Circular Economy Implementation into the Clothing and Household Textiles in Finland

Case Study: Planning the Reuse Practices to Meet the Specific Objectives of the LIFE IP CIRCWASTE Finland Project

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Abstract

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A circular economy has been promoted as one pillar of sustainability across all sectors in Finland and all other global societies. In particular, the textile industry has been criticized for its devastating footprints of natural resource exhaustion and environmental pollution resulting from unsustainable production and consumption and the disposal of after-use garments. Therefore, many organizations including traders, recyclers, waste pickers and social enterprises have started coming together to look for inspiring reuse practices to transform the way communities manufacture, procure, and use textile products. The overall aim of this thesis is to discover action plans for textile business-related producers and retailers, municipalities and non-profit organizations to keep materials in the economy through eco-design, reusing and recycling. The thesis summarizes current textile flows and focal points in the newly enacted waste law in Finland. Finally, it outlines at what level Finnish consumers accept pre-owned merchandises, and observes possible motivating factors along with an overview of specific obstacles standing in the way of consolidating the reuse of products and perspectives to overcome those challenges. The thesis was conducted using qualitative methods. The data was gathered through an online survey and semi-structured interviews with four retailers who handle discarded textiles and secondhand goods. The research reveals that a typical Finn purchases approximately 11.3 kilograms of clothing and other household textiles a year. Rather than casting off the no-longer-needed, Finns are encouraged to sell them at flea markets or collect separately in tight packaging and donate to charities or bring to recycling centers, as means of contributing to circular economy and ensuring commodities are given the fullest opportunities to reach their reuse potential. Thereby, 90% of them successfully join the influxes of secondhand markets in the country. However, regardless of the upward sign of sustainable consumption, more than 70% of those reusable but unsellable leftovers so far head to refineries and waste incinerators due to low quality fast fashion, ambiguous definition of the term “*poistotekstiili*” used nationwide in collecting and sorting, and lack of interest from corporate retrievers. In conclusion, Finnish textile waste management systems presently resort to the least desirable courses of the EU’s Waste Framework Directive. There are several programs to work on to engage consumers, stimulate fabricators, correct collection systems to shift the focus onto the two top practices: prevention and preparing for reuse.

Keywords Circular economy, reuse, textiles, post-consumer, second-hand, recycling.
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1 Introduction

In this modern day, there are two types of approaches to industrialization: linear economy and circular economy (Nguyen et al., 2014). In a traditional linear economy, raw substances, which categorized into three groups animal-based, plant-based, and mineral-based, are exploited from the natural resources as inputs for the economic system, and at the end of the economic cycle, discarded into the natural environment; whereas, in a circular economy, the waste from the process of production and consumption are recovered to put back to the economic system, in the form of "waste as the new inputs" (Ellen MacArthur Foundation, 2013).

The author has chosen this topic because of a strong personal interest in circular economy and the research opportunity given by Helsinki Metropolitan Area Reuse Center Ltd from its active attempt to look for reuse solutions in the textile industry. In cooperation between the author and the organization, a meaningful work to strengthen relationship with old textiles has been built to enable sustainable ways of living in Finland.

On an international basis, the global 1.3 trillion US Dollars clothing and textiles industry is an unarguably significant sector when it comes to the fact that it provides employment for 300 million livelihoods, and everyone lives with the basic needs of clothing for protection and comfort. Unfortunately, it is the world's second most polluting sector after the oil industry; the linear manufacturing and consumption system have shown detrimental effects on environment and climate. More than 500 billion US Dollars of worth loss, 1.2 billion tons of greenhouse gas emissions, and 93 billion cubic meters of water have been reported annually due to hazardous substances utilization, non-renewable resources extraction, overproduction, and massive underusage. For instance, a single piece of garment requires more than 97% of virgin feedstock materials (63% plastic, 26% cotton, 11% others); in the last 15 years, usage rate has decreased by 40%, less than 1% of them is recycled into new clothing and 73% is landfilled and incinerated (Ellen MacArthur Foundation, n.d.e).

From the perspective of consumption, current fast fashion interest, unsustainable throwing-away behavior and exponential fashion trends passed through social media, again, fuel over-but-profitable production endorsed by major companies and retailers, which also lead to large amounts of textile waste (Niinimäki et al., 2020). In recent years, initiatives have been piloted, demonstrated, and put into practice to disrupt this linear system. However, most methods place stress on efficient materials and production – but not on causal contribution from the consumers and the actors who generate residential and industrial end-of-life textiles and waste. Alongside with suppliers, end-users and waste operators also have chances to make the impact, particularly in utilization, reusing, and recycling rates of a textile product (Ellen MacArthur Foundation, n.d.e).

1.1 Research question

The research question of this thesis is "How should the reuse be done for clothing and household textiles in Finland, from the perspectives of producers, retailers, municipalities, and reuse operators?"

This thesis contains research and information from key qualitative methods: a survey questionnaire and a remote interview. Further, the author also gathered data from primary and secondary publications, which consists of thorough text, mining from plentiful reports, books, scholarly articles, journals, and citations, for evaluating, analysizing and formulating conclusions in the latter parts.

1.2 Commissioning company

Helsinki Metropolitan Area Reuse Center Ltd ("*Pääkaupunkiseudun Kierrätyskeskus Oy*" in Finnish), in short "Kierrätyskeskus", is a non-profit company founded in 1990 working with a vision to secure the future by ecologically, socially and economically sustainable actions and a mission to reduce natural resources consumption, increase environmental awareness and better the community. The operations of the center simply started with donations from nationwide residents and companies, for instance household goods, clothes, various home textiles, interior decoration, bicycles, and many more. To this day, it has 12 stores in Espoo, Vantaa and Helsinki, each one has a "*Boksi*" donation point, second-hand goods selling operation, and a department to give away stuff; an online store, a sorting center, and Fetch home collection for smaller donations. In its free-of-charge division in 2022 alone, a whopping 2.8 million items were received and distributed forward. Along with the resale activities, the social enterprise also provides circular economy services, vocational education, environmental training, working opportunities to 150 businesses and 55,000 people, who belong to groups of disability, long-term unemployment, and students in need of Finnish language internship. Moreover, besides collection containers at the company's own selected stores, it is collaborating with Prisma, other shopping centers, and Helsinki Region Environmental Services HSY in growing the donation and sorting points of post-consumer textiles. Reported from a "*Boksi*" in Espoo's Prisma Olari in September 2022, almost 900 kilos of reusable household goods were gifted every week. The items granted continue their journey to both online and brick-and-mortar stores, or become materials and supplies to customers who are interested in craft work. By promoting such operations and not distributing profits to its owners, Helsinki Metropolitan Area Reuse Center Ltd determines to extend the life-cycle of goods, save natural resources, support employment work and circular economy solutions (Kierrätyskeskus, n.d.a).

Kierrätyskeskus is also involved in the reuse promotion activities of the Cirwaste project, a seven-year integrated scheme funded by the European Union (EU), whose LIFE program is co-financing more than 4500 other campaigns designed for actions in priority areas ranging from environment and resource efficiency to nature and biodiversity to air quality and waste. Circwaste was established in 2016; to date, it has been operating with 20 partners and 10 financiers in coordination with Finnish Environment Institute to continually bring Finland towards a circular economy. Expert groups and relevant stakeholders of the project, including waste operators, municipalities, non-profit organizations, specifically in five geographical regions: Central Finland, Southwest Finland, Satakunta, North Karelia and South Karelia, have been researching, developing, and demonstrating new studies, trials, practices, and advancements to prevent and decrease the amount of waste as well as to transform the conventional use and management of material flows (Finnish Environment Institute, 2022). Kierrätyskeskus acts as a strong social influencer and has successfully established a national Reuse Network Finland RENET ("*Uudelleenkäyttöverkosto*" in Finnish) since November 22, 2022. At a greater reach, RENET aims to evolve into a place for cooperation and discussions, to give consultancy on the setting-up of new reuse centres, to investigate reuse networks of other European countries, and conduct experiments in reuse approaches by welcoming organizations operating in repair, reuse, resale, and other product life extension of household goods to become members (Kierrätyskeskus, n.d.b).

1.3 Objectives

As having realized that research has been barely sufficient to help Helsinki Metropolitan Area Reuse Centre Ltd (HMARC) map out the possible cooperation models between the stakeholders in the clothing and textiles industry in Finland, the author intends to put forward a set of suggestions on how production should be done among brands and retailers, and how post-consumer items should be more efficiently collected and recirculated among municipal waste controllers and reuse operators in Finland. With the focus on reuse and recycling in the circular economy concept, the thesis explored methods to increase products' utilization cycles, achieve better management of waste and material efficiency. By understanding what goes on behind the minds of consumers from the findings of consumer behavior towards their secondhand purchasing in the methodology part, the study aims at generating information and knowledge to share with members of the Reuse Network Finland and Kierrätyskeskus, so that the association could opportunistically conduct experiments to amplify actions in pursuit of the reuse economy and transform into a strong social influencer, and in the long run benefit the Circwaste project. Generally, the author hopes to share a well-written work, so that more and more fashion and textile business-related organizations and public administrators and services begin to see the importance of reuse in circular economy, and therefore apply ideas in collection, sorting, distribution, upcycling, downcycling, and reselling unwanted items or recycled materials to the new users.

1.4 Research background

Everyone leaves a certain amount of ecological footprint to sustain a lifestyle. It is advisable to learn about the current impacts of human consumptions and the long-standing industrial economy overwhelmed by linear processes on the global ecosystems. The ones living in an urban area, who commute by car powered by fossil fuels and serviced by technology to work every day, cause greater pressures to natural systems than the farmer who lives in a countryside and works in his nearby agricultural field. On that account, human impacts on the biosphere, atmosphere, geosphere, hydrosphere are heavily influenced by population size and their affluence. Critically, according to The World Bank, the total number of people inhabiting on Earth will rise to 9 billion by 2050. And, that nearly 60% of the world's population, which is as of today 4.4 billion, living in the urban and suburban areas, will also increase to 6 billion by the second half of the 21st century (The World Bank, 2022).

Moreover, the consuming habits of an individual within the growing population affect the health of ecosystems and availability of finite and not-always-renewable resources. Since the 18th century, when the first Industrial Revolution began with large-scale and mechanized factory system, corporations have been relying intensely on the linear model of production and consumption. Continuing to the very recent, in order to satisfy living standards and achieve economic growth, resources have been drawn to manufacture commodities and leftovers after consumption have been being incinerated or piled up in the landfills. In reality, the four steps of destructive linear economy "take-make-consume-dispose" emits toxic substances, leads to great exploitation of water, soil, air, and energy, increased waste, depletion of nature and environmental pollution and degradation. Consequently, it jeopardizes the provision of life's essential resources, which is not sustainable (Muthu, 2018). The underneath figure 1 describes the flow of resources in a linear production, which is the process of turning resources into waste and leads to resource depletion and environmental deterioration, regrettably has been thrived by usually-modelled businesses and supported by governing bodies with non-existent mandatory laws and regulations.

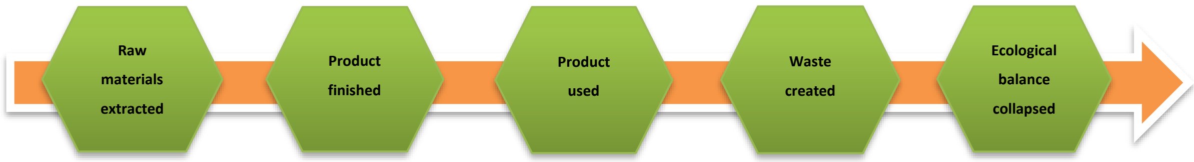

Figure 1: *Linear economy flow structure* (Rochester Institute of Technology, 2020).

As stated, here are a few alarming facts and figures resulted from devastating linear production (Circle Economy, n.d; Trvst, 2022):

- Extraction from global resources has been greater than tripled since 1970.
- More than 30% of the food produced ends up in landfills.
- 460 billion US Dollars worth from wearables are thrown away globally.

- At the present time, the percentage of recovered materials used for new production, equivalent to global circularity gap, only stood at 8.6%, down from 9.1% in 2019.
- Carbon dioxide, so called Green House Gas emissions are forecasted to climb up to 65 billion tons in 2030, leads to 3 to 6 degree increase in temperature, and resulting to climate crises.
- 80% of all emissions are related to societal needs such as clothes, construction, food, and transportation.
- Humans create 400 million tons of plastic waste every year.
- In three years' time from now, approximately 70% of the world's population will face consequences of water scarcity.

Circular economy has emerged and evolved over the years as a panacea for planetary resources' problems and exponentially growing population. On a worldwide scale, the circular economy will bring profit of 4.5 trillion US Dollars by 2030 (Lacy & Rutqvist, 2015). In Europe, the adoption of a circular economy model not only creates a positive impact on the environment and society, but also helps create an economic value of up to EUR 1.8 trillion by 2030. It is addedly assessed that promoting circular economy in sectors such as: fashion and textiles, construction and building materials, energy and carbon systems, chemicals, electricity electronics and high-end technology will procure greater opportunities in economies (McKinsey & Company, 2015). Worldwide consumers have been changing their buying habits and brand picking to match their values and high degree of environmental awareness. Leaders and managers from prestigious companies from every industry are deploying the concept to create opportunities to reduce impact on the earth and to thrive in the market, and a growing number of textile organizations are putting stresses on circular economy practices. As a result from very little consumption of raw materials and demand for virgin ones, businesses would reduce material costs, secure supply stability and increase innovations and productivity, which leads to better systematic production on a global scale (Ellen MacArthur Foundation, 2013).

In the following chapter, the author reviews literature and previous studies in order to get a profound picture of the circular economy, whose system is believed to bring social and environmental merits, produce vigorous economic activities through new lights of manufacturing and consuming commodities; as well as the highest value model in comparison with other approaches in circular economy – the Reuse, and contemporary status of such in Finnish textile and fashion sector.

2 Theoretical Framework

2.1 Circular economy

2.1.1 Circular economy concepts

Motives, ideas, written documents and texts shown in history considering by-products and closed-loop theories have come up and evolved since mid-19th century (Stahel, 2010). Nowadays, circular economy is usually mistaken for sustainability; alternatively, it is also encountered synonymously in the context of waste management. However, circular economy is practically one of the means to intertwine the three circles of sustainability: social, economic, environmental; and it demands a high degree of collaboration and innovations to attain its vision of regenerative circular system, where products' worth and materials' values are maximized over time (Meidl, 2021). There are at least seven concepts behind the circular economy.

