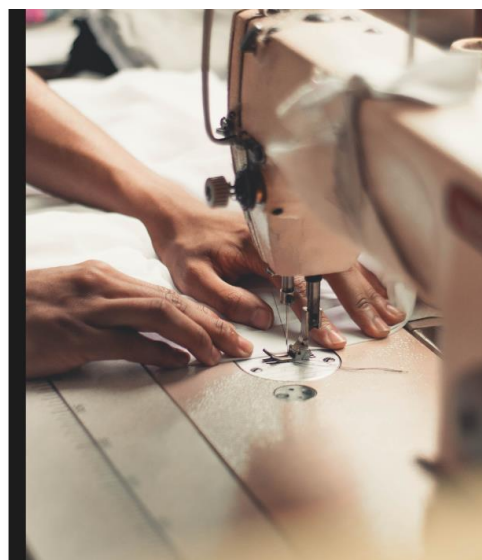

Circularizing the Japanese Fashion & Textile economy; future prospects and opportunities for business cooperation for European companies and SMEs in Japan

Japanese Circular Fashion with Potential in Local Economy

MARCH 2023
MINERVA PROGRAMME
MAYU IMANISHI



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PREREQUISITE

This report covers the circulation in the fashion and textile industry. However, even textiles it focuses on clothing textiles and does not cover the circulation of footwear or industrial materials. The report also excludes the circulation of plastic products related to purchasing. For more general information on Japan's circular economy, including other areas, we recommend referring to the following documents from the same MINERVA report.

JAPAN'S CIRCULARITY ~ A Panorama of Japanese Policy, Innovation, Technology and Industry Contributions Towards Achieving the Paris Agreement.

Executive Summary

Circularity in the fashion and textile industry is one of the world's most important and growing topics, and Japan is no exception.

This report aims to provide an overview of Japan's current state in the fashion and textile industry, summarising market trends, historical background and private sector circularity initiatives and start-ups. Focusing particularly on the circularity initiatives of local textile-related SMEs, the report presents the potential of specific circularity models according to climate and history as well as the reforms needed to achieve a circular society in Japan. Based on these findings, the report suggests potential opportunities for European companies to enter the Japanese market.

The decline of Japanese textile companies, the monopoly of some global companies and the delay in adopting CE

The apparel and textile market are currently experiencing stagnation due to a declining population, an ageing workforce and the COVID-19 pandemic. Clothing supply chains have become increasingly complex, extending globally in search of cheap labour after years of mass production and consumption. Only a few global private companies, such as Fast Retailing, dominate the market by offering high-value-added products at low prices. However, these companies are also lagging behind the circular economy trend and are facing demands to address environmental and human rights issues. Without specific government legislation on textile recycling, individual and corporate recycling initiatives are less binding force compared to other developed countries.

On the other hand, the fabric processing industry, with its artisanal subcontractors concentrated in rural areas, is in decline due to the fast fashion wave. However, some segments, such as the high-end brands business in Europe, still remain competitive. The reuse and sharing market in Japan align with Global trends and shows growth. However, many people still have a strong attitude towards used products due to the impact of COVID-19, necessitating a change in consumer perceptions. Japan has made limited progress in the recycling and recovery phase due to the prevalence of incinerators. Nevertheless, some companies are encouraging chemical recycling technologies and expanding their operations overseas.

Japan's circularity potential in local textile industries

This report presents circularity trends in several regions and highlights the potential of Japan's own circular fashion by leveraging the existing textile industry and traditional crafts. It is necessary to consider the region as an ecosystem that involves the public, private and academic sectors through the textile industry rather than relying solely on individual company initiatives within the supply chain. By branding textile products that make use of local characteristics and history, and creating a cycle that facilitates natural regeneration, Japan can draw inspiration from the ancient system of Sampo Yoshi,

which refers to the principle of conducting business in a way that benefits not only oneself but also the other party and society as a whole.

Furthermore, by establishing an autonomous and decentralised network system that connects the cycles created by each region's unique characteristics, it will be possible to propose business models that consider environmental impact and human rights not only for the local region but also for revitalizing declining regions in Japan, as well as the regions of the Global South where the economy is projected to grow.

Potential for EU-Japan industrial cooperation

Future challenges in realizing circularity in Japan include revitalising the garment circulation technology, fostering the start-up community and establishing equal partnerships with multinational companies. This research proposes four points of collaboration between Japan and Europe to address these challenges. Firstly, exchanging information between the European Circular Economy Cluster, the Circular Fashion Ecosystem, and local company clusters to foster new regional economies. Secondly, introducing a system to educate individuals on circular fashion with whole ecosystem design, one of Europe's strengths. Thirdly, fostering cooperation with European high-end brands to expand the market for local textile companies. The fourth point of collaboration is the entry or joint development of recycling and collection technologies and solutions from European start-ups into the Japanese market. The aim is to create opportunities for EU-Japan industrial cooperation based on the four perspectives outlined above, to accelerate the circular textile society in Europe and Japan, as well as to develop and co-create businesses that prioritize environmental impact and human rights in the Global South, where the economy is experiencing significant growing.

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List of Abbreviations

EU	European Union
SPA	Speciality store retailer of Private label Apparel
SKU	Stock keeping Unit
RPF	Refuse Paper and Plastic Fuel
METI	Ministry of Economy, Trade and Industry of Japan
CAA	Consumer Affairs Agency
MOE	Ministry of Environment
NEDO	New Energy and Industrial Technology Development Organization
IPF	Institute of Positive Fashion
IFPEN	IFP Energies nouvellee
OEM	Original Equipment Manufacturing
3Rs	Reduce, Reuse and Recycle
ESG	Environmental, Social and Governance
GHGs	Greenhouse Gases
PET	Polyethylene terephthalate
SPA	Speciality store retailer of Private label Apparel
NGO	Non-governmental organisation
SDGs	Sustainable Development Goals
UNFCCC	United Nations Framework Convention on Climate Change

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Introduction

The world's population is now 8 billion, and India's population has surpassed China's this year, 2023. While technologies such as AI and robotics are advancing, the developing world is still dominated by labour-intensive industries. Japan has also gone through a period of time when it was a developing country. This was a period of continuous population growth and industrial development. The textile industry achieved significant growth during this period of rapid economic growth. However, Japan is now in a mature phase, where the population has started to decline, GDP growth has been stagnant, and the system that boosts national power through mass production with the help of the workforce is very far from being in place. Everyone is aware of this discrepancy, yet it has been a grossly neglected issue. There have been efforts to correct the system's bias by relocating production to cheap labour locations abroad, but that exploits the labour and resources of developing countries and fails to focus on real issues. The export of waste to other countries in the name of reuse and recycling only serves to shift and hide the problems that every country should face. It is time to end the existing system.

Japan's apparel industry is at a turning point. While the domestic apparel sales market has shrunk from 15 trillion yen in 1991 during the bubble to 8 trillion yen in 2020, the outbreak of COVID-19 has further caused sales to fall. The industry is declining, with domestic and overseas operations shrinking and fewer people being involved. To capture the growing offshore marketplace, many companies require guidance about what to do next, whether inbound or cross-border e-commerce.

Since the post-war period, when there was nothing, and through rapid economic growth, people have tied their happiness to consuming goods. They habitually think of being happy by having more expensive things than others. This relates to an economic structure in that fast fashion has profoundly changed. While fast fashion has granted people of all wealth and age groups the freedom to wear the clothes they want, it has also led to unintentional and inferior exploitation. Fast fashion has replicated a linear business system of that over-exploits natural and human resources through production, consumption and disposal. This linear system puts pressure on the earth's resources, pollutes the natural environment, and profoundly impacts the ecosystem. Thanks to the energy revolution and advances in mechanisation, industrialisation and technology, the world has become seamlessly connected, allowing people to rapidly and affordably access the latest clothing trends from around the world. At the same time, how many of us do realise that the more convenient and inexpensive our clothes become, the less tangible they are? There has been a complete lost sight of the fact that creating a system that allows some countries to produce clothes cheaply is not just about the result of technological advancements but also reflects a disregard for global environment and human rights issues, both domestically and internationally. The act of ending something means the disappearance of the industries, companies, services and products involved, often accompanied by forces of resistance. It is necessary to give new meaning to the developed technologies.

The concept of circularity, the theme of this issue, derives from the EU's Green Deal circular economy strategy, which is an excellent approach to creating a relationship that develops the economy without damaging the environment. It aims to secure economy benefits for businesses without compromising the global environment¹.

The key to achieving this lies in the history of the textile industry in Japan. The textile industry, which has existed in Japan since ancient times and has been deeply rooted in the land, establishing various services through connections with people. Edo merchants relied on natural resources for most of their goods and energy, encompassing food, clothing and shelter, recycling and reusing. It was a completely circular society, where food was grown, and waste was used as fertiliser for local farms. Clothing was produced, spun and designed to last as long as possible. It was repaired, used for secondary and tertiary purposes and eventually biodegraded.

Unravelling this history reveals the reasons behind our current situation and provides insights into achieving happiness. It was during this period that the fusion with Western culture began, followed by a period of scarcity during the war, then post-war reconstruction, the development of manufacturing technology towards mass production overseas, the low-price wave of fast fashion during the bubble period, and finally, the present time, which is the result of several external factors. Despite these changes, there are still companies in Japan that remain ingrained in the land. They value a culture in harmony with the climate and the environment, and even in the face of mechanisation and mass production, they have continued to grow, passing on valuable skills that should be preserved. Taking inspiration from their example, this research will explore the future they are aiming for and the paths they can take to create new business models.

There are many areas where Japan and the EU can collaborate in developing this approach. First of all, Japan needs to create its own self-sustaining recycling society. EU countries and Japan have relatively close structures with mature domestic markets and share common challenges arising from past difficulties, such as limited land and dependence on other countries due to lack of underground resources. By drawing up a roadmap and taking measures step by step that align with the EU's approach, we can create a situation where we can co-create with each other. This collaboration can then build on the strengths and compensate for the weaknesses of both the EU and Japan, establishing a foundation for the realisation of a global recycling society.

2. Research objectives

This research will explore the current state of the circular economy in the Japanese fashion and textile industry, unravel the Japanese culture and history, analyse the trends of the European circular economy, and explore the direction for realising a unique circular society that fits with Japanese culture and habits. For companies, this report can give new suggestions regarding the idea of circularity, which has been considered as business as usual or a cost, and it will propose new business opportunities. Additionally,

¹ https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en

It will examine the strengths of Japan and the EU in achieving a circular society in Europe and Japan and explore the key factors necessary cooperation between the EU and Japan.

3. Target reader

The study sets out a vision and identifies concrete cooperation opportunities for the transition to a circular society for small and medium-sized enterprises (SMEs) in Japan and the EU. SMEs, which account for 99% of all enterprises, are crucial in transitioning from a linear economy to a circular economy (CE)². Currently, many SMEs still face challenges in initiating the CE transition due to cost and human resource issues. However, in the fashion industry, 90% of the environmental impact is from raw material sourcing to production, so there is no doubt that the transformation efforts and business case tips from SMEs, including OEMs, will be a step towards the overall CE and its realisation. This report aims to clarify the steps towards CE transition and enable them to take concrete action.

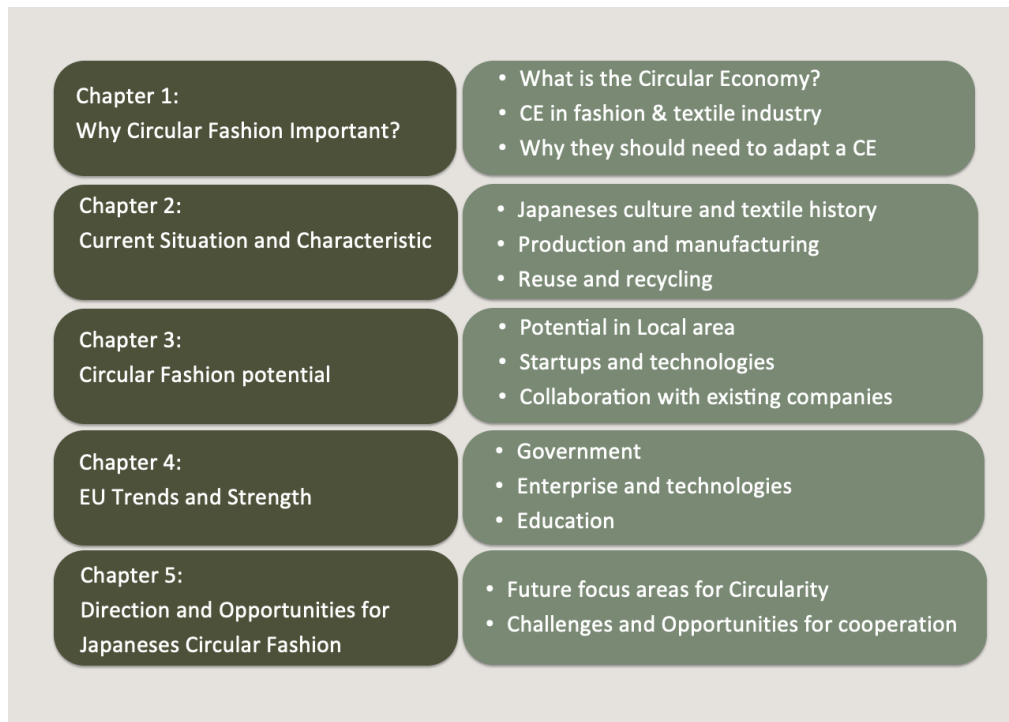
4. Structure of this report research

The report consists of five chapters.

1. Introduces the current state of the circular economy in the fashion industry and highlights the need for circular fashion.
2. Describes the current situation, characteristics and challenges of the Japanese fashion industry.
3. Explains the potential of circular fashion in Japan through various case studies.
4. Considers the trends and directions of circular fashion in the EU.
5. The final chapter lists the directions and focus areas of circular fashion that Japan should prioritize, discusses the challenges it faces and suggests opportunities for cooperation with the EU to complement these challenges.

² Adoption of circular economy practices in small and medium-sized enterprises: Evidence from Europe at <https://www.sciencedirect.com/science/article/pii/S0925527322000895#bib57>

PICTURE 1: Structure of this report research



5. Methodology

The report is based on desk research and more than 20 interviews with stakeholders from SMEs to large multinationals, government officials, clusters and public and private sector stakeholders in Japan and the EU.

Chapter 1: Why is Circular Fashion Important?

1.1 What is the Circular Economy?

1.1.1 What is the circular economy?

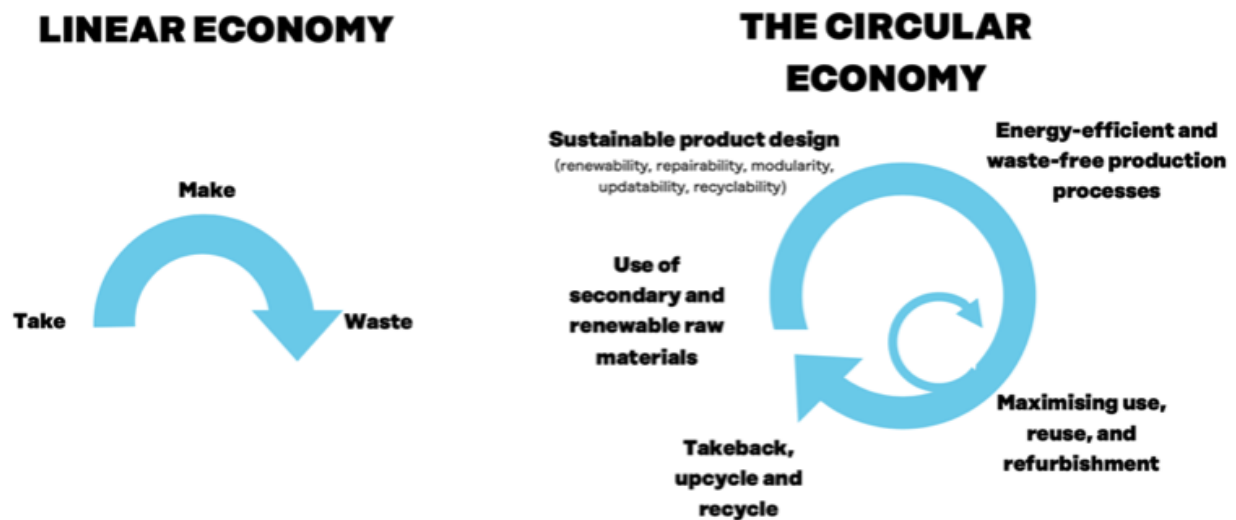
The circular economy (CE) is a business model that tackles social issues such as biodiversity loss, the climate crisis and the depletion of natural resources. The most important concept is not to continuously produce new products but to maximize the value derived from current resources. It involves keeping the matter within the economy as long as possible through consumption activities such as design, digital solutions and non-ownership services. Newly created products aim to minimize resource consumption, waste generation, etc., replacing the current linear economic system of Take – Make - Waste.

For companies, embracing the circular economy represents a new approach of doing business by creating more value with fewer resources. It is a sustainable choice for the planet and an opportunity to meet changing customer needs, reduce costs and minimize risks. According to a report published by the Finnish institute Sitra in December 2022, the potential economic benefits for the EU market brought about by CE are estimated as follows.³

- EUR 3.7 trillion in value created by 2030
- 700 000 new jobs created by 2030
- 75% increase in product lifecycle value
- 7 times increase in business revenues.

³https://www.sitra.fi/app/uploads/2022/12/sitra_sustainable_growth_with_circular_economy_business_models.pdf

PICTURE 2: What is Circular Economy ?



Sources:: SUSTAINABLE GROWTH WITH CIRCULAR ECONOMY BUSINESS MODELS from [sitra](https://www.sitra.fi/en/publications/sustainable-growth-with-circular-economy-business-models/) published 2022/12 at <https://www.sitra.fi/en/publications/sustainable-growth-with-circular-economy-business-models/>

1.1.2 Background

When discussing about the importance of CE, it is necessary to explain the concept of Carbon Neutrality (CN). The promotion of the CE strategy, mainly by the EU and others, is closely related to the Paris Agreement of 2015, which agreed on a pathway to CN, and the Glasgow COP26 of 2021, which emphasized the goal of achieving CN by 2050. To achieve CN, countries need to set targets in stages in accordance with their own situation. This requires significant social changes and industrial restructuring, such as the introduction of renewable energies and the acceleration of electrification. In Europe, the CE is not solely reliant on energy transformation; it also involves increasing resource efficiency through recycling and reuse, as well as decoupling (*) between economic growth and environmental protection. The CE strategy is positioned as a part of the European Green Deal. The Ellen MacArthur Foundation report estimates that, adopting the CE strategy in five key sectors (steel, aluminium, cement, plastics, and food). could result in an annual reduction of 9.3 billion tonnes of CO₂ emissions in 2050, which is 45% of the 2050 CN target, it is essential to implement CE to achieve the globally agreed CN targets.⁴

*Decoupling.

The UN argues that since the Earth's resources are finite and therefore stresses the importance of improving resource efficiency. The goal is to decouple human well-being and economic activity from

⁴ <https://ellenmacarthurfoundation.org/completing-the-picture>

the acceleration of economic activity and its impact on the environment, as well as the increasing scarcity of resources⁵.

PICTURE 3: Percentage reduction in CO2 emissions due to the CE

TOTAL CURRENT GLOBAL GREENHOUSE GAS EMISSIONS



HOW THE CIRCULAR ECONOMY HELPS TACKLE CLIMATE CHANGE



Design out waste and pollution
to reduce GHG emissions
across the value chain



Keep products and materials in use
to retain the energy embodied
within them

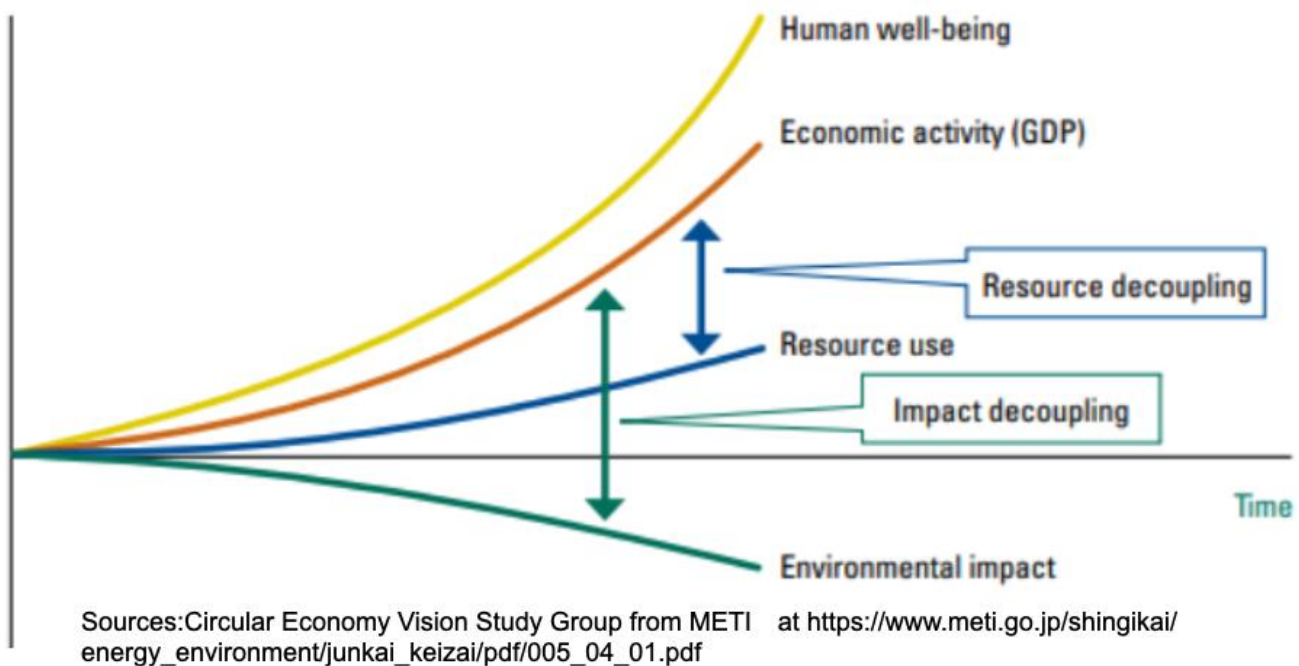


Regenerate natural systems
to sequester carbon
in soil and products

Sources: Ellen MacArthur Foundation, Material Economics, Completing the Picture: how the circular economy tackles climate change (2019)

⁵<https://wedocs.unep.org/handle/20.500.11822/9816;jsessionid=480347D0C53F4341CAAFF5795FE1AEFA>

PICTURE 4: Decoupling



1.1.3 Key Points of Realisation

Circular economy: three guiding principles

The Ellen MacArthur Foundation, established in 2010 as a UK-based private, not-for-profit organisation, dedicated to accelerate the transition to a circular economy, offers three guiding principles for achieving a circular economy.

1. Design out waste and pollution
2. Use products and materials in use
3. Regenerate natural systems

The Butterfly Diagram, developed by the Ellen MacArthur Foundation, is an economic model based on the original Cradle to Cradle concept (Michael Braungart, William McDonough, 2002), which identifies two types of cycles: biological and technological. The technological process involves the recovery and restoration of products, components and materials through reuse, repair, refurbishment and recycling. The biological cycle, on the other hand, returns organic materials (e.g., food, cotton, wood) to the soil system through processes such as anaerobic digestion and composting, supporting ecosystem regeneration and the provision of renewable resources. The key is to design separate cycles without mixing biological and industrial materials, and to start small. The focus is not about creating innovations but reconstructing the system by drawing inspiration from ancient practices.

REGENERATIVE LIFE MODELS concept.

The third principle, regenerative, refers to the idea of regenerating the global environment while allowing the ecosystem as a whole to thrive. Regeneration means that humans and nature are not separate and that all forms of life can grow in a cycle, whereas sustainability focuses on actions to reduce negative impacts on the planet and refers to 'less bad' (zeroing out the negative). On the other hand, regeneration refers to "more good" (creating a positive). This includes humans being part of the earth system and thriving with the earth. (PICTURE 4)

The concept of CE is an alternative to linear economic models and their impact on the global ecosystem and the efficiency of resource inputs to ensure economic efficiency. Still, it is only a "less bad" (zeroing out the negative) action. In recent years, there have been arguments for the need to revise the model in its approach due to the separation of humans and nature. The social and human aspects are not discussed enough.

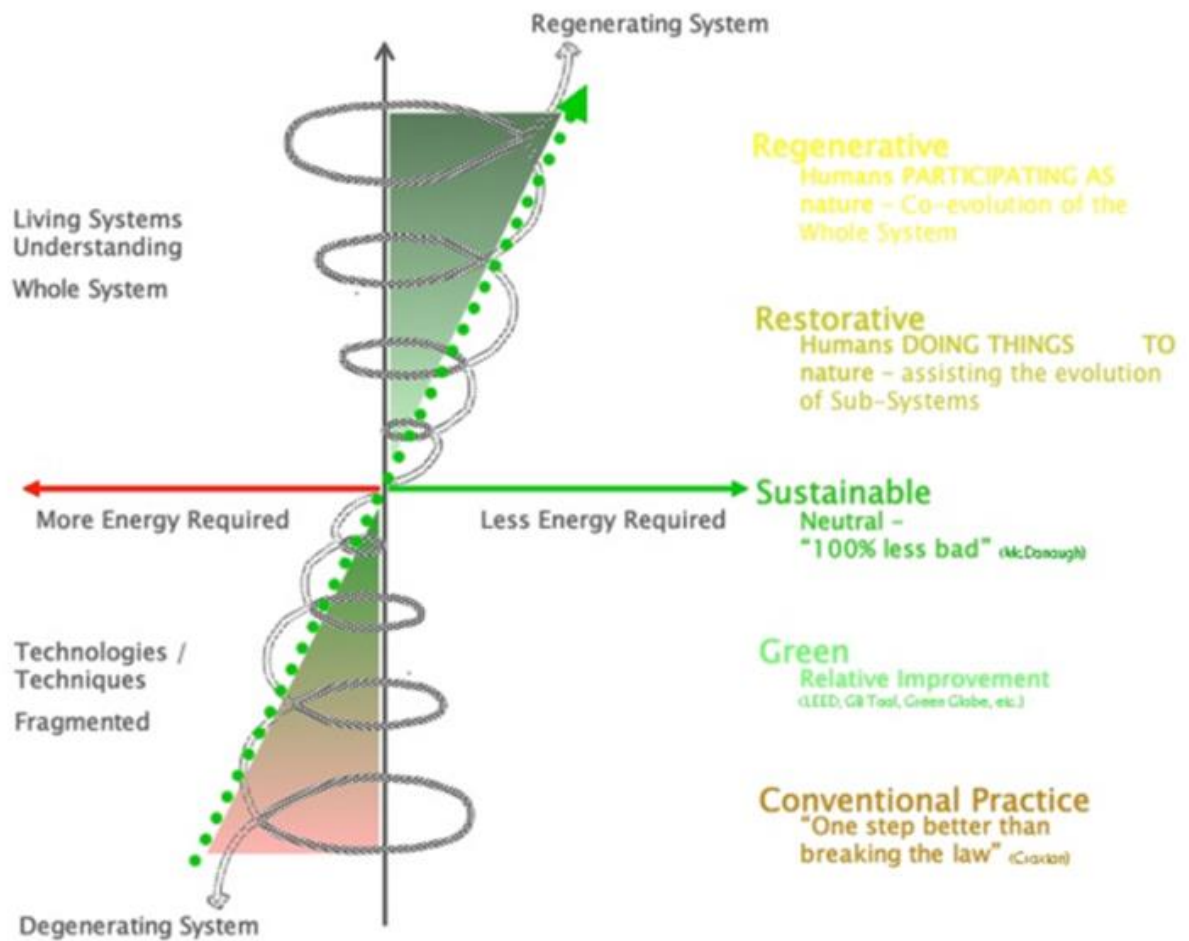
Therefore, the regenerative approach, which has gained significant attention, refers to system reform by integrating humans into the circular system as part of an ecosystem with different values and new belief systems rather than as mere users of the economy and services. The aim is for people to thrive with the planet and to have a sense of connectedness with nature. The concept of the Circular Human-sphere is also discussed in relation to this topic. (PICTURE 5)

The concept of system dynamics, as proposed in *Thinking in Systems* published by Donella Meadows's famous book "Limits of Growth", also helps capture the concept of CE. In a major system transformation, there can quickly be a reversal with unforeseen consequences if only partial optimisation exists. Suppose there is an imbalance between the stocks that remain in circulation and the flows in and out of circulation, in which case various forces can work to keep the stocks in a desirable state, such as resilience and more excellent self-organisation, to return to the original state. If exploitation matches the rate at which the resource is regenerated, it will be stable. However, if it is over-exploited through technological efficiency, the dynamics will fluctuate greatly. In other words, focusing solely on the details can be misleading.

It is necessary to understand the system as a whole, taking into account the elements, relationships and objectives of each subsystem, identifying structures that influence potential behaviours, observing how the system moves over a long period, and recognizing the conditions that drive these behaviours. CE can only succeed if those involved discuss it and agree on new and broader goals.