The first remarkable among them is the concept of sustainability and industrial product in loops by the Swiss architect-engineer Walter Stahel and his partner Genevieve Reday, who reported their research to the Commission of the European Communities in 1976, and a few years later in 1981 published a book "*Jobs for Tomorrow, the potential for substituting manpower for energy*". Their work visualized how closed-loop economy could prevent waste, save resources, create jobs and economic advantages. In all analyses during the Eighties, Stahel emphasized on four key pillars of circular economy (Stahel & Reday, 1981):

- Reusing goods (and components) and recycling molecules bring substantial economic differences.
- Sustainable corporate company or group has to consider the smallest-loop strategies, as it is the most profitable one.
- Liability loop closing is equally necessary as such in physical loops, in particular, lawful and policy making issues.
- Energy and resources inputs have direct impact on job creation in a loop economy.

The second well-known one is called the "*Cradle to Cradle*", developed in 1992 by German chemist Michael Braungart and American designer William McDonough, who forcefully carried on validating until now and are recognized as "*the fathers of circular economy*". Their concept was inspired by nature that sketched a continual process in which every global resource is a resource for something else; in other words, every output ingredient of old product do not turn to waste, but fully recycled into nutrients for succeeding production generations (McDonough & Braungart, 2010).

Another notion was the one built since 2010 from the British Ellen MacArthur Foundation, who advocated its mission in transitioning linear economy to the circular economy and gained mostly notice by world leaders and international corporations (Ellen MacArthur Foundation, n.d.a). Ellen MacArthur Foundation's theory refers circular economy to a system in which materials, products, and services are consistently maintained the usability, enabled extensive series of life cycles, and kept in movements and transmission for as long as possible. To rephrase, this enduring system is based on making the most out of everything taken and produced from the earth's capacity, continuously transfering and utilizing them elsewhere, and ultimately returning them to the ecosystems. It is a matter of mindfulness of environmental concerns. While the consumption of finite supplies is violently surging to serve the fast-growing world's population, circular economy outperforms linear model as it works the same way as natural cycle. In essence, just because all sorts of residuals become coarse food or components for something else, it minimizes waste, enhances the renewables, retains further values, and improves wildlife and human health (Ellen MacArthur Foundation, n.d.a). Founding partners of the Ellen MacArthur Foundation supplementarily reported:
"The circular economy refers to an industrial economy that is restorative by intention; aims to rely on renewable energy; minimises, tracks, and eliminates the use of toxic chemicals; and eradicates waste through careful design." (Ellen MacArthur Foundation, 2013, p. 22) and illustrated circular economy as in figure 2, which exhibits that, materials of technical and biological cycles are kept in continuous flow within circular economy concept to either serve a new use or return to nature.

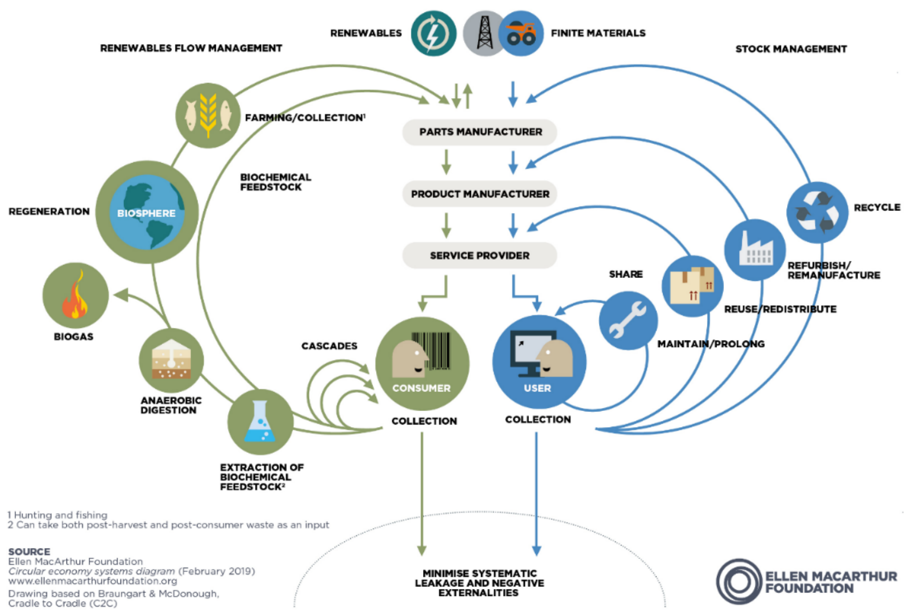

Figure 2: *Restorative circular industrial economy butterfly diagram* (Ellen MacArthur Foundation, n.d.c).

The other four circular economy concepts which hold similar concerns of enriched resource efficiency and decreased economic outputs are:

Biomimicry – a theory of connecting biology with design that inspires people to learn about natural systems to spark regenerative solutions and innovations for a healthy planet (Wadhwani, 2022).

Regenerative Design – the concept of regeneration developed by John T. Lyle, who studied with Willian Donough, provides practices of using water, land, energy and designing buildings for sustainable development (Lyle, 1996).

Natural Capitalism – this concept encourages businesses notice the resources' scarcity to design production and adopt technologies that keep the natural capital of ecosystems vital (Lovins et al., 2007).

Industrial Ecology – the studies implemented in design and manufacturing processes to reduce the environmental impacts from production (Garner & Keolleian, 1995).

2.1.2 Principles of the circular economy

A principle is a standard rule or general law on which a concept or a theory is conducted, and companies put core values in to achieve their goals. Just as definitions of circular economy that have been developed in time in more than 100 contexts of research and literatures, its principles are, for that reason, also formed diversely depending on concepts of philosophers and scientific practitioners in various areas (Braungart et al., 2007; Haas et al., 2015; Hobson, 2016; Huppes & Ishikawa, 2009). Among many versions emerged from academic communities and corporate-related institutions, the author based this thesis on two fundamental sets from Ellen MacArthur Foundation and William McDonough. Their principles give prominence to a comprehensible reuse and recycling guide, which can be applied in a circular textiles system.

The British Foundation established its notion of circularity on three principles (Ellen MacArthur Foundation, n.d.e):

- *Design out waste and pollution*. Quality, value, and performance are significantly important objectives to drive negative impacts of residuals and hazardous susbtances out of the environment.
- *Keep products and materials in use*. This focuses on capitalization of post-consumer and post-industrial products, well-functioning markets for the recyclables and the reusables are to be expanded and strengthened.
- *Regenerate natural system*. In the loops of products, optimal utilization rate is achieved when components and maerials constantly continue in the market and re-enter production, to avoid non-renewable resources and preserve natural system. Innovations and green manufacturing technologies and renewable energy sources are to be embraced and sought after.

Quite similar principles were also emphasized by William McDonough in his "*The Five Goods*" representing the "*Cradle to Cradle: Remaking the Way We Make Things*" framework as the following (McDonough & Braungart, 2010):

- *Good materials*: elimination of harmful substances in production to exclude potential negativity that might affect human and ecological health. Resources are eternal when everything become "food" for something else.
- *Good economy*: reusing parts at the end of product life.
- *Good energy*: reliance on sustainable energy inputs.
- *Good water*: protection of clean water for the next generations.

- *Good lives*: promotion of fair working conditions and accommodation of family living circumstances.

2.1.3 A circular economy for textile industry

A textile is a flexible material made of interlaced yarns or threads, which are created by spinning either natural fibers (specifically coming from plant-based, animal-based, mineral sources) or man-made fibers (including cellulosic, semi-synthetic, synthetic supplies) into long and twisted strings. These yarns are then used to form textiles by different types of fabric assembly techniques, the most common are weaving, knitting, tufting, felting, or bonding (The Textile Museum, n.d). It has been proved that detrimental impacts come from every phase of a textile product (United Nations Environment Programme, 2020):

- Production stage: large amounts of fossil fuels to make synthetic fibers, such of agrichemicals are used to produce natural fibers, microfibers shed to the environment.
- Usage stage: expenditure on electricity and water on the taking-care activities.
- End-of-life stage: material loss due to low rates of usage and recovery.

In the textiles industry, implementing circular economy means investing in circular design and renewable materials development, after-use collection, sorting, reusing infrastructure and methods, recycling technology to fortify continuously different cycles of a product. The priority principles are “*good materials*”, “*design out waste*”, “*good economy*”, and “*keep products and materials in use*”, by which textiles are made more durable and suitable to be repaired for the next use (Ellen MacArthur Foundation, n.d.e; McDonough & Braungart, 2010). The biggest problems of current global linear apparel industry are mass production of cheap and low quality of fast-fashion garments, with major familiar brands such as Zara, H&M Group, Uniqlo, GAP, Forever 21 producing double amount compared with the level of the year 2000. Consequently, it leads to excessively unnecessary consumption and dramatically decreasing number of times the average item of garment is worn – by around 36% lower than 15 years ago (Igini, 2022).

Figure 3 shows the flow of materials in a circular model of textiles, where both the producer and the user are proactive in impacting the value and circularity of a given product. A series of interventions like fiber and yarn sourcing and preparation (products are composed to be fixable and recyclable), repair and repurpose techniques for reuse and resale intentions, or adoption of end-of-life disposal in other value chains, to altogether eliminate waste (United Nations Environment Programme, n.d).

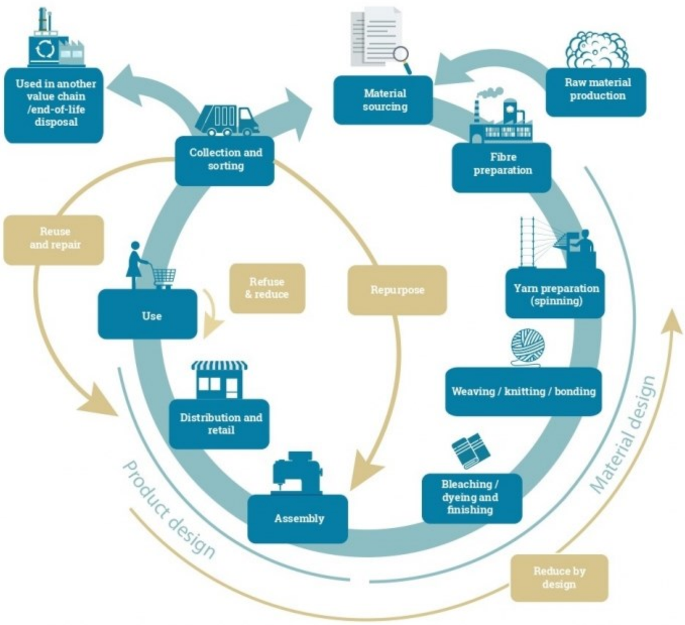

Figure 3: *Circular economy sketch of textiles* (United Nations Environment Programme, n.d).

2.1.4 Circular textile value chain

According to examinations from scholars and researchers in recent years, there are many *R*'s to close the circularity gap. Examples in practice include: "*The 10R's of sustainable living*" from Planet Schooling (Legan, 2019), "*The Ten R's of circularity*" of House of Thol from the Netherlands (House of Thol, n.d), or the Swiss private bank Lombard Odier's "*The 10 steps to a circular economy*" (Bank Lombard Odier & Co Ltd, 2020). Although different companies define different alternative sets of R's, they all depart from the same foundations of avoiding waste, protect resources and human health. In general, each "R" deployed by those sustainable organizations represents a strategy, which has a distinct level of importance in each phase of the value chain. In this piece of experimentation fact-finding, the author explained roles of the 10 R's "Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, Recover" (Legan, 2019) in the context of circular value chain in apparel and home textile businesses.

In business world, most companies adopt the breakthrough Michael Porter's value chain framework, introduced in 1985 in the book "*Competitive Advantage*", to perform competitor analysis, deliver valuable products, and stay more profitable than rivals. The value chain puts common organization's activities into strategic areas as explicated in figure 4, describing the generic value chain in five main activities that create competitive advantage for a company, so that traders can see the overall operations in a more comprehensive picture where cost and differentiation variants are then utilized to make corresponding changes. In similar fashion, circular value chain evolves from this traditional one.

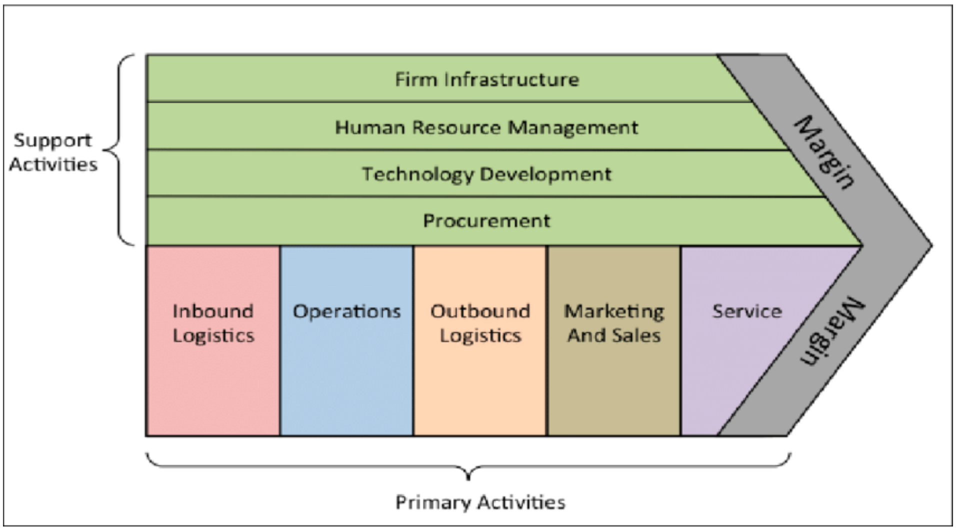

Figure 4: *Michael Porter's value chain diagram* (Barnes, 2001).

Within a firm's circular value-added chain, which differs from business-as-usual value chain in structure and level of complication demonstrated in figure 5, its primary activities include inbound logistics, operations, outbound logistics, sales and marketing, service, and reverse logistics; and supporting activities, whose core focus is centered on organizational, social, and environmental value and sustainability, consist of procurement, infrastructure, technological development, and human resource management (NextGen, 2022). Circular businesses obtain technologies that help the company become circular faster and enable information to travel alongside operations. All activities are connected in a seamless flow across the entire lean-agile value chain, from consumers to partners, from material intake to reverse logistics, from management to planning (Gartner, n.d).