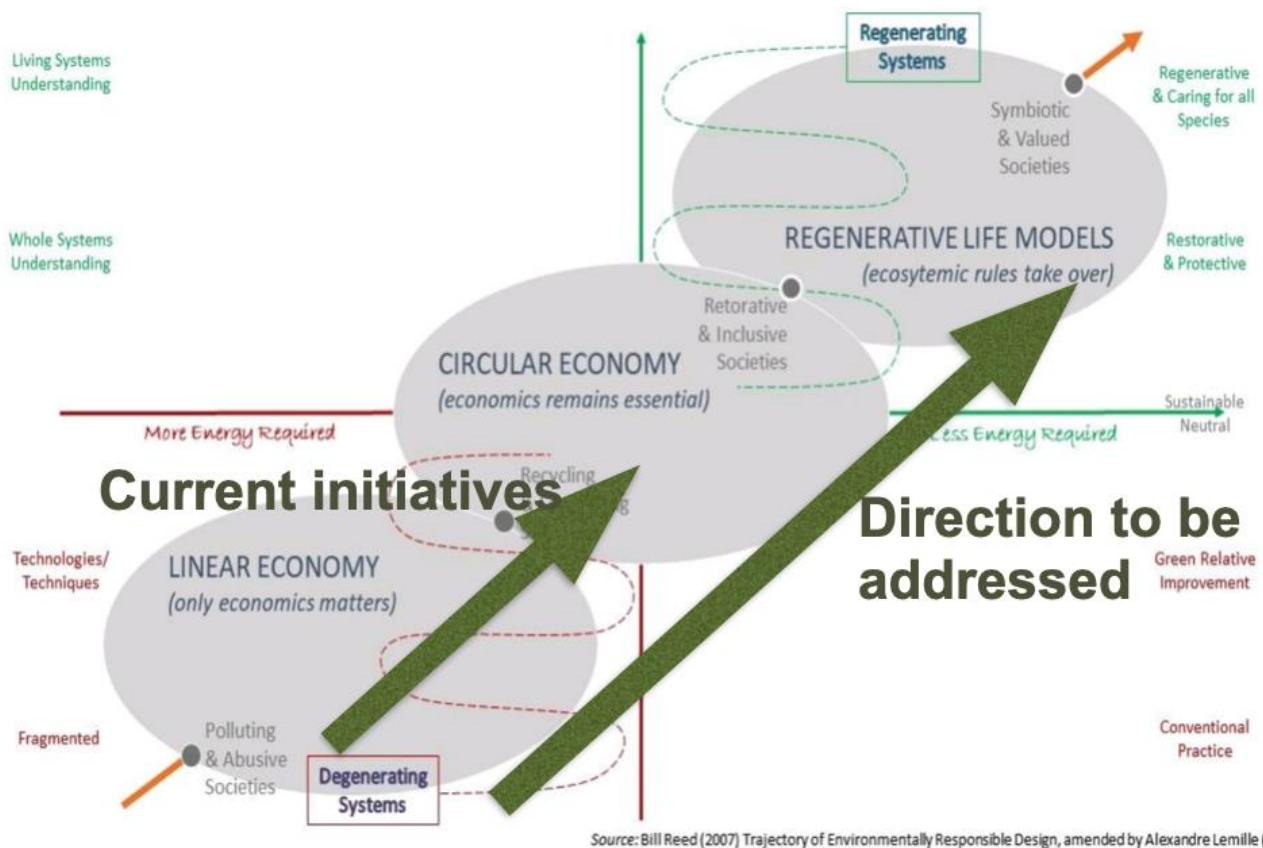
Digital technology is essential in driving the transition to a circular economy as it enables the capture, management and utilization of data in a rapid feedback cycle.

PICTURE 5: Trajectory of Environmentally Responsible Design



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PICTURE 6: Interaction of Circular Economy & Regenerative Life Model



Source: Bill Reed (2007) Trajectory of Environmentally Responsible Design, amended by Alexandre Lemille (2021)

Source :Bill Reed(2007), amended by Alexandre Lemille(2021)

1.2 Circular Economy in the Fashion and Textile Industry

Various countries have set out roadmaps and targets for the circular economy, but it is important to emphasize the inclusion of textiles. This is because the return on investment for transitioning to a circular economy has been estimated to be lower compared to other sectors such as the construction, food and automotive industries. However, the European Commission has identified textiles and clothing as one of the sectors with high resource consumption, significant carbon emissions, and limited recycling potential. As part of its Circular Economy 2020 Action Plan⁶, the EU Textile Strategy has been developed, and actions are currently being developed in public hearings and task forces.

When looking at CE in the textile industry, it is essential to acknowledge that the manufacturing phase represents the most resource-, energy- and labour-intensive phase. Despite the high environmental impact of the extraction and manufacturing process, there used to be limited economic incentives for recycling. The key for clothing lies in establishing a durable technological cycle. There are initiatives to

⁶ https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en

make the material biologically recyclable, such as through composting, but this leads to the disposal of substantial resources invested during production and a loss of value. Furthermore, clothing itself contains few soil-building nutrients and does not contribute to the regeneration of the planet. In other words, the priority is to keep the product in use for as long as possible, with the order being < recycle < reuse < repair and remanufacture.

1.3 Why the Japanese Fashion and Textile Industry Should Adopt a Circular Economy Strategy

So why must the Japanese fashion and textile industry transition to a circular economy? When looking at CE policies worldwide, the reasons for adopting CE differ depending on the country. CE policy is mainly focuses on improving waste management and the associated business opportunities, including existing waste management and promoting the recovery of raw materials in the manufacturing process⁷. For the EU, CE is expected to build a more sustainable and less resource-dependent economy, significantly reducing dependence on raw material imports. However, on the supply side, this could significantly impact relations and development in the Global South. It is hoped that by supporting not only their own countries and the EU but also developing countries, including the Global South, countries can achieve their sustainability goals and the world as a whole can move in a carbon-positive direction. Europe sees global agendas such as CE as 'good intentions' and 'opportunities'. It has been active in rule-making, including lobbying. The following four points summarise the reasons why Japan should adapt to CE, with reference to the reasons for CE adoption in other countries.

- Risk-aversion and economic development potential of resource constraints.

Situation:

Japan's textile industry relies heavily on resource-rich countries, mainly China, for raw materials and energy resources. The war in Ukraine and the expansion of COVID-19 have led to an increase in global resource demand, thereby increasing Japan's economic vulnerability. To solve this problem, Japan must use its knowledge and expertise to increase domestic resource recycling and reduce imports.

Reason:

By adopting more efficient production technologies, developing recovery and recycling technologies Japan can achieve resource sustainability. This shift will not only reduce its dependence on international markets, but also increase its competitiveness with emerging economies.

In addition, Japan has recognized the importance of resources since its isolationist period, and utilising this culture heritage and technology will create new business opportunities. Transforming the knowledge and technology of the circular economy, rooted in Japan's rural areas, into businesses can drive employment and regional development in rural areas. Furthermore, exporting Japan's own technologies to other countries can also lead to sustainable development and market expansion.⁸

⁷ <https://www.cairn.info/revue-journal-of-innovation-economics-2022-3-page-45.htm&wt.src=pdf>

⁸ <https://www.jpmac.or.jp/img/relation/pdf/2021pdf-full.pdf>

- Growing environmental issues and ESG investment at home and abroad

Situation:

The fashion industry is considered the second most polluting industry in the world, and the production and consumption of textiles have a significant impact on the environment. The environmental impact of the production stage includes the cultivation and production of natural fibres, which is affected by the use of land, water, fertilisers and pesticides, and the production of synthetic fibres, which has an even greater environmental impact due to the use of energy and chemical raw materials. Manufacturing products in the fashion industry involves the use of energy, water, and a wide range of chemicals (e.g., dyes and finishes), contributing to pollution. For example, according to the United Nations Conference on Trade and Development (UNCTAD), the average amount of water needed to produce a pair of jeans is approximately 7,500 litres, equivalent to seven years of drinking water for one person. The fashion industry consumes 93 billion cubic metres of resources annually, using enough water to meet the needs of 5 million people.⁹

During distribution and retailing, energy and resources are consumed through CO₂ emissions during transport and the high use of packaging waste. In addition, a significant amount of textile products that remain unsold end up being disposed as waste. During the use and maintenance phase, such as washing, drying and ironing, electricity, water and detergents are used, and chemicals and microfibres are released into urban wastewater. Finally, after use, textiles are either collected, sorted, reused, recycled, or incinerated, which also consumes large amounts of energy and emits greenhouse gases.

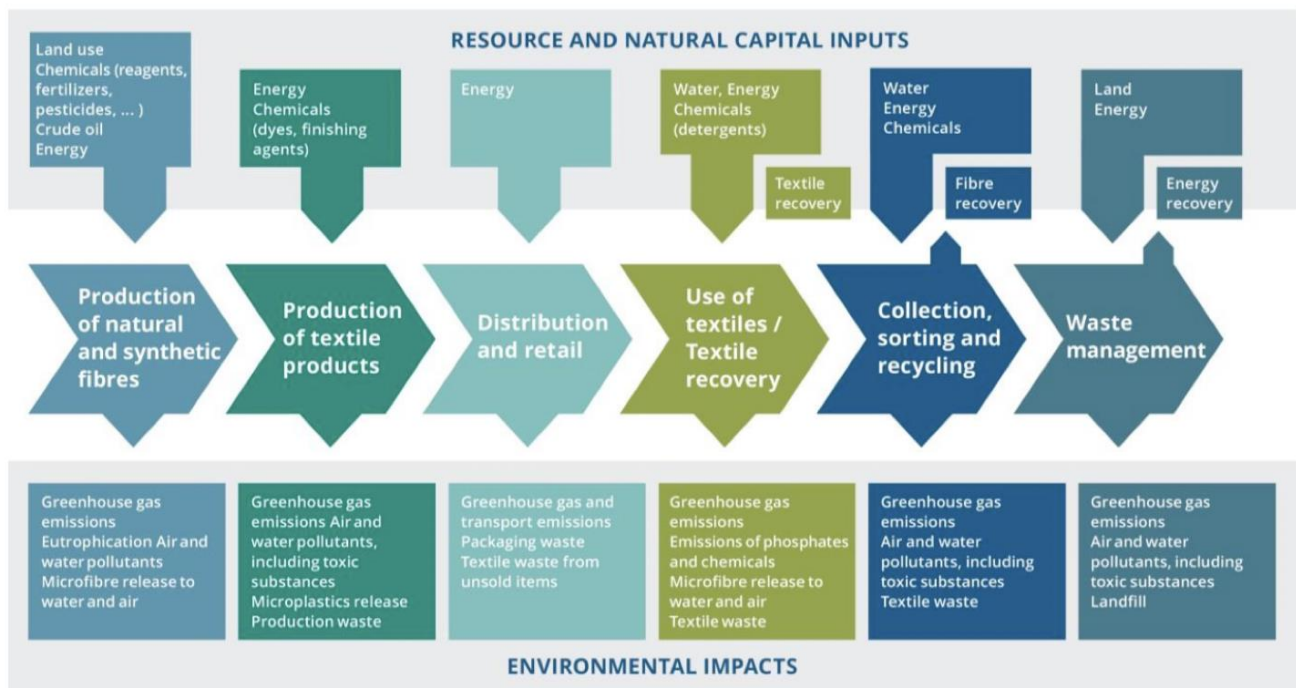
Reason:

As a result of these environmental pressures, society, including investors, is demanding greater environmental performance. For example, the Ellen MacArthur Foundation, the World Economic Forum, and global companies have established a global network, such as the Circular Business Initiative in collaboration with the United Nations Environment Programme and others, are working to accelerate the drive towards a circular economy. In addition, there is a growing trend in ESG investment: According to GSIA research, global ESG investment balances increased from \$22,839 billion in 2016 to \$35,301 billion in 2020, with further growth expected in the future. The Green Deal Industrial Plan aims to facilitate investments in circular businesses by increasing the competitiveness of the climate tech industry. Although the amount of ESG investment in Japan is small compared to overseas, companies that fail to take environmental measures and disclose information may face challenges in raising funds and ensure long-term survival.¹⁰

⁹ https://www.unic.or.jp/news_press/features_backgrounders/32952/

¹⁰ https://ec.europa.eu/commission/presscorner/detail/en/IP_23_510

PICTURE 7: Environmental impact of textile products during their life cycle



Source; Textiles and the Environment The Role of Design in Europe's circular economy from the European Environment Agency

- Growing human rights concerns

Situation:

Ethical issues in the fashion industry have become prominent in recent years. In the 1990s, labour issues started to emerge in some companies, and in 2013, the Rana Plaza collapse in Bangladesh highlighted the tragic consequences of exploiting workers who were subjected to low wages and poor working conditions in garment factories. In 2021, the EU and US successfully sanctioned companies engaged in business with factories in China's Xinjiang Uygur Autonomous Region, where there are concerns about the employment of workers from the region. Japanese companies such as Fast Retailing and MUJI were also sanctioned, highlighting the need for global companies to monitor and continue to audit for human rights abuses such as forced and child labour, in all transactions along their supply chains.

Reason:

In February 2023, Asako Okai, the director of crisis management at UNDP, told Japanese companies, including those in the textile industry, that falling behind international ethical standards poses a risk to conducting business in the global market. She urged companies to implement stronger human rights mechanisms in their supply chains. In Japan, the government issued Guidelines on Respecting Human Rights in Responsible Supply Chains in September 2022, providing guidance for companies to formulate human rights policies, conduct due diligence, and take remedial actions to address any

violations. However, concrete measures are still under consideration. Enhanced transparency and careful management of the entire supply chain are prerequisites for fair business practices in the international community.¹¹

- Developments in digital technology

Situation:

An essential aspect of CE implementation is the importance of development and promotion of digitalisation technologies. Digital technologies are expected to enable more efficient processing and use of environmental impacts and labour in the value chain by managing and monitoring them, potentially reducing costs and increasing productivity.

Reason:

The accumulation of data allows business models to expand from simply selling goods to providing services using goods. Furthermore, such data can be used to build a new economic infrastructure for regions and societies to survive and develop, contributing to the sustainable growth of society as a whole.

¹¹ https://d-arch.ide.go.jp/je_archive/society/wp_unu_jpn80.html

Chapter 2 The Current Situation and Characteristics in the Japanese Fashion Industry

2.1 Japanese Culture and Textile History

Producers, not consumers of clothing, food and shelter¹²

Before the industrialisation of synthetic fibres in the early 20th century, everything was made from natural fibres. In villages throughout Japan, one could witness the whole process of extracting fibres from bark and grass in the surrounding mountains, growing hemp, cotton and silkworms, spinning them into yarn, weaving them and dyeing them to the desired colour. The cultivation of cotton and sericulture were arduous tasks that required time and effort at every stage. As a result, people developed strong attachments to the clothes they had spent time crafted themselves and did not want to waste them. In addition, dyed and woven products from different parts of Japan, which could only be produced under the local climatic conditions, had a rare value and were regarded as precious and expensive. Old clothes and fabrics also had a commodity value. They were transported to markets across Japan based on demand, and people waited for the opportunity to acquire them. They were not merely consumers but active participants in the production process.

Thorough circulation system because it is a valuable resource.¹³

During the 17th century, the spread of cotton led to the emergence of second-hand clothing merchants and traders began to flourish in Osaka and Edo. These merchants collected old clothes and fabrics from all over the region and transported to all parts of Japan. The demand for such items was particularly high in Tohoku, where the land was too cold and too thin for cotton cultivation. Rags, such as those used in "Sakiori" (rip weaving), where waste fabric is torn into strips, reformed into cords and woven together, had commercial value. In fact, it was more important and valuable than food. Cloth also served as a cash crop, allowing individuals to earn a living. People devised ways to become self-sufficient in producing textiles from odds and ends and discarded threads from the production process. The idea of 'Mottainai', similar to today's concept of circularity, began to take root in the region. In each region, clothing was not considered as waste but was carefully reused and recycled.

The thought behind cutting

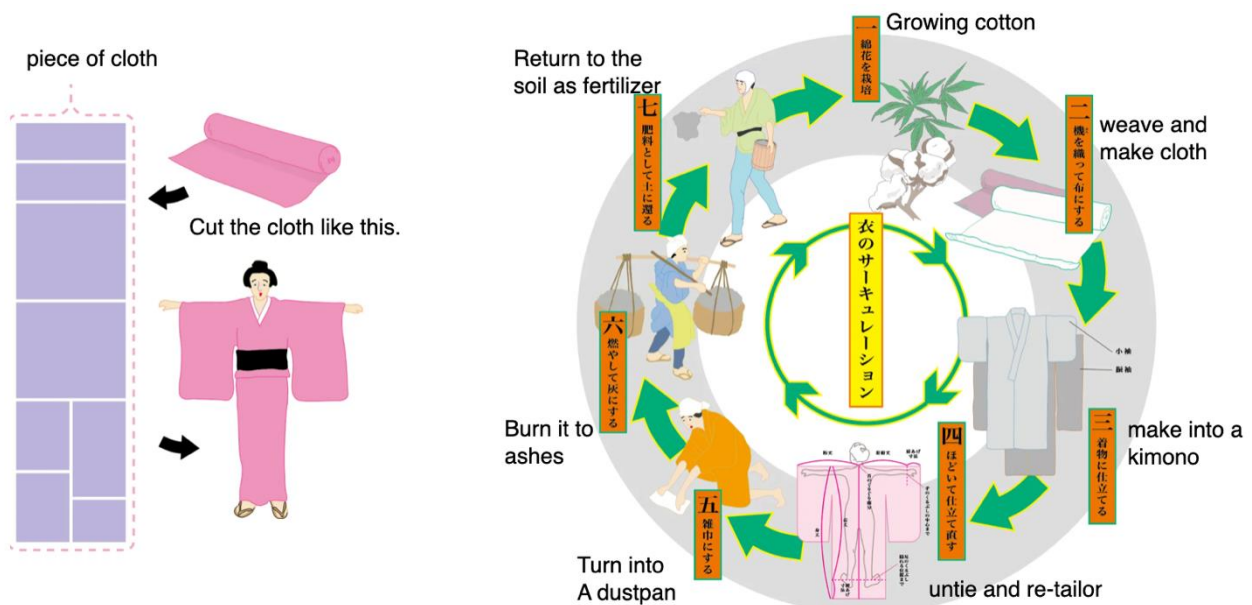
Modern everyday clothes in Japan are cut and sewn into three-dimensional shapes that conform to the human body. Kimonos, on the other hand, is cut in a straight line and worn on the body. When untied, they return to a single piece of fabric. This unique characteristic is considered a gift from nature, as it ensures the life within the material is not wasted in the slightest. The cloth is designed to be used

¹² Natural fabrics -- beautiful Japanese fabrics --. Published 2018/06

¹³ https://d-arch.ide.go.jp/je_archive/society/wp_unu_jpn80.html

repeatedly from the moment it is cut. Once a kimono has fulfilled its purpose, the fabric is repurposed into various items. For instance, rags from adult clothing are recycled and re-made into children's clothes, then transformed into aprons and nappies, and ultimately used until the rags can be returned to the soil as fertiliser. Throughout the process, the wishes and prayers of those who wore the kimonos are believed to be incorporated into the next creation. For example, the Hyakutoku Kimono in Kanazawa, a children's kimono made from scraps of kimono sewn together, is meant to encourage children to grow strong and healthy by harnessing the collective energy of many healthy individuals. Traditional costumes from different regions of Japan are filled with these wishes, and there was also a custom of worshipping clothes as Monogami (object gods). Within Japanese culture, the role of clothing was to accompany such experiences by fostering a sense of community connection as individuals grow, dressing appropriately for age-related milestones, annual events and festivals. This cultural practice continued until the period before textile industrialisation began.

PICTURE 8: Textile Circularity in Edo Period



Source; NIHONBASHI MODEL Promotion Committee

The industrious revolution and craftsmanship in the Edo Period ¹⁴

During the Edo period in Japan, there was a significant increase in the rural population which resulted in a dramatic decline in the number of livestock- a phenomenon known as the 'Industrious Revolution' compared to the Industrial Revolution in Western Europe. It is generally assumed that an increase in population would lead to increased production and an expansion of livestock. However, the exact opposite happened. At the time, rural communities lacked the capital to invest in large quantities of productive assets such as livestock. In addition, keeping livestock required fodder from pastures and

¹⁴ <https://www.murc.jp/wp-content/uploads/2022/10/196.pdf>

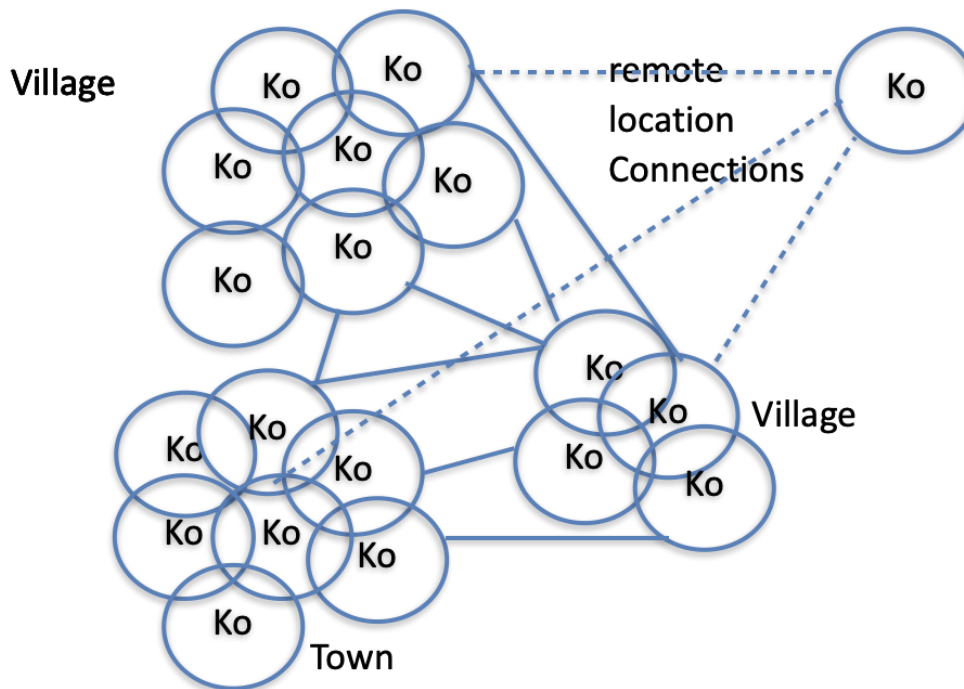
other sources, which was seen as inefficient from the perspective of using arable land in land-scarce country like Japan. The rational option was for people to increase the marginal productivity of the land through family labour and hard work.

Concurrently, the textile industry developed along with agriculture. To acquire the high skills required for skilled manufacturing, time, labour, and industriousness were essential. Rural communities across the country started producing raw materials like cotton, and eventually, cottage industries proliferated where farmers processed the raw materials into finished products that were then distributed. There was also the development of the home industry, where traders loaned materials to farmers who spun and wove them and subsequently purchased the finished products in bulk. This framework forms the basis of the fashion and textile industry today. Depending on the climate and lifestyle of the industrial area, Japanese textile manufacturing technology, which was born out of the diligence of the Japanese people, varied and encompassed diverse practices including silk weaving, cotton weaving, and linen weaving, enriching the lives of the people.

“Ko” communities and their links to economic activities.

In the Edo period, the term 'Ko' referred to the formation of various business associations. Traditionally, craftsmen in the building industry formed trade associations under the name 'Something-Ko'. With the development of the economy, various communities were formed, such as 'Tanomoshi ko', which was formed among the general population for mutual financial support. Over time, more and more people joined more than one Ko, and the Ko became interconnected and spread throughout the country. New business opportunities and often excellent business models were created when Ko and Ko, with some autonomous economic activity, came together. From Edo's small, closed economy, divided into hundreds of fiefdoms, all of Japan was connected by Ko, and business spread with these connections.

PICTURE 9: Network Society in Edo



Source: strategic use of Web 2.0 in the Edo period.

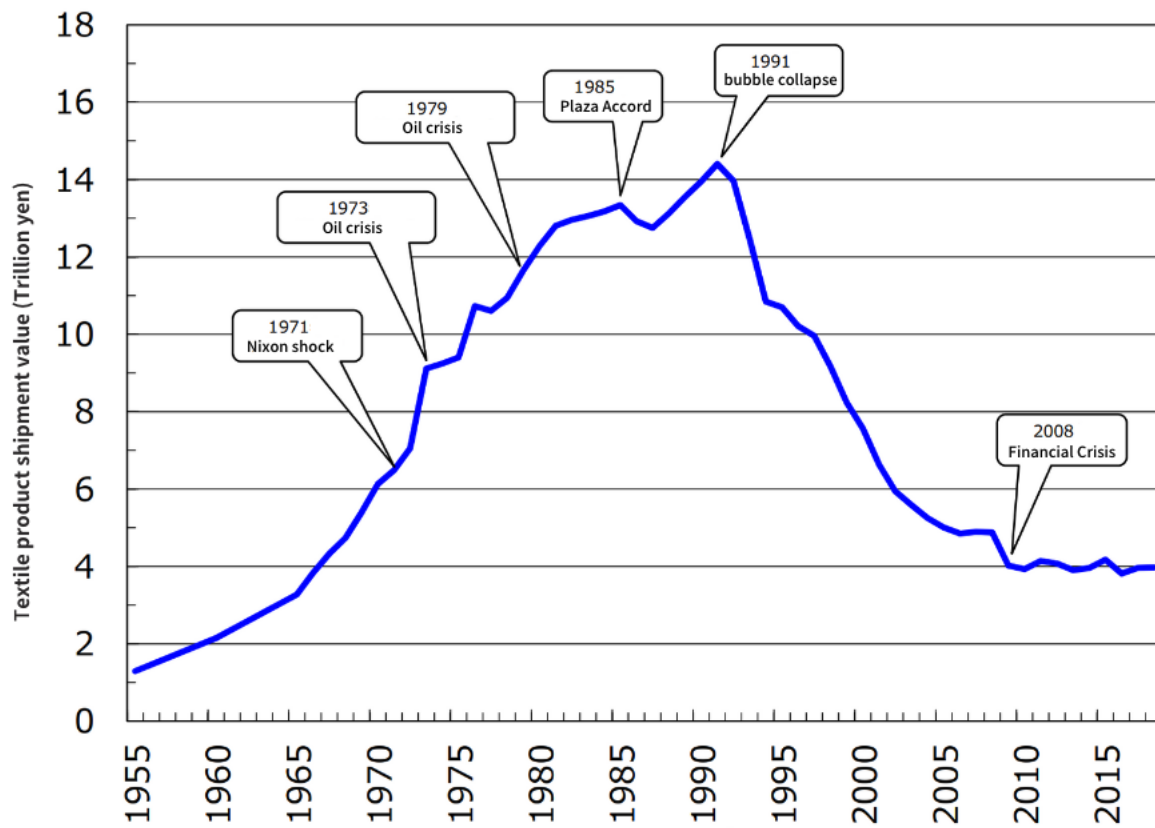
2.2 Production, Manufacturing, Trade, Sales and Distribution

2.2.1 Production and Manufacturing

The Japanese apparel and textile industry emerged as a crucial export industry during the Second World War and rapid economic growth in Japan. At that time, the industry was dominated by developing-country-style industries that relied on cheap labour and competed internationally based on cost advantage. The value of textile exports grew significantly. However, in the 1990s, the bursting of economic bubble led to a decline in the luxury brand apparel market, while fast fashion gained popularity. Japanese global brand UNIQLO products became a huge hit, and foreign brands such as Zara and H&M also arrived in Japan. This led to the fast-fashion boom in the late 2000s.