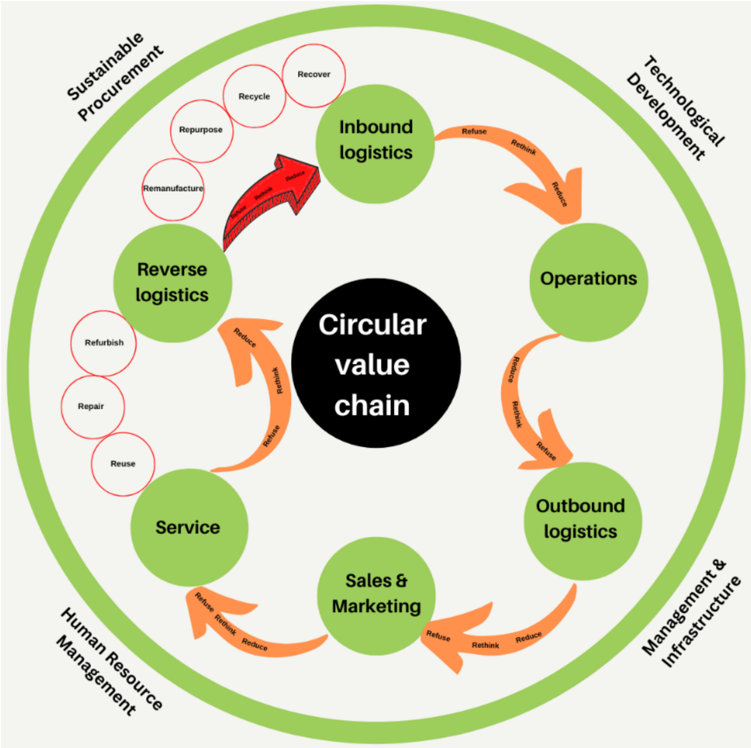

Figure 5: *Circular value chain (*United Nations Environment Programme, n.d).

With the goal to meet customer demands and gain circularity, a textile enterprise is required to use Refuse (e.g. low-graded fabric, fast fashion manufacturing), Rethink (e.g. more durable fibre), Reduce (e.g. the number of categories, the batch size) in all activities across its value chain. Specifically, in inbound logistics, the implementation of the concept promotes early strategic decisions and innovations on the design of the products, and the choices of primary and secondary raw materials, which effects on how a product can be used at the end-of-life. These three R's instruments unfold, develop and strike to offer greater values creation to ensure circular economy's success (Ellen MacArthur Foundation, n.d.b). Refuse, Rethink, Reduce is systematically to take place across operations, distribution, selling, marketing and customer service activities. By way of explanation, new energy-efficient skills and expertise are to produce capable goods in the manufacturing course to gain sustainability competitive advantage; eco-designs are enhanced to solve the problem of them being tossed away recklessly. "Green marketing" is newly hot act among brands, who advertise eco-friendly packaging and shopping bags to raise customer awareness (Shirdan, 2022). Reuse (e.g. takeback scheme, voucher, incentive to encourage consumer return used products and resell in-house), Repair (product and value retention through fixing the faults), and Refurbish (e.g. transform unsold stock into new collection) are to present in the process of after-sales customer service and to the care of post-industrial waste. In addition, circular economy concept also causes influences on service management, it stresses a textile corporate on communications and long-term relationships with its customers on increasing the times a product is worn and what to do at end-of-life phase. Remanufacture, Repurpose, Recycle and Recovery are to set up in reverse logistics. New waste management and material evaluation, qualified with technological and biological gadgets, are to produce secondary fibres for the next product generations, to loop the resource-product cycle and bring opportunities of cost cutting to organizations (Govindan & Soleimani, 2017).

On top of that, circular economy concept inspires textile companies to sustainably procure by sourcing from suppliers and vendors with green materials in the most possible environmentally-friendly manner in conformity with trustworthy partnerships and purchasing policies. It additionally promotes transformation of work culture and management, because choosing eco products may boost employee engagement and inspire companies to rethink and redesign operations (Walker & Brammer, 2009).

2.1.5 Reuse in a circular economy

According to the Waste Framework Directive conceptualized by the EU that helps visualize an order of top priority approaches for what is best for the waste management and the environment, the preparation for reuse comes at the second most important approach aspiring transformation towards a circular economy. The systemic waste hierarchy is a five-step inverted pyramid (illustrated in figure 6), in which the most preferred course of actions “prevention” is placed at the top, gradually coming subsequent tiers “reuse, recycling, recovery”, and finally to the least favourable one “disposal” at the bottom (European Commission, n.d.b). In compliance with the waste hierarchy, France and Sweden are the only two countries in the EU presently enforcing the regulatory measure. For instance, surplus products are destruction prohibited, but obliged to be donated or recycled (European Union, 2021).

Figure 6: *The EU waste framework directive* (European Commission, n.d.b).

As claimed in Ellen MacArthur Foundation's specialized glossary, reuse is defined as: *"The repeated use of a product or component for its intended purpose without significant modification. Small adjustments and cleaning of the component or product may be necessary to prepare for the next use."* (Ellen MacArthur Foundation, n.d.d).

Therefore, reuse implies a maximizing-resource value, which begins with the first owner's intention to retain end-of-life product, that has a strong potential in extending its usefulness. Depending on the condition of the discarded items, the process of reuse is carried out by activities of individuals, households, and businesses, institutions, and governments to bring them back to the stream of resale (re-commerce) operations outlined in figure 7 (Fontell & Heikkila, 2017).

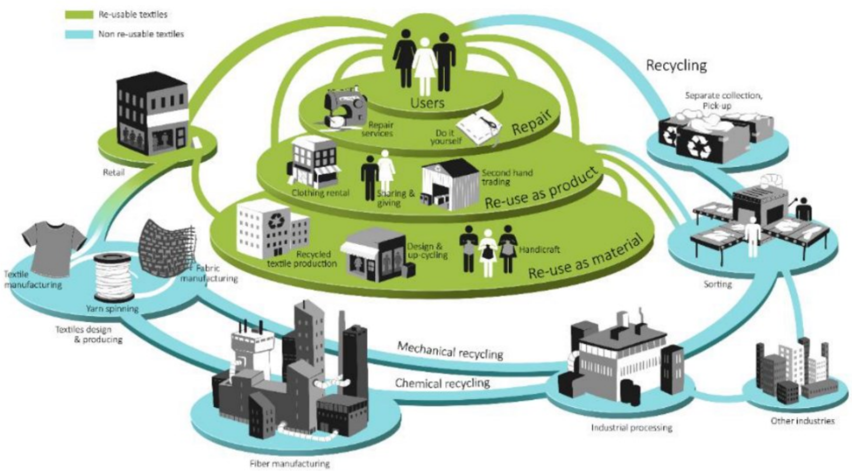

Figure 7: *Model of circular business ecosystem for textiles* (Fontell & Heikkila, 2017).

Reusing clothing and household textiles includes these strategies:

- Truly sustainable textile design. This pledges durability, reparability and recyclability based on requirements on excellence score of circularity and environment performance. To give an example, the EU is reviewing and continuing to work on the rules supporting durable design, and make it easy for consumers to choose reliable products by implementing “Digital Product Passport” and “Textile Labelling Regulation” in all garments and textiles (European Commission, 2022).
- Extended Producer Responsibility (EPR), an obligatory measure that holds the textile producer in financial and/or operational accountability in actions of managing sold product after the customer’s use stage. Case in point, additionally coming in the proposal of the European Commission and will be published in 2023 as a new EU textiles strategy, the EU aims at holding the manufacturers responsible for the waste from their production and takes what is next for their industrial by-products into account (European Commission, 2022).
- Reuse as material. It refers to the reprocessing of defective textiles that no longer fit for another use in their initial form. With reference to clothing and textile industry, there are two types of activities in this methodology: upcycling and textile-to-textile recycling. Upcycling is reusing the old or stained clothes or surplus deadstock with the help of take-back scheme or handicraft or repurpose projects to turn the same fabric into a new piece. It is believed to happen at the costs of infrastructure and labor skills to source, disassemble, and re-design. Otherwise, textile-to-textile recycling, shown in figure 8, is mechanically and chemically breaking down an item into materials and then reconstituting into a new fabric. It occurs in closed-loop recycling system, where fiber becomes new fiber; or in open-loop recycling activities, whereof cotton, polyester, polymer, monomer, and mixed materials serve as raw inputs for other different industrial sectors. In the context of environmental damages and natural resource usage, upcycling outperforms recycling (Sandin & Peters, 2018).

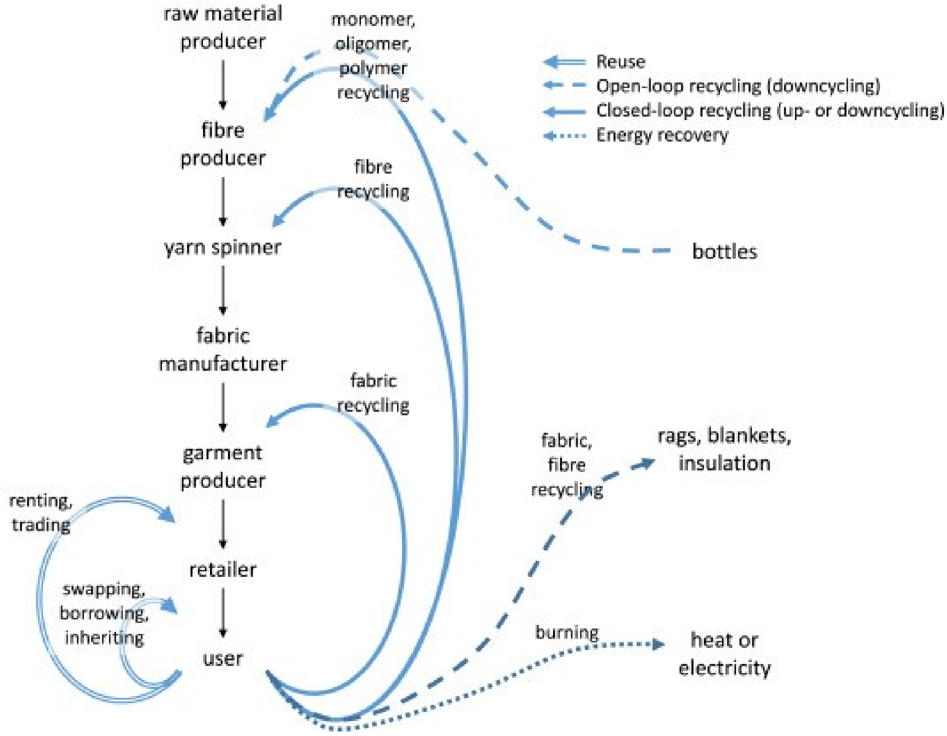

Figure 8: *The routes of textile reuse and recycling* (Sandin & Peters, 2018).

- Individual exchanging, donating and inheriting, giving away to friends, family, neighbors.
- Transactional sharing use by renting and borrowing.
- Reuse as product, reselling the good quality products as their original purpose, with or without cleaning and a few repairs at any flea marketplaces, charitable organizations, social service enterprises, secondhand stores, thrift shops, local community, online sites.

In reuse-as-product approach, the environmental impact of using a single piece of clothing again compared to making a new one is 70 times lower, even when emissions from transportation and export are taken into account (EuRIC Textiles, 2023). A 2022 report by ThredUP studied that the global second-hand apparel re-commerce sector has seen a three-times growth from 2012 to 2022, a 275% enlarge in the number of brands that have their resale shops (from 8 to 30) within the last three years, and nearly 1 billion of secondhand have dislodged the would-have-been-bought-new pieces out of total garment purchases in 2021. The industry is expected to augment to a market worth 51 billion US Dollars in 2023; in Europe alone, the value is 150 billion US Dollars in 2026. Fashion brands and retailers are embracing clothing resale models and accelerating the trend inclined by millennials and GenZ generation. Figure 9 demonstrated global demand for the pre-worn collection is potentially hiking faster than such of the overall fashion, which is a more accessible and inclusive solution to the sustainable future for the planet (ThredUP, 2022).

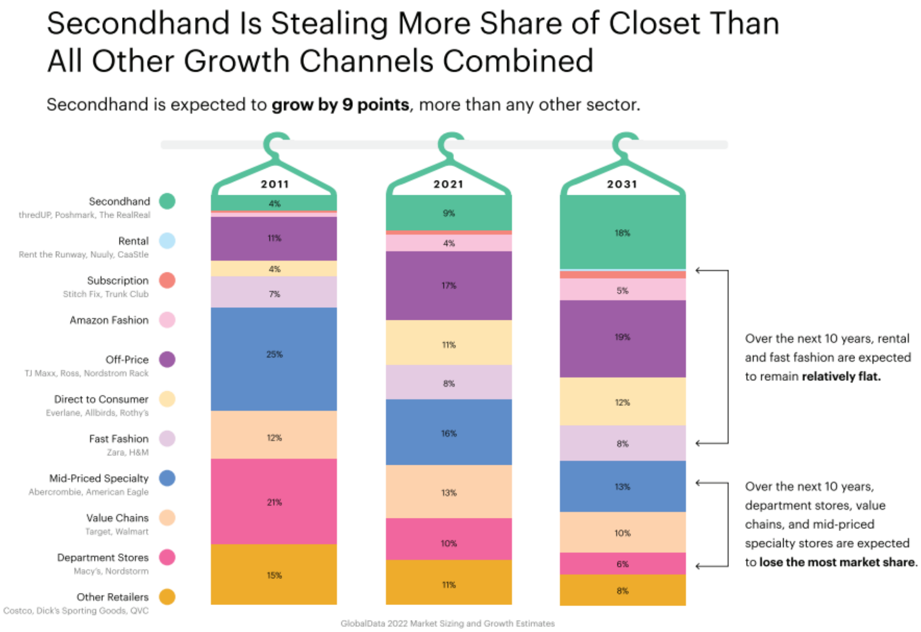

Figure 9: *Secondhand market in comparison with other apparel buying avenues* (ThredUP, 2022).

2.2 Consumer behavior and stakeholder theories

2.2.1 Consumer behavior

Consumer purchasing behavior refers to the study of how individuals, organizations, and groups behave while going through various emotional and mental stages relating to their needs and desire before spending time, money, effort to buy, use, and dispose a certain product or service. The process basically starts with one recognizes the problem and determines what the need is, resulting the prospective consumer in information search, alternatives' analysis, then happens to make the obtaining decision, and post-purchase evaluation, which reflects the experience and passes a judgement on whether to repeat the acquisition. It is substantially beneficial for entrepreneurs and marketers to understand the factors influencing their reasoning, attitudes, and behaviors, such as psychological (e.g.

motivation, perception, information processing ability), personal (e.g. preferences, age, gender), socio-cultural (e.g. family background, living-in community). Moreover, by knowing the demands, businesses can identify the most attractive product choices which helps them close the gap between the customers' intention and their actual buying action. Generally, it is the key to drive unit sold volumes and revenue (White, 2020).

As a matter of fact, everyone is unique in areas of life experience, taste and perception, which leads to variances in choices to procure a piece of apparel or textiles. In harmony with the various needs and motives, fashion and textile consumers are oftentimes categorized in six clusters (Shaw & Koumbis, 2017):

- Seek out deals. This group buys at thrift stores, outlets, and may think "hand-me-downs first".
- Overshadow the crowd. This type willfully looks for new trends and buys aesthetically stylish items from boutiques or costume designer stores.
- Fit in a network. This class chooses the same style as friends do and shops from where their circle commonly visit.
- Avoid clothes shopping. This kind has infrequent purchasing patterns, and does not invest time in shopping.
- Imitate a celebrity. These persons keep track and get access to special objects shown on social media, magazines, or blogs.
- Love the environment. These individuals buy from a particular brand that allies with ethical concerns, attempt to find new use for unnecessary pieces, and opt out of over-buying.

In the concept of pre-owned fashion consumption, motivations for shopping are chiefly geared by four segmentations: economic, fashionable, recreational, and critical. Economic reasonings commonly arise from price sensitivity and financial gratification. In motives of fashionability, second-hand clothing are viewed as vintage and authentic goods that create identity and uniqueness. Critical rationales are the way consumers express ethical and ecological concerns against waste and unsustainable behaviors. Recreational inspirations are inclusive of the thrill of browsing, exploring, treasure hunting and the excitement or nostalgic pleasure of seeing and trying the goods (Ferraro et al., 2016). Additionally, a research from Lodz University of Technology has found that, in perspectives of sustainability and a successfully functioning circular textile economy, customers play an pivotal role by choosing standardized products, the right amount needed to purchase, opting for rental or shared items, using goods longer, learning about the products before throwing away, repairing and taking after-use items to the recycling points, and buying passed-on things to reduce waste (Koszewska, 2019). In term of postpurchase behavior, it is recommended to evaluate customer satisfaction, including survey and rating, to reflect product's performance, anticipate repurchase intention, and to drive customer loyalty and word-of-mouth effects (Harrison & Shaw, 2004).

2.2.2 The producer and retailer

The fashion industry is a complicated supply network that involves many steps spanning from agricultural and petrochemical production (to obtain organic fibers and synthetic fibers) to distribution and retail. Each of its manufacturing practices directly impacts climate, water, society, and environment (Niinimäki et al., 2020).

In consonance with the Finnish Waste Act (Waste Act, 494/2022), whose purpose is to prevent and reduce the amount of the hazardous and harmful threats to the well-being of human and the environment affected by waste and waste management system, and supplementarily stimulate the sustainability aspects of natural resources utilization, a producer is given an interpretation:
"… a natural person or legal person who professionally places products on the market." (Waste Act, 494/2022).
The quoted statement explicitly holds any organization, businessperson, or corporate entity, or legitimate individual who produces and sells apparel and textiles goods and raw materials in the country accountable for another lawful matter regarding to promoting reuse for its side streams and deadstock as the subsequent:
"*The producer shall organize the reception and transport of discarded products so that the products collected are not needlessly broken or damaged, so that undamaged or repairable products and their components are kept separate or separated as necessary, and that the re-use of products and their components is promoted in other ways.*" (Waste Act, 494/2022).

Under the "*EU Strategy for Sustainable and Circular Textiles*", textile and apparel brands or producers, or manufacturers, and retailers are equally at the same position in regulatory responsibilities in terms of key actions and the handling of their possessed goods resulted from business operations, such as Eco-design for Sustainable Products Regulation, EPR, Green Claims Initiative (European Commission, 2022).

2.2.3 The waste management operator

In accordance with the Finnish Waste Act, (Waste Act, 494/2022), the description of waste management functions consists of:
"*… the collection, transport, recovery and disposal of waste, including the monitoring and control of such activities and the aftercare of disposal sites and including actions taken as a broker*." (Waste Act, 494/2022).

That is to say, a waste treatment operator or waste intermediary is a certified operator whose system of execution and facility is in charge of private, or commercial, or municipal waste, that streamline hauling, transferring, storage, processing, recycling, disposal, along with environmentally compatible planning and closure of landfills, consultation and education on waste prevention, volume reduction, and cost-effective solutions for residents and businesses.

It is important for waste administrators to recognize that, both EU and Finnish level obligations have the most intense goal in reuse (European Commission, 2022). When it comes to textiles in municipal waste and the measures of promoting reuse, the operator relies heavily on inhabitant's actions of separation. The expansion and development of separate collections is essential to obtain clean fractions for preparing for reuse (Schumacher & Forster, 2022).

2.2.4 The reuse operator

It is important to recite the terms "reuse" and "preparing for re-use" as they were defined in the Finnish Waste Act for the purpose of precisely characterizing the reuse operator:

"*Re-use means using a product or its component again for same the purpose for which it was originally conceived. Preparing for re-use means any activity for the purpose of checking, cleaning or repairing waste by which a discarded product or its component is prepared so that it can be re-used without any other pre-processing*." (Waste Act, 494/2022).

Therefore, it is equivalently agreeable to perceive reuse operator as individual, business, or managed marketplace whose activities are to collect, sort, organize the reception of hand-me-down products and extend their life by repairing, upcycling, reselling products and their components as their original intended functions. In Finland, reuse centers vary from privately owned to non-profit enterprises, typically functioning as producers or retailers with their own secondhand shops (business models vary), flea markets ("*kirpputori*" or "*kirppis*" in Finnish), consignment stores (e.g. Second Hand Market Store, Relove, renting places that provides for examples cleaning, security check, and payment support for sellers and buyers to perform transactions), second-hand stores, and charitable organizations funded by donations. Main charitable recipients of pre-owned things are commonly UFF, Fida, Salvation Army, Finnish Red Cross (SPR), Finnish Red Cross Kontti, Kierrätyskeskus, Texvex, Jyväskylän katulähetys (Dahlbo et al., 2015). Because Finland's population and industrial activity are dispersed greatly in a wide geography, reuse centers are naturally at locations where there are a large number of residents and correspondingly large amount of waste attributed. The two major players UFF and Fida respectively runs over 20 thrift shops and 23 stores in the biggest cities like Helsinki, Espoo, Vantaa, Turku, Tampere, Lahti, and Jyväskylä (Fida, n.d; UFF, n.d). A 2022 study stated, the proportion of textiles sorted for reuse in 2019 within Finnish soil from the total donations stood at: 4.7% in UFF, 30% in Salvation Army, 29% in SPR, 41% in SPR Kontti, 33% in Fida, 60% in Kierrätyskeskus. The greatest sum of 14,742 tons went to UFF; however, the organization eventually settled on sending the large part of it – 13,283 tons abroad, equivalent to over 90% of intakes (Manninen, 2022).

2.3 Current situation of reuse in Finnish textile industry

2.3.1 Reusable textiles and textile waste defined

After-use Finnish household textiles and apparel arrive typically in four destinations: to the mixed waste bins, to separate collections, to person-to-person exchanging, to resale on online or at brick-and-mortar stores. Underwear, socks, pantyhose, and those textiles that are wet, oily, or have strong smell or bugs and pests, and in-bad-condition carpets, pillows, blankets, mattresses, cushions, soft toys are considered waste and to be sorted into mixed garbage and later collected by municipal waste operators. Clothes (e.g. jackets, trousers, skirts and shirts), home textiles (e.g. sheets, towels and tablecloths), which are no longer wanted but dry and has no odor, are to be split up in plastic bags and put in collection containers for further sorting, grading, and processing purposes. Assemblage tanks or boxes are placed at various locations depending on city or town; in Helsinki, they are most of the time on the edge of shopping centers and charitable units. A portion of separate collections, which are perceived to some extent valuable and yet become waste, are then sorted for reuse, both as products and as materials, or exported. The rest from the separately collected and mized waste are recovered as energy. Predominantly, Finns are encouraged to sell or donate textiles that are re-wearable and capable of being used again in their original form to charity or reuse hubs, such as flea markets, vintage stores, thrift shops, consignment outlets (Helsinki Region Environmental Services HSY, n.d).

2.3.2 Textile waste flows

Finnish textile industry is heavily dependent on foreign trade, with over 80% of total supply is new imports, domestic production is about 7% and exports are 10% when compared to imports; annually 73 million kilograms of commodities travelled inwards from more than 80 countries, substantially from China, Bangladesh, India, Pakistan, and some European members. 83% of the supply is landed in households, only 17% is shared by companies and the public sector (Dahlbo et al., 2015).

The recent study in 2021 by the Finnish Environment Institute, Turku University of Applied Sciences and Southwest Finland Waste Management ("*Lounais-Suomen Jätehuolto Oy*" in Finnish) unveiled that, it has seen no significant changes in textiles consumption in Finland in comparison with the level of ten years ago and even an upward trend in the amount of waste. On average, Finns purchased 11.3 kilograms of new textile products per person with 79% is new clothes and 21% is home textiles. 44% of those consumed goods afterwards went to separate collections ("*poistotekstiilin keräys*" in Finnish). In the largest community – Helsinki capital, whereof municipal waste operator HSY reported, at the end of 2022, its preliminary sorting of unwanted clothing collections from containers in shopping centers has yielded: 3% was reused as products, 60% reused as materials, 37% sent to energy recovery and waste fraction (Zero Waste Europe, 2022). On a national scale, figure 10 disclosed, in the total 85.77 million kilograms of discarded textiles, only 3% was treated for reuse purposes, 60% ended up in incineration points, 18% exported abroad, and 20% remained in homeland to be recovered as material or energy (Finnish Environment Institute, 2021).

	Category	New textiles	End-of-life textiles
Supply	Domestic	63 971	85 773
	Imports	117 530	1 035
	Total	**181 501**	**86 808**
Use	Textile industry	7 044	0
	Other industries	61 097	960
	Households	69 714	3 719
	Treatment: energy recovery	-	52 014
	Treatment: material recovery	-	15 012
	Treatment: reuse	-	29
	Total use in Finland	**137 855**	**71 735**
	Exports	43 646	14 043
	Total use	**181 501**	**85 778**
	Supply – Use	**0**	**1 030**

Figure 10: *The flows of textiles waste in Finland in tons* (Turku University of Applied Sciences, 2021).

2.3.3 Textile waste obligations

Over the years, Finland has been tightening the legislation to raise its people's awareness and inclusion in waste management. In order to hit the targets of the EU's Waste Framework Directive: "*…by 2025, the preparing for re-use and the recycling of municipal waste shall be increased to a minimum of 55 %, 60% and 65% by weight by 2025, 2030 and 2035 respectively*", under the Waste Act 494/2022 of the Finnish Parliament, the new waste obligations for Finnish municipalities and companies in the textile and fashion industry also started being in force from January 1, 2023 (European Commission, n.d.b). In the manner of the ordinance and priority of reuse-over-recycling, each municipality's authorities must organize the reception facilities to generate textiles waste separately from residential homes at regional points; producers and retailers must be in connection with regional collection services for the waste they are responsible for. Distinctively stipulated in section 15a, separately collected waste is strictly incineration and landfilling prohibited, and reuse and recycling shall be the best treatments (Waste Act, 494/2022). Textile by-products must be processed as much as possible to be prepared for reuse as products, or reuse as materials, or recycled in the highest qualifiable ways. All pre-sorted textile batches transferred from companies, charitable organizations, 31 metropolitan waste management facilities ("*kuntien jätelaitokset*" in Finnish), 1,208 regional reusable-textile ("*uudelleenkäytettävä tekstiili*" in Finnnish) and other 263 end-of-life textiles ("*poistotekstiilit*" in Finnish) collection points from private and non-profit waste companies across the country, that are not compatible for resales as used goods, are then textile-fiber recycled or converted into other materials in Paimio using mechanical methods (EastCham Finland, n.d; Gädda, n.d; Suomen Kiertovoima Ry, n.d). Finland has so far only one textile recycling plant in Paimio, namely "the Green Field Hub", operated by Lounais-Suomen Jätehuolto and private company Rester Oy. The plant runs at a maximum capacity of 6 million kilograms per year, processing 10% of nationwide business side streams and residential waste, to make raw fiber or yarn for domestic market and construction industry. Another full-scale similar plant is also being built in Turku's Topinpuisto, that pledges to start in 2025 to process waste from all of Finnish households and other Baltic countries (Lounais-Suomen Jätehuolto, n.d.a; Rester, n.d).

Moreover, in such cases that substantial quantities of waste produced from business'- and public administration and service operations, those entities must arrange the separate collections of textile waste ("*tekstiilijätteen erilliskeräys*" in Finnish). In simple terms, companies are responsible for their own waste, or they can acquire the services needed from other private waste actors, and those transporting and handling waste operators have to be registered in the Finnish waste management system Elinkeino-, Liikenne-, ja Ympäristökeskus (Elinkeino-, liikenne- ja ympäristökeskus, 2021; Waste Act, 494/2022). In situation where service is not available, and those waste holders whose service need exceeding 2,000 in worth, organizations in question must request from municipality, using *Materiaalitori.fi* (Suomen Tekstiili & Muoti, 2022). *Materiaalitori* platform is constituted by the Finnish Ministry of Environment and managed by the State-owned Motiva Ltd, with the intention to domestically serve companies from all industries a joint market where providers and users of recycled materials can sell, purchase, exchange and keep them in circulation for as long as possible (Ympäristöministeriö, n.d).

3 Methodology

To fulfil the objectives of this thesis, both primary and secondary information sources were taken advantages of in the research. The primary data collection was designed to take place in two structures using online survey and one-to-one interview. First, the questionnaire was created using web-based survey tool Webropol, including yes-no, multiple-choice and open-ended answers, so that partipants could potentially complete within 5 to 7 minutes, in order to avoid fatigue and raise the number of respondents. It comprised the following 13 questions with principal justifications of how they were intended to gather useful information:

How old are you? and *Which of the following best decribes your annual financial condition these days?* – to identify which age and socioeconomic status groups in Finland are the most interested in secondhand markets.