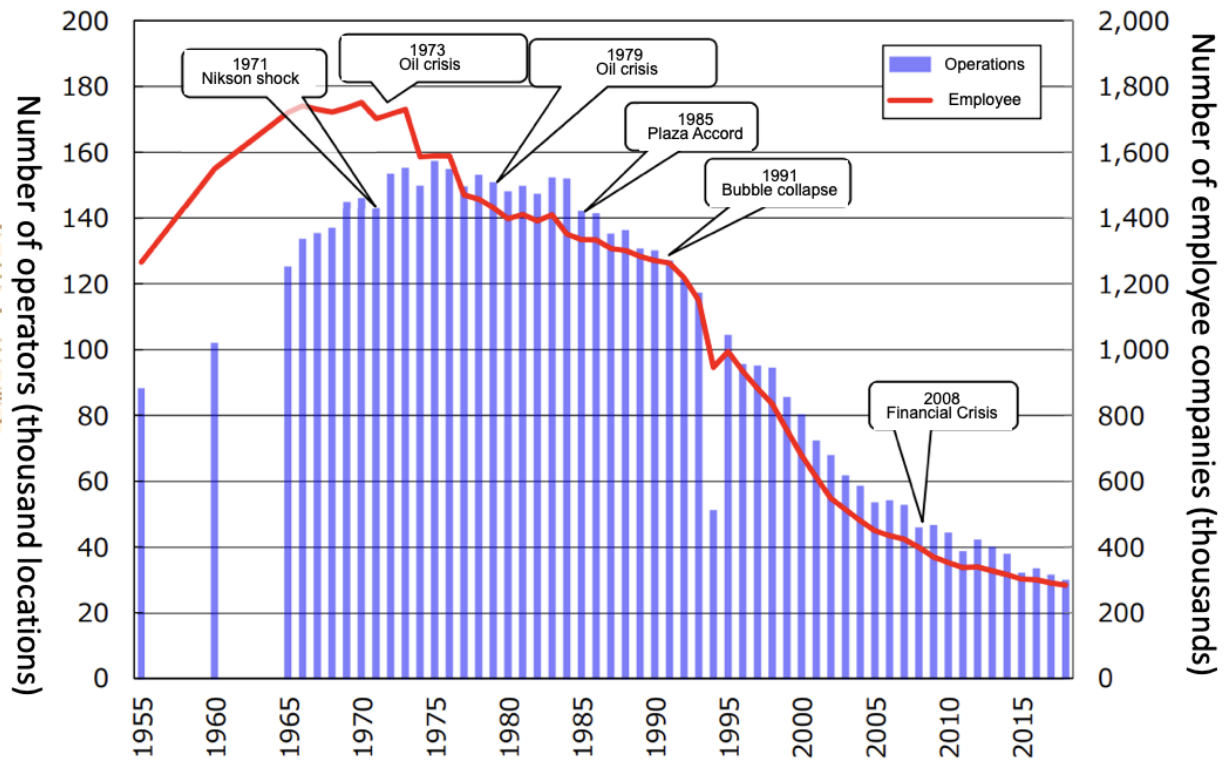
While the number of employees and enterprises increased, so did labour productivity. The number of employees peaked in the 1960s and the number of enterprises reached its peak in the 1970s; However, since the burst of the economic bubble in 1991, the number of enterprises and employees have declined sharply and continues due to the market slowdown.

PICTURE 10: Manufactured textile product shipment value in Japan



Source; Ministry of Economy, Trade and Industry First Subcommittee on Textile Industry 2021, Nov

PICTURE 11: Textile Industry scale



Source; Ministry of Economy, Trade and Industry First Subcommittee on Textile Industry 2021, Nov

2.2.2 Trade

Import

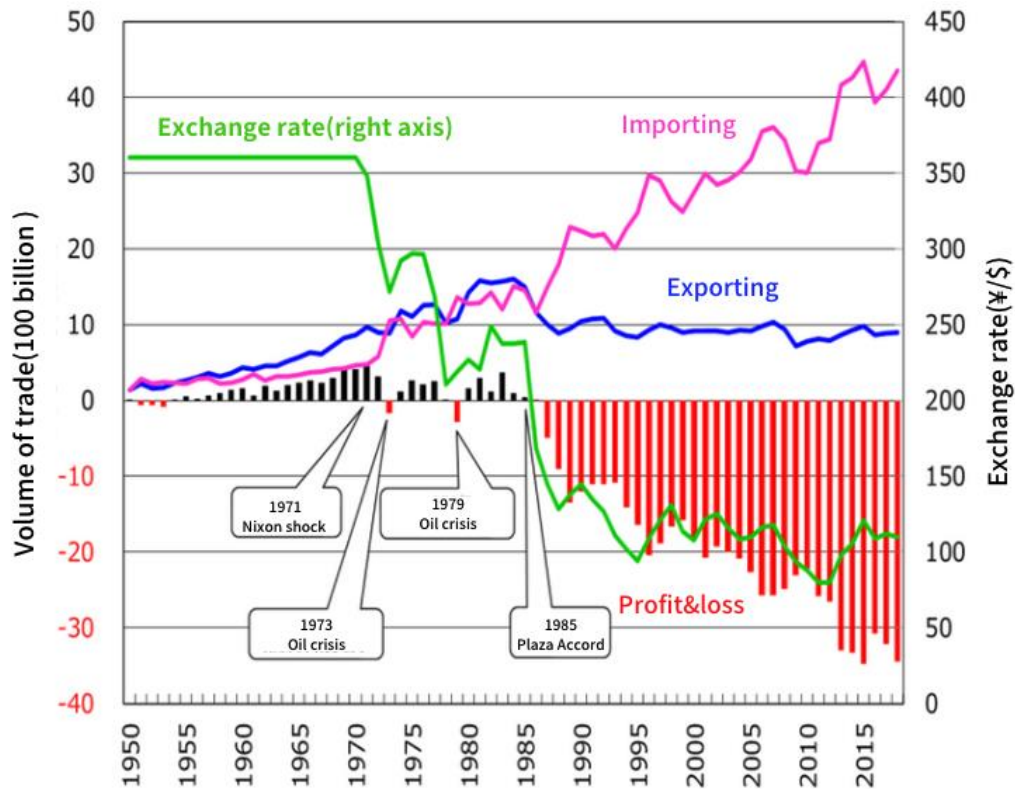
During Japan's period of high economic growth, Textile imports and exports experienced an increase as the Japanese exchange rate stabilised after the 1985 Plaza Accord. However, the rapid appreciation of the yen made the Japanese industry less competitive, and the trade balance became negative (PICTURE 11). The majority of imports in the textile sector were clothing. The import penetration rate for clothing in Japan is particularly high, at 97.9%. This heavy reliance on imports is because many Japanese clothing companies have moved their production bases to overseas countries with lower labour costs and importing processed products. Japan also imports 100% of its wool and cotton, with China and Southeast Asia serving as the main import partners.

Export

Japan exports clothing and textiles, with a total value of JPY 990.2 billion in 2018. Fabrics account for the largest share at 31%. The main export destinations are China, East Asia and the Middle East. Japanese fabrics are highly advanced in terms of technology, and the exported fabrics carry a high

value and are internationally competitive. In fact, Japan exports more fabric articles than EU countries and the USA.¹⁵¹⁶

PICTURE 12: Trade defects

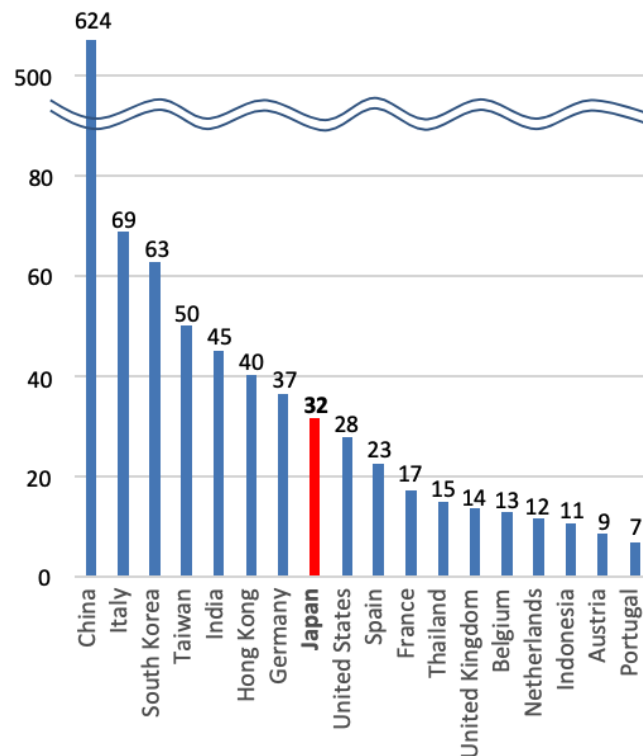


Source; Ministry of Economy, Trade and Industry First Subcommittee on Textile Industry 2021, Nov

¹⁵ <https://www.jtia.or.jp/toukei/toukei.htm>

¹⁶ <https://www.jpmac.or.jp/img/relation/pdf/2021pdf-full.pdf>

PICTURE 13: Fabric Exports in each country



Source; Ministry of Economy, Trade and Industry First Subcommittee on Textile Industry 2021, Nov

2.2.3 Structure and Issues of the Japanese textile industry

In 2020, Japan's apparel sales were 8.6 trillion yen, representing a 20% decrease from the previous year due to COVID-19 (PICTURE 13). On the other hand, the number of domestic garments supplied increased to 3.57 billion, which is 1.5 times higher than in 1990. This indicated an oversupply situation in the market where the domestic procurement volume was 2.8 billion items, while the consumption volume was 1.36 billion (PICTURE 14). In contrast, in 1990, the figures show a circulation of 1.19 billion items and 1.15 billion items were sold. This is thought to be due to the expansion of the SPA (Speciality store retailer of Private label Apparel) business model in Japan, a term coined in 1986 by the chairman of US worldwide clothing retailer to describe his company's business model, which vertically integrates everything from product planning to production and distribution. Retailers order months ahead of the season and buy large quantities of material, so they can't adjust supply and demand according to trends and climate predictions. Various sizes and colours are produced in large quantities, products on shop shelves remain unsold, discount sales and overseas exports have become the norm, and exports of used clothing overseas continue to increase. That is why exports of used clothing overseas continue to increase.¹⁷¹⁸¹⁹

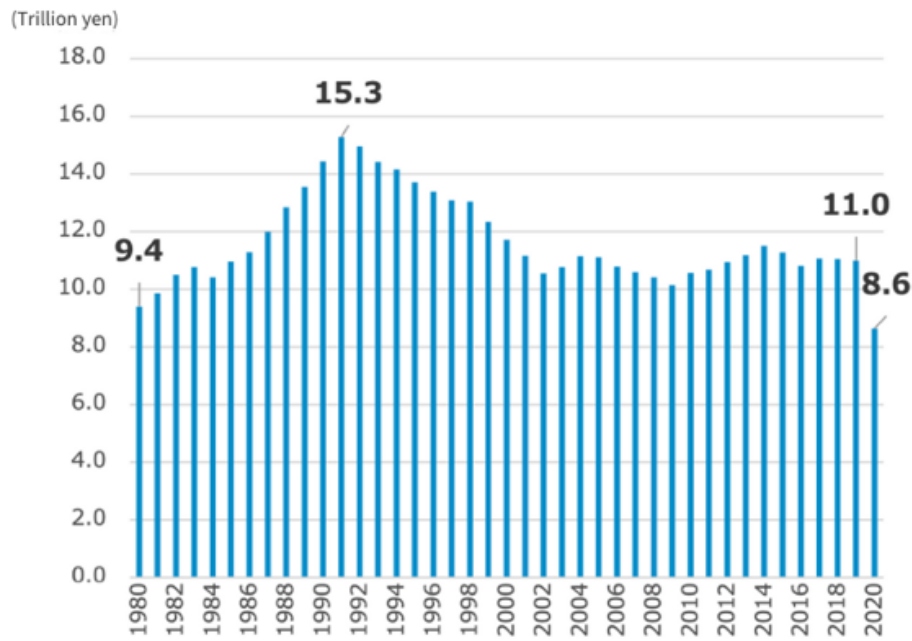
¹⁷ <https://c-fine.jp/magazine/sustainability/>

¹⁸ <https://www.wwdjapan.com/articles/990986>

¹⁹ https://www.meti.go.jp/shingikai/mono_info_service/textile_industry/pdf/001_07_00.pdf

The market survey conducted by Full Kaiten Corporation on the profit structure of apparel companies from April to June 2020 reveals that only 20% of all SKUs generate 80% of the total gross profit from sales. This means that the remaining 80% of SKUs do not generate any profit. Such an inefficient business model when the profit of the company and the impact on the environment are taken into account.

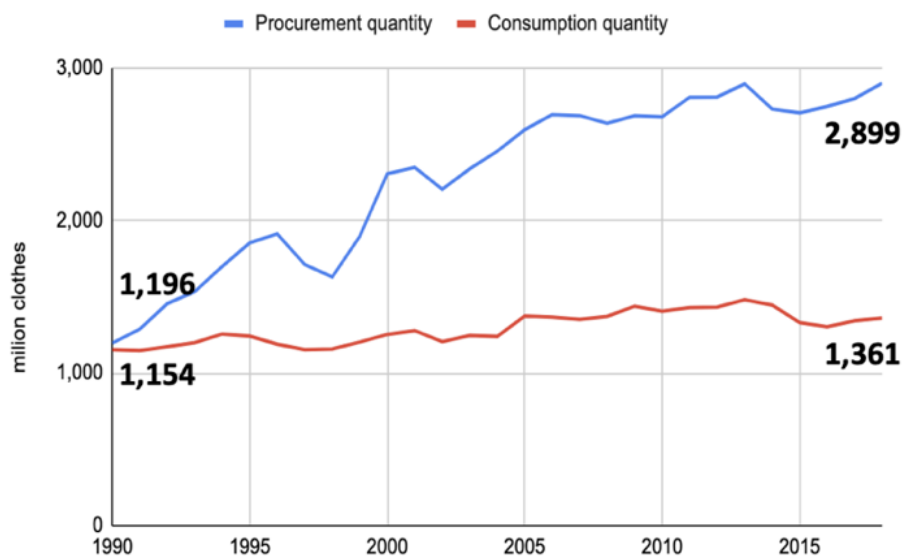
PICTURE 14: Domestic clothing market



※Sales of the textile, clothes, personal belongings

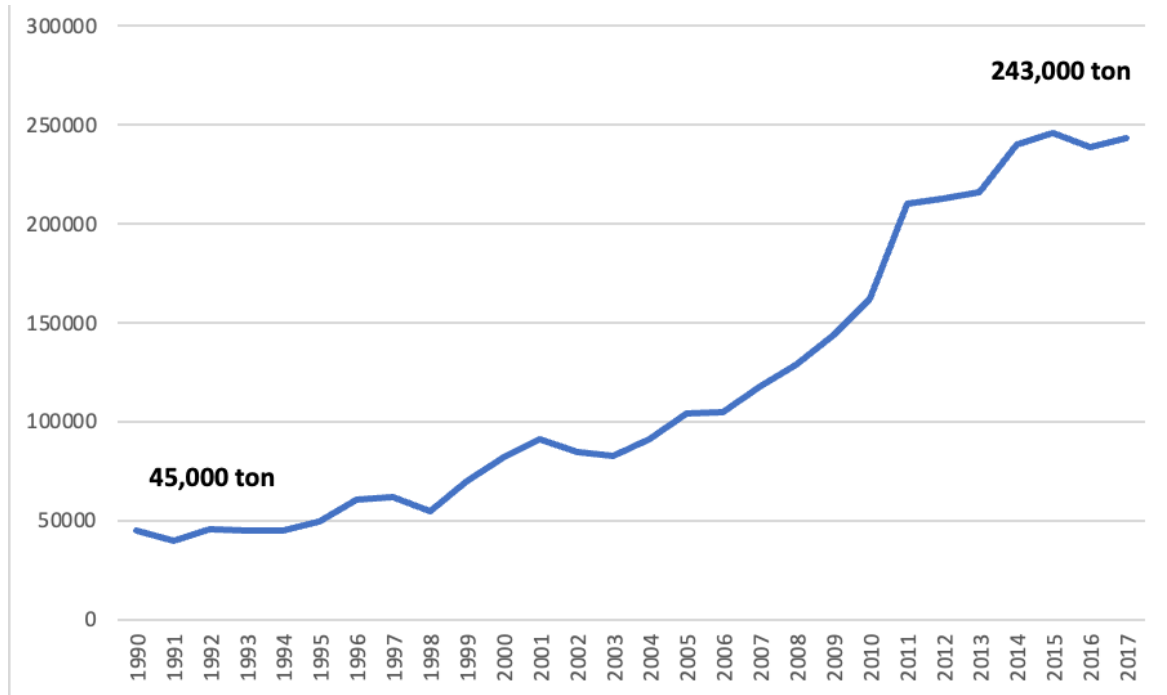
Source: Towards 2030 Prospects for the textile industry from METI First Subcommittee on Textile Industry 2022, May

PICTURE 15: Fashion clothes supply and demand balance



Source: Kojima Fashion Marketing Co. Research 2020/6²⁰

PICTURE 16: Export Used Clothes



Source: Kojima Fashion Marketing Co. Research 2020/6²¹

²⁰ <http://www.fcn.co.jp/thesis/gendai200625/>

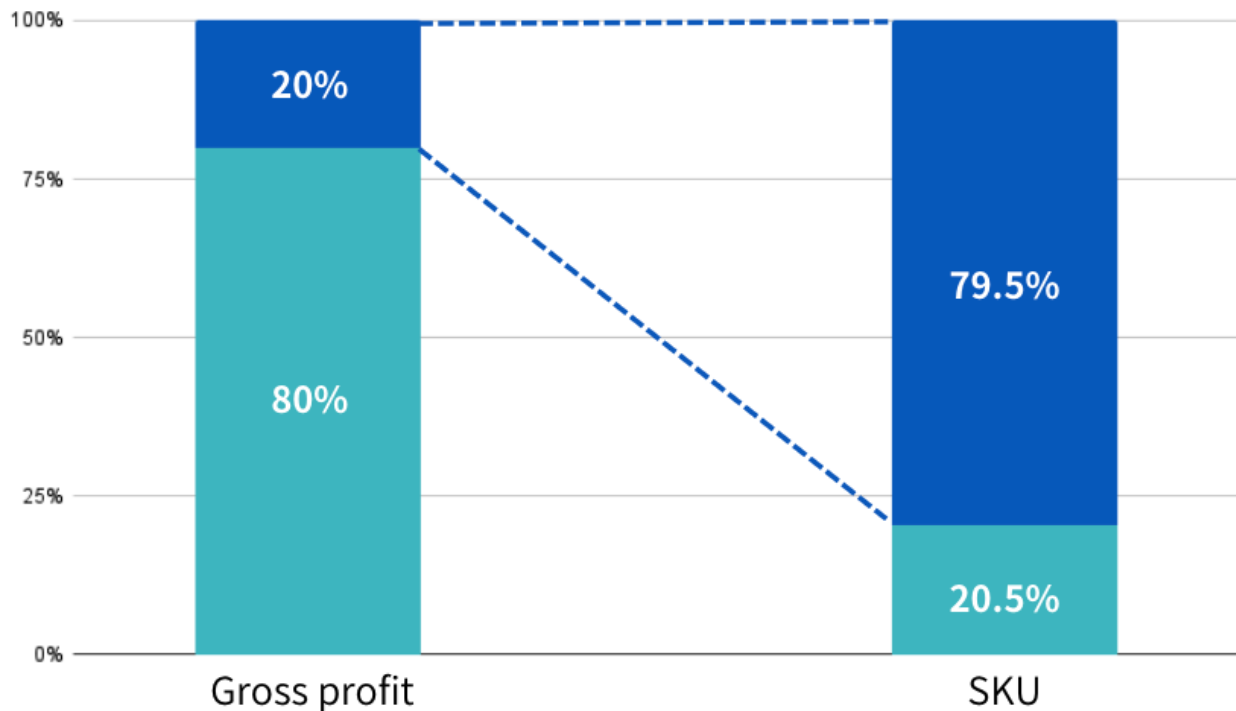
²¹ <http://www.fcn.co.jp/thesis/gendai200625/>

PICTURE 17: Profit structure in apparel

Overstocking problem in the apparel industry

80% of Gross profit comes from 20.5% of Stock keeping Unit(SKU).

From April to June 2020, Average of 34 companies(168 brands)



Source; Market survey conducted by Full Kaiten Corporation 2022/9²²

2.2.4 Chemical fibres market

Chinese textile manufacturers are growing rapidly, accounting for over 50% of global textile production. The majority of polyester and nylon, which are the two largest synthetic fibres, are produced in China. In Japan, the leading synthetic fibre producers are Toray, Teijin Frontier, and Asahi Kasei. Toray develops all three major Japanese synthetic fibres (nylon, polyester and acrylic). In recent years, Toray has been focusing on creating additional value by developing an integrated supply chain business, processing fibre materials, including textiles, sewing, and yarn. The company is working with global retailers, such as UNIQLO to expand sales and develop new textile technologies for innovative materials, establishing a competitive position globally.

2.2.5 Apparel markets

²² <https://u-note.me/note/70889>

When analysing the clothing market by distribution channel, department stores (DpS) and GMS/supermarkets have experienced a decline in market share, while speciality stores (SpS) and the size of e-commerce have increased. Most of the market share is dominated by a small number of large retailers, led by Fast Retailing with its UNIQLO and GU brands. Other clothing retailers include Adastria, Ryohin Keikaku (MUJI) and World. On the other hand, there are challenges faced by low-cost retail chains such as Shimamura, which specifically target the shrinking Japanese domestic market. These retailers are in danger of disappearing, and their sales are declining. In contrast, Fast Retailing is focusing on expanding its presence in the overseas market rather than the shrinking Japanese market. They have begun to cater to the strong overseas demand for CE. As the apparel market in Japan continues to shrink, global companies will be forced to strengthen their CE initiatives, while apparel companies competing in the Japanese domestic market will be weeded out.

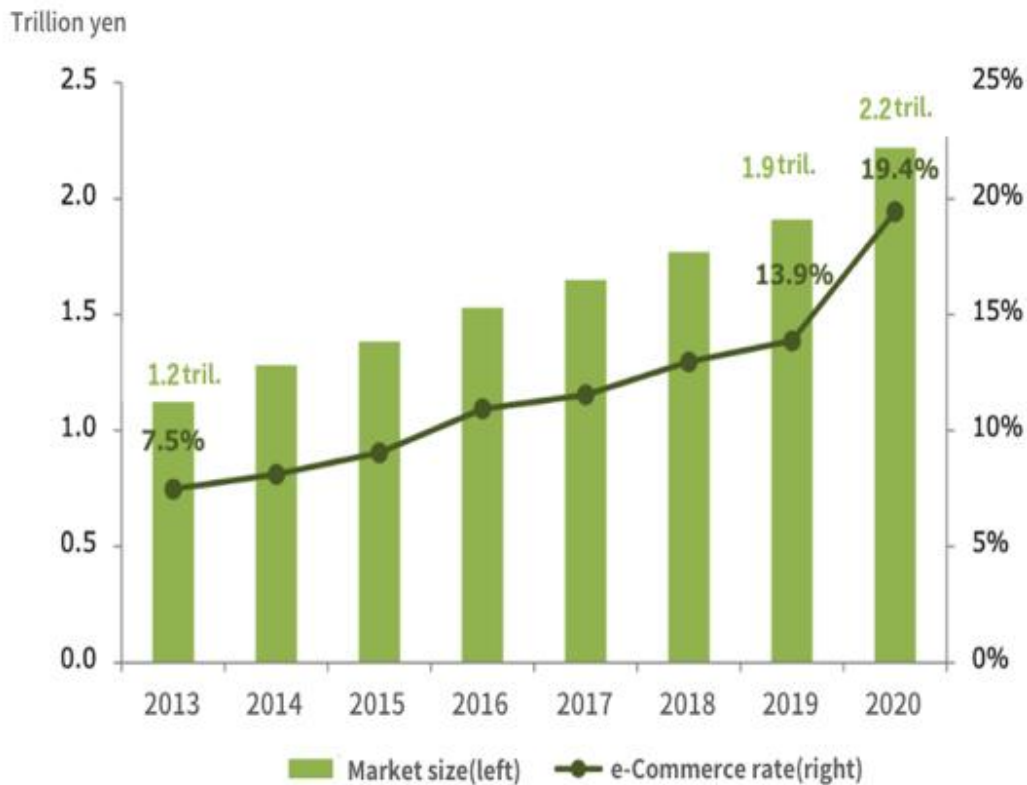
The e-commerce market for the apparel industry is growing steadily: reaching a value of 2.2 trillion yen by 2020. E-commerce now accounts for 19.4% of the market (*), indicating that buying clothes online has become the norm for many consumers. In the apparel e-commerce retail sector, ZOZO Corporation has consistently increased its sales and profits. The company is also continuously evolving, introducing new features to its WEAR online coordination application, which has led to the creation of a new C-to-C retailing market. Emphasizing the role of technology is the key to our market expansion strategy.

*EC conversion rate: refers to the proportion of all consumer purchases made via e-commerce (EC).

Table 1:Top10 Apparel Retailers FY2019

Rank	Company	Type	Sales ¥mn	YonY %	Apparel in Total sales %
1	Uniqlo	SpS	872,957	0.9	100
2	Shimamura	SpS	516,068	-4.4	100
3	Zozo	EC	317,423	6.7	92
4	Aeon Retail	GMS	301,927	-3.9	17.2
5	Daimaru-Matsuzakaya	DpS	239,495	-4.2	26.5
6	GU	SpS	238,700	12.7	100
7	Adastria HD	SpS	222,376	-0.1	100
8	Isetan-Mistukoshi	DpS	200,038	-12.3	34.3
9	Onward Holdings	SpS	197,424	5.9	79.5
10	Takashimaya	DpS	194,234	-2.8	27.9

e.g JAPAN'S APPAREL & TEXTILE MARKET in 2021 modified by JapanConsuming

PICTURE 18: Market size and e-commerce ratio in the fashion industry

Source:e-Commerce Market Survey in 2020

2.2.6 Structure and Issues of the Japanese textile industry

The textile industry has a multi-stage supply chain with many subcontractors, ranging from the production of synthetic fibres to the manufacturing of garments. Each stage, the production of raw yarn and fabrics, dyeing and sorting, sewing, etc. has its own division of labour. Trading companies act as the link between domestic and overseas production centres, effectively organising and coordinating the supply chain. However, this complex structure between trading firms creates a lack of transparency, weakening the links between the garment and domestic manufacturing firms. In addition, due to rising labour costs in Japan and the expansion of SPAs, manufacturing companies are moving production overseas. As a result, certain regions in Japan are experiencing a decline and disappearance of the sewing, dyeing and processing industries, posing a risk of supply chain disruption. Manufacturing companies are concentrated in certain production areas, and most rely on outsourced production instead of developing their own products, so the challenge is to become "self-sufficient" in terms of developing and selling their products.

Table 2: Companies in each supply chain in their strengths and challenges

Supply Chain	Main enterprises	Strength	Challenge
Upstream [Synthetic textile manufacturing and spinning industry]	Mainly large companies (e.g., Toray, Teijin, Toyobo)	Technological development capabilities (e.g., development and expansion of carbon fibre and new materials and applications, development of materials derived from non-fossil raw materials)	Diversified and textile businesses' revenue streams are non-clothing
Middle stream [Dyeing and processing industry, textile industry].	Focus on small and medium-sized enterprises, textile production areas throughout Japan	Processing technology, coordination (with material manufacturers and other process companies), cooperation with different fields (e.g., with the automotive and electronics industries), technology transfer (human resources development).	Expansion and independence into non-clothing (own product development and sales)
Downstream [sewing, manufacturing, apparel].	SMEs	Ability to disseminate fashion information (brand power)	Strengthening international competitiveness, addressing environmental issues and human rights.
Other [trading companies, SPAs].	Mainly large companies (e.g., Itochu, Uniqlo)	Ability to disseminate fashion information (brand strength, international expansion), degree of responsiveness to environmental protection and consumer safety (recycling, false labelling, measures against hazardous substances)	Strengthening international competitiveness, addressing environmental issues and human rights.

Source; Ministry of Economy, Trade and Industry First Subcommittee on Textile Industry 2021, Nov

2.3 Reuse markets

The reuse market in Japan is growing despite the challenges posed by the COVID-19 pandemic and economic environment, reaching 2.7 trillion yen in 2021 and is expected to reach 3.5 trillion yen by 2025.²³ This growth can be attributed to the increasing awareness among consumers about the

²³ https://www.recycle-tsushin.com/news/detail_7557.php

importance of protecting their livelihoods, as many things tend to become more expensive due to the weak yen and high resource prices. In particular, customer-to-customer (CtoC) transactions via flea market apps are growing rapidly and are expected to account for 44% of CtoC transactions by 2020. Society's environmental awareness and 'appreciation of things' are also on the rise, with Mercari as a driving force. According to the 'Consumer behaviour of users and non-users of flea market apps in 2022', 53.0% of respondents said that they had no objection to purchasing second-hand goods.²⁴

The reuse market for fashion products was 720 billion yen in 2019 and is expected to grow to 990 billion yen by 2022.²⁵

Overseas, resale platforms for used clothing, especially online, are expected to drive market growth, boosting the overall global result.²⁶

In 2021, the top five companies in the reuse industry recorded impressive sales of 168.4 billion yen, showing a significant year-on-year increase of 26.0%. from GEO Holdings, which mainly operates a shop purchase business; Mercari, a C-to-C online trading company, achieved sales of 147 billion yen, marking a growth of 38.5%; Comehyo experienced sales of 71.1 yen billion, an increase of 40.2%; and Valence HD with a sales growth of 38.5%, reached 52.5 billion yen. However, store-based reuse companies, known as recycle shops, such as GEO, have a business model of buying items at low prices and selling them at even lower prices. On the other hand, online CtoC transactions, such as Mercari, are believed to be relatively high in terms of legitimate prices. Online platforms have enabled the sale of durable and valuable items, regardless of their age, do not drop in price and enter into secondary and tertiary distribution. This system breaks away from the linear system where one person consumes and disposes of things, but a system where a product is passed on to multiple consumers who can continue to use it and maintain its circularity over a longer period.

One of the future challenges is the establishment of a robust product tracking system. Manufacturers currently have no incentive to produce durable products now because the secondary and tertiary distribution profits do not flow back to them. A system needs to be set up where profits are properly allocated through the subsequent secondary and tertiary distribution value chain back to the product manufacturing side, where the cycle may be prolonged.