Have you ever bought secondhand? and *Have you ever made clothing or household textiles donations?* – to track down an overview of second-hand textile consumption and charitable redistribution activities among Finnish consumers.

What is your experience in buying secondhand? and *How often do you shop or visit second-hand stores or shopping sites?* – to discern how well the pre-worn have met or exceeded consumer's expectation and purchase frequency.

Where do you prefer to purchase used items? – to learn about consumption place preference of informants.

What are your main reasons for buying secondhand? – to understand the top motivators for purchasing.

Would you like to shop at brands and retailers offering secondhand collection in addition to their new? – to discover the level of consumer acceptance when textile brands have resale programs, and whether it is a new business niche for them.

How do you understand "kierrätys" in Kierrätyskeskus? – to detect consumer's perception of the commissioning company's mission, vision and operations.

"Second-hand clothes/textiles are associated with low status" – to get the picture of what consumers think when wearing pre-worn clothing.

In your opinion, are reuse infrastructure and network adequately available in Finland? – to get to know whether there is a need for improvement in current reuse practices and infrastructures from the point of view of consumers.

Could you please name the second-hand stores/brands you usually visit? – to be advised which are the most preferred second-hand marketplaces on the web and within Finnish borders.

The online survey adopted simple random sampling method and was available during the period of February 23rd, 2023 to March 12th, 2023. During that time, it attracted a total of 74 respondents. The total sample size consisted of broadly residents of Helsinki city and people who were regularly visiting pre-loved and consignment stores.

In the second phase, with the support and referral from Satu Vasala from Helsinki Metropolitan Area Reuse Center Ltd, one-to-one interviews were conducted during March, 2023. Supplementary to facts-and-figures-related email requests, the author had almost one-and-a-half-hour conversation with the companies' representatives, who possibly make business strategies, planning, and circular economy implementation, to assure validity and probability of data. With interviewee's consent, names, contact information, position within organization, date of interview are listed in the table below:

Anna Garton	Account Manager at Lounais-Suomen Jätehuolto Oy (The local waste management company)	16.3.2023
Rinna Saramäki	Chief Executive Officer at Second Hand Market Store Redi (The consignment shop)	20.3.2023
Miia Podworsky	Product Management Manager at Pääkaupunkiseudun Kierrätyskeskus Oy (The non-profit organization)	17.3.2023 and 24.3.2023
Emppu Nurminen	Secretary, sorting instructor, head person at the vintage department, at Nextiili Ry (The reuse operator and promoter of circular economy in Pirkanmaa area)	24.3.2023

Seeing each type of stakeholders in question has distinct business model, a couple of questions were skipped depending on operating method, situation, and answers of interviewee. In general, queries are on subjects: how waste management and their facility work; the amount of clothes and textiles collected or flown in the organization; how and how many percent of them got reused, or headed to both material recycling; the convenience and obstacles they had in collection, sorting and further processing; insights and suggestions on the current system and for the future of circular textile economy in Finland. The detailed set of questions for discussion is underneath:

- How many kilograms of textiles did [the organization] receive last year? From what channels? Has the amount been growing in recent years? How many percent of them got resold? What did [the organization] do with the remainder? Did [the organization] have the transparent information on the fate of that remainder?

- Are there any challenges in sorting activities? How many percent of total separately collected textiles are wet, dirty, have bad smell, contain hazardous contamination, wrongly put, or incorrectly packed?

- Does [the organization] have clear rules, standards and process for sorting, whether an item is qualified for resale, or can only be recycled?

- How much of collections does [the organization] have to repair before being able to resell them? Are there enough staff to manage the workload? Do they need or receive trainings on repair skills and craftmanship?

- How does [the organization] price an item? Are there any pricing strategies to increase sold unit volume?

- Are there any strategies or factors that influence the location decision of the store/collection points? May I know the emptying rhythm?

- How is customers' overall feedback with their purchased used items?

- Does [the organization] think current collection point system efficient or confusing (because it affects residents' willingness to hand-carry and bring reusable textiles to the right place)? In your opinions, where is the right place to install collection container?

- Does [the organization] pay for transportation costs (or any other costs) for the unsold (at this stage: the textile waste) to make its trip to Paimio plant? How often does [the organization] ship them?

- What are your insights on current system in perspectives of promoting reuse economy?

The primary aim of this data collection mode was to identify the understanding of the customer's motivations and attitudes over pre-owned goods, preferences for places to shop from, opinions over current reuse channels, and whether there are more favorable brands than others. This would give an information that benefits producers, retailers, municipalities and reuse operators, where to head for from the current situation. The grounded purpose for conversations with stakeholders was furthermore to gain details about their operations, their views on resale, the bottlenecks, challenges, also insights, solutions and recommendations about reuse and recycling activities.

4 Results

4.1 Questionnaire analysis

In this sub-chapter, the author examined the outcomes of the survey and formulated the findings.

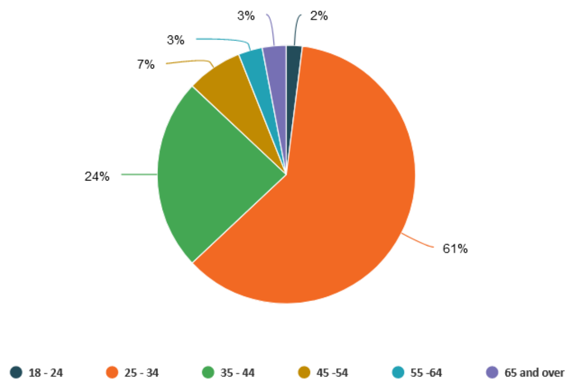

Figure 11: *Age classifications of respondents in survey*.

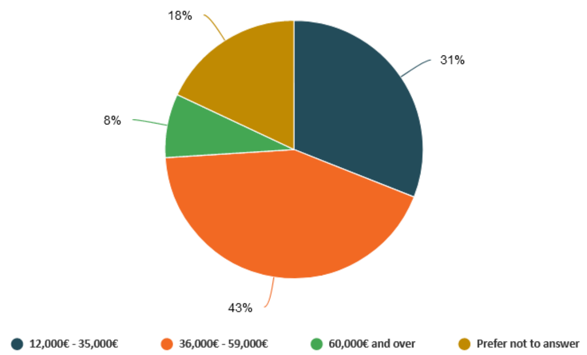

Figure 12: *Financial capabilities of participants*

Figure 11 outlined, nearly 61% of respondents, who are 25 – 34 years old were the most likely age cohort to be fond of buying pre-used apparel and textiles, followed by the group of 35 – 44, which made up 24%. Quite the opposition, the 18 – 24 Gen Z and adults aged 55 and over were the least likely interested in secondhand experiencing. Figure 12 shown, the size of consumers who earned 36,000 – 59,000 euros per annum (43%) was 12 percentage-point bigger than such of whom pocketing on average 12,000 – 35,000 euros a year (31%).

Age and socioeconomic conditions have played a substantial role in identifying the main groups contributing to the popularity of secondhand and re-commerce movement. Finnish young and middle-aged generations who were born between 1979 and 1998 are assumably embracing the trend. The two Finland's largest age groups are more willing than other demographics to join the activities of resale market. Despite the fact that, the creation of second-hand stores has traditionally been for low-income families, when taking a close look at which types of income individuals shop at or from thrift stores, unexpectedly, thrifting is, to a certain degree, more popular among the middle class than the lower socioeconomic classed consumers. That argues, the motivation for buying is no longer solely dependent on the income situation of the consumers. Additionally, there is evidently an increase in purchasing power and a shift in the way Finns make conscious choices to spend their money on used apparel from new ones.

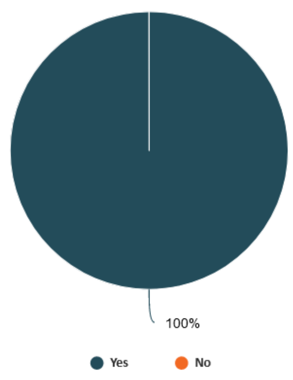

Figure 13: *Percentage of questionnaire takers buying secondhand*.

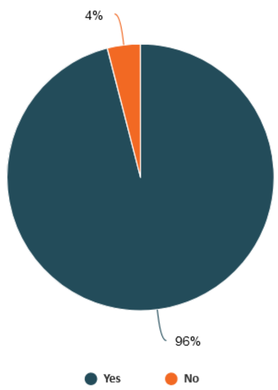

Figure 14: *Ratio of textile donors in sample*.

The survey found that the nearly entire of participants said they have bought preloved garment and home textiles and donated their used ones to someone else or to some organizations, with respectively an absolute 100% (figure 13) and a definitely high 96% (figure 14) in two dimensions: acquiring and disposing of post-consumer goods.

The statistics prove an extreme interest of Finns in purchasing old goods and actions to promote continuous lifecycle of the unwanted through voluntary systems. It also indicates that, charitable and non-profit organizations were receiving the biggest share of textile collections from households, among other reuse entities, producers, and municipal waste facilities in Finland. The author combined this data with the aforementioned fact in sub-chapter 2.3.1 – 44% of consumers' total consumption of home textiles ended up in separate collections, to outline a recommendation: in order to answer the thesis' research question, future reuse approaches for Finland should be focused on addressing and controlling the post-consumer textile flows generated and circulated in all the largest charitable organizations, namely UFF, Pelastus Armeja, Finnish Red Cross Kontti, Fida, and Pääkaupunkiseudun Kierrätyskeskus.

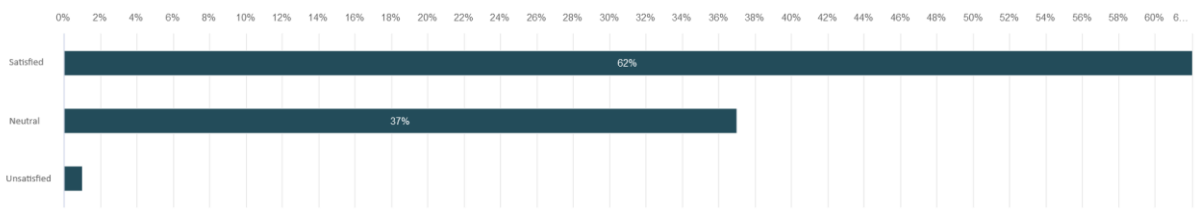

Figure 15: *Post-purchase customer satisfaction rankings.*

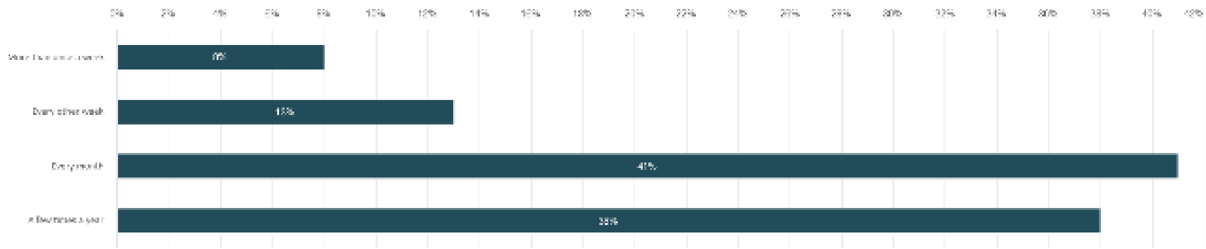

Figure 16: *Secondhand shopping frequency*.

In post-purchasing stage (figure 15), most of respondents were moderately satisfied with the decision to buy second-hand products, with 62% of the total 74 responses declared they had positive experience, 37% mentioned neutral feelings or considerable difficulties in judging, dissatisfaction and regret were rare (1%). With regards to visiting and buying frequency, people are habitually shopping more than once a week (8%), every other week (13%), once a month (41%). In total, 62% of buyers shop monthly, and 38% a few times a year (figure 16).

Relatively high frequency was seen as the majority was actively doing it at least once a month. This means, to a degree, they were satisfied with earlier purchases, and present resale markets in Finland are operating effectively. The achieved satisfaction is also a good indicator that pre-worn fashion has been performing well in respondents' consuming journey. Both measurements predict a strong likeliness of consumer acquisition and retention, loyalty level, and repeating purchases in secondhand commerce.

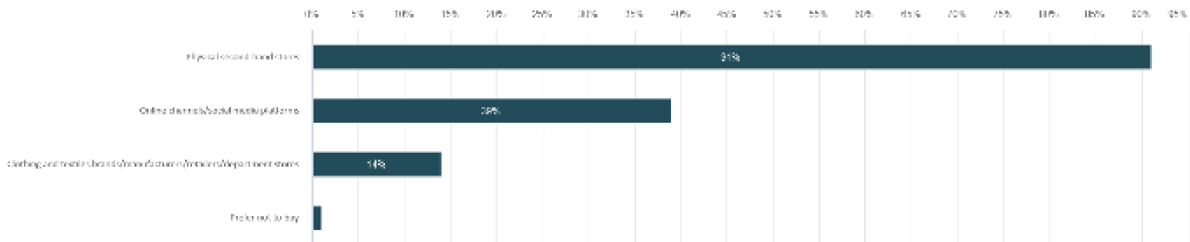

Figure 17: *Preferred platforms for buying used goods*.

Concerning the place preference, among different channels representing in Finland for the distribution of the secondhand, an immense 91% of participants had a desire for brick-and-mortar stores, dramatically lower amount of people chose online shopping sites (39%), and retailers with pre-owned section was the least favorable resort (14%).

That expresses, in general, when it comes to actual purchasing second-hand textiles, physical stores were three times worthier for demands'- and expectations' satisfaction compared to online stores and textile brands, as they seemed an unpopular option. In the context of consumption behaviors, Finnish consumers are predominantly driven by fashionable and recreational motivations, with the need to personally experience the ambiance of the stores, and the observable, touchable, feelable textile commodities.

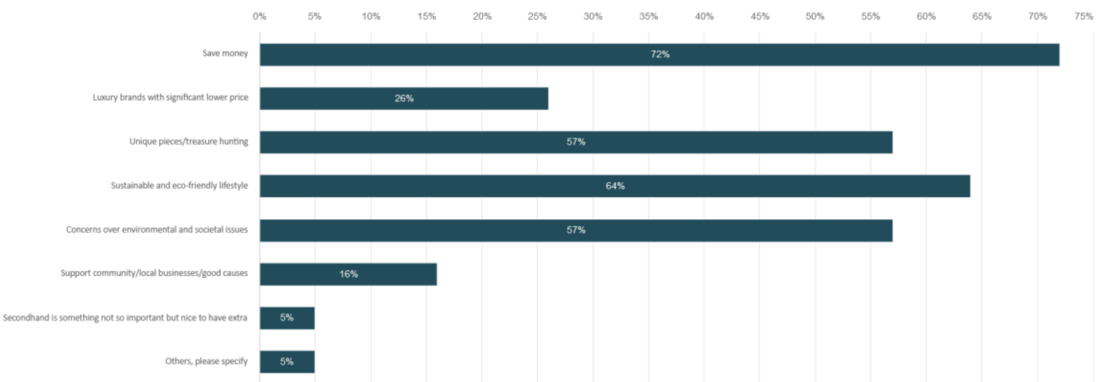

Figure 18: *Primary grounds behind post-consumer product purchase*.

The numbers revealed there are four most important motives that engage consumers into secondhand consumption. Purchasing behaviors of consumers found a direct connection between their wishes to conduct a sustainable and eco-friendly lifestyle (64%), as well as their environmental and societal concerns (57%) and preference to hunt unique pieces (57%) and the biggest emphasis fell on economic incentive “save money”, which accounted for 72%.

It indicates high price for used and recycled products appears as challenges for environmentally attentive purchasing behavior patterns and textile reuse economy and the success of circular production and consumption. Although the majority raised awareness in sustainability and shown a high intention of social responsibility, the influence of price is more crucial than the other drives in making final decision. It signifies, when there are a number of alternatives to compare with in the consumer’s mental stages, it exists a high possibility that they would opt for the more affordable option. Furthermore, in light of 57% answerers viewed secondhand shopping as a fun activity with browsing and treasure searching, and under the circumstances of above-stated results, the author discovers the variety of assortments could enable stimulation to visit reuse operation stores.

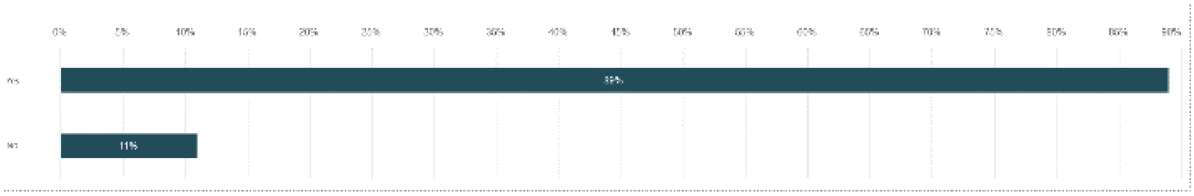

Figure 19: *Possibility of consumers being in favor of brand movement in in-house resale*.

In term of manufacturer and retailer providing their own secondhand collection in addition to their new, the preferences of customers were high, with 89% of prospective consumers expressing they would make considerations.

This finding informs that textile players could have a significant power to provide trust and a peace of mind in Finnish consumers' shopping second-hand decision making. They may promisingly put a huge impact on buying channel and location preferences, create a wider network for consumers to activate purchases, as well as expedite awareness of green consumption. The information moreover encourages brands to capitalize on this new pre-owned fashion trend and consumer's willingness-to-try, to create re-commerce business model.

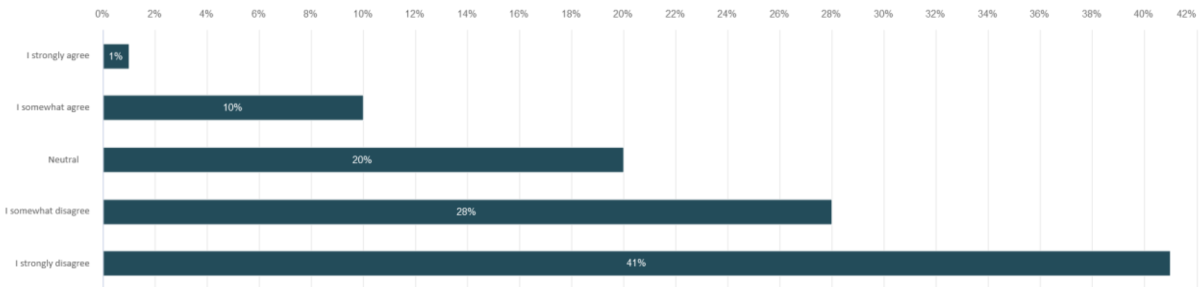

Figure 20: *Conception and portrayal of second-hand textiles*.

The number of respondents normalized the value of hand-me-downs and took pride in wearing or utilizing was relatively small, with just 40% strongly disagreed, 28% somewhat disagreed, 20% was neutral about secondhand exposed a low status. The finding displayed contradiction between consumers' perception and action: only 40% assertively likes the pre-loved clothing they wear and does not feel shameful or guilty or care about the stigma around them, but 100% had purchased anyway.

Surprisingly, the stigma of poor and shame implications in second-hand clothing is still moderately seen in the community and wearing something previously used degrades the value of oneself. Acquiring and re-wearing are two vastly different scopes. In other words, the existence of preloved textiles in respondents' lives and general interest might be because it is fun and a current mainstream, however, not well appreciated; or the willingness towards purchasing due to influential sustainable lifestyle trend is higher than the perception and comfort level of utilizing them. The meaning of using and the relationship with pre-owned clothing is not of importance, or to some extent, something consumers are reluctant to speak about. This interprets a medium part of Finnish consumers are not ready to re-wear old apparel, or announce the possessing to the next persons; there is a probability that they belong to the cluster *"Fit in a network"* (explained in sub-chapter 2.2.1), who shop to keep up with the fashion trends. Consequently, it would happen two scenarios, secondhand are purchased but only utilized for a few times, stacked up in the wardrobe for a long period and got donated again to charity organizations. The author believes, if there is no cultural shifts and consumption stimulators, consumers' low confidence in utilizing and motivation to influence the societal surroundings would possibly make Finnish clothing resale economy remains steady, as well as the expansion of business-related reuse entities is unachievable. Therefore, in the longer term, it is unpredictable to say whether the Finnish younger generations would continue the second-hand buying trend, and whether the reuse market of textiles in Finland will be larger or remaining at the same level as it is today.

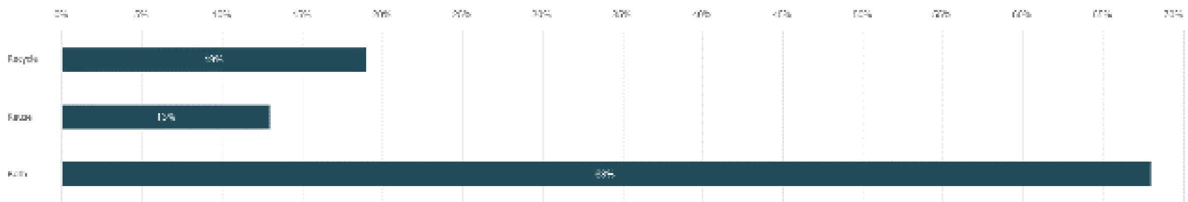

Figure 21: *Consumers' understanding of Kierrätyskeskus' central strategy*.

One in five consumers (19%) said the commissioning company solitarily offered recycling arrangement. Nearly three-quarters (68%) supposed it had both reuse and recycling programs. Only thirteen percent assumed the center was the place for reusable goods.

With reuse as the root of movement, undoubtedly, most Finns are confused about the ideas of Kierrätyskeskus' vision and core operations. Although Kierrätyskeskus' mission is to enable the sufficency of natural resources and a sustainable lifestyle, it does not function as a recycler – a stop for waste and no sorting; just the opposite, recycling is the organization's very last option after all efforts of reselling, maintaining, repairing, crafting, lending are made. It is an exchanging place of goods from donations of local residents since its birth 30 years ago and now is offering pratical solutions for sharing economy and the reuse of surplus and discarded products. This confusion and misunderstanding led to almost 90% of consumers is putting their “recyclables” - “maybe-for-reuse” - “maybe-for-recycle” to Kierrätyskeskus and then follows the philosophy ”hope for the best”. This result coupled with ones from figure 13 and 14, from which the author withdraws a conclusion, consumers have high hopes for reuse centers (charitable organizations within Finnish borders), strong intentions, and concrete deeds for saving natural resources, but low understanding of how and what textiles are for reuse and recycle, that exposes risks and threats to reusing efforts. In the long run, the assumptions might also raise higher contamination rate and the cost of sorting and operations; instead, decrease the share of prime-quality reusable textiles and the capacity of reuse operators to get the optimal value out of collections.

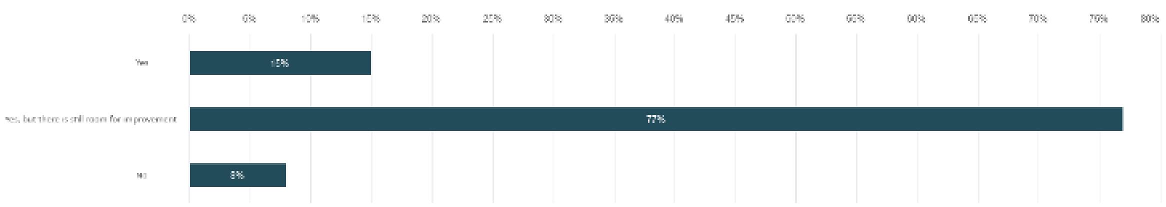

Figure 22: *Perspectives on reuse supporting system*.

A minor 15% of participants completely approved current system of collection, sales, distribution points, centers, and services for reuse activities and network of actors were sufficient, whereas 77% insisted that they were not remarkably satisfactory and there are definitely gaps remaining to be closed.

The outcome affirms changes are imperative. There is a need for investments and many improvements in reuse infrastructure and advancements in the cooperation among reuse operators, for the textile reuse economy to take place and radically breakthrough.

Lastly, 68 informants answered the open-ended question on their most favorite pre-loved-commodity shops. Rounded up below is the list of endorsed marketplaces with the times each was mentioned in the survey:

- UFF – 47 times

- Various local flea markets – 36 times (mainly Siisti Kirpis, Hietaniemen Kirpputori, Punavuoren Patina, Kaivarin Kanuuna, Jäähallin Kirpputori, "kirpputori" in general)
- Fida – 21 times
- Kierrätyskeskus – 20 times
- Relove – 17 times
- For the most popular means to buy items online: Tori.fi (11 times), followed by Emmy webstore (4 times) and Facebook (3 times).

Charities, traditional flea markets, and consignment shops prove their magnitude as a great spot for Finns to buy used clothes, with UFF, Fida, Kierrätyskeskus ranked the top three powerful players. For the most extent, participants shop at sites happen to be near where they live or at which pop up during recreational walk, reason given they catch the eyes and curiosity. Secondhand e-commerce does not come into vogue since consumers uttered no chance to try on and only bought when knowing the size very well.

4.2 Interview examination

4.2.1 Lounais-Suomen Jätehuolto Oy

LSJH is owned by and providing waste management for 18 municipalities in the southwest of Finland, stewarding an interconnected textile-treatment system of venues, waste treatment centers, mobile and pop-up sorting stations, indoor and outdoor containers at business partners'- and affiliated charities' premises, that assists 4.5 million residents. In collecting, LSJH works with other 31 Finnish municipal waste facilities and allies in cooperation and delivery agreement, under which pre-sorting and transportation are the responsibilities of municipalities and partners, maximum and minimum quantity is obligated, and handling fee is determined by how far pre-sorting has been executed at reception points. First stage pre-sorting activities mostly take place as quickly as possible at city-level facilities close to collection hubs, before the remainders are sent to LSJH. That avoids damages and deterioration of textiles during transportation and storage. At LSJH's Paimio plant, there are another four rounds of sorting and grading textiles, including pre-sorting, further sorting for reuse and recycling, material sorting, and quality sorting (using optical infrared handheld scanner connected with a smartphone app). According to Anna Garton, it will take a couple more years to build another plant in Topinpuisto in Turku to process textiles from all Finnish municipalities and industrial side streams in cooperation with Paimio.

In 2022, 600,000 kilograms of priorly sorted textiles arrived at LSJH. Anna also explained, piece by piece, that quantum underwent a sorting process involving manual labor of 15 employees, who work alongside a couple of experienced professionals. Because the system demands accuracy and is at the very beginning stage to deal with year-over-year increasing amounts, LSJH's personnel are learning day by day the knowledge and skills to identify various categories, materials and quality of textiles. And, a whole pallet could be easily disposed of if one single item was hygienically defective and affected all others around it. Due to contamination resulting from inappropriate packing and human mistakes, last year, the share of the reuse-as-it-is was only 20,000 kilograms (10%); roughly 30% of inflows were scraps, that were unsuitable for both resale and fiber recycling. These reusables are thereafter sold at LSJH's owned *Poistotekstiilimyymälä* in Turku and to interested second-hand stores via messaging schemes on Facebook and Instagram or by word-of-mouth. LSJH has yet to have a marketing strategy to market and intensify the sales volume of reusable garments. In reuse-as-material action, LSJH dedicates its line inside Paimio recycling plant to process household textiles into a range of customized premium raw fibers for different industrial uses. The quotient of gained materials stood at 60% of total intakes in 2022. The company constantly and conscientiously looks for sustainable manufacturers, brands, retailers, and collaborators in Finland, in the EU and global trade to sell sorted textiles and recycled materials (e.g. cellulose, cotton, denim, knitted, linen, polyester, synthetics, viscose, wool) in difference colors, textures (e.g. fine fiber, fiber, shredded, shoddy), and settings (e.g. yarns, fabrics, non-wovens). All captured feedstocks are qualified for the Finnish Social Enterprise Mark (mirrors transparency and openness of activities) and the Key Flag Symbol (indicates domestic content origin). Presently, due to the requirement of traceability (LSJH is to know the fate of purchases), the narrow market of buyers – both domestically and internationally, and storage limitation, LSJH resolves on making 300,000 kilograms of recycled materials available in buffer inventory and the rest of existing and incoming textiles are to be (or most likely) delivered to waste incineration for energy recovery. Besides, LSJH is undecided to put bigger investment in the plant, owing to the uncertainty and timing of EU's Extended Producer Responsibility program, that might require brands and retailers to takeback and recover their used products.