MERCARI (MERCARI Corporation)

The service was launched in 2013, and has since provided Japan's largest C-to-C marketplace where users can list and sell items to each other. According to the 2022 Sustainability Report, the app has prevented approximately 59,000 tonnes of clothing waste in Japan and the US, which in turn, has resulted in an estimated avoidance of approximately 1.4 million tonnes of CO2 emissions. As

²⁴ https://about.mercari.com/press/news/articles/20220816_consumersurvey/

²⁵ (https://www.yano.co.jp/press-release/show/press_id/2395)

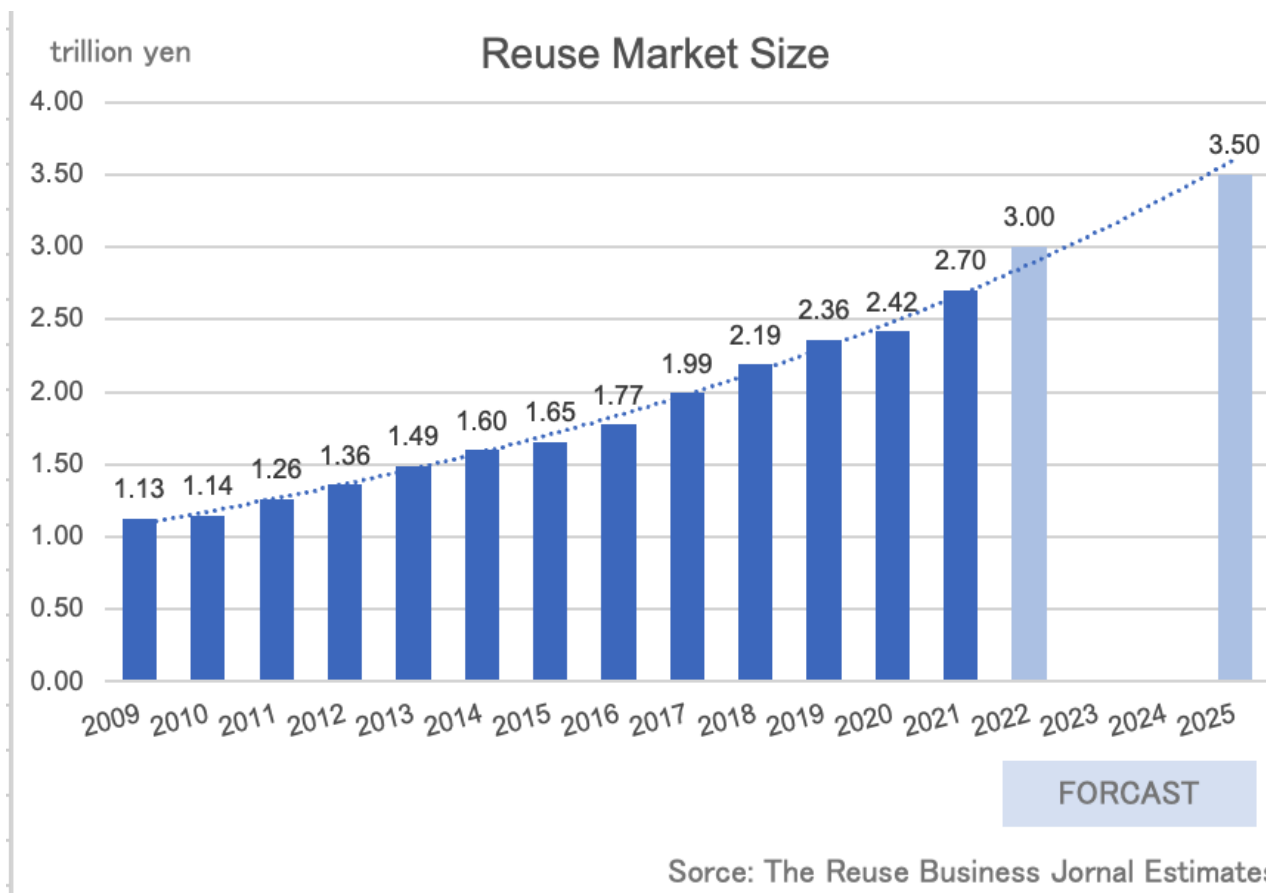
²⁶ <https://www.jetro.go.jp/biz/areareports/special/2022/0201/0a57c90175aa4216.html>

competitors, Rakuten Inc. operates "Rakuma" and Yahoo Japan Corporation launched the Paypay flea market in 2019, each with around 5 million monthly active users.

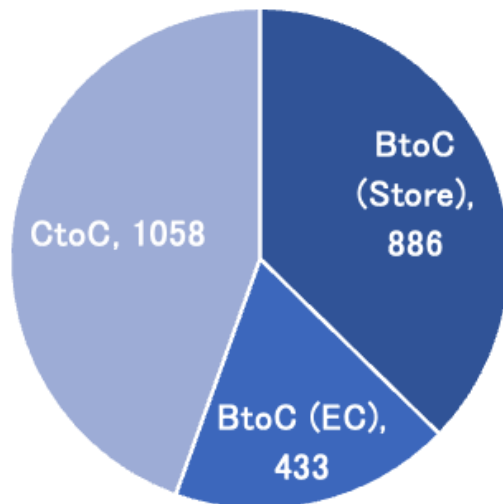
Valuence Japan.

The company primarily focuses on the reuse of branded goods and other products in Japan. It has 119 shops in Japan and 23 shops in 16 foreign countries. In January 2022, it became a member of the Ellen MacArthur Foundation Network, and in May 2021, the company introduced a proprietary measurement tool that utilises LCA methods to assess its environmental impact. It will report on its contribution to environmental footprint reduction, as well as the amount of carbon dioxide, water and energy used by the products it handles. This information is disclosed as the "Resale Impact". The company also highlights the amount of contribution to the reduction of carbon dioxide emissions and water use is stated on the product tags in its shops. Furthermore, In October 2022, the company joined 'The Fashion Pact'. Additionally, Isetan Mitsukoshi launched the 'I'm green' initiative, a long-established department store, uses the external sales channel to provide a service whereby brand clothing, bags, watches, jewellery, antiques and works of art that are lying in the wardrobe are received at the shop and connected to reuse and recycling.

PICTURE 19: Reuse Market Size in Japan

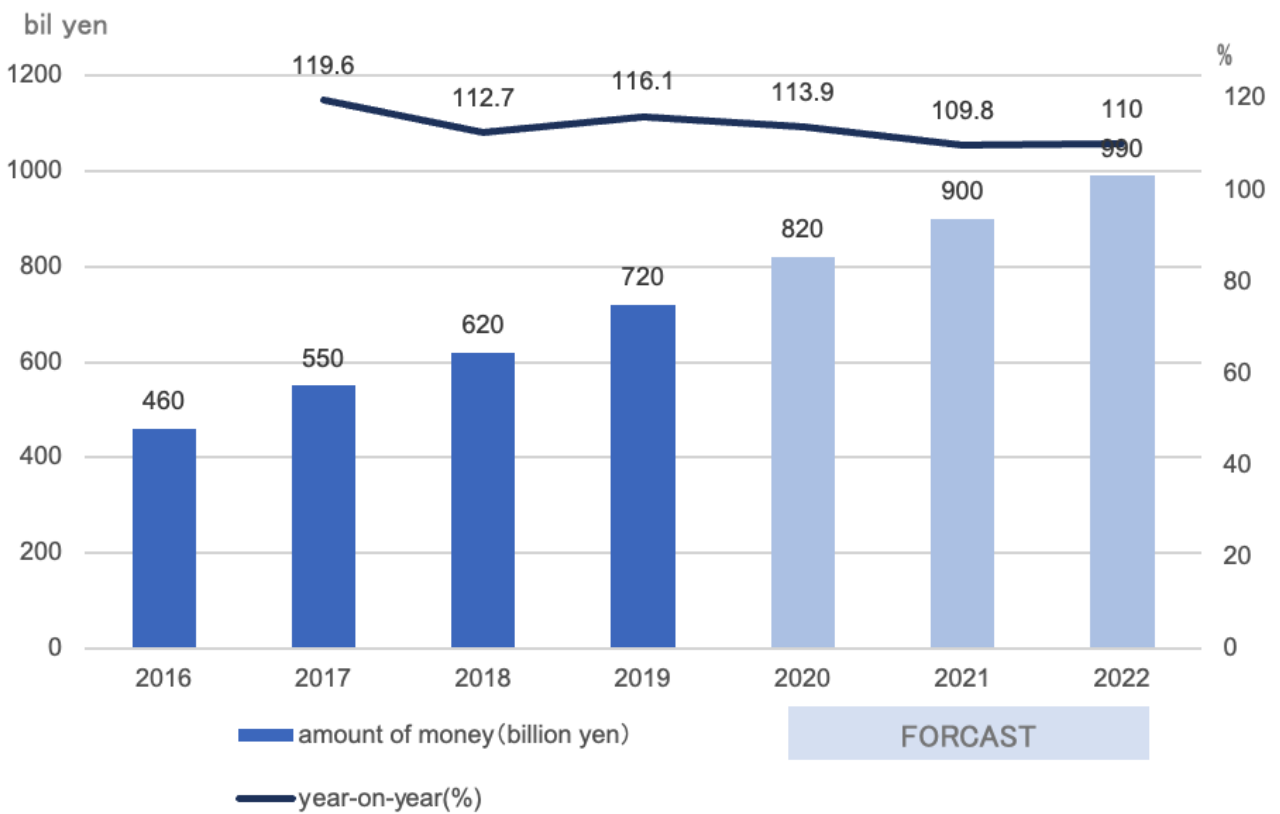


PICTURE 20: Market scale 2020 in each Reuse Channel(bil yen)



Sorce: The Reuse Business Jornal Estimates

PICTURE 21: Fashion Reuse Market Size Trends and Forecasts



Sorce: Yano Research Institute Inc.

PICTURE 22: Used Clothes Market in the US

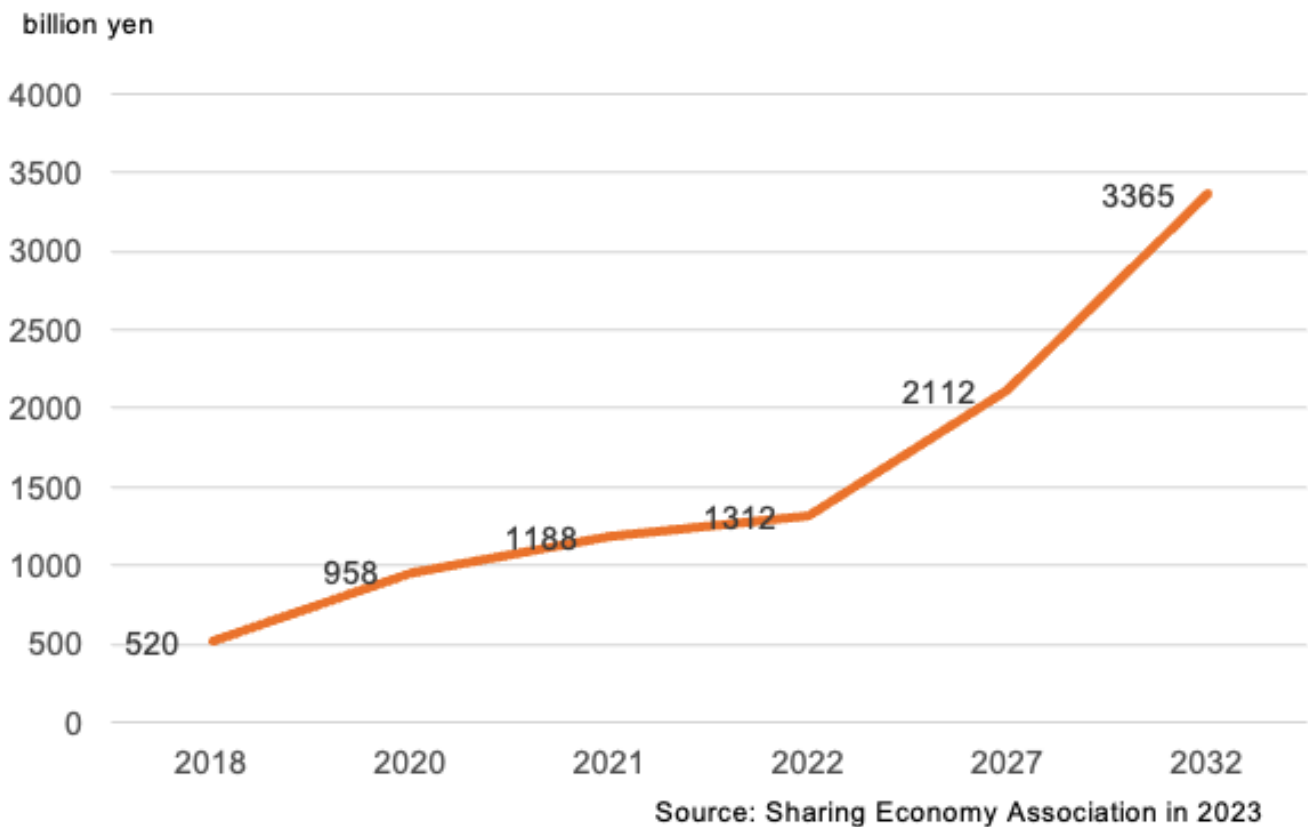


Sources; Thredup Resale and Impact Report 2021

2.4 Sharing services

The Japanese market for goods (including clothing) sharing services is expected to grow to around 3.3 trillion yen by 2032 as technologies such as AI-based styling services develop, and logistics systems become more efficient. This growth will enable consumers to rent clothes that match their outfits and align with current trends easily. This sharing service is expected to reach 3 trillion yen. Such sharing services are increasingly in demand, especially among the younger generation, as they offer benefits such as environmental protection, efficient use of resources and money savings. Japan has several clothing-sharing services, ranging from those aimed at the average user to luxury brand rentals. However, many people may feel uncomfortable lending their clothes to others or sharing the same clothes with others. Especially after the COVID-19 pandemic, people are worried and averse to infection, and the challenge is how to overcome such attitudes in the future.

PICTURE 23: Sharing Goods (including Clothes) market size in Japan



2.5 Current status of collection and recycling

The integration of waste collection into everyday life and the efficient operation of sorting facilities has been subjects of trial and error in many countries. This is also the case in Japan: I:COLLECT, a German company that is part of the SOEX Group, a global textile and footwear recycler with operations in 90 countries and used clothing and footwear collection operations in 63 countries, has been operating in Japan since 2013. However, successful collaborations with local companies have been limited. The Japanese system of collecting and sorting clothes differs from the Western culture of donation, and it is necessary to understand the historical background of a used textile business. In addition, instead of simply exporting sorted waste, which is called reuse in many countries, there is a need to promote secondary distribution, material and chemical recycling in Japan. This shift is crucial, considering the expanded definition of the Basel Convention.²⁷ rather than being pushed abroad.

Japan has a long history of circular textiles, with a particular type of trader specialising in used textiles. The main method is cascading, where textiles are reused in other products, but at a lower quality level. The path from collection to reuse is complex and varied, with collection carried out by municipalities and SMEs, along with sorting and other tasks carried out manually.

²⁷ <http://tmsj.or.jp/labo/recycle/data/01.pdf>

Material recycling of recovered textiles can be divided into three categories of use: reselling used clothing (Reuse), remanufacturing as used clothing using the material (Remake), and remanufacturing with Hanmo technology* (Recycle). While the proper proportions are not measured, based on interviews with companies, it is estimated that the respective sorting rates are around 60% for used clothing, 20% for used fabrics and 1.5% for wool waste, with the remainder being disposed of. Used clothing is finely sorted and mainly exported to South East Asia. The waste from used clothing is converted into fibre and sold to the Japanese manufacturing industry (mainly the automotive industry). Hanmo technology can be applied to various products, including cotton and wool, and is currently converted into automotive interior materials, home insulation, felt and cushioning materials. Other products, limited to uniforms, are pelletised and sometimes re-commodified as buttons and fasteners.

JEPLAN is at the forefront technology for polyester chemical recycling, while Toray leads in nylon chemical recycling. As for the chemical recycling of polyester, about 9% of all recovered clothing is converted into recycled polyester. The remainder is reused, recycled as a material for automotive interiors, or used as thermal energy materials. depending on the characteristics of the fibres, Recycling rates are not increasing because very few garments are made from a single polyester material, with most made from mixed fibres. The challenges for the future are to develop efficient methods to recover single materials and to develop technologies to enable the chemical recycling of mixed fibres. Toray and Refineverse have developed technologies for recycled polyester.

*Hanmo is the technology for recycling old fibres back into fibre.

Table 3: The Way of Recycling in Japan

technique	reclaimed goods	affiliated organisation	Summary.
material recycling	second-hand clothing	Used clothing distributors and late textile traders	The rags with the highest commercial value are re-used as second-hand clothing both domestically and internationally. As sorting is manual and a labour-intensive industry, countries with low labour costs are the main competitors. Profitability is high compared to material recycling. <Issues> Wetting and soiling in collection and domestic clothing emissions do not match the demand for clothing in developing countries.
	waste (cloth)	Waste manufacturer and late textile trading company	Selected clothing, such as T-shirts, underwear, Y-shirts, etc., are recycled as waste cloths (rags for the domestic manufacturing industry) < Issues > Dependent on the utilisation rate of the domestic manufacturing industry.

	counterfeit paper money	Anti-wool manufacturing and anti-wool trading companies	Textile products are converted back into cotton or hair-like single fibres using needle-like tools and used as textile raw materials. The fibres are recycled into automobile interior materials, house insulation, felt, cushioning materials, etc. <Issues> Mostly used for automobile interior materials and dependent on the business conditions of the automobile industry.
chemical recycling	Textile raw materials	JEPLAN Toray	Collect clothing and, after sorting, produce high-quality chemically recycled fibres < Issue > Chemical recycling with mixed materials, collection of clothing made of recyclable materials
thermal recovery		Municipal processing facilities, etc.	Energy materials

Source; METI, Asian circular economy model Research projects 2020²⁸

In 2022, Patagonia chose as a partner with Nakano Ltd, a well-established supplier of used textiles, to collect and sort T-shirts made from Patagonia's infinitely recyclable fibre, Infinna, in a horizontal recycling operation. Nakano Corporation uses its existing network to efficiently collect the fibres and has a consistent system of human sorting, recycling and bridging to recycling.²⁹

Nakano Ltd.

Established in 1934 and has a turnover of 3.8 billion yen. It operates as a textile collecting and sorting company. The main business is the production and sale of recycled waste cloth, military gloves, as well as the wholesale of various industrial subsidiary materials, safety equipment and protective gear. The collected used clothing is exported abroad and converted into rags, woollen, felt, military gloves, etc.

Historical background of old textile traders.

In the Edo period, the concept of resource reuse took root in everyday life. Used fibres from clothing and fabrics were bought and sold for sewing. In the Meiji Era (1868-1912), the demand for used cotton and linen fibres as raw materials for paper mills increased, which led to the emergence of the resource recovery industry began to trade in used clothing, fabrics and waste fibres.

Clothing was treated differently from other products such as plastics, food and building materials and was a viable business for old textile merchants. Rags in particular were a major export in the pre-war period. Overseas, rags are made from lint obtained from cotton spinning. However, in Japan, before the development of the Western spinning industry there was no lint, so old fibres were cut into usable

²⁸ https://www.meti.go.jp/meti_lib/report/2020FY/000271.pdf

²⁹ <https://www.wwdjapan.com/articles/1447938>

sizes and transformed into high-quality cotton rags. Eventually, this traditional collection system became unprofitable as an era of mass production and mass consumption began. The rationalisation of production methods, technological innovation and falling raw material prices led to a surplus of material. In addition, the rapid diversification of textile types has become an obstacle to recovery and recycling. The introduction of synthetic and chemical fibres, and the use of blended fibres rather than single fibres, made it difficult to produce high-quality rags but had to be converted into cheap consumables such as mops and gloves by means of hair removal, making the labour-intensive and arduous process of sorting and converting into down-cycled products an unprofitable business.

2.6 Environmental awareness

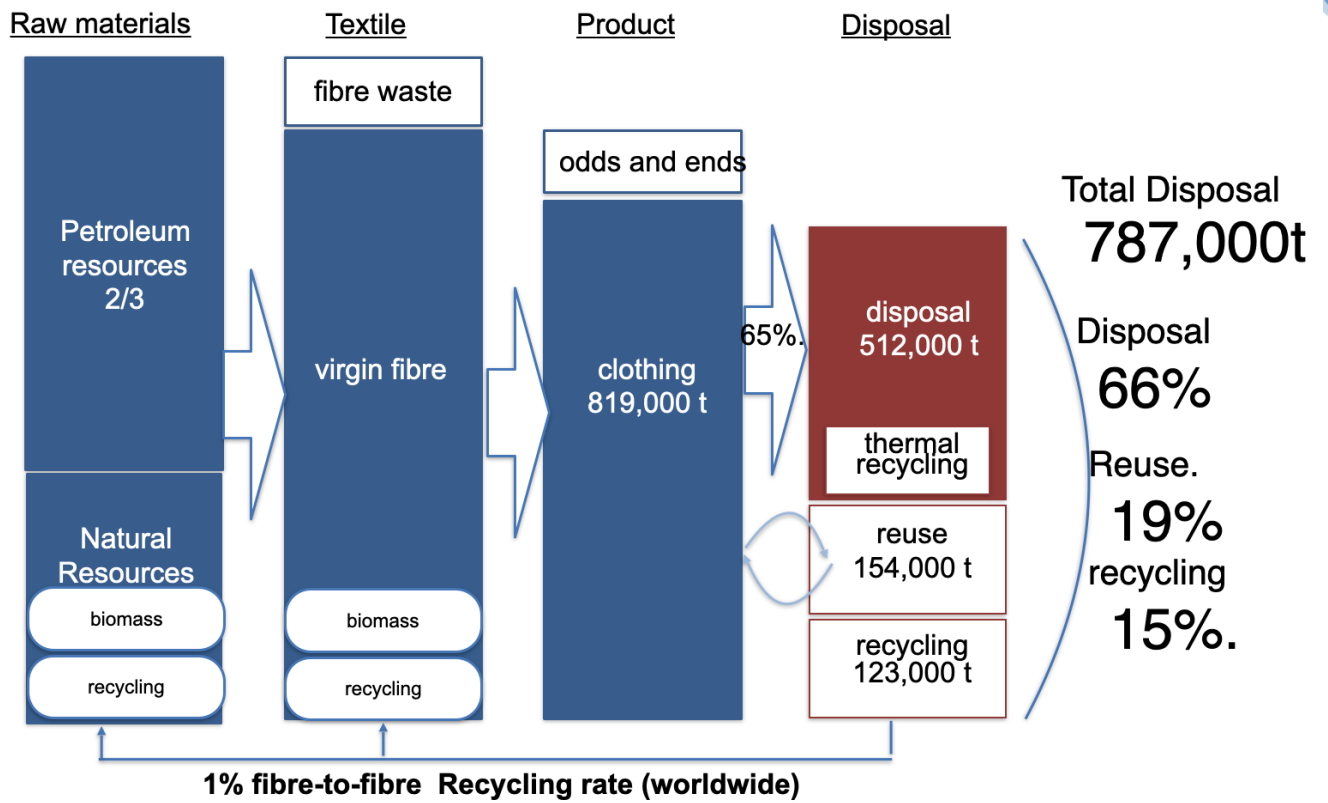
2.6.1 Environmental Impact on the fashion industry

According to the Ministry of the Environment, Japan's annual water consumption is 8.3 billion cubic metres and carbon emissions are 90,000 kilotons. It is estimated that each clothing item emits 25.5 kg of CO₂ and uses 2,300 litres of water resources. The clothing industry also generates 45,000 million tonnes of scrap fabric, wood and other waste materials.³⁰

Material flows show that more than 780,000 tonnes of textiles are disposed of annually in Japan. Among this, 65% (512,000 tonnes) is incinerated and landfilled. Approximately 19% (154,000 tonnes) is reused domestically, 15% (123,000 tonnes) is sent for recycling and 5% (40,000 tonnes) is exported abroad. Although some of this is chemically recycled back into textiles, this accounts for less than 1% of the global total. Other statistics show that more than 70% of household clothing is incinerated. This is partly due to the high number of incineration plants in Japan. According to data released by the Ministry of the Environment in March 2021, there are 1067 waste incineration facilities in Japan. This is an order of magnitude higher than in other countries: according to OECD data from 2008, more than half of the world's incinerators are in Japan. This is because Japan is a small country and the construction of waste incineration facilities was promoted on a national scale at a time when mass production and mass consumption were beginning during the era of rapid economic growth. It is also shown that Japan's general waste disposal business will cost 2,088.5 billion yen (in 2019), and now that 60 years have passed since the era of high economic growth, local authorities need to consider the ageing of incineration systems and what they can do to promote recycling rather than installing new incinerators. It is crucial to raise awareness within the community and encourage sustainable waste management practices.

³⁰https://www.env.go.jp/policy/sustainable_fashion/

PICTURE 24 Material Flow



Source: First study group on textile resource recycling systems from NEDO³¹

³¹ https://www.meti.go.jp/policy/mono_info_service/mono/fiber/pdf/23012005.pdf

Table 4: The number of incineration plants

Japan	1,893
U.S.A	168
France	100
Italy	51
Germany	51
Switzerland	29
Sweden	21
Netherlands	9

2008 OECD statistics Units: place

2.6.2 Consumer Trends in Japan

According to a survey by the Ministry of the Environment, 59% (3+1+4+54%) of people are interested in sustainable fashion, including those who are taking action, and more than half are aware of and concerned about the environmental impact and social issues associated with the fashion industry.

However, a report on consumer attitudes by the Consumer Affairs Agency indicates that the most important consideration when buying clothes is the price (79.1%), followed by design (70%) and comfort (49.9%), suggesting that environmental awareness is not linked to the purchasing decisions.

The survey further reveals that 53.9% of clothes are bought from fast fashion brand shops, 47% from general retail shops and 40.6% from online shopping. Only a small percentage of consumers, 7.8% buy from flea markets, 6.6% from second-hand shops and 6.6% from recycling shops, with a very low percentage of 0.8% using sharing services. Many people still want to buy clothes after they have actually seen them in a shop, and 51.9% have a negative perception or dislike of second-hand clothes. The future challenge will be overcoming these attitudes towards wearing second-hand clothes and sharing them with others. In addition, consumers are still sceptical about sustainability commitments from manufacturers and brands. There is uncertainty about whether companies claiming to be

ecological are environmentally conscious, so it is necessary to develop appropriate certification schemes for Greenwashing (*).³²³³

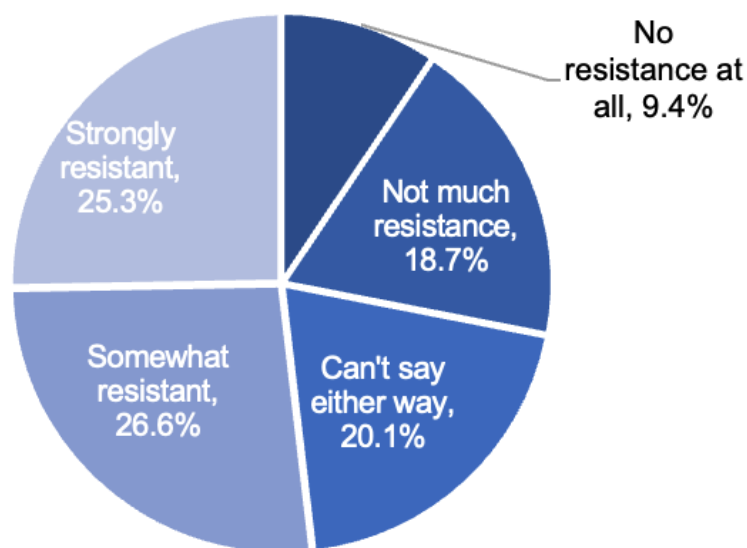
(*) Greenwashing refers to things that appear to be environmentally friendly when they are not, misleading environmentally conscious consumers.

PICTURE 25: Interest in Sustainable Fashion



Sources: MOE 「Sustainable Fashion」 at https://www.env.go.jp/policy/sustainable_fashion/

PICTURE 26: Attitude to buying second-hand clothes

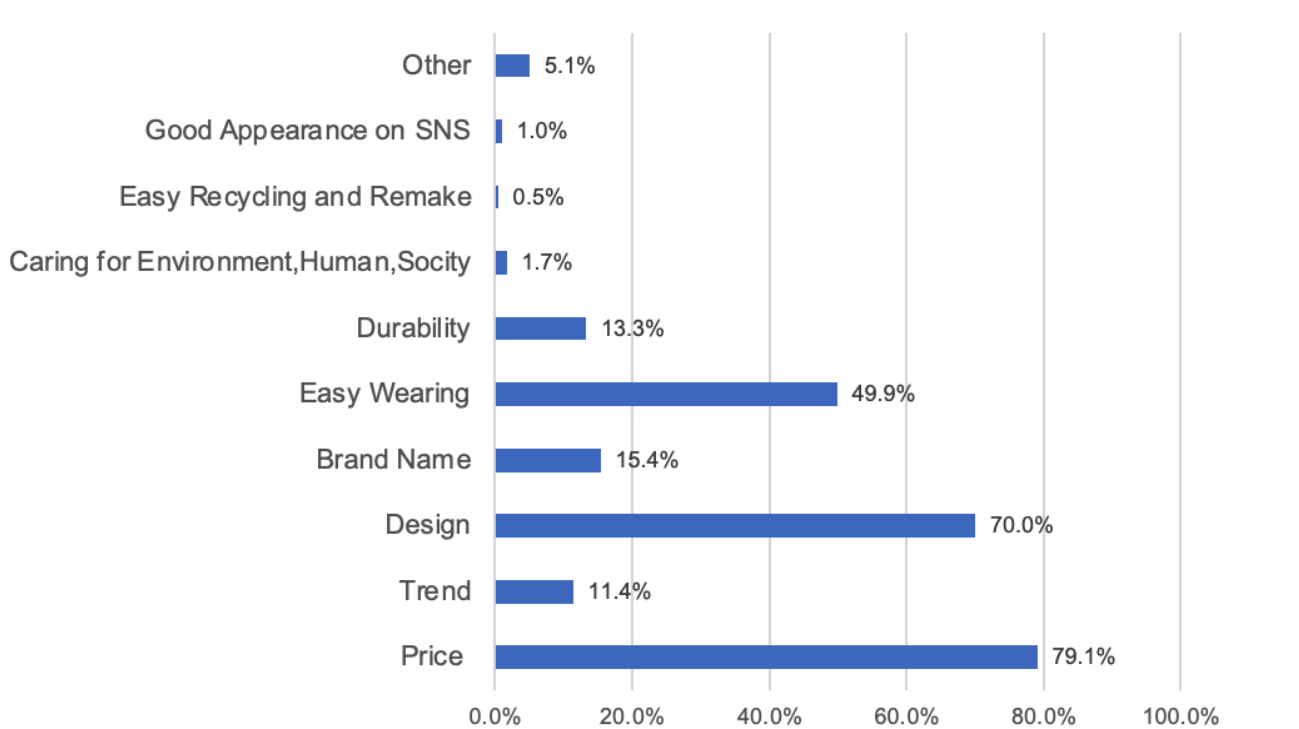


Source;2021 Basic Consumer Awareness from Consumer

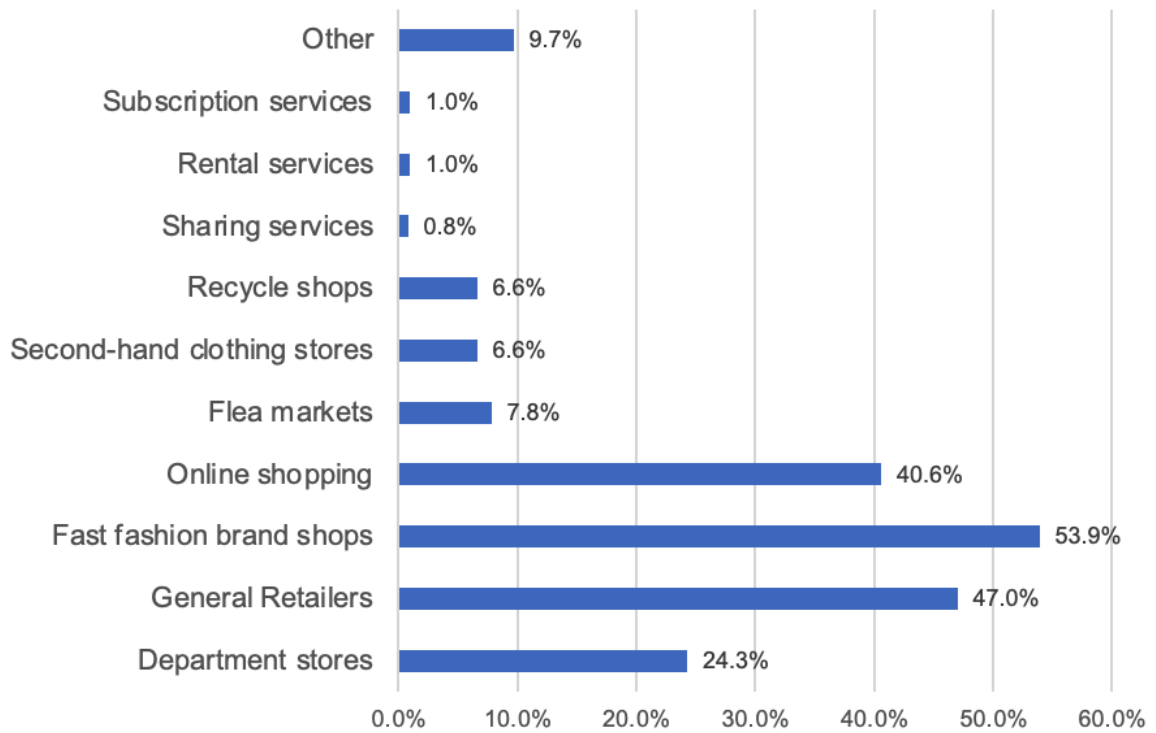
³² Available at:

https://www.caa.go.jp/policies/policy/consumer_education/public_awareness/ethical/investigation/assets/consumer_education_cms202_211013_01.pdf

³³ https://www.tr.mufg.jp/shisan-ken/pdf/kinnyuu_literacy_20.pdf

PICTURE 27: Important buying points for clothes

Source;2020 Basic Consumer Awareness from Consumer Affairs Agency

PICTURE 28: Places for buying clothes

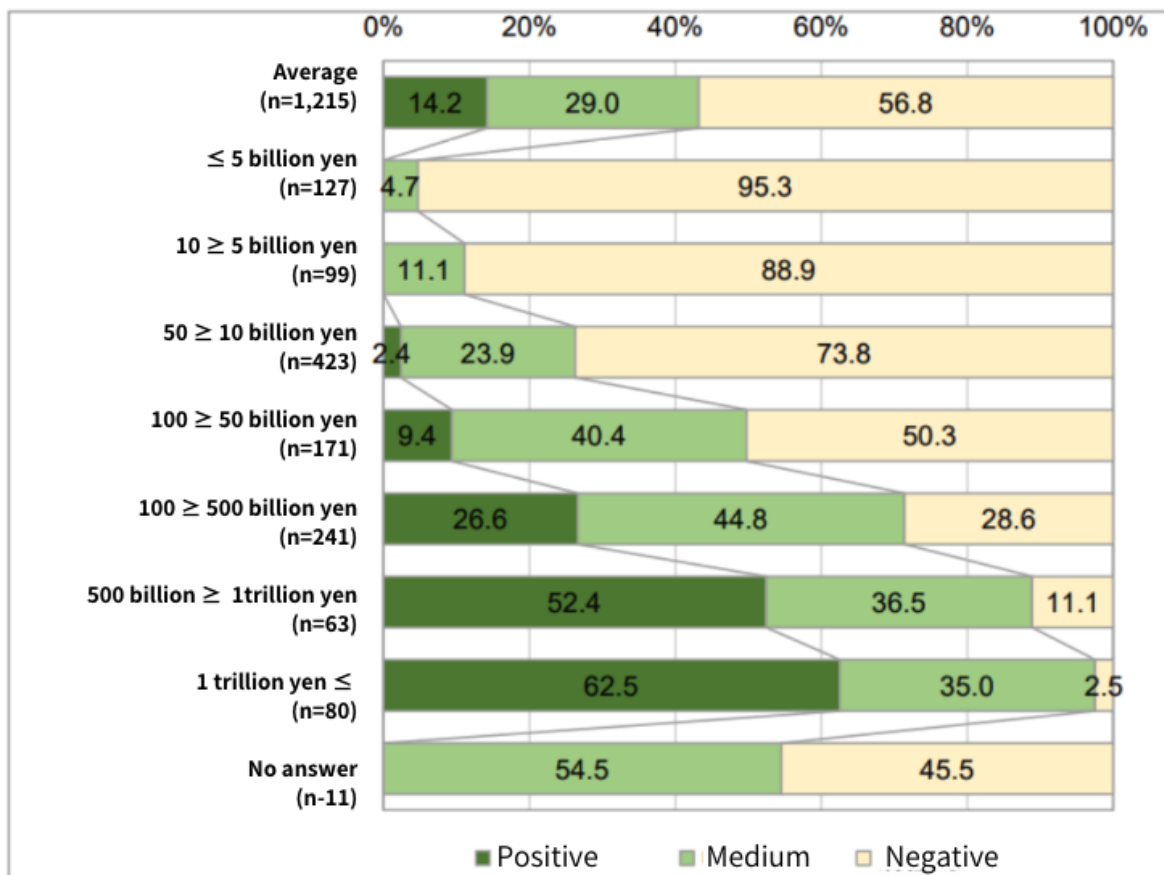
Source;2021 Basic Consumer Awareness from Consumer Affairs Agency

2.6.3 SME Awareness and Response

In recent years, terms such as SDGs and sustainability have gained popularity through the media, and companies have started to recognise and drive initiatives. However, at the moment, companies still see environmental issues and climate change as a cost, rather than new business opportunity. According to Ministry of the Environment data, the smaller the company, the less likely it is to be actively engaged in environmental initiatives.

The Ministry of the Environment has published the Decarbonisation Management Handbook for SME³⁴ Businesses, which outlines the steps for developing a plan to promote carbon neutrality initiatives for SMEs. As circularity initiatives seem to contradict carbon neutrality goals, it is advisable to integrate circularity measures with decarbonization efforts and provide new government guidance.

PICTURE 29: Environmental initiative by sales volume of the company



Source: 2019 Report eco-friendly company's activity survey /Ministry of Environment.

³⁴ https://www.env.go.jp/earth/SMEs_handbook.pdf

2.7 Government Actions

In Japan, the Circular Economy Vision was published in 1999, ahead of the rest of the world. The perception of environmental problems shifted from being limited to certain areas of Japan to a nationwide concern due to rapid economic development. At that time, the remaining lifespan of a landfill was a pressuring issue, with 8.5 years for general waste and 3.0 years for industrial waste. The recycling rate for general waste was 10% and that for industrial waste was around 40%. The main objective of this vision was to increase recycling and reduce waste generation to prolong the life of landfills. It was a response to a problem that had arisen and was seen as a cost, rather than creating new business,

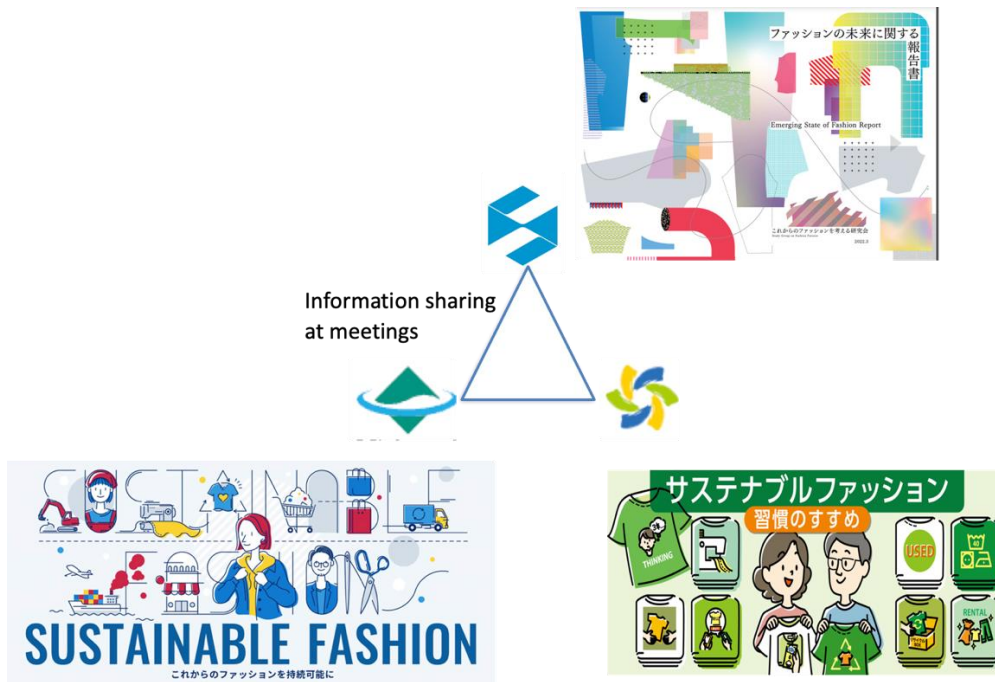
Times have changed dramatically since then, and the government's Circular Economy Vision 2020 has redefined the concept as a shift towards a circular economy for the purpose of economic activity. However, no clear vision or roadmap has yet been developed, aside from acknowledging the need to address the textile sector. There is also an explicit reference to reducing the amount of waste exported in the name of supply and support to developing countries, which is currently defined as reuse.

The Ministry of the Environment, the Ministry of Trade and Industry, and the Ministry of Consumer Protection are all working on the issue of environmental pollution in the fashion industry and are publishing reports under the term 'sustainable fashion'. In addition, a joint discussion and information exchange forum between the three ministries started on 20 January 2023.

Ministry of Economy, Trade and Industry: Emerging State of Fashion Report

- Ministry of Economy, Trade and Industry (METI): Report on the Future of Fashion
- Ministry of the Environment (MOE): SUSTAINABLE FASHION
- Consumer Affairs Agency (CAA); Promoting sustainable fashion habits.

PICTURE 30: Researches presented by METI, MOE, CAA



History of circular legislation textile-related

The Waste Management and Public Cleaning Act of 1970 was a law to promote the sorted collection and recycling of materials, but it did not cover clothing. This was due to the existence of second-hand textile traders and an established system of secondary distribution and cascade recycling was in place as a business. However, the business of second-hand textile traders declined as the trend towards mass production and the diversification of products such as synthetics made their business unprofitable.

To address this situation, the government needs to develop resource recovery strategy for clothing, establish standards and certification, and implement action plans. It is also necessary to consider not only legislation aimed at controlling, but also legislation aimed at promoting textile recycling.³⁵

³⁵ https://www.meti.go.jp/medi_lib/report/2020FY/000271.pdf

Chapter 3 Japan's Circularity Potential in Fashion & Textile

3.1 The Potential of Japanese circular fashion

In recent years, there has been a growing awareness of existing business systems' negative environmental and social impacts. Brands and retailers have begun to address these issues individually and collectively within their supply chains. But the focus has often been on improving production techniques' efficiency and reducing the environmental footprint of materials. Few companies have directly addressed fundamental system issues such as the durability of clothing, the number of cycles and recycling rates.

There are four main circular strategies: closing the Loop; slowing down the Loop; reducing Resource consumption; the regenerating Through Circulation (Regenerative Life Model). Implementing these strategies require new skills at every stage of the supply chain, including sourcing, product design, manufacturing, sales, customer service, secondary distribution, recovery and recycling. Such implementation requires significant investment and time and consideration of transition costs. Implementing a circular business model is easier in environments that allow for continuous experimentation and small-scale innovation, such as start-ups and internal start-ups, when compared to large companies with established business structures in an existing linear society.

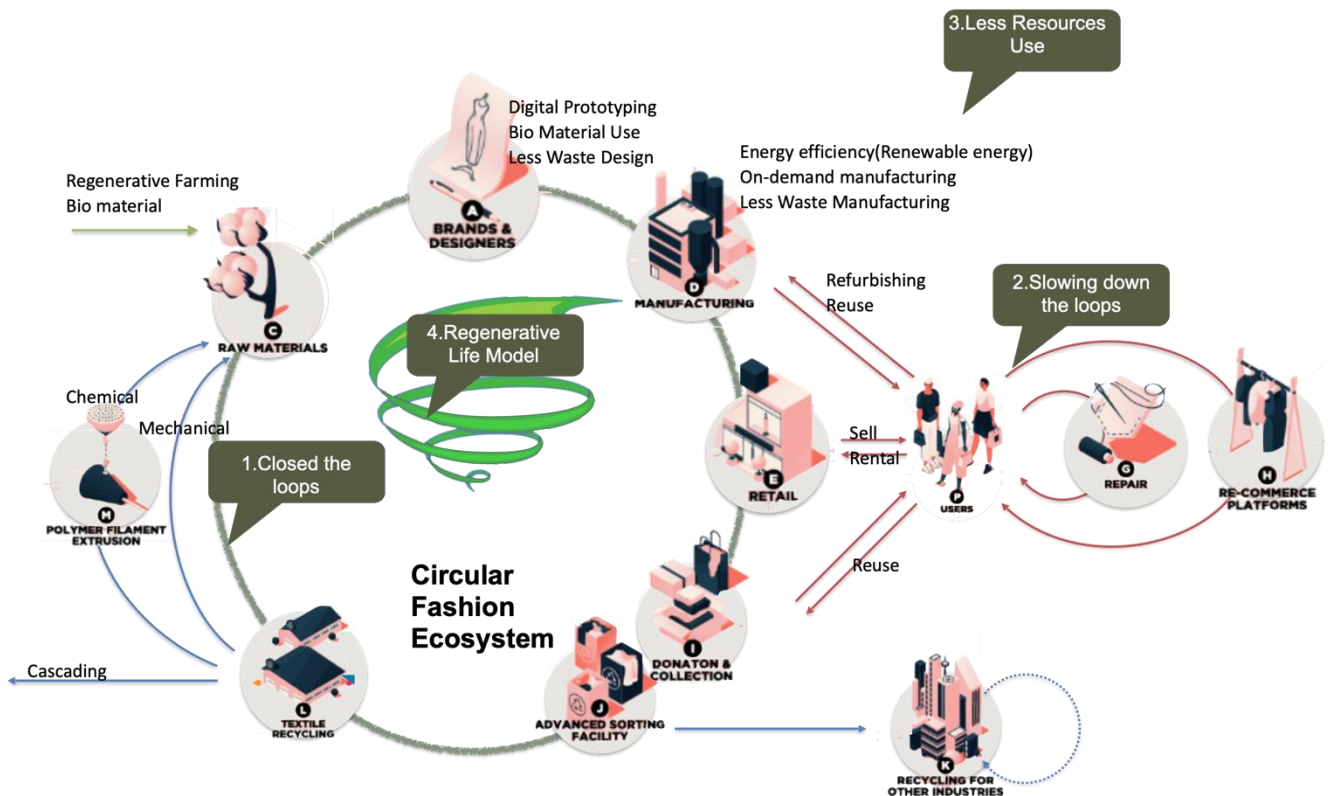
In addition, making systemic changes or transform a company's business model is a challenging endeavour. It is difficult for any single company to comprehensively implement the four strategies mentioned above. Transformation requires the creation of an ecosystem, and the key to success is continuous cross-sector collaboration, which should extend beyond peers, suppliers and customers to include local authorities and research institutions. This is the most important prerequisite for scaling up circular business models.

Here, creating an ecosystem around circularity in the local textile industry is proposed as a possibility for Japan's own circular fashion. The potential regions and companies will be presented from the following three points of view.

1. Circular design as a new economic zone for the rural areas of Japan
2. Circular design that integrates natural activities of plants and animals
3. Circular design with an open network to encourage autonomy and new economic zones

The first example is a whole town that is beginning to move towards establishing itself as a circular ecosystem, and the second example highlights a company that is creating authentic circularity through a comprehensive four-pronged strategy by unravelling traditional textile technology and history. And thirdly, there is a call to action to expand and replicate such economic zone and enterprises.

PICTURE 31: The Circular Fashion Ecosystem and Four Strategies



Circular Fashion Ecosystem of Circular Fashion Ecosystem Blueprint report (Ellen Macarthur Foundation) modified by the author

3.2 Designing circular ecosystems new regional economic zones

When considering the principles of circularity, it is necessary to design a holistic system that does not produce services and products of material circulation fitting in the first place but rather regenerates the planet without waste. Successful companies in the EU circular economy have the ability to collaboratively redesign production and distribution networks.

For example, the well-known Dutch company Mad Jeans, which offers a monthly leasing model for jeans, has established production, repair and redistribution sites in neighbouring Spain and Tunisia. When considering the circularity of textiles, one of the key strategies is 'slowing down the loop', which involves extending the flow in the loop by repairing and maintaining the product and designing a system that allows this to be done within easy reach of the local area. The system is designed to accommodate such activities in inaccessible locations. Additionally, the company prioritizes local profitability and user friendliness, offering free shipping for returns and repairs within the EU.

Metsä Fibre, one of the world's largest pulp producers in Finland, also produces a range of biomaterials from wood chips and bark. The company's products are designed to be reusable and recyclable, any material that cannot be used in its original form is converted into energy, making the company 151% energy self-sufficient. This achievement not only eliminates the reliance on fossil fuels, but also plays a positive role in providing energy to the community. When using resources, a whole system has been

created to ensure that any surplus is effectively used by the company itself, neighbouring communities, and other industries.

3.2.1 Fukuoka Prefecture, Yame City Building a new economic zone linking local living

In the Chikugo region, traditional crafts are centred on Kurume Gasuri (*), a unique textile that combines dyeing and weaving techniques. There is a movement to establish a new regional economic zone based on circularity that connects culture to the world through the cooperation of traditional weaving and dyeing factories, local cultural trading companies that bridge consumers and culture, as well as the town of Hirokawa and other public, and private and academic organisations.

What is Kurume Gasuri?

This cotton fabric has been woven in the Kurume region of southern Fukuoka Prefecture for more than 200 years since the Edo period. The term “Kasuri” refers to a weaving technique where pre-dyed threads are used in the warp, weft or both to create a pattern. Patterns and designs are expressed by dyeing the threads before weaving. The fabric is then woven using a traditional loom, employing different techniques to create different types of patterns and designs, such as plain or striped patterns and vertical or horizontal patterns.

Formation of local ecosystems to keep products in use for longer

Regional cultural trading company Unagi no Nedoko³⁶ selects and sells household goods and clothing made using traditional techniques, and plans and develops original products. It currently works with approximately 227 craftsmen and 52 textile-related companies, mainly in Kyushu. They research on local culture and history, create product stories through dialogue with craftsmen, and brand and market their products to meet the needs of modern customers.

Many SMEs textile companies concentrated in rural areas have world-class technological capabilities, and such companies have managers who refine their skills with a craftsmanship spirit. However, most of them tend to focus solely on their technical expertise, lacking familiarity with marketing and sales strategies, and have not thought of establishing themselves as a brand. In addition, the role of branding to the consumer is essentially played by the retailer of the final product. In contrast, craftsmanship sometimes plays a behind-the-scenes role in supporting the value of the product. Unagi no Nedoko highlights craftsmanship by incorporating it into their branding strategy, and ensuring equitable sharing of associated benefits.

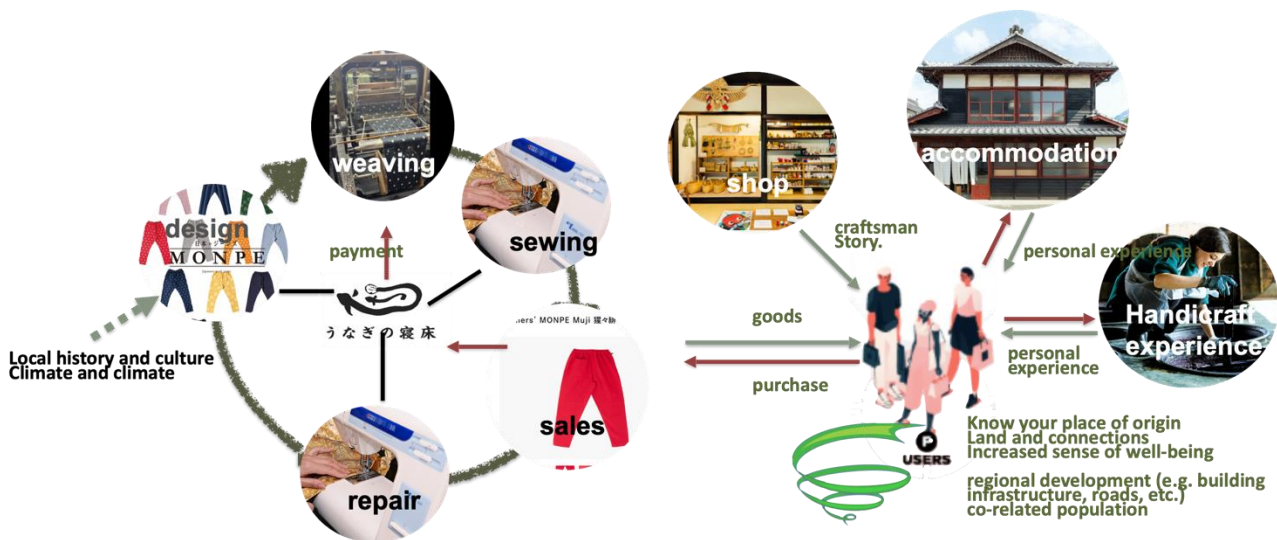
Their flagship product, the modern “Monpe” featuring Kurume Gasuri, has gained tremendous popularity that sales have increased more than 30 times in the 10 years since the company was founded in 2012, continuously growing for 10 consecutive fiscal years. Originally, Monpe was renowned as post-war agricultural work clothing. However, they have been adapted to suit modern times by incorporating various patterns and colours while retaining their traditional function which aims to minimise waste by

³⁶ <https://unagino-nedoko.net/>

making full use of fabric width. The company provides paid repair services at sewing factories in Kurume and in the neighbouring prefecture of Saga. Besides, it also collaborates with local traditional weavers such as Banshu (Hyogo), Enshu (Shizuoka), Bingofushiori (Hiroshima), and Haebaruhanaori (Okinawa). The project is developed in different regions, showcasing their unique textiles and culture. They also sell patterns for consumers who wish to create Monpe themselves.

In addition, the Fukushima area of Yame City, Fukuoka Prefecture, is a castle town designated as a traditional building preservation area where a townscape preservation movement is active. It has formed an ecosystem to build businesses throughout the region, such as an inn that offers hands-on tourism and craft experiences there, and many sympathetic experiences designed to help consumers use products longer.

PICTURE 32: Circulars in the cultural sphere that promote consumer awareness change



The potential for global expansion with IPs in the new economic sphere.

Kasuri, also known as ikat, is a textile technique originated in India around the 7th-8th century and spread to Southeast Asia and Europe. By the 15th-16th century, it spread to Latin America, where it is still woven today in Mexico and Guatemala. In Japan, it was introduced to Okinawa in the late Edo period (14th-15th century), where it developed its own unique Kasuri weaving style; it later spread to the mainland in the 18th century and became popular among the upper classes. However, by the early 19th century it had become accessible to the general public as Kurume cotton weave.

While the technique is used worldwide, the textiles woven in each region differ in colour, pattern and purpose, and are produced differently due to their diversity and indigeneity. If the format that constitutes circulation in the local economy of the Kurume Gasuri production area can be extended, to other Kasuri production areas around the world, it could lead to the expansion of an autonomous, decentralised, textile-centred circular economy.

Clothes made in direct connection with history/land/culture and people enhance people's well-being.

Shimokawa Orimono is a Kurume Gasuri weaver founded in 1948. The company has received many invitations to participate in exhibitions in Paris, France, Italy and other countries. Designers from abroad have also shown interest and visited their factory. They have also established business relationships with top European brands. Mr. Shimokawa, who is the manager of Shimokawa Orimono, has been open to accepting outsiders in Japan and overseas, such as local cultural trading companies, private dealers and designers who are attracted to Kurume Gasuri, and has attracted many people and created a community to promote Kurume Gasuri.

Dr Tarben-Shahar, an advocate of well-being, emphasizes the importance of maintaining a comprehensive sense of the five elements of 'SPIRE' to foster well-being. This stands for Spiritual, Physical, Intellectual, Relational and Emotional. When people gather around Mr. Shimokawa and "Unagi no Nedoko", they have to opportunity to learn about the history and spirituality of Yame through the Kusuri. Additionally, they can directly experience the manual labour of weaving and interact with local people. This contributes to the consumer's own well-being.

Fashion is a powerful tool for consumer self-expression and behaviour change because of its influence on culture and society. It encompasses innovation, creativity, culture and self-expression and is unique among other commodities in terms of its impact on society. Consumers feel and learn through their experiences, verbalise and share their insights through others, and then use clothing as a means to express themselves and shape their identity. Clothing, as a platform of these interactions, has great potential to contribute to people's state of well-being.

I believe that the basis of circularity lies in people's involvement in textiles, as a traditional local industry, which will change their awareness, leading to an increased the number of individuals who have the agency to choose their own happiness.

Why making an increase in well-being people leads to the way to a circular society?

An interview with a freelance fashion editor unravels the link between circularity and well-being.

Recently, there has been an increase in the number of products claiming to be aligned with the SDGs, ethical and sustainable. As media professionals, we often use these catchy buzzwords. However, it is undeniable that the words have taken on their own life. How many people understand the meaning of such buzzwords and their relevance to their own experience? I guess few people seriously consider and choose such products.