Challenges to the reuse of post-consumer textiles in the perspectives of LSJH:

- There is a misleading impression of the term “*poistotekstiili*”. “*Poisto*” means something unwanted to be dumped or gotten rid of, partially or completely, depending on individual’s comprehension.
- There is unclear guidance in how to sort textiles (or lack of an explicit sorting chart) and fault in the thinking that all items would be washed or maintained or repaired before being put on reuse or recycling.
- Textile products are easily damaged and too perishable to wait for long emptying intervals. Outdoor containers pose challenges, as they are not weather- and waterproof.

Insights for the future system:

- A need to change the term “*poistotekstiili*” to better suit the new situation of prioritizing reuse over recycling.
- A need for revolutionary change in collection, meaning collection point development and consumers need to know the value of pre-loved textiles and the options to deal with them.
- In circulatory system, the expansion of collection points has to be on the same page and in harmony with such in recycling processes and end markets, because snowballing amount of collected textiles raises workload and capacity of plant whose feedstock outputs demand stronger consumption of the resaleable and recycled-fiber end purchasers in the circular economy.
- A need for automation and innovative technology for sorting, mechanical and chemical recycling.
- Textile collection bins under the same roof with other waste fractions in residential buildings is not recommended. It would encourage people to thoughtlessly toss away; plus, waste operators and municipalities would be overwhelmed by thousands of kilograms of discarded garment gathered daily, which drives up operating, collecting, transporting costs.

4.2.2 Second Hand Market Store Redi

In practice, Second Hand Market Store Redi (SHMSR) is a small-scaled consignment business, which was retail-modelled and for-profit, started operations in September 2022. Brands and enterpreneurs, who are consignees, rent a spot in the shop to sell their used, recycled, pre-consumer items with their own decided prices and pay provision out of total sales, in the care of SHMSR's staff. Except the rent, enterpreneurs do not pay anything until products are sold. Its inventory range of assortments comes from resellers, like used home textiles, clothing, accessories, dishes, small home decorative items, and furniture. The idea of birth and reason for existence of the store is to raise public awareness to shop more sustainably and bring circular economy to shopping malls, prominently to offer consumers reuse options to replace brand new items with vintage, second-hand, upcycled, and recycled ones. From the two revenue streams of sale-of-goods and clothing rental services, by far, the biggest share has been from fashion items. To this day, SHMSR does not have own website to convey its purposes and values. The company advertises, communicates and interacts with both communities and active thrifters through two main social media platforms Facebook and Instagram. As a matter of fact, SHMSR does not have marketing campaigns as well. Organically, with the help of newspapers and articles on the hot topic ”circular fashion economy”, engagement and cooperation with resellers have happened through business owners and entrepreneurs seeking and reaching out to SHMSR. The current consignee base is 48, of which 80% is under continuous long-term contract, and 20% is on three-month trial. There are three types of categories in the resale source, new items from recycled materials (e.g. Pure Waste), crafted clothing from fabric scraps (e.g. Ilomar), vintage and second-hand garments. On average, SHMSR sees 200 visitors and customers daily from the adult age groups 25 – 50. As the right approach stipulated by strategy of location and offerings from high quality to authentic to specially curated preloved clothing, it has gained satisfaction from customer base in quality and convenience scopes. This explains, after only 6 months into operations, SHMSR has paid all startup costs and is at this stage financially viable. Furthermore, the secondhand accelerator has partnership with Menddie Oy to provide garment repair, fixing, modifying, and maintenance services as a way to facilitate the environment that encourages people to engage in reviving and extending the life cycle of the clothes . However, as reported, existing audiences are more curious than serious; quite often, the repair service was asked about but no real contacts or usage played out. Rinna Saramäki also noticed, consumers were thinking too long before buying from sustainable brands.

Challenges to the reuse of post-consumer textiles in the perspectives of SHMSR:

- As a truth, sales and cheap prices give people a sense of thrill and excitement. Brand new clothing stores in Redi shopping mall usually have sales campaigns, such as 50% off, summer sales, back to school sales. Nevertheless, cooperative brands, retailers, and enterpreneurs at the consignment shop does not have big margins from their products. Thus, SHMSR is facing a dilemma, it cannot offer anything alike (which is against business objective of empowering people to consume sustainably), but it wishes to attract more crowd to the shop. SHMSR is yet to have transformative marketing strategy to build bigger consumers and suppliers base.

- No resources for big advertisements.

Insights for the future system:

- Lots of customers do not know or are not sufficiently well-informed about what textile waste is, how to separate properly, and which product is in good condition enough to be reuse as how it is created.
- *”Poistotekstiili”* gives a wrong implication for something cannot be used again. Rinna Saramäki suggested a new term ”*Uudelleenkäytö- ja kierrätystekstiili*”, which has better and more precise description.
- One of the practices to encourage textile circularity is repair, that can be implemented by both companies and users. It is vital to understand consumer’s perspectives and barriers that hinder willingness-to-use and stop them from repairing apparel.
- Associating with a consignment shop is an opportunity and lighter solution for fashion producers and retailers to run resale operation without having to invest in and manage its own platform.

4.2.3 Pääkaupunkiseudun Kierrätyskeskus Oy

In 2022 accounting, Kierrätyskeskus attained 850,000 kilograms of donated textiles, of which 68 % went to both reselling and free-of-charge departments; the remaining was sent to Paimio plant, with 16% was for fiber-recycling, and the 16% wet and moldy residues was treated in energy recovery. When compared to the level of 2019, the proportion of reuse has enjoyed a steady growth of 8%, and material obtaining rate has soared by 15%. The company has its own standardized process and quality rules across all 12 stores, where donations are accumulated and transferred to one sorting center for arranging, pricing and tagging. Kierrätyskeskus does not have textile repairing proceedings nor scattered collection containers or points like other non-profit organizations. Guidelines for sorting and pricing are based on categories, such as pants, shirts, jackets, children clothing, etc. Keeping all prices of diverse portfolio fairly matched with ongoing market and cheaper than competitors is its corresponding strategy to promote reuse and drive sold units volume. The capacity of handling influx has been effective thanks to automative conveying belt, noteworthily during peak seasons: spring and autumn. Understanding and satisfying customer needs has been optimistic as the social enterprise witnessed the broadening in the number of visitors and buyers and enjoyed rapid enlargement within the last few years. At the moment, revenues from resale help Kierrätyskeskus fund 70% of operating costs; the 30% balance is from governmental compensation for its educational trainings and temporary work placements offered to unemployed jobseekers in coordination with Finland’s TE Employment Service. Furthermore, on average, the firm sends unsold, surplus, and tainted textiles to Paimio around every 2 weeks in shipments of 7,000 to 8,000 kilograms which costs 800 euros each. Because LSJH regulates acceptable quantity and charges handling fee (described in 4.2.1), and the cost of transportation has recently increased, Kierrätyskeskus is determined to deliver excessive goods less frequently, and try different techniques in internal sorting to bring total expenditures down. The company so far sees that it is going on the right direction to accomplish its goals and vision.

4.2.4 Nextiili Ry

Nextiili began operations on October 1st, 2015 as a part of Pirkanmaa Recycling and Work Association (“*Pirkanmaan Kierrätys Ja Työtoiminta Ry*” in Finnish). In order to strengthen the culture and know-how of circular economy and ecology in society, and thanks to the increase in the amount of textile donations, Nextiili Ry officially set to be an autonomous non-profit association on April 1st, 2021. The non-profit firm pledges to address solutions to tackle discarded household textiles according to the order of priority of the EU’s Waste Framework Directive by finding the new owners for after-use products, based on cooperation with donors, customers, and employees. Additionally, Nextiili Ry joined the piloting phase of Paimio plant. Besides focusing on domestic reuse, from the point of being independent until the end of the first three quarters of the year 2022, the company subordinately networked with one organization, who accepted pre-loved goodies that are in less-than-in-prime-condition but also do not belong to energy waste, to ship abroad. During that time, the redistribution rate including those exports was 48%. In October 2022, Nextilli

Ry replaced that international partnership with a registered association Tampere-based Mahdollisuuksien Talo Ry, due to traceability and ecological matters and intention to support national recycling efforts. As a result, the equation for aggregate inputs' reuse, recycling, energy restoration was respectively 26.8%, 34.2%, 39.0% in the fourth quarter of 2022. The aftermath saw a dramatic drop in reuse quota and a hike in energy recovery due to restricted capacity of Paimio plant and Finland's dull material-buyers markets. The entire endowments stockpiled 300,000 kilograms of textiles in 2022.

Local inhabitants' donations compose more than 90% of Nextiili's inventory, which is currently pre-sorted by 2 professional instructors and 4 regular workers, who are on apprenticeship. Nextiili has two stores, also act as collection points, in Lielahti and Nekala; both of them have a free section. As a mean to widen possibilities for reuse and avoid materials going to recycling and energy waste, the volutary firm has practically six channels for redirection:

- Reselling vintage and secondhand clothes, fabrics, yarns, and handicraft supplies at physical and on online store.
- Reselling to associations (e.g. amateur and professional theatres) and though "*Keräyspalvelu*" (tailored or made-to-order collection service), where cost of materials and service fee 8 euros are charged, for small companies and enterpreneurs who need fabrics for their projects. Before by-kilogram transactions, Nextiili checks the company's identification number, investigates legitimate background and the fate of each purchase.
- Deals for a price for teachers and students at preliminary schools and textile vocational institutes who are in need of second-hand fabrics and yarns for handicraft lessons.
- Gifting through Mahdollisuuksien Talo Ry, who reallocates reusable clothes that can not be sold to charities, churches with diakonia work, social services around Tampere.
- Donating onwards to other charities who privately contact and request for passed-down apparel.
- Complimentary giving contemporary materials to Pirkanmaa Recycling and Work Association, who sells at their three recycling hubs under a renewable 4-year contract.

In redistribution, recommerce makes up nearly 75% of total reusables, and free giving-away is 25%. Among selections of various quality types of used goods, its vintage home textiles has been a success as the largest of its kind in Tampere area.

Nextiili Ry has been operating in financial stability without any deficits nor external fundings, its two streams of revenue are from:

- The stores' selling sources, noted that employees who are working at Nextiili are on temporary work placement or pay subsidy employment, with a larger portion of salary is from the Finnish State's national unemployment services.
- The sorting activities as a subcontractor for municipal waste management Pirkanmaa Jätehuolto Oy, who owned by 17 municipalities, to extract the resuables before waste is sent to grinder.

Pricing strategy is prominently determined and instructed by six main instructors, with the ultimate goal is to sell as many as possile at appropriate prices. For instances, following the general trends, comparing with other second-hand stores, assessing textile conditions, keeping 3 – 4 euro items a requisite segment, are in the midst of balancing acts to drive revenues, simultaneously convince people to buy ecologically cheap clothes, and the materials stay locally.

Challenges to the reuse of post-consumer textiles in the perspectives of Nextiili Ry:

- It started receiving textiles intended for recycling, therefore the overall quality has gone down, which affects product-reusing rate.
- The organization has more materials that fit for reuse purposes, but do not have the channels for sharing out.
- Secondhand have much higher prices than what they used to ten years ago. Since they are not a fashionable mainstream, they are becoming too expensive in some parts of Finland for the working class to buy.
- Changes in conditions of pay subsidy system provided by the Employment and Growth Services of the city of Tampere, consequently, Nextiili does not have qualified personnel to work as sorting experts.
- Space shortage since the received amount is growing every year (in 2-year time, it has grown by a third).

Insights for the future system:

- A need to address and rectify terminology issues. Even though "*poistotekstiili*" term orginally included both reuse and recycling by The Telaketju Project, but some waste management companies define "*poistotekstiili*" differently: textiles that are good for recycling, but not for product-reusing.

- A need to invent an umbrella term encompassing both reuse and recycling. Emppu Nurminen was cautiously in favor of the term "*Kierrätystekstiili*".
- Indoor collection points, for example, inside of shopping malls.
- One-stop destination for both reusable and recyclable textiles, so that households, who do not have time or knowledge or skills, do not have to figure out which kind of after-use options a particular article of clothing is for. There is a huge amount of textiles with small stains or small holes, which Finns wants to sell but do not know what to do with them, and a majority of municipal collection points only accept loads for recycling.
- Textile sorting is to become an accredited profession with responsible individuals posess a textile related vocational degree or certification, such as from Tredu in Tampere. At the moment, not too many organizations in Finland has workers on regular working contract and capabilities in textile sorting, most of them are on temporary placement and pay subsidy.

4.3 Key findings

The combined results of questionnaire and interview signify that, at the present stage, even though consumers do have great awareness of sustainability, still they lack of comprehension about the differences between reuse and recycling, and do not recognize what kind of procedures an apparel goes through after being removed from usage. Albeit mounting donations are sent to the most well-known reuse organizers – charities and the consumption of hand-me-downs is advancing, many factors have blocked the growth rate of product and material reuse and the completion of circular economy, such as:

- The consumers' enthusiasm for cheap clothing and their absence of care and repair skills, which encourage the need to toss away and buy more.
- The fast fashion items that only fit for incineration after a few uses from fabricators and retailers.
- Consumers' perceptions of wearing used clothing are not acceptably positive.
- The imperfection of terminology affects efficiency of collecting and sorting.

- The loss and deterioration of quality of textiles due to mis-sorting happens during internal processing and shortage of qualified textile experts at municipal facilities, reuse centers, and recycling plant.
- The costs of labor to do the sorting manually and such of infrastructure expansion.
- The unreadiness of recycled content end markets impacts the recycling capacity.

Sorting at the place of origins is the key part of the reuse economy, and separating out the reusables from material and energy recovery waste is the responsibility of all actors. At the levels of collection and sorting, there are three biggest obstacles that created the small proportion of suitable-for-use-again textiles:

- Collection boxes are for the most part placed outdoors across Finland. Those containers and the packaging by individuals are not weather- and water resistant. The old textiles get wet and contaminated easily with the concurrent emptying intervals of 2 to 3 weeks or even longer.
- Collections and donations are incorrectly sorted with items that are dirty and not compatible.
- Charities and for-profit organizations do not have resources for repairing and upcycling (the only substitute is handing out without charge).

Furthermore, although the new waste legislation obliges unnecessary and surplus textiles to be collected separately and describes the meaning of "*re-use*" and "*preparation for re-use*", there is no official definition and informed treatments of "*poistotekstiili*". The government also does not have separate standards and regulatory systems for traceability and transparency on act of selling and using recycled materials.

5 Conclusions

In this thesis, Finnish reusable textiles in separated collections and waste flows and the operations of stakeholders involved in the movements were investigated. The author examined the consumption of old textiles and how the unwanted were processed when reaching post-consumer stage.

The results show that Finnish domestic production is extremely low compared to massive new textile imports. Discarded household textiles are to a large extent settled on costly material and energy recovery; each share of product reuse and material reuse varies barely from 10% to around 30%. Finns reuse less than one third fraction of their separated collections, which are some 44% of total consumption. That means, the current management systems of textile waste go in opposite directions from the EU Waste Hierarchy, as “prevention” and “reuse” positions are inferior to “recycling” and “recovery” rankings, because supplies are strongly resorting to overseas production and national reuse economic activities are little. In other words, the controlling still falls back on the two bottom options of the Waste Framework Directive, not the top desirable approaches (illustrated in chapter 2.1.5). Evidential reasons are likely to be current disharmonized system: uncommon language among stakeholders, misunderstanding from consumers, inadequate infrastructure, non-existent recycled material end markets. During the course of the last ten years, the amount of donations and separated collections has grown upwards, and the consumption of used textiles in Finland has also risen. However, a part of the increase is possibly due to non-profit organizations are giving commodities away for free by their efforts to foster channels for goods being widely used again. Charities, second-hand stores, flea markets, and consignment shops, who are generating more than 90% of unwanted household textiles, have proven to be viable and influential means of reusable shopping. Challenges to domestic reuse and capacity of recycling are caused not only by knowledge of textiles, discernment of reuse options, general attitudes and beliefs towards old goods on the consumer side, but also by worsening quality of new products from manufacturers and retailers. The implementation of the Finnish Waste Act enacted in the beginning of 2023 and introduction of the EU Strategy for Sustainable and Circular Textiles have slowly shown impacts on operations of producers, retailers, municipal waste managament companies, and reuse centers functioning within Finnish borders.

5.1 Answer to the research question

Given that textiles are for personal need and always sorted manually after-use with judgement of eyes and hands, in general, the four aforementioned parties in question should have clearer instructions and more educational campaigns for buyers during both usage and end-of-life phases of a product, in order to raise the opportunities that garments are maintained longer and elevate the ratio of reusable textiles in collections and donations. Consumers need to be informed that a series of logistical work is done and several employees go through each item before it hits a second-hand market or recycling center. It is likewise advantageous for producers, retailers, and reuse operators to understand that the Finnish middle-income group, who has the buying power, is interested in the trend of second-hand clothing shopping. Correspondingly, they should have acceptable pricing strategies to make secondhand clothing and home textiles stay competitive over new collections, additionally, be responsible for marketing and educating customers on sustainable consumption and that reusing is not a contemporary trend. Furthermore, to increase sales volume, recycled-content products should be set at reasonably lower price than pure ones.

On a national level, a textile circular and reuse economy is not possible without the catalytic contribution of legislative systems. Therefore, besides the probability of the EU's impending Extended Producer Responsibility program, Finnish regulatory authorities need to come up with introduction of taxes on virgin fiber resources, monitoring measures on the exporting of used textiles and unsold inventory (products are reused locally rather than abroad), more well-defined objectives of preparation for reuse and reuse set out over recycling, and a new equivalently agreeable Finnish term to convey the common language: when a textile item is removed from one's usage, it can still be reused by a new user, and again be in circulation to serve different purposes. As suggested by representatives of interviewed companies, "*Uudelleenkäytö- ja kierrätystekstiili*" term and a more coherently clarified sorting chart, which resonate with citizens, would enable unambiguous systems in the whole of Finland. Also, there exists a need for investment to develop high-speed automated sorter, fabric waste recycling and identification technology for inland ongoing and projected closed-loop and open-loop recycling approaches.

To put forth recommendations for reuse actions, the steps are drawn up in the following paragraphs by integrating the outcomes from Results part, taking the points of view of actors in interviews into account, and benchmarking successful approaches from global firms and cities (European Clothing Action Plan, 2018; RREUSE, 2022; WRAP, 2016).

5.1.1 Producers and retailers

Producers and retailers should follow these directions:

- Set of sustainable eco-design criteria for durability – repairability – reusability – recyclability should be embraced, as the EU will soon introduce those requirements in textiles "... *under the Ecodesign for Sustainable Products Regulation 21 , subject to its approval by the co-legislators and a dedicated impact assessment, the Commission will develop binding product-specific ecodesign requirements to increase textiles' performance in terms of durability, reusability, reparability, fibre-to-fibre recyclability and mandatory recycled fibre content, to minimise and track the presence of substances of concern and to reduce the adverse impacts on climate and the environment*." (European Commission, 2022). That means, brands should avoid overproduction (because the unsold inventory destroying is banned and exporting is strictly controlled) and the use of complex mixed fibres, plastic-based fibres and fossil-fuel fibres (polyester and other synthetic fibres), to increase the potentials of second-hand selling and recycling (Changing Markets Foundation, n.d; Nguyen, 2021).
- Recycled fibers mandatory approach (to reduce virgin material extraction and widen recovered content end users) should become an imperative work to implement.
- Reverse logistics (in-store and non-store collection points, pick-up service), reuse and recycling practices for unsold stock (in-house or with affiliates or with social enterprises – prioritizing donations) should be optimized.
- Fast fashion should be abandoned from production because they are too low quality for reuse and does not deliver profitable trade-offs when compared to the high costs of collecting, sorting, identifying, and complex-structured-textile recycling.
- Information about content and origin, warranty, life-prolonging measures, repair service, and the possibility of returning should be added to the products, because "... *as part of the measures under the new Ecodesign for Sustainable Products Regulation, the Commission will introduce a Digital Product Passport for textiles based on mandatory information requirements on circularity and other key environmental aspects*." (European Commission, 2022).

- Excess (post-industrial) and defective items should be sent or sold to charitable or for-profit second-hand firms or vocational schools (for students to practice and at the same time teach them about circular economy), or resolved using *Materiaalitori.fi.*
- Renting models (online and in-store) should be adopted to satisfy the changing short-term needs of apparel consumers.
- Have resale programs tested at a consignment shop to observe customer's reaction and study the markets before putting in investment to bring resale business to a bigger scale.
- Request for Value Added Tax reduction or tax exemption for donations of unsold products from Finnish Tax Administration, since currently only donations which are "in money" for charitable purposes are deductible (PwC Worldwide Tax Summaries, 2023).
- Producers and retailers should not have monopolistic competition with reuse operators in textile flows (e.g. takeback program), pricing, renting and repairing services, as it does not motivate people to donate; and aggressive ownership might lead to situation of premature recycling of product-reusables.
- Support domestic recycling economic activities.

5.1.2 Municipalities

To meet objectives of increasing the reusing rates of textiles, it requires municipal waste management companies to have a massive change of moving collection containers from outdoors to indoors, which is to say, warm and well-covered places to avoid the content getting wet and quality deteriorated. The proximity and ease of carrying and handing the undesired goods, and citizen's sense of the value of needless textiles are decisive factors that determine residents' willingness to sort out and donate their redundant commodities. On that account, municipalities can:

- Organize tours to sorting facility, where citizens can see operation and find out what happens to the collections afterwards.
- Deliver free bags (with times and dates attached) for collecting to voice the message and improve understanding, for instance, "*Do not throw your unnecessary clothes or household textiles in mixed waste, try to wash and put in this bag for reuse and recycling purposes. We collect free of charge and know what is best for them*".

- Inform citizens about textile reuse and waste data via advertisements on residual waste trucks, free local newspapers, and transparent communication on publicly available website, social media.
- Increase the volume of containers in order to reduce the amount ended up in mixed waste. Collection bins should be placed at a different station from regular garbage, or at points where there are also bins for charitable organizations (a need to build up partnerships with charitable organizations).
- Research routes that the majority of Finns easily access in daily life to make effective collection location decision (e.g. by citizen survey), whether it can be inside of churches, schools, post offices, high street fashion shops, supermarkets, nurseries.
- Establish reuse stores funded by municipality and materials provided by municipal waste management company to build community acceptance of pre-owned goods and support resale and repair sectors.
- Develop sorting facility to shift away from relying on subcontractors, charities, non-governmental organizations, and reuse businesses.

5.1.3 Reuse operators

Enterprises in reuse segment can further contribute by:

- Collecting the clothing and other textiles at residents' homes and workplaces (on-call and door-to-door), and collaborate with manufacturing and retailing companies in promoting capacities of influxes and opening of new shops.
- Collecting both product-reusable and material-reusable textiles.
- Strengthening marketing programs to inform the right ideas of central strategy (explained under figure 21).
- Reinforcing activities in redesigning, remaking, repairing, upcycling, craft work and trading practices, like discount, sale-off, clearance, sell by weight.
- Finding alternatives of domestic usage and recycling solutions to replace or stay away from exporting second-hand and low-quality-products. In points of the *EU Strategy for Sustainable and Circular Textiles,* it is articulated "... *On average, a social enterprise creates 20-35 jobs per 1,000 tonnes of collected textiles with a view re-use. Boosting social enterprises active in the reuse sector is particularly important, as they have*

considerable potential to create local, green and inclusive businesses and jobs in the EU." (European Commission, 2022).

- Providing formal trainings and qualifications for personnel along the management and selling of secondhand.

5.2 Limitations and prospective research forward

Owing to no responses from contacted manufacturers, the research is limited due to insufficiency of general ideas from a textile producer functioning in Finland. The author was not able to gather data about the activities of takeback program, selling used and recycled textiles, repairing service, and the likeliness of customers being interested in brand's collection and resale business. Consequently, some suggestions for action for producers and retailers might only be applicable under a circumstance that second-hand business in overall operations is financially successful and able to be independently sustained. Further work can be done by interviewing wider network of the aforementioned parties in research question to gain broader insights and raise the feasibility of proposals.

Secondhand markets are economically tied to new markets. Circular economy is achievable when textile makers focus on quality rather than quantity, and the constant crave exists for a new apparel is replaced by a second-hand purchase on the shopper side. In truth, people can obtain a lot of used items at the same price of a single new one. The reasons behind the shame of wearing used garments whereas consumption patterns are generally positive were not investigated in the questionnaire. Those items could possibly spend a longer life in a wardrobe than they actually do on buyer's bodies, and the current blooming consumption of secondhand of younger generations are seemingly rooted in the adrenaline rush of buying bargains and cheap things due to price sensitivity. Therefore, the author believes, research on barriers of secondhand consumption in consumer behaviors in Finland and the possibilities of overconsumption catalyzed by secondhand buying, will bring benefits to Reuse Network Finland.

Moreover, the author and representatives of companies noticed the prices of thrifted goods have been doubled in comparison with their level of ten years ago and people started to prioritize quality of articles of clothing in order to resell them. Since survey displays nearly half of active buyers are middle income class, and stylish consignment shop like Relove has gained attraction and become a new phenomenon. It is recommended to examine how gentrification of second-hand stores impact fashion manufacturers, low-income shoppers, the operations of charities and reuse operators, and the overall reuse economy.

Lastly, the author sees the need to explore solutions for the made and coming recycled fibers to penetrate markets in Finland when recycling capacities are promoted, as restraints found: most supplies are foreign products, domestic manufacturing is significantly small, and prioritizing materials stay local is at tipping point in the scope of reuse.

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Appendix 1: Survey questions

1. How old are you?

18 - 24

25 - 34

35 - 44

45 -54

55 -64

65 and over

2. Have you ever bought secondhand?

Yes

No

3. Have you ever made clothing or household textiles donations?

Yes

No

4. What is your experience in buying secondhand?

Satisfied

Neutral

Unsatisfied

5. What are your main reasons for buying secondhand? (Please select 3 most relevant)

Save money

Luxury brands with significant lower price

Unique pieces/treasure hunting

Sustainable and eco-friendly lifestyle

Concerns over environmental and societal issues

Support community/local businesses/good causes

Secondhand is something not so important but nice to have extra.

Others, please specify.

6. Where do you prefer to purchase used items? (Please select any relevant)

Physical second-hand stores

Online channels/social media platforms

Clothing and textiles brands/manufacturers/retailers/department stores

Prefer not to buy.

7. How often do you shop or visit second-hand stores or shopping sites?

More than once a week

Every other week

Every month

A few times a year

8. Would you like to shop at brands and retailers offering secondhand collection in addition to their new?

Yes

No

9. Could you please name the second-hand stores/brands you usually visit? (Any charity shops, non-profit organizations, flea markets, garage sales, online platforms, etc.)

10. Which of the following best describes your annual financial condition these days?

12,000€ - 35,000€

36,000€ - 59,000€

60,000€ and over

Prefer not to answer.

11. How do you understand "kierrätys" in Kierrätyskeskus?

Recycle

Reuse

Both

12. "Second-hand clothes/textiles are associated with low status."

I strongly agree.

I somewhat agree.

Neutral

I somewhat disagree.

I strongly disagree.

13. In your opinion, are reuse infrastructure and network adequately available in Finland? (Collection, sales, and distribution points, centers, and services)

Yes

Yes, but there is still room for improvement.

No

Appendix 2: Interview questions

How many kilograms of textiles did [the organization] receive last year? From what channels? Has the amount been growing in recent years? How many percent of them got resold? What did [the organization] do with the remainder? Did [the organization] have the transparent information on the fate of that remainder?

Are there any challenges in sorting activities? How many percent of total separately collected textiles are wet, dirty, have bad smell, contain hazardous contamination, wrongly put, or incorrectly packed?

Does [the organization] have clear rules, standards and process for sorting, whether an item is qualified for resale, or can only be recycled?

How much of collections does [the organization] have to repair before being able to resell them? Are there enough staff to manage the workload? Do they need or receive trainings on repair skills and craftmanship?

How does [the organization] price an item? Are there any pricing strategies to increase sold unit volume?

Are there any strategies or factors that influence the location decision of the store/collection points? May I know the emptying rhythm?

How is customers' overall feedback with their purchased used items?

Does [the organization] think current collection point system efficient or confusing (because it affects residents' willingness to hand-carry and bring reusable textiles to the right place)? In your opinions, where is the right place to install collection container?

Does [the organization] pay for transportation costs (or any other costs) for the unsold (at this stage: the textile waste) to make its trip to Paimio plant? How often does [the organization] ship them?

What are your insights on current system in perspectives of promoting reuse economy?