The difficulty is that goods aimed at benefitting the planet and human rights are often expensive. As a consumer, no matter how durable or made of natural materials, I would choose a cheaper UNIQLO T-shirt over an identical white one. Even if you are ethically and sustainably educated, the choice is difficult. What is needed is a holistic approach. You must realise it's not a simple choice between good and bad for the environment. We should ask ourselves: Do I really need it? Why do I need it? Do I require so

much of it? Is this the right product for me? This mindset encourages continuous self-confrontation and introspection in the process of simply choosing and buying things. If you go through this process, you will not consume unnecessarily. This leads to a society where more and more people obtain only what they genuinely need where they need it, generating a positive cycle.

What does it mean to value things and value oneself? It is not something that can be merely contemplated in one's mind. You have to personally immerse into and feel it with your body and your experience. It depends on how many people can take those steps.

In my case, it started with the realization that I couldn't handle raising my children alone. After facing myself incessantly, I stopped trying to do it alone. I recognised my weakness early on and created a community who could support each other in raising our children. The members who gathered all faced similar challenges, so we offered assistance to each other. And the feeling of spiritual connection and security naturally allowed me to expand my perspective and encompass the well-being of the planet as well.

Regardless of how circular a system is well-designed, as long as the ones making the choices are people, the well-being of people is a vital part of the circular system. People's choices are diverse, autonomous and, essentially life fulfilling is a prerequisite for circularity.

PICTURE 33: Weaving machine in Shimokawa Orimono (site visit)



3.2.2 Supply chain integration of textile-related companies within a 20km radius of Fukui Prefecture, Fukui City and Sabae City

MADE BY is an initiative that aims to use Fukui's network of textile-related companies to create manufacturing that can be completed in a compact area within a 20 km radius. Now six companies involved in sewing, textile weaving, printing and dyeing are taking part, offering tours of production areas and designer matching. Fukui has a long history of silk textiles and a concentration of textile-related companies that have developed their own unique skills and high-quality Japanese technology that can be used globally. In the past, these companies operated independently, but the shortage of masks during the COVID-19 disaster brought them together to collaborate on manufacturing and delivering masks. At present, the main activities of MADE BY include creating businesses and opportunities such as upcycling products made from pre-consumer waste through matching designers and factory tours. However, the future vision is to establish a series of complete production, sales and repair facilities within the Fukui region, and to create a new economic zone based on high-quality, low-impact circular fashion.

PICTURE 34:MADEBY tour visit



3.3 Circular from the natural behaviour of plants and animals' circular design

As mentioned in 2.1, Culture and History of Textiles, the circulation system of the Edo period before the development of the textile industry, not only encompassed the management of goods but also established a sense of circularity, where clothing was closely tied to local events and festivals, fostering a feeling of community connection. In this section, you will find examples of textiles based on this traditional way of using textiles but which have been taken up by the Japanese market with new ideas and in line with modern needs.

3.3.1 Ichinoseki, Iwate Kyoya Dyeing Shop Branding the life cycle circulation

Kyoya Dye Shop³⁷, based in Iwate Prefecture, is a dyeing company that has been in business for 100 years. The company handles everything from design to dyeing, sewing and sales. They have created a circular system from the waste generated in harmony of nature and incorporated traditional culture into their branded products. Their own brand en•nichi³⁸ includes kappo-gi (aprons for cooking), which have been worn in Japan since ancient times, and Sarubakama (sarubakama/sappakama), a stray coat from the Tohoku region. By looking back at history and culture and developing products that integrate their essence and spirituality into modern life, they contribute to the creation of new local cultural economies, which greatly impact other sectors and sub-systems. that can be created by Yamanoitadaki, an everyday tool inspired by the local 'Deer Dance' festival, was created to solve a local problem. In recent years, crop damage caused by deer and other animals has amounted to more than 400 million yen per year, and even when hunted, more than 90% of the approximately 26,000 captured animals were discarded, resulting in a shrinking number of hide processors and stitchers. To combat this issue, the company began to produce and sell products made from deer skins that had been treated for vermin for helping to repurpose the resources and reduce waste.

The Deer Dance is a festival to express gratitude and make offerings to deer, which were a valuable source of food in the Tohoku region,. By branding the story of this traditional culture and appealing to a

³⁷ https://kyo-ya.net/localwear_iwate/

³⁸ <https://ennichi.jp/>

sensory value, it resonates to many people and strengthens the connection to sales. Distributing the sales generated by this cycle evenly throughout the value chain not only revitalises those involved in the production of the products, but also reduces pests, increases agricultural income, and contributes to cultural preservation by donating 3% of sales to traditional performing arts. In addition, the continuous organisation of cultural and production events for users has led to an increased involvement and migration. The products are also a gateway for users to learn about the cycle of life, experience the Japanese spirituality and embrace the beliefs that all things, including people, things, animals and nature, are equal and circulate energy, leading to an increase in the number of people who are aware of sustainability.

User interface for long-lasting use through craftsmanship that uses old-fashioned wisdom.

All products from Kyoya Dye shop have a 'Permanent Repair' service. Stitch repairs are also available for torn and punctured items, which are embellished by applying fabric. Clothes tags are made using 'Sakiori', which involves tearing waste fabrics from clothes cuttings, reforming it into a cord and weaving the torn cloth back together. Iwate has historically been characterized by cold weather and scarcity of resources, where cotton was precious because it did not grow in the area, leading to a culture of cherishing and prolonging the lifespan of clothing. Practices such as 'Sashiko' and 'Sakiori' are unique to the Tōhoku culture, which originated in the Edo period, and represent the wisdom of taking care of clothing until the end of its life. Because the system is designed from the culture, it is an interface that is easy for consumers to use, and Kyoya Dyeing Shop products are loved by many people in the Tohoku region.

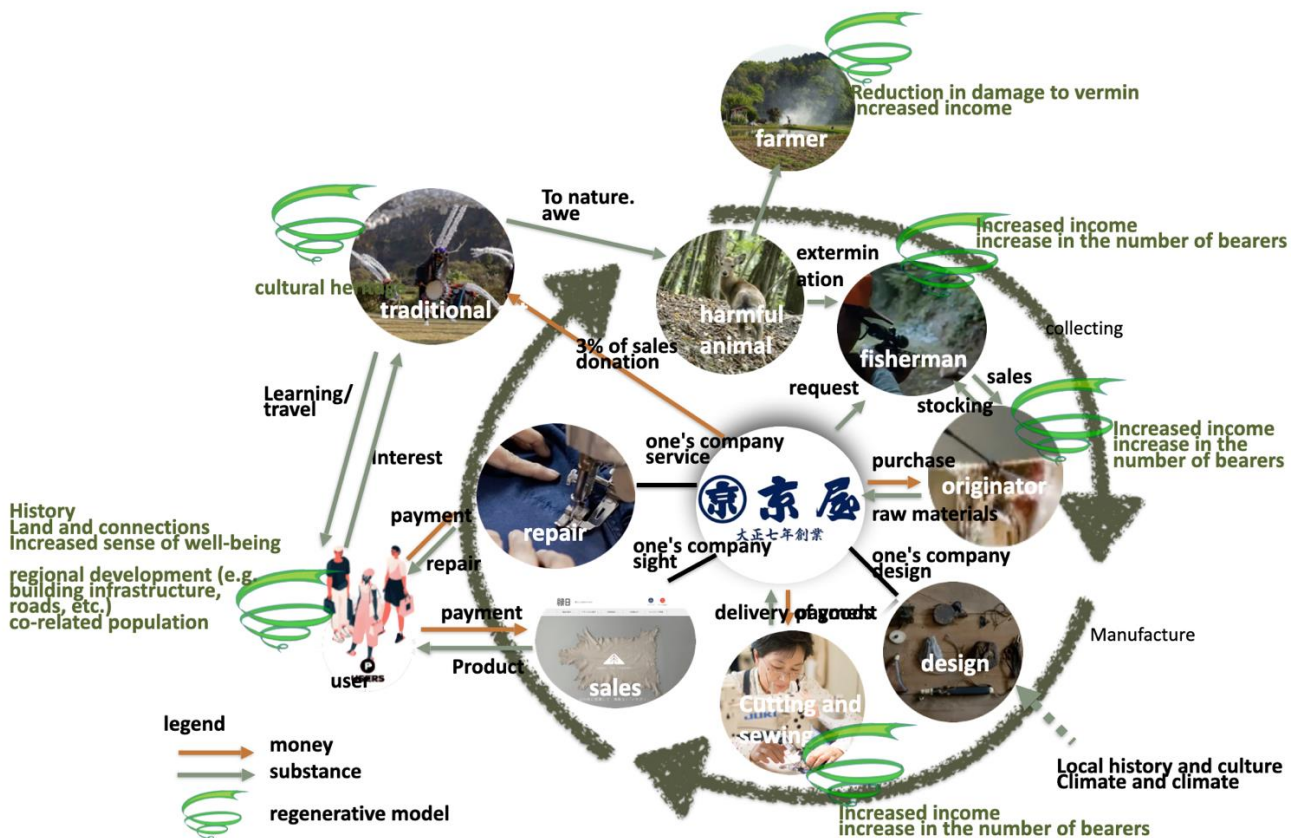
In-house products with an identity are the beginning of Circular Design.

The fact that dye company brings its products to life through storytelling and manages the entire supply chain internally, production, sales and collection - offers clues to regenerative circular design that go beyond the focus on materials alone. By making connections with their own company or with neighbouring businesses, they facilitate the creation of a "slowing down the loop" business model. With their own products, they can design entry points for users to keep wearing their products for a long time. At the same time, they can create new business opportunities for sewing companies.

In the Edo period, there were highly skilled sewers called "Omonoshi" who mended and sized kimonos, and there were repair shops that provided services for long-lasting use of geta, sandals and pottery. Besides, fashion is a tool that touches people's values and emotions and drives the economy. The fact that a product's identity is rooted in the region, drawing upon its historical significance and looking at the region as a whole, forms a broad temporal and spatial axis, making it a circular product that touches people's sensibilities and creates a sense of circulation.

Having a distinct identity is an advantage when working with global companies, as it aligns with the regenerative fashion that foreign high-end brands are working on.

PICTURE 35: The Regenerative Circularity by Kyoya Dyeing Shop



3.3.2 Okinawa Food Reborn Circular with non-pasturing parts and make global development

This project aims to develop technology for extracting natural fibres from inedible parts such as pineapple leaves and banana stems, which are typically discarded in large quantities. The project also focuses on establishing a mechanism that allows profits generated from this technology to be returned to the farmers who produce these fibres. The company has focused on and improved machinery used for extracting fibre from leaves, a technology that has existed since ancient time. Through their endeavours, they have succeeded in developing a compact machine that ensures high production efficiency and improved fibre quality. This advancement not only reduces transport costs and CO2 emissions for the collection and production of fibre resources, but also enables cost savings by locating machines closer to the plantation. This solution addresses the challenges faced by sustainable fibres, such as the use of resins made from edible sources and the high levels of CO2 emissions during the manufacturing process. The business model is unique in that the machinery is loaned to local farmers free of charge, with payment based on the weight of the fibre. This regenerative approach aims to increase farmers' incomes while producing fibre with a low environmental impact. The project is not limited to Okinawa, but is expanding to East Asia where there is a higher demand for fibre in October 2022 a partnership was announced with the Taiwan Textile Association (TTTA), which brings together 215 Taiwanese textile companies, and in November 2022 with INDUK KUD, an agricultural organisation in Indonesia, the world's fourth largest pineapple producer. KUD, Food Ribbon and the Natural Fibre

Circulation International Association (NICO) have signed a Memorandum of Understanding, where the project will now be promoted under the leadership of national government agencies. In addition to the production of fiber, the company also runs a business that uses residues from the fibre extraction process to make biodegradable products such as straws and cutlery. They also operate a business called Soil and Vegetables Ltd, which sells vegetables grown from these products to be used as soil amendments in cafes. The company is also developing a traceability system for machinery.

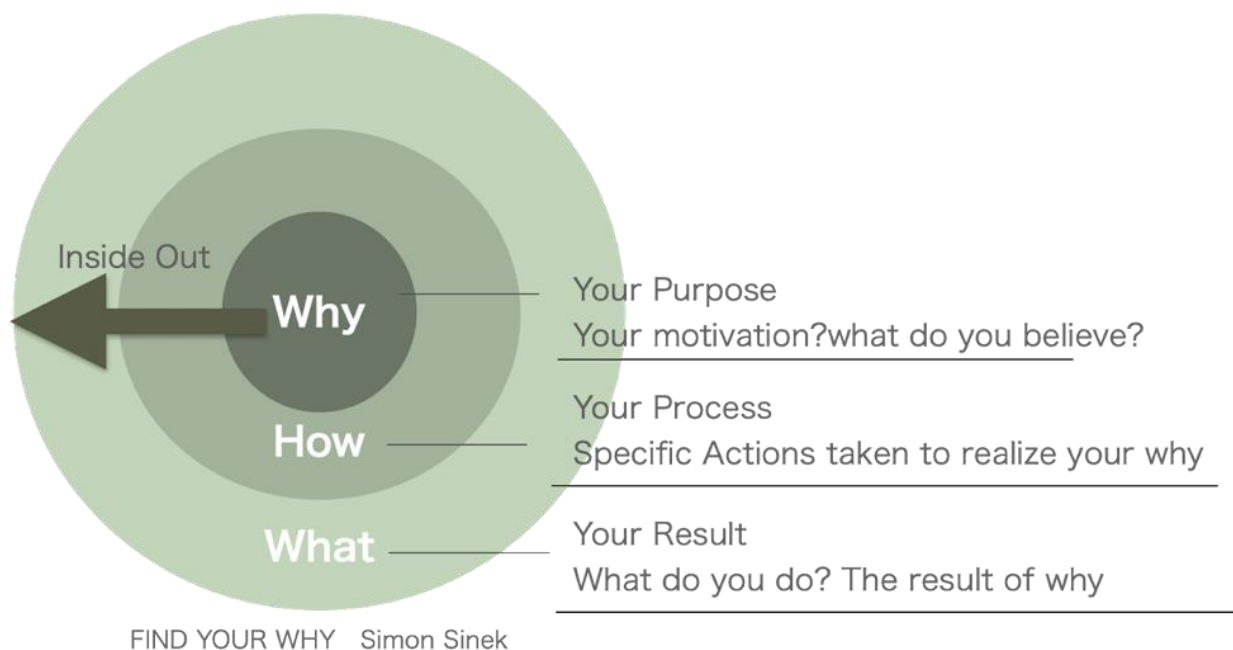
3.4 Circular design with open Network to encourage autonomy and new economic zones

The examples so far suggest the need for more local textile companies to create a circular ecosystem with a new economic zone in the region centred on textiles.

Simon Sinek explains that what people and organisations need to succeed is not just the WHAT and the HOW, but an understanding of the WHY, the underlying purpose and beliefs about their actions and activities. The rural textile industry often remains a subcontractor to garment companies, and while they hone their technical skills, the premise of circular fashion is to clarify their WHY (philosophy) and then use their skills to create products that are aligned with their WHY, HOW and WHAT and rooted in their thoughts and community.

Such a reason cannot be created alone. it requires connecting and learning from people who are practising in the region. The following list includes initiatives aimed at facilitating collaboration and partnerships between communities.

PICTURE 36: The Golden Circle by Simon Sinek



3.4.1 Autonomous decentralised networking system across regions for textile

The Textile Production Area Network is a community of practitioners from all over Japan who come together to address the challenges faced by manufacturing production areas and share the possibilities of a new future in 'monozukuri (manufacturing)'. It has been held in Tokyo, Fukuoka, Aichi, Kyoto, Okinawa, Hachioji, etc. The main participants are also practitioners in Iwate, Saitama, Toyama, Fukui, Okayama and other regions who run textile industries and are dealing with their own unique challenges. By fostering cross-industry and cross-regional exchanges that go beyond the framework of existing unions within the same industry or region, the network creates opportunities to find new leads and co-creation possibilities for issues that cannot be considered solely within a single region or company. This initiative has resulted in the joint development of products through regional links, such as the collaboration between the Japanese workwear of the Kyoya Dyeing Shop SAPPAKAMA in Iwate and the traditional craft of Nagoya Kuromonzukizome Dyeing in Aichi. In the future, the network aims to extend this to problem solving and global networking. It is expected that autonomous and decentralised organisational communities within each region will contribute to the emergence of circular designs.³⁹

3.4.2 Kyoto: Edonomy practices with increased craftsman autonomy

DESIGN WEEK KYOTO⁴⁰ aims to open up Kyoto's manufacturing scene and generate new ideas and products through interactions with visitors from home and abroad. The representative, Mr Kitabayashi, is an advocate of a circular society and economy. He aims to promote globally the goods and products rooted in the nature and climate of the region in Kyoto, and realise a sustainable society. They develop sales channels for local industries, provide business coordination, and organise cultural exchange events, community activities, tours and seminars. Their aim is to familiarise consumers with traditional crafts and to promote exchanges between holders in order to create new creative opportunities. The initiative also provides training and support to traditional artisans in areas such as branding, marketing and PR. By working to increase the autonomy of artisans, this initiative aims to achieve the sixth industrialisation of traditional crafts and circular initiatives that open up new business opportunities such as repair and reuse.

*Edonomy.

Edonomy is a term coined from Edo (Edo) + economy. In the Edo period, the concept of recycling and reuse was prevalent, emphasizing the avoidance of waste. It refers to the idea and approach of learning from the wisdom and ingenuity of the people of the Edo period and integrating the latest technology with natural mechanisms as a means to avoid global crises.

3.4.3 Smiles Co., Ltd; Pass the Baton Market

Launched in 2019, PASS THE BATON MARKET is a real market held in Tokyo that rethinks consumption patterns by focusing on dead stock, substandard products and traditional crafts that are

³⁹ <https://www.makuake.com/project/sappakama/>

⁴⁰ <https://designweek-kyoto.com/>

often overlooked in commercial outlets and secondary distribution channels. More than 50 brands take part each time, including domestic and foreign brands and traditional crafts. Over the two days, more than 5,000 people visited the market. In 2022, the market shifted its focus towards traditional crafts and launched a project with the Association for the Promotion of Traditional Craft Industries. In an interview, I spoke with Mr Nozaki, President of Smiles Co., Ltd, the founder of Pass the Button Market, about the challenges of the craftsmanship business in Japan and tips for success.

Q: What are the challenges of reuse and re-commerce in Japan?

Creating new business channels for re-sale and re-commerce.

Nowadays, sellers are disposing of their stock because producers believe that items with minor scratches or dirt can only be sold at a discount or not at all. Consumers, on the other hand, tend to hesitate in purchasing such products with imperfections. There is an invisible hierarchy between the manufacturer and the consumer. What we are trying to do is to bridge the information asymmetry.

Q: Why did you start working with traditional crafts?

To highlight what already exists rather than create something new.

Craftspeople who are passionate about their work often have difficulty communicating and selling the appeal of their products. This prevents the proper conveyance of the good quality of their products. This is also an opportunity for artisans with technical skills to be on the ground to connect with modern needs. What we do is accompany each craftsman and carry out a thorough branding, including visuals, VMD, PR and information dissemination. Our aim is to enhance their ability to communicate with visitors and guide them towards purchase without changing the product itself. And such garments cannot be made in large quantities and are therefore not suitable for existing mass-oriented commercial channels. We believe that we can expand the circulation with a social impact by trading at a fair price through the peer-to-peer exchange at venues such as the Pass the Baton Market. Consumers, on the other hand, have the opportunity to reconsider the value of traditional crafts, not as an art or something distant, but as a form of beauty for use in their own lives today. Moreover, this causes new businesses to emerge from interaction with craftsmanship in different regions. For example, MARUGO, which manufactures and sells tabi shoes in Okayama, teamed up with ITONAMI, a denim manufacturer in Okayama, to develop denim tabi shoes.

Creating a place to touch people's wealth

People's buying motivations are created by extrinsic factors such as the environment. For example, when you enjoy a bowl of ordinary soup in Kyoto, the taste is not solely influenced by the flavour itself, but also by unconscious perceptions such as the association with the location of "Kyoto", and the longing for a sense of luxury, and the belief that tasting food in that particular setting is an extraordinary experience. Pass the Baton Market aims to create exceptional moments and unique stories in such limited places and times. The essence of human wealth comes from being superfluous. Fashion, for

example, falls into this category of superfluous, which is why we can create touchpoints that evokes a sense of wealth.

Products with stories give you meaning in each person differently. If you know the background of how things are made, you want to tell someone, and it also allows you to continue to be attached to things. It enriches the mind of the person who bought it above all.

3.5 New technologies needed in the ecosystem

3.5.1 Start-ups, ventures and technology

In order to create a major business shift towards a circular society, it is important to partner with start-ups that have the potential to make a significant impact. This section highlights various start-ups and ventures that are developing advanced technologies for circular fashion. The list includes companies in the early stages of development as well as larger companies that have raised significant funding.

The government and local authorities need to invest in these technology companies and create a large ecosystem in Japan, including companies in existing businesses. It is important to note that the list is solely at the discretion of the author and without prejudice. Systems for recycling and reusing disposal of non-performing inventory because they are apart from the essence of circularity.

PICTURE 37: Circular Fashion Ventures in Japan



<frame>

- Design & Procurement: sourcing in a more sustainable way, responsible and transparent supply chain design
- Materials: developing durable, low resource-consuming materials.
- Manufacturing: using recyclable materials and waste as raw materials, implementing intelligent operation to reduce waste generation, tracking of product emissions

- D. Retail: using recyclable materials in shops and during transport, optimisation of shop inventories and lot sizes, tracking of garments using RFID and other identification technologies.
- E. Transparency: tracking product emissions and environmental impact
- F. Cloth Rental: introducing a new business model for garment rental
- G. Second-Hand Platform: implementing new business models such as re-commerce, rental and repair; effective waste utilisation and second-life business models: improved recycling technology: efficient supply-demand matching
- H. Recycling: matching supply and demand for efficient recycling; improving recycling technology

<Company case study>

a. Sitateru Corporation, a sourcing support platform for order-based production and distribution.

This company operates a sourcing service that connects registered designers, brands, companies and e-commerce businesses with factories and suppliers in the cloud. It provides a one-stop shop for orders, production and sales, offering a 'zero inventory' garment sales mechanism. It enables all kinds of people, not just specific companies and designers, to create products. Its main business is an e-commerce packaging service that integrates order taking, production and delivery; it also offers information management for garment companies throughout the production, sales and delivery process; as well as a digitised support service for communication with various suppliers. It currently works with about 1,600 sewing factories, fabric manufacturers, etc., mainly in Japan, and about 22,700 brands and companies are registered with it. (As of March 2022) In February 2021, a sewing-free space suit was planned and developed as a JAXA project and adopted as a daily necessity to be worn on the International Space Station (ISS).

b. Spiber: Development of synthetic biomaterials

This university-initiated project has established mass production technology for Brewed Protein, a protein material produced through the artificial synthesis of structural proteins. The main raw material is a structural protein produced by microbial fermentation of plant resources, which is attracting attention as a material that does not use depleted petroleum-based resources and requires little energy in the production process.

In recent years, research has also progressed towards the mass production of cellulose from agricultural residues and waste, such as sugar cane pomace (bagasse) and corn stalks and leaves. These resources serve as a resource instead of 'food' alternatives such as sugar from pressed sugar cane and corn starch. Also, research is being conducted to convert old clothing into sugar and use it as a resource. This requires further development, as the technology for saccharification from mixed materials is not yet established and is affected by dyes and other chemicals.

Through the fermentation and cultivation of various microorganisms, the company can provide products containing 'engineered' protein gene sequences, which will lead to the conversion of all garments, including secondary materials, into bred protein, facilitating their recycling process. In January 2023, a

mass-production factory in Thailand began operations, increasing the number of mass-produced products by several hundred times compared to previous domestic production levels. The site is currently powered by coal, however there are plans to develop a green infrastructure using renewable energy in the future. In addition, in partnership with Archer Daniels Midland Company (ADM), a major grain processor in the US, the company is building a mass production facility in the US, expected to be operational by 2023.

d. synflux Ltd: Development of a design system to minimise waste in cutting

A university-launched company that develops fashion design software and provide support for circular garment design and manufacturing. Additionally, it operates a virtual fashion platform business. Using machine learning, 3D simulation and algorithmic design, the company is developing and commercialising [Algorithmic Couture], a design system to minimise material waste during garment production. This innovative system draws inspiration from the straight cut of the kimono. It has developed projects and demonstrations with brands and research institutions. In November 2022, it launched a joint project with Goldwyn Inc. called SYN-GRID, which won a special prize at the Global Change Awards organised by the H&M Foundation.

e. CFCL 3D computerised knitting x WHOLEGARMENT design to reduce waste.

This luxury fashion brand is affiliated with a clothing manufacturer. Founded in 2021 by an independent designer who previously worked with the world-renowned ISSEI MIYAKE, which creates clothes from a single piece of fabric. The brand uses 3D computer knitting technology. Approximately 60% of its collection is produced using SHIMA SEIKI's WHOLEGARMENT machines, which eliminate the need for sewing process and waste. The brand is committed to transparency and sustainability, CO2 emissions are clearly displayed on all products' websites, and information is provided to consumers. In its latest collection, the company prioritizes the use of sustainable materials, with approximately 73% recycled yarn (recycled polyester) made from plastic bottles certified to the Global Recycled Standard (GRS). In July 2022, the company became the first Japanese apparel brand to obtain B-Corporation, an international certification system for environmentally conscious companies with high public interest.

f. SUSTENA TECH K.K.: Development of waterless dyeing technology.

This project, initiated by Fukui University, aims to develop and put into practice a supercritical dyeing process technology that uses carbon dioxide (CO2) instead of water for the dyeing process. Supercritical dyeing involved dyeing textiles in a pressurized vessel using high temperatures and pressures with carbon dioxide. The key advantage of this technology is that it minimizes its water usage, eliminating the generation of wastewater and reducing environmental impact. It also reduces the amount of water used in the process, streamlines the number of processes involved and significantly decreases energy consumption. NEDO adopted the project in June 2022 and is being promoted for practical application with the participation of the Kyoto Institute of Technology, the Fukui Industrial

Technology Centre and 10 textile industry companies. The project will significantly reduce the dyeing industry's environmental impact in Japan and abroad. In addition, the utilization of electron beam irradiation technology makes it possible to produce highly durable products while minimizing the amount of chemicals used.

g. hap Ltd: Development of multifunctional additive materials using photocatalytic technology

The company is focused on the development of COVEROSS® range of eco-friendly multifunctional materials and garments, as well as its growth of brand business and garment OEM/ODM. COVEROSS® is the world's first technology that uses unique photocatalytic technology, allowing for the incorporation of functions such as antibacterial/odour control, antiviral and water repellence to synthetic and natural fibres without compromising comfort and design. Several joint industry-university research projects are underway in collaboration with the Faculty of Textiles at Shinshu University.

A major fashion brand, in partnership with JEPAN, a recovery and recycling company, have launched a circular fashion product brand using chemically recycled materials (30%) and incorporates Coveross technology.

In addition to the Japanese market, hap is a member of telaketju, a Finnish environmental organisation promoting the circular economy, and will open a development and sales base in Helsinki in 2019. Other collaborations include FinCERRES, a Finnish research institute for cellulose-related research and development, and Synbio Power HOUSE, which researches synthetic biology.

h. FULL KAITEN Corporation: Development of an inventory management system for retailers

The company develops cloud services to solve the inventory problems faced by retail companies. Through the utilization of cloud-based data, AI-powered system automatically analyses sales and inventory status and proposes measures to reduce excess inventory, optimise purchasing, and increase gross margins for both e-commerce and brick-and-mortar stores. The system currently analyses inventories for small and medium-sized retailers. Still, the company's long-term goals to extend its reach to include trading companies and wholesalers, building a platform for optimising distribution volumes across companies and countries throughout the supply chain.

i. Updater Corporation: visualising the environmental impact of renewable energy suppliers

The company started a business to visualise financial transactions with producers in the production process of products by applying blockchain technology developed in the electricity sector. In 2022, the company developed and marketed a product that discloses the cost of cashmere goats at every stage of the process, starting from raw wool extraction to online sales. This enables buyers to have the visibility into the product's cost structure. The aim is to establish verifiable proof of raw materials, proof of production in the factory, analysis of defects and, above all, to create a system that allows the appropriate distribution of profits to the 1003 companies involved.

j. ECOMMIT Inc. Development of collection and recycling infrastructure through data visualisation

With a nationwide collection and distribution network, along with its expertise in sorting and a re-sale network, the company is building an efficient infrastructure to manage the entire collection, sorting and redistribution process. It has seven national distribution centres and works with more than 30 municipalities, managing around 1,300 collection points nationwide.

To enhance transparency, the company has implemented a traceability system that uses digital technology to visualise its own collection and sorting processes. This system allows the reuse and recycling percentages of collected garments to be monitored on a store-by-store and weight basis. The status of garments can be easily tracked from the initial stage to final destination, and this information can be conveniently accessed using a smartphone. The system also allows for clear visibility of the reduction in carbon emissions.

In March 2022, they launched Wear to Fashion, a textile collection in cooperation with Itochu Corporation. This service collects and sorts textile products from companies and communities for the purpose of reusing and recycling. Recyclable polyester products are used as raw materials for RENU (Recycled Polyester Material RENU), a service provided by ITOCHU that uses used clothing and fabric generated in the production process as raw materials. Collection bins have been placed in various locations, facilitating convenient drop-offs for individuals while they shop or commute to work or school. They also work with local authorities in Kagoshima, Kyoto, Saga, and other prefectures. As of December 2022, nearly 3,000 stores have been equipped with collection boxes to facilitate expansion. In the future, the company envisions using its own collection and sorting expertise to expand its reach into the Asian region (Thailand and Singapore) to create an infrastructure model for collection and recycling near manufacturing plants. Enhancing sorting technology remains a key challenge in achieving this objective.

k. JEMS Corporation, using blockchain to visualise CO2 emissions in the supply chain

The company specializes in providing IT solutions for waste management. It has launched a textile traceability service in partnership with BPLab, a recycling platform for recovery and reclamation, from 1 September 2022. This service, known as Circular Navi, employs blockchain technology to visualise CO2 emissions across the supply chain, facilitating information disclosure and communication between companies on product information.

l. AirCloset Inc: Fashion rental service provider and platform

The company provides one of the largest clothing rental services for women in Japan, with the service launched in February 2015. The service targets working women in their 20s to 40s and offers a monthly fee for 3-5 items of clothing, depending on the chosen plan. The rented clothing is returned unwashed. ShareCloset, a subsidiary of the company, collects unwanted clothes, repairs, cleans, and then rents them out. In 2022, the company plans to expand its business by adding an AI personalised shop function, which is developed in-house, using the data accumulated from its operations.

Optimising its own logistics system with RFID tags and becoming a platformer

The company has been managing its warehouses, with the exception of cleaning, as it requires assistance in implementing shared services with its existing logistics system. This is because fashion rental services involve a return flow, which is not typically accommodated in the conventional one-way process of delivering goods in garment logistics system. It is essential to build a logistics system that considers the circulation of returned clothes, including their maintenance, inspection, storage and delivery to the next user. Since the company has been founded, it has recognised the challenges of achieving such a circulatory logistics system with existing systems, and has set up a dedicated team to create and strengthen the foundations for warehouse management and logistics systems other than dry cleaning.

Besides, in 2019, as RFID technology advanced and the number of items handled by the company increased, it decided to invest in and implement RFID tags. This implementation has resulted in a 12% reduction in workload and logistics operating costs. By simply applying the tags and registering the initial data when new garments arrive, the subsequent human workload of visual checks and attaching and removing bags and tags is eliminated. Looking ahead, the company aims to transform this implementation into a platform for further expansion and horizontal development.

s. State of Mind Inc: online matchmaking service with refurbishment and repair tradespeople.

This company operates the crowdsourcing service 'nutte', which allows users to request sewing work from professional craftspeople. The service provides customers with the opportunity to engage with approximately 1,000 registered sewing craftspeople, not only for sewing clothes to be sold as products, but also for miscellaneous goods, remakes, and more. Additionally, the service allows customers to request the 're-dyeing' of their clothes either online or in-store, where clothes with sentimental values can be 're-dyed' to be 'worn again'.

o. JEPLAN, INC. Advanced chemical recycling technology that encompasses the supply chain to achieve circularity

Established in 2007, with a sale approx. 700 million yen (2020), JEPLAN plans and manages projects related to recycling and recovery. The company develops chemical recycling technologies, and, starting from 2020, establishes a recycling-oriented supply chain that manufactures and sells products using recycled materials. One of their notable technologies is BRING, which breaks down polyester at the molecular level and converts it into recycled resin, enabling 'fiber to fiber recycling' of clothing (recycling efficiency of around 96%). As of 2021, JEPLAN has partnered with more than 2,000 brands and companies in its collection business, with an annual collection volume of 500 tonnes. The company sorts the collected products and reuse clean products, while cotton products are recycled for various application, including car interiors. Single polyester materials are then processed into private-label

products. The challenge for the future is to develop chemical recycling technology for composite materials and expand it globally.

In September 2020, the company formed a business alliance with the French research institute IFP Energies nouvelles (IFPEN - www.ifpen.fr) and the French chemical plant construction company Axens (www.axens.net/) to develop a recycling system in France. Together, they collaborated on technology development and build a recovery system adapted to French consumer culture.

p. Refinverse Group Inc.

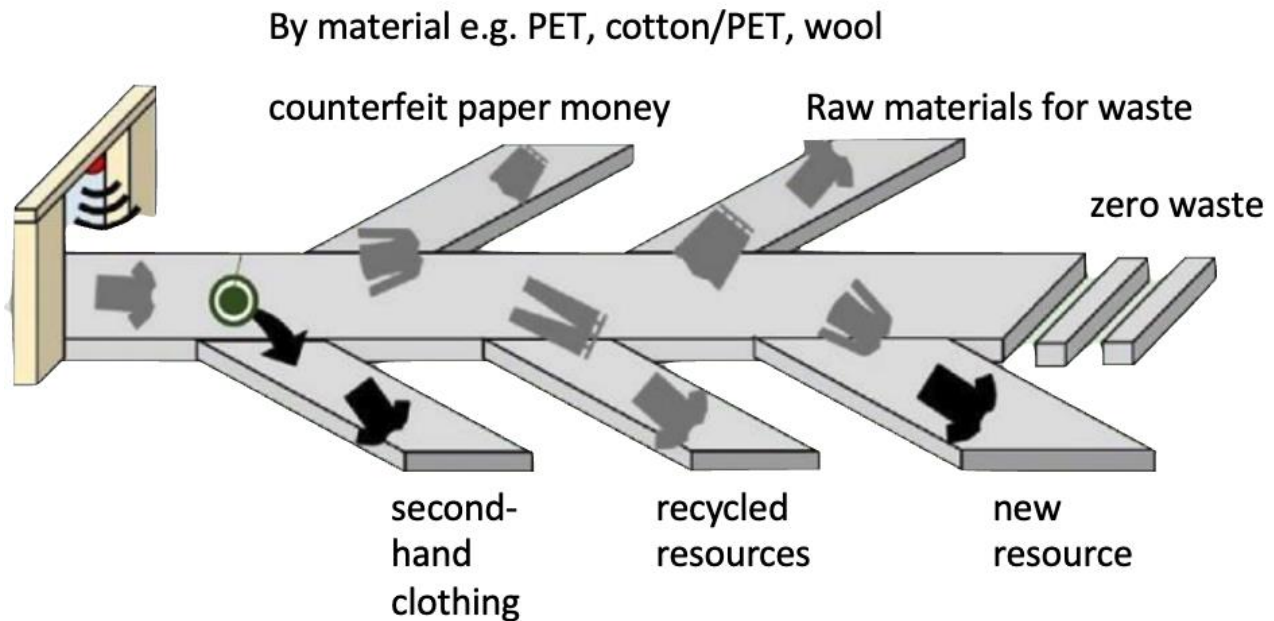
Founded in 2003, this company recovers and recycles materials using chemical recycling technology. It has also developed its own mass-production technology for advanced separation and removal of foreign substances from nylon airbags, as well as material recycling for high-quality nylon resin. In collaboration with Toray Industries, the company produces recycled nylon pellets from recovered nylon waste from fishing nets and airbag manufacturing process. These recycled materials are then converted into raw materials for automotive parts, building materials, textiles and other products. This process contributed to a reduction of approximately 82% in CO2 emissions by compared to virgin nylon production. The company has provided the technology licence to Toyota Tsusho and in April 2023, they would start a recycling business at an airbag manufacturing plant in Vietnam. They will also work with local Toyota Group companies to recover materials and develop applications for recycled raw materials, to achieve a circular economy in the automotive textile sector. As technological development progresses, the production of low-carbon airbags that reduce CO2 emissions by around 80% will become possible.

3.5.2 Technical Studies

The following three fibre-to-fibre studies are underway at NEDO (including planned):

- Conducted research on "Research and development of recycling processes for plant-based fibre resources".
- Establish the "Resource Recycling System Resilience Demonstration Project for Resource Autonomy" in FY2022. Develop technologies for material and chemical recycling of various textiles and blends.
- They plan to develop technologies such as automatic separators for used clothing in the future.

PICTURE 38: Automatic Separators for used-clothes



Source: Progress of initiatives on sustainable fashion material from METI 2022/Dec

3.6 Collaborate case with existing companies

Collaboration initiatives with existing large companies in the fashion and textile industry are being presented. Large companies are investing money and developing advanced technologies to stay competitive on the global stage. However, they have not broken away from the existing business model with a logistics system that spans across foreign countries. It seems that these companies are not functioning as a system to distribute wealth or recover resources. To illustrate this point, let's first consider the case of Patagonia. Patagonia is a world-renowned company known for its commitment to the global environment. Rather than operating solely as a large corporation, they work with different stakeholders, both large and small, to build a circular system through consistent purpose management. Other notable examples include Fast Retailing, a major Japanese clothing retailer; Toray Industries, which engages in various business overseas; and Adastria, a domestic clothing company considered a leader of its field.

3.6.1 Patagonia

On the 15th of September 2022, a piece of news deeply touched many people. The founder, Yvon Chouinard, announced his decision to donate all of his shares in the company to an environmental charity. Yvon's powerful statement, 'The Earth is our only shareholder', made us question the purpose of business in the realm of capitalism.

Patagonia founded in 1973, is an outdoor gear company that conducts its business with a strong environmental and social responsibility. Rather than "Circular Economy" to describe their approach,

they prefer to use "Circularity & Responsibility". This term encompasses the multitude of cycles involved in their operations, including materials. "Responsibility" refers to minimizing pollution as creators and caretakers of the planet. "Circularity" extends beyond material cycles, focusing on creating cycles that benefit future generations and the planet. This approach aligns with the ideas of Circularity and Regenerative in this research. During an interview, I asked Mr Shino, Sustainable Brand Manager at Patagonia, about the potential of circular fashion in Japan and sought advice on how to succeed as a circular business.

Q. What is Patagonia Japan working on?

Responsibility - responsibility for what we produce

We have set goals to completely eliminate the use of virgin fibres derived from petroleum-based raw materials by 2025. Furthermore, by 2040, we aim to achieve net-zero energy in the development, production, and sale of our products, as well as in the creation of new materials. Today, 94% of our products are made from recycled materials. In addition, the environmental impact of each product's extraction and manufacturing processes is presented to consumers in an environmental balance sheet. This figure serves as a criterion in the development of new products. In addition, we have established two repair centres in Japan, available both in-store and online. We also offer a mobile repair service called the "worn wear surf tour" specifically for surf equipment, with repair vans to prolong the lifespan of our products.

In July 2022, the company launched a T-shirt made from Infinna, a recycled fibre developed in Finland. While the development of recycled textile materials is quite common, the reality is that only a few fibres are recovered and reused, even if the material itself is recycled. This is due to the fragmented nature of the material's development, marketing, collection and recycling. Patagonia's approach is innovative in that it is a retailer that works with each operator in the supply chain to create a holistic product cycle. The development and recycling of recycled fibre are entrusted to Infinited Fiber Company, the collection is handled by Nakano Ltd, a Japanese company specialized in local collection system, while Patagonia is responsible for the sale and remanufacturing of the product. Each of these companies leverages its strengths and expertise to form a cohesive supply chain that completes the product cycle.

Circularity - regenerating the earth, people and culture (4th Regenerative Life Model)

For cotton, the company supports more than 2,200 cotton farmers in India who practice regenerative organic farming. In 2022, they will launch the first certified regenerative cotton products.

Another well-known initiative is '1% for the planet', where the company donates 1% of its sales to environmental organisations. More recently, the company has collaborated with Bereo to produce and sell down jackets, made from discarded fishing nets. In addition, 1% of the sales from these jackets are donated to marine conservation. In the future, we plan to extend this to other coastal regions in South America.

Furthermore, solar panels were installed on farmland in Sosa City, Chiba, as part of the transition to renewable energy in our stores. This not only generating energy, but also brings secondary and tertiary benefits to the local community and the environment through organic farming. The operation is outsourced to a local citizens' group, which regularly organises events involving the local community. This has increased the understanding of the surrounding public and the awareness of environmental issues among related businesses.

Q: What do you think is important for the Japanese fashion industry?

Localisation is Japan's strength.

We must develop localisation methods "rooted in Japanese values and products". Some products were used daily before the advent of convenient plastics and synthetics, even if they are now considered as traditional crafts because of the decline in craftsmen and production volumes. For example, hemp products are said to have been an essential material for Shinto rituals in the Takachiho area of Miyazaki and played a role in supporting the local economy. Unfortunately, due to various historical distortions, hemp cultivation has ceased. We believe that reusing such products linked to the original culture will help us move away from existing products with a high environmental impact. And we sincerely hope that traditional Japanese textiles and craftsmanship will be passed down to the next generation.

Q: Do you have any tips for Circularity's success in Japan?

MORE VALUE WITH FEWER RESOURCES

When developing a new product, we take into consideration how to generate profit by reducing the volume sold, allowing us to derive multiple profits from a single product. One way to achieve this is by redefining the product's value, using easily recyclable materials, and exploring possibilities for expansion into other regions.

Let me provide an example of recycling down jackets from discarded fishing nets. We focus on developing chemical recycling rather than material recycling because fabric lasts longer. Hence, we have generously shared Patagonia's know-how and technology with Breo, the material developer. NetPlus materials are now used in 150 Patagonia products. By leveraging chemicals of high quality, we can recycle our products, add value and create a wealth-sharing mechanism with various stakeholders (fishermen and recyclers). Netplus products not only reduce environmental impact, but also contribute to the regeneration of communities and improve people's well-being as their production increases. Currently, the raw materials are sourced from Chile. Still, we are actively establishing future supply chains in South American countries, Central America and along the coasts of North America, and it may be possible to introduce the same system in Japan. The project has been under development since 2014, and it has proven to be a worthwhile investment in terms of the benefits offered by recycled fishing net fibre in many parts of the world. In other words, it is essential to understand the whole system when designing materials and products and to consider the challenges that may arise during the recovery and recycling phase to anticipate the next cycle and the one after that.

Transparency leads to fair sharing and trust.

Quantifying complex supply chains not only provides a decision axis for manufacturing products but also helps to identify areas for improvement and their impact. It can also provide evidence of fair and equitable wealth distribution and helps to secure the trust of consumers and partner companies. However, the cost of implementation will pose a challenge for many SMEs.

Open sourcing and initiatives

Initiatives that significantly change existing systems, such as the circular economy and circularity, must encourage innovation across the industry. Regardless of concerns about external confidentiality, we are opening up our green business processes to the public. Rather than each company working independently, companies need to share information and work together to make this happen. While many companies are reluctant to share information due to competition, taking the initiative to openly share information can lead to development of strong relationships and a shared commitment to creating a better world for all business involved. Above all, we have proven that profits will follow if you do the right thing.

Author's observations

The reason why Patagonia is loved is the consistency between Being and Doing.

Everything Patagonia does is consistent. Our mission is "We're in business to save the planet we call home," and business is a means to that end. The Patagonia brand also changes how people think and behave through the products and how we sell them.

Today, the look and quality of clothing are mainly indistinguishable as technological advances, the differentiation lies in the story. Like Patagonia, having an unwavering mission, vision, purpose, and behaviours that align with them are crucial to driving interest in the brand, which ultimately leads to sales. However, it is more than just increasing sales, it is about attracting and engaging people in Patagonia's culture and values and gradually changing consumer attitudes.

The Patagonia case study provides excellent insights for small and medium-sized businesses.

3.6.2 Toray Industries, Inc.

The fibre business of Toray is projected to will generate sales of 836.2 billion yen in 2021. In addition to the yarn business, Toray is actively expanding overseas and diversifying its business. The strategic partnership alliance with UNIQLO in 2006 has been a key factor in the success of Toray's fibre business. In March 2023, Toray partnered with the Refinverse Group, a recycling company, to sell chemically recycled textile products in Japan, using recycled resin from recovered fishing nets as raw material and utilising its proprietary depolymerisation and repolymerisation technology. The company aims to achieve sales of approximately 800 million yen in 2023 and 1.2 billion yen in 2025.

In addition, Toray has launched the &+® (and plus) brand, a recycled fibre made from collected PET bottles and sold in cooperation with SEVEN-ELEVEN JAPAN CO., LTD and other companies. Using a unique traceability system, &+® garments are made from raw fibre materials with a special additive as a footprint to enable detection and issue of a recycling certificate. Regarding information transparency, the tags can only be traced back to the point of sale. Still, Toray's development of tracking through additives in raw materials has the potential to be extended to many more areas in the future.

3.6.3 First retailing

A global company that operates several brands worldwide, including UNIQLO, GU, and Theory. It sells high-quality clothing at reasonable prices through an integrated process from sourcing to planning, production and sales. It ranks as the third-highest in sales among global apparel manufacturing and retailing companies.

The Group's core business, Uniqlo, has approximately 2,200 stores in 22 countries and regions, with sales of approximately 1.9 trillion yen (end of August 2019). Using sustainable materials is being researched and developed by Toray, with a policy to switch to eco-friendly materials for 50% of all products by FY2030 (5% in 2022). GU generates sales of approximately 240 billion yen. It has 416 stores in Japan and 35 in Greater China, including Hong Kong and Taiwan (as of end-May 2022). It will also open its first shop in New York in October 2022 and aims to expand globally.

Closed the loops: material for fibre-to-fibre through chemical recycling.

In October 2022, they collaborated with Toray, which has "chemical recycling" technology, which involves chemically decomposing nylon fibre scraps and fishing nets to their raw material stage. This collaboration succeeded in making the "side fabric" used for the jacket surface from 100% recycled nylon for the first time. For the reuse of the padding, a device developed by Toray separates down feathers and fabrics by airflow after the product has been cut. The collection of down jackets started in stores in September 2019, and a total of 1 million garments have been collected by April 2022. Among the collected items, those in good condition can be reused for, for example, by being sent to refugee camps without recycling. Garments that cannot be worn are converted into solid recovered fuel (SRF*), which is used in special boilers at large paper companies.

They have also developed technology to recycle plastic bottles into polyester fibres for use in fleece, underwear and other clothing. However, polyester fibres are easy to recycle because PET bottles are readily available in large quantities and contain few contaminants, keeping prices low, while nylon is considered difficult to recycle. Patagonia and others are working on this at high prices, not for the masses. The big impact for Uniqlo, which has a large share of the clothing market, is significantly reducing the use of virgin materials made from fossil fuels, reducing carbon emissions.

Slowing down the loops: Developing a durable reuse and repair service.

The UNIQLO repair service will be launched in Germany in August 2021 in partnership with the Berliner Stadtmission, a local NGO. In September 2022, the UNIQLO Regent Street store in London, UK, began offering advanced services using the traditional Japanese embroidery technique of “Sashiko”, in addition to the repair service. This collaboration is carried out with Studio Masachuka, a London-based pattern and sewing studio, with price starting from £10 (approx. 1,650 yen). There are plans to expand this service to other countries and regions.

In October 2022, a trial of RE.UNIQLO STUDIO, a customisation service for garment repairs and remakes, was launched in a suburb of Tokyo, Japan. However, during the trial, there was little repair service for man-made fabrics, and the embroidery service was mechanised and restricted. The impression was that the demand for this service was not high in Japan, as the shop was located in the suburbs, more than an hour from Tokyo Station, compared to shops opened in upscale areas in other countries. The trial is scheduled to continue until March 2023.

Less Resources Use: Becoming an information manufacturing retailer

UNIQLO is transforming its business format into an "information manufacturing retailer", a new industry that turns information into products. It uses digital technology to improve inventory management from production to distribution and reduce overproduction to reduce waste throughout the supply chain in stores. Since 2018, Uniqlo has been attaching RFID tags to all of its products, enabling optimal inventory management and improving the efficiency of shop operations, such as unmanned checkouts. Starting from 2023, supply chain information will be disclosed for each product. By 2025, information about the country where each product was sewn, and the country of origin of raw materials will also be sorted and gradually disclosed. They also plan to disclose information on the country of manufacturing and the country of origin of raw materials for each product in 2025. For cotton, they are actively undertaking initiatives such as identifying spinning mills and visiting mills to verify working environment and ensure the accuracy of traceability information.

3.6.4 Adastria Inc.

A chain of casual clothing stores, founded in 1953, operates over 30 brands and approximately 1,400 stores in Japan and abroad. It has a turnover of approximately 183.8 billion yen and 5,701 full-time staff. The company is committed to using sustainable materials and promoting recycling. BY FY2020, It has achieved zero incineration of unsold stock, collected 27,072 garments (approx. 9 tonnes) and reduced the number of shopping bags by a cumulative total of 4.49 million. The e-commerce-only brand, o0u, uses the Higg Index MSI (Materials Sustainability Index) to calculate a score for each product by multiplying detailed factors such as raw material usage, blend ratio, processing and manufacturing methods. The company discloses the amount of CO₂ emissions and water consumption for each product. It also offered a sharing service for children's clothing, but the business failed to take off and ended in 2021.

3.7 Circular fashion organisations

Several organisations in Japan promote circular fashion. The following are some of the most important examples of action.

Japan Sustainable Fashion Alliance⁴¹ (JSFA)

Launched in August 2021, the Alliance aims to become carbon neutral by 2050 and achieve zero fashion losses by implementing optimal production, purchase and recycling practices.

As of April 2022, the Alliance has 44 members, consisting of fashion and textile companies, along with public partners as the Ministry of Economy, Trade and Industry, the Ministry of the Environment and the Consumer Affairs Agency. Although each stakeholder seemed to be exchanging information, little movement was observed thus far.

Japan Apparel and Fashion Industry Council (JAFIC)

JAFIC is an association of Japanese apparel manufacturers established in 1979 to promote the sound development of the Japanese apparel industry. In 1985, the certification system "J∞QUALITY" was created by the Japan Fashion Industry Council, and was later transferred to JAFIC when the two associations were merged. I. The J∞QUALITY website has a feature called FACTORY ∞ SEARCH, which allows users to search for more than 500 factories nationwide by keyword and match designers. The website also offers a designer matching service. The site is available in English, Chinese, Korean and Japanese.

To facilitate systemic change of circular economy, it is crucial to foster a paradigm shift and view it as a new business opportunity rather than a mere cost. This report Emphasizes the importance of connecting civil society and business for a circular economy.

⁴¹ <https://jsfa.info/>

Chapter 4 European Legal and Public Movement and Trend and Strength

Compared to Japan's circularity, EU countries have a more advanced legal system, and companies (large companies, SMEs and start-ups) are becoming more active in this field. In this context, collaborations between major brands and Japanese textile suppliers are also emerging.

4.1 Government

4.1.1 Legal system

The EU adopted its first Circular Economy Action Plan in 2015. With the EU's recent work and plans, particularly the new Circular Economy Action Plan, more legislation is expected to support the transition to a circular economy in the coming years. Below are listed three key pieces of legislation.

Design: Proposed regulations on eco-design for sustainable products.

Mar 2022: Additional legislation extending the Eco-design Directive requires companies to clarify the environmental footprint of their products and assess and improve their sustainability performance. Companies will need to create a common understanding and invest in the development and collection of data during the product development phase and throughout the supply chain to ensure the competitiveness and superior environmental performance of their products.

Repair: legislative and non-legislative measures to create a new 'right to repair'.

A resolution on a more sustainable single market for businesses and consumers was adopted in November 2020. The resolution aims to promote a repair culture among consumers and extend the product life cycle by providing sufficient information and services (such as extended warranties, spare parts guarantee, and repair and maintenance information) to make product repair systematic, cost-effective and attractive for consumers.

Businesses must be prepared to provide consumers with information on the availability of spare parts, repair services, product durability and services at the point of purchase.

Recycling: Revised waste shipment rules.

In November 2021, a proposal will be made to revise the efficient system for recycling waste as a resource. The proposal includes restrictions on waste exports to non-OECD countries, and the establishment of a monitoring system for OECD countries. If any OECD country causes environmental problems, their waste export privileges will be suspended. Companies are required to ensure the integrity of receiving facilities when exporting waste. At the same time, the EU is promoting the circulation of

waste within its member states, aiming to move away from reliance on virgin materials from abroad and adopting a more integrated approach within the EU.

Reference: Basel Convention Flow.

The Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal, which regulates the international movement of wastes, was adopted in 1989 under the auspices of UNEP (United Nations Environment Programme) and has 188 Parties as of February 2023. (Japan joined in 1993). The Convention initially covered lead-acid batteries, waste oils and pharmaceuticals. However, in 2019, plastic waste became a new regulatory target. Consequently, large quantities of plastic waste that were previously exported could no longer be sent out, and countries that were slow to respond faces severe consequence.

Textiles are currently not regulated under the Basel Convention. Still, with the revision of EU legislation and the trend in other Asian countries towards imposing restrictions on waste imports and other environment-related legislation, it is essential for the global community to establish unified waste management regulations. By then, Japan must develop a comprehensive circulation and management audit system for used textiles, which are currently exported overseas under the pretext of recycling in Japan or within Asia.

In response to the global need for waste management regulations, countries are also developing their own legislation.

France: Jan 2022, Circular economy law applies to textiles obligations to reduce waste, recycle resources and provide information to consumers.

The Netherlands: 2023 Jan Extended producers' responsibility for clothing production to collect, recycle and reuse disposal of their products.

Sweden: January 2024: Extended producer responsibility Obligation to register producer responsibility organisations for textile waste management.

4.1.2 Clusters

Transitioning to a recycling society involves a complex mix of related stakeholders and issues. In the EU, clusters play a vital role in connecting various organisations and facilitating information exchange. However, Japanese organisations are currently fragmented in many aspects, such as business, research and funding, and there is a lack of people and organisations to act as a link between them.

Role of clusters.

There are at least 250 green clusters in Europe, and these clusters play an important role in facilitating the transition of SMEs to a circular society within the EU. They collaborate and build bridges between research institutions and companies, provide SMEs with up-to-date information, disseminate knowledge and raise awareness through events and workshops. The clusters fulfil five essential roles:

1. Bridging research and business.

2. Supporting the translation of EU and national CE policies into strategies.
3. Helping to raise funds for CE.
4. Linking alignment with the SDGs and other holistic societal issues.
5. Bridging public policy and procurement support.

4.1.3 Community development

Instead of relying on a centralised approach of the past, there is a shift towards autonomous, and decentralised medium-scale urban development. There are many points of reference that cities in Japan's textile cluster industries can draw on in their urban planning based on the circularity of textiles.

London/Leeds, UK.

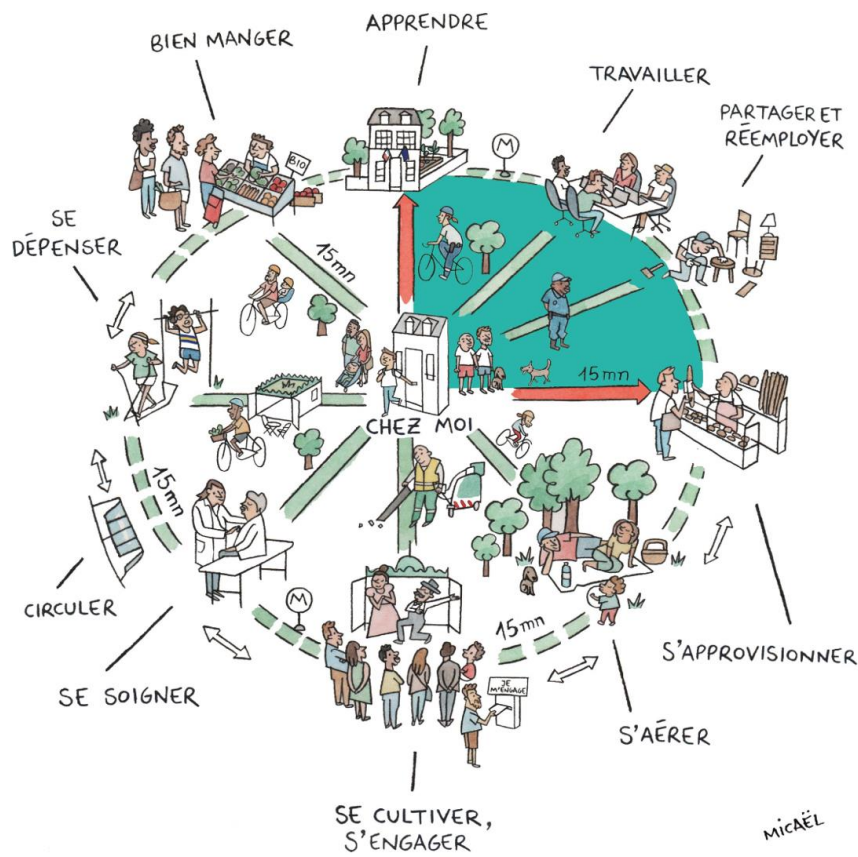
Many initiatives are currently underway in the UK to drive the fashion industry towards a circular economy. In November 2022, the Institute of Positive Fashion (IPF) published a progress report on its work to build a Circular Fashion Ecosystem (CFE) in the country. Through the lens of Kate Raworth's Doughnut Economics model, the report examines the implementation of a CFE in the autonomous cities of London and Leeds. It aims to foster collaborative opportunities for among stakeholders, assess the current situation and conduct demonstration experiments.

Paris, France 15-minute city

The city is promoting the concept of "15-minute city" as a strategy to combat air pollution and climate change. The aim is to create a city where all essential functions such as work, food, entertainment, parks, housing and clinics are within 15-minute reach by walking, cycling or public transport, thereby improving the quality of life while simultaneously reducing the air and noise pollution caused by the severe traffic congestion that has plagued the city for years. By implementing this concept, the city aspires to make a positive impact on the global environment.

Similar ideas are gaining traction in other parts of the world, as evidenced by the '20-Minute Neighbourhoods' in Portland, USA, Melbourne, Australia, and '20-Minute Towns & a 45-Minute City' in Singapore. These approaches recognize the potential of small-scale urban development to have a positive impact on both environmental sustainability and people's health.

PICTURE 39: 15 minutes city in Paris



Source: world economic forum "The surprising stickiness of the "15-minute city"⁴²

4.2 Enterprise and Technology

4.2.1 Large companies and high-brand movements

Many fashion companies focusing on circularity see the cycle as a flow that goes beyond the material cycle and are increasing their collaboration with global artisans on an equal footing. As the demand for transparency in supply chains grows due to concerns about human rights and environmental issues, the Japanese textile industry has the opportunity to showcase its technical capabilities, which can now play a subcontracting role for high-brands.

LVMH.

During the visit to Japan in May 2022, Chairman and CEO had the opportunity to meet with Chief Cabinet Secretary Matsuno, and discussed the proposal to strengthen cooperation with the Japanese fashion and art industry.

1. State the specific name of the place of origin in the product description section when using textiles made in Japan, highlighting Japan's exceptional craftsmanship to international audiences.

⁴² <https://www.weforum.org/agenda/2022/03/15-minute-city-stickiness/>

2. Cooperate with Japanese companies, especially small and medium-sized enterprises (SMEs) with high craftsmanship, and contribute to the success of these companies and craftsmen
3. Encourage greater partnership with young Japanese artists and craftsmen.

Richemont.

Chloé has launched its Women Forward for a fairer future statement, partnered with the World Fair Trade Federation. In line with this initiative, the company has also collaborated with design label Mifuko on a range of handbags hand-woven by artisans in Kenya. By collaborating with Mifuko and working with artisans in Kenya, Chloé aims to highlight the importance of global craftsmanship and artisanal skills, as well as the value of preserving traditional techniques.

Kering.

The company has announced a CE-focused strategy for its business, including improved product design, manufacturing and use, accelerated transition to regenerative agriculture and extended product life. As part of its craftsmanship collaboration with Japan, a product collaboration was unveiled with HOSOO, a long-established Nishijin textile company, a traditional craft in Kyoto in December 2022.⁴³ The company is also active in talent development, partnering with the London College of Fashion to launch a public online course (MOOC) in 2021 and an innovative education programme on fashion and sustainability called Fashion Values.

H&M.

In collaboration with HKRITA (Hong Kong Research and Development Centre for Textiles and Apparel), a recycling technology has been developed for mixed fibres of cotton and polyester, which were previously considered difficult to separate. Ehime University and Shinshu University in Japan were also involved in the development of this technology and its successful practical application. The organisation also supports start-ups that address a range of social issues, and its Global Change Award provides the winner with a €1 million grant and a year's participation in the Innovation Accelerator Programme.

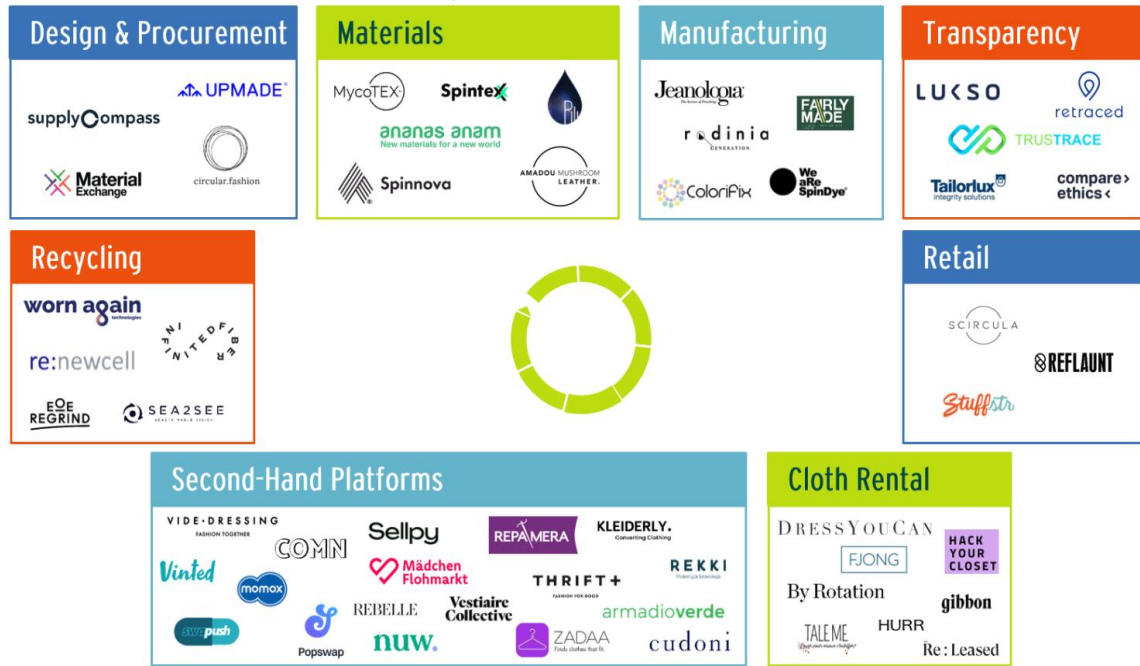
4.2.2 Start-up

Below is a list of circular fashion start-ups marketing in the EU. Compared to Japan, start-ups in the EU are active in all sectors. In particular, in EU countries where the second-hand culture is well established, the second-Hand platform and clothing rental sectors are prevalent. In Japan, where oversupply and opaque supply chains are concerns, areas such as manufacturing, transparency and retailing will be needed. There is also potential for cooperation in the highly technical field of recycling.

⁴³ <https://www.japanartscraft.com/en/76140/>

PICTURE 40: Circular Fashion Start-Ups in Europe

Circular Fashion start-ups in Europe



MVP

Source; Munich Venture Partners

Table 5: Circular Fashion Start-ups in Europe

Type	Company	What they do	Country
Design & Procurement	Upmade	Development of software to easily and quickly create upcycled products from garment scraps	Estonia
	Material Exchange	Platform for fashion brands and suppliers to search for environmentally friendly materials and supply chains	Sweden
	Circular.fashion	Provision of a software platform to support circular fashion design	Germany
Materials	MycoTEX	Development of mycelium leather and fully automated production of bio-fabricated materials	Netherlands
	Spinnova	Development of new textile materials using wood and agricultural waste	Finland
Manufacturing	Jeanologia	Technology to reduce water consumption in dyeing of denim products, new model apps for on-demand production, development of tools to measure the sustainability of denim	Spain
	Fairly made	QR tags to measure and display the traceability of the environmental impact of the production and distribution of products	France

	We aRe Spin Dye	Development of dyeing technologies that do not consume water when mixed with recycled polyester materials	Sweden
Transparency	Lukso	Building blockchain applications to trace the life of products from production to distribution and verify their authenticity with regard to fashion and art.	Germany
	retraced	Platforms that use blockchain technology to track information on environmental impact, human rights, working conditions, etc. in the sourcing and manufacture of products.	Germany
	Tailorlux	Development and production of smart textile products, using sensor technology to capture data on temperature, humidity, etc.	Germany
Retail	Scircula	Fashion retail data analysis platform	Netherlands
Clothes Rental	Dress You Can	Rental services for dresses and other party fashions	Italy
	Fjong	Rental service for organic, ethical and sustainable fashion brands	Norway
	Hack your closet	Provision of applications that automatically scan clothes in the closet and provide styling suggestions	Norway
	Gibbon	Travel destination fashion rental platform	Belgium
	Tale Me	Provides rental services for maternity and children's fashion brands	Belgium
Second-hand Platforms	vide-dressing	Platform for the sale of second-hand luxury fashion items	France
	Comn	Sales platform for sustainable fashion items made from recycled materials.	Germany
	Sellpy	Sales platform for second-hand items. Visualisation of each item's carbon footprint and water usage.	Sweden
	Repamera	Online service for garment repair and cleaning	Sweden
	Vinted	Sales platform for second-hand clothing and accessories	Lithuania
	momox	Platforms for buying and selling second-hand books and used clothing	Germany
	Madchen Flohmarkt	Flea market applications for women	Austria
	Rebelle	Online second-hand shops for luxury brand clothing, bags and accessories	Germany
	Vesiaire Collective	Online second-hand shop for luxury fashion	France

	ZADAA	Online fashion marketplace for second-hand clothing with AI technology-based offers	Australia
Recycling	Re:newcell	Development of chemical recycling technology to convert mixed fibres from used clothing and other textile waste into renewable cellulose fibre Circulose® pulp. Used in clothing, household products, medical equipment, automotive parts, etc.	Sweden
	Infinited fiber	Development of high-quality, renewable, natural resource cellulose fibre Infinna™ from old clothes and waste from production processes. Used for textile to textile, non-textile and other applications.	Finland

4.2.3 Technological developments

As a national project, there are three circular fashion-related technology developments in circular fashion-related technology. Textile-to-textile recycling and sorting technology have great potential for cooperation with Japan to promote technological innovation on both sides.

Table 6: List of projects for circular fashion

Name	Country	Time	Budget.	Project Overview
CISUTAC	Belgium (24 companies from Netherlands, Germany, Italy and others)	2022-2026	9.2 M€.	Repair and dismantling, sorting for reuse and recycling, fibre-to-fibre circular apparel design for polyester and cotton fibre garments
T-REX	Germany (10 companies from France, the Netherlands and Fen)	2022-2025.	8.4 M€.	Demonstration of the separate collection of garment waste from households and its conversion into desired raw materials, involving players from across the value chain.
SCIRT	Belgium (17 companies from Germany, France and Switzerland)	2021-2024	9.2 M€.	Demonstration of an integrated textile-to-textile recycling system for used textiles (natural, synthetic and blends) by all players in the textile industry value chain.

4.3 Certification schemes

Bcorp

B Corp, the international corporate certification from the USA, is an international certification system for socially and environmentally responsible companies in the public interest. It was launched in 2007, with the 'B' standing for 'benefit'. The aim of the system is to recognise companies that benefit not only their

management, shareholders and employees, but also their business partners, customers, the global environment, local communities and all other stakeholders. The certification is awarded to companies that conduct their business in an environmentally and socially responsible manner and meet strict criteria such as transparency. In Japan, B Corp certification helps distinguish between companies that have high SDG goals but take no action and those that claim to be socially responsible through superficial acts of greenwashing. There are currently over 6,000 companies with B Corp certification, including Patagonia and Chloe in the fashion sector. In Japan, CFCL will be certified in July 2022. While ISO remains the mainstream certification for businesses, B Corp certification can help build trust when collaborating with EU companies.

4.4 Education

a. Higher education

In the 2022 ranking of the world's fashion schools, EU countries have notable placements. The University of Aalt in Finland ranks sixth, and the Politecnico di Milano in Italy ranks ninth. The ranking is based on the opinions of 40,000 students, 50,000 professionals and 30,000 business people from around the world. Many of the top-ranked universities offer opportunities to study business fundamentals and entrepreneurship outside of fashion design, such as production management, marketing, management and entrepreneurship. In Japan, Bunka Fashion College holds the 10th position, but there are few opportunities to study business or the latest technology-related subjects, where the curriculum particularly focuses on beauty and luxury design.

b. Facilities

Fashion for Good

This facility, which opened in Amsterdam in 2018, showcases numerous initiatives of the fashion industry for the future. In particular, it is recognized as an 'ethical fashion museum' due to its display of environmentally, socially and labour-friendly initiatives from the fashion industry and apparel manufacturing companies. The facility features various exhibitors including global companies such as Adidas as well as start-ups.

Chapter 5 Direction for Japanese Circularity and Opportunities

EU-Japan SMEs

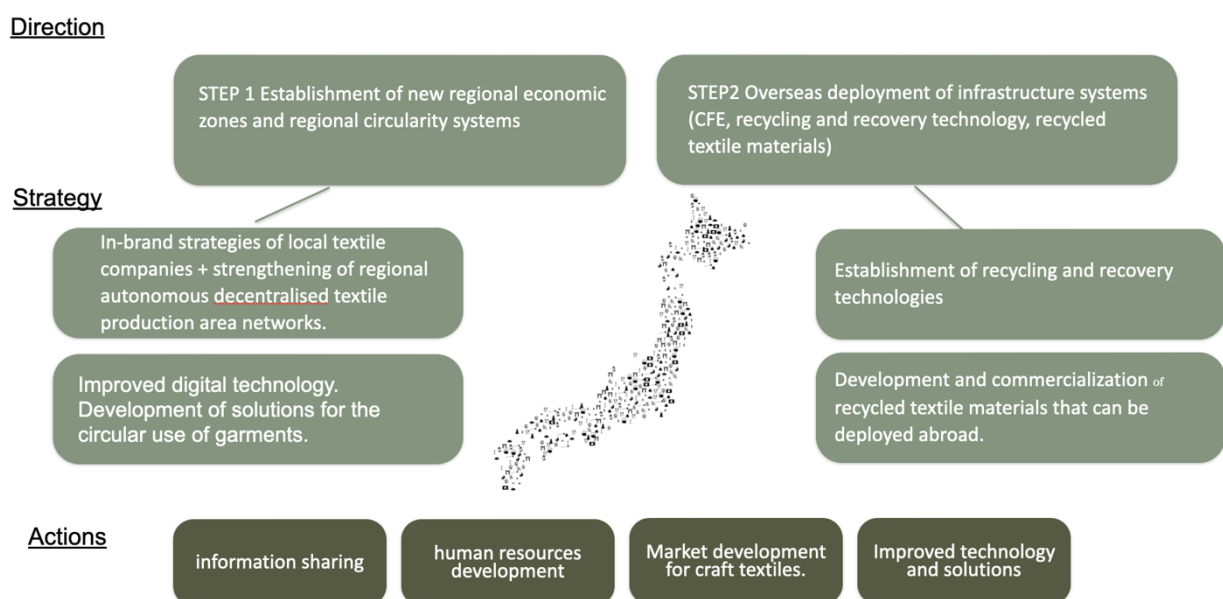
So far, through several case studies, the report shows the current situation and challenges of the Japanese fashion and textile industry. It explores the history and culture of textiles in Japan and presents the potential for a unique approach to achieving circular society. It suggests that the rich heritage and the craftsmanship, cultivated in harmony with the local history, climate and culture, holds valuable clues for creating an ecosystem of circulation and regeneration in local textile-related agglomerations. The concept of circularity requires a system thinking approach that goes beyond improving resource productivity and recycling rates. It emphasizes the importance of considering the well-being of people, the utilization of global resources and the preservation of diverse cultures within the whole system over time and across sectors. While the regions covered in this report provide glimpses of a circularity ecosystem, they still face the challenge of building and strengthening their capacity to build circularity businesses. At present, there are many obstacles to overcome in terms of the number of domestic start-ups, the speed of technology development, the commitment of large companies and government action.

This chapter outlines the key focus areas and challenges in realising a circular ecosystem with a focus on local SMEs and suggests opportunities for collaboration with the EU to achieve these goals.

5.1 Future focus areas for circularity with a Japanese character

In order to accelerate the transition to a circular economy in the Japanese market, the following priority areas could be addressed

PICTURE 41: Direction, Strategy, and Actions for Japanese Circular Fashion



<Direction>

STEP1 Establish new regional economic zones and regional circular economy systems.

STEP2 Develop infrastructure systems overseas (CFE, recycling and recovery technologies, recycled textile materials).

<Strategy>

STEP 1: In-branding strategy of local textile companies (*) + Strengthening of regional autonomous decentralised networks of textile production areas.

Develop solutions for the recycling of garments using digital technology.

STEP 2: Establish recycling and recovery technologies

Develop and market recycled textile materials that can be produced overseas.

The "in-brand" strategy stands for Ingredient Branding, which was advocated by Kotler, the father of marketing, as a branding strategy for companies dealing with materials. The key to success lies in working with multinational companies and using retail channels. One example of this strategy is Gore-Tex.

As a business direction, this report proposes the establishment of Circular Fashion Ecosystems (CFEs) in local industrial clusters with Japanese textile craftsmanship and the development of these CFEs as intellectual property for business development abroad.

To achieve this, the first step is to establish a local CFE. The Institute of Positive Fashion (IPF) report from the UK highlights that the CFE framework should be introduced in cities with diverse characteristics. From this point of view, an in-brand strategy is proposed as a STEP 1 strategy to highlight the unique characteristics of the textile industry in each region. At present, the regional textile industry primarily operates as a subcontracting business, with few companies having their own brands (2.2.4). However, the case of Kyoya Dyer, which successfully created a cycle with a natural living system as a brand strategy based on local festivals and historical backgrounds (3.3.1), suggests that leveraging brand power to enhance competitiveness through an in-brand strategy that deeply explores the characteristics of each Japanese region and combines them with textile craft skills. This direction of utilizing brand power is a suitable approach for improving competitiveness. In addition, we believe that instead of each region improving its competitive advantage independently, it is possible to create a city development system that is tailored to the unique characteristic of each region. This can be achieved by strengthening the region-wide autonomous decentralised networking system, collaborating with textile production areas in Japan and abroad, sharing information on initiatives, and creating a mechanism to stimulate business expansion. By doing so, we can foster the creation of a distinctive urban development system for each region. In addition to the development of new businesses focusing on repair and remaking by textile companies, it is essential to develop solutions for the recycling and reuse of clothing through digital technology. The implementation of digital technology for re-use and sharing, the optimisation of

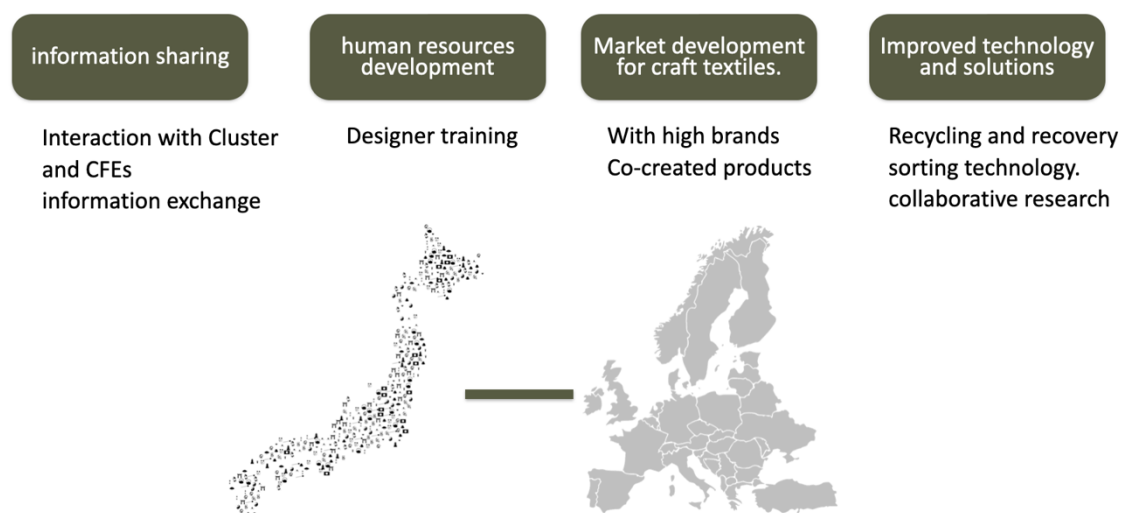
collection infrastructures and the promotion of grassroots movements by citizens are all essential elements that need to be developed.

STEP 2 proposes the development of infrastructure overseas. Rather than focusing on scaling up in Japan, where the population is declining, it is necessary to explore opportunities for expansion overseas. While cross-border e-commerce and digital sales of goods to overseas markets are proposed, circularity requires a system design that minimizes waste generation. Of course, there are costs and environmental impacts associated with the transportation of goods, and there is a need to promote small-scale circularity with a focus on regeneration, emphasizing the sourcing and manufacturing of goods at a local level. The overseas expansion strategy pursued by EU companies in terms of circular economy is in the direction of "selling intellectual property" (selling licences and transferring skills) rather than "selling goods". It would be appropriate to apply this idea to Southeast Asia, where Japan is seeking to expand its market presence. Three Japanese infrastructure technologies that can be employed overseas are CEF, recycling and recovery technology, and recycled textile materials. However, they need to be established in their respective countries before deploying them abroad, as the caveat for development in third country markets is that localization in alignment with the local culture is crucial. Business models that have been successful in Japan and the EU may require adaption to suit local consumer lifestyles, local climates and cultures.

5.2 Challenges and Opportunities for Cooperation in Japan

In order to implement the business directions and strategies outlined in 5.1, this research identifies several gaps in Japan's current situation as challenges. The following four challenges have been identified as opportunities for collaboration between the EU and Japan to realise a Japan-specific circular fashion ecosystem.

PICTURE 42: Opportunities for EU–Japan Collaboration



<Challenges >

1. Information exchange on CFEs
2. Training of CFEs
3. Market development for local textile enterprises
4. Improving technology and solutions for garment circularity

<Opportunities for cooperation>.

1. Information exchange on CFE

→Information sharing with the European Circular Economy Cluster

To invite local authorities engaged in circular city planning in their regional clusters and small areas to Japan, which aims to exchange information on forming new regional economies based on circular fashion.

In the past, France and Japan exchanged information about sustainable actions. Looking ahead, it will be necessary to establish continuous communication in addition to the exchange of information.

Reference: Franco-Japanese symposium to be held in March 2022 by the Consumer Affairs Agency/Ministry of Economy, Trade and Industry and the Embassy of France in Japan.

International trends and future developments in a sustainable fashion. ⁴⁴

2. Training of CEF

→Introduction of European Circular Fashion Design Education

There is a demand for human resources and organisations capable of designing the blueprint for the circular fashion ecosystem and connect different stakeholders and sectors. As Europe is focusing on circular design and ecosystem design education, there is an opportunity to develop similar educational content in Japan.

3. Market development of regional textile companies

→Cooperate between European high brands and Japanese regional textile companies

In order to implement an in-brand strategy for local textile companies, it is crucial to find value in brands that are in line with the local Japanese culture and climate, as well as to collaborate with high-end brands that are developing in the mass market. In the past, there have been some collaborations, such as LVMH and HOSO, which show respect for Japanese craftsmanship. However, the key aspect is to build an equitable relationship. Additionally, government agencies should intervene to facilitate such co-creation relationships. For reference, a case study of collaboration between the Japanese small and medium textile industry and Apple is described in section 5.2.1.

4-1. Improving technology and solutions for garment circularity

⁴⁴ <https://www.caa.go.jp/notice/entry/027694/>

→European start-ups entering the Japanese market

Compared to Japan, Europe has a more active start-up market with many companies venturing into various fields. Furthermore, in line with the European Textile Strategy, it is expected that the number of Climate Tech start-ups will increase in the future. Japan has a potential to enter the transparency disclosure and second-hand market. In the past, JETRO and Business Finland (the commercial section of the Finnish Embassy) have conducted business matching between start-ups from different countries. Such exchanges between start-ups should also be promoted.

4-2. Improving technology and solutions for garment circularity

→Joint development of collection and recycling technologies

It would be effective to jointly develop recycling technology, which is being actively developed in Japan and Europe, as well as automated sorting technology for collection.⁴⁵

5.2.1 Reference: Collaboration between Inoue Ribbon and Apple Inc

Inoue Ribbon Industry, located in Echizen City, Fukui Prefecture, is a 75-year-old narrow woven fabric manufacturer with about 150 employees.⁴⁶ The company produces two types of bands, Alpine Loop and Trail Loop, which are designed to have high water and shock resistance to contemplate the latest Apple Watch model released in the autumn of 2022. Through a collaborative effort with Apple, the company has successfully created products that are well-designed, strong and durable, driven by a shared passion for craftsmanship, workmanship and the exchange of problem-solving skills between the two companies. This research shows an interview with Mr Inoue, the Director, who shares the insights and tips for the success of this collaboration.⁴⁷

Appropriate data management and iterative improvement

The strength of the Japanese textile industry lies in the spirit of challenge and the craftsmanship of continuous effort. Continuous improvement always requires data management. When high quality is demanded, instead of giving up, they analyse the data and continuously improve their skills and offer suggestions for improvements. Although it took two and a half years, the success achieved results from both companies' perseverance and continuous improvements. When dealing with industrial materials, more detailed data management is required. However, implementing a large-scale system is unnecessary, when a small and medium-sized company can adopt its own approach. Enhancing data management can also lead to the next business opportunity.

Rapid development capability based on demonstration experiments.

⁴⁵ <https://prtimes.jp/main/html/rd/p/000000006.000050747.html>

⁴⁶ <https://www.telala.com/>

⁴⁷ <https://www.elle.com/jp/decor/decor-interior-design/a42290914/apple-watch-ultra-with-tim-cook-20221220/>

Inoue Ribbon's other strength lies in their ability to rapidly develop and create products, showing them for discussion. They have a keen eye for identifying areas for improvement, even in a short period of time. Additionally, they are involved in creating a part of Apple's products packaging. When tasked with creating a 100% recyclable package instead of the usual nylon, Inoue Ribbon suggested using machine weaving techniques to produce strong paper handles that met the required specifications.

Open sourcing technology

Many textile companies are reluctant to share their skills and information. However, from the perspective of the textile industry as a whole, they are more interested in developing together than in competing with each other, leading to co-creation. This approach aligns with the Japanese culture of valuing human relationships and building trust in business. The collaboration with Inoue Ribbon and Apple also led to the creation of improved products and opportunities for the next business by sharing quality control technology. The textile industry will be revolutionised if more companies like this are established.

Conclusion.

The regions hold the potential for Japanese circular fashion.

This report shows some directions in which the Japanese circular fashion should be heading, emphasizing the potential found in local areas in Japan, and of the abundance of craftsmanship that can be harnessed for circulation. The cases shown in Chapter 3 of forming new economic zones that use the knowledge and wisdom of traditional circulation in each region are a step towards real circularity that values the existing culture and skills. Bottom-up approaches, even on a small-scale, created in local communities are sustainable. Furthermore, local actions are more likely to involve stakeholders, including citizens, and form an essential ecosystem. As Japan faces a declining birth-rate and a shrinking population and still has a concentrated system where the population and business are still concentrated in Tokyo, solutions locally that encourage autonomous decentralisation from the old large scale could not only fill the domestic gap but could be a leading future model for a shrinking society. However, Japan still only has the seeds. The seeds need to be watered and nurtured. It is necessary for the help of EU countries and companies forming CFEs ahead of us. In particular, there must be more education and human resources for CFE designers in Japan and a need for more technology and innovation to revitalise the region.

Opportunities for EU SMEs

Europe and Japan have a lot in common concerning population, resources and limited land size. Making them well-suited for collaboration in promoting the autonomous, decentralised, small-scale system of circular fashion and textiles.

As mentioned above, there is an urgent need to train designers for CFE in Japan. This would not be possible without the support of European companies. Partnerships and joint ventures are good options for developing and horizontal application of recycling and recovery technologies and recyclable textiles developed jointly in Europe and Japan. EU companies will likely have to overcome various challenges, such as Japanese culture and old habits, language and cultural barriers, local regulations and building trust, which will take time and patience. It will also be essential to have the support of organisations such as the EU-Japan Centre for Industrial Cooperation, which acts as a bridge between Europe and Japan, to gain the ability to deal with such barriers. Above all, realising a new economic zone locally for circularity through cooperation between Europe and Japan will bring new values to countries with future economic development and will undoubtedly significantly contribute to global environmental issues.

Fashion can play a role in improving well-being.

In 2006, I had the opportunity to do an internship as an environmental consultant in the UK, focusing on impact assessments through the EU-Japan Centre for Industrial Cooperation. As a student, I wanted to see the differences between Japan and Europe, which were considered environmentally advanced. There, I was responsible for investigating the potential water and air pollution surrounding a new plant

and assessing its impact on the ecosystem. I wrote an environmental impact report that the pollution levels did not exceed EU standards. I also spent weekends visiting renewable energy and waste facilities in different countries.

The discomfort I felt at the time was the gap between top-down government policy and the need for more awareness of those involved about what they were building and consuming. Seventeen years on, climate change and waste issues have become more serious, and more companies and individuals have developed a sense of urgency and are taking environmental issues seriously. However, the textile sector needs to be more developed than other industries.

Circularity cannot be achieved by solely creating a system. The system will only become useless if the people who use the system do not cultivate tangibly caring values relationships with things simultaneously. It is necessary to reform the system on people's values.

Clothing is a tool that not only protects the body but also embodies who you are. Instead of a linear life cycle where everyone likes the same thing and throws it away when it goes out of fashion, it is a step towards a recycling-oriented society where everyone recognises their way of being and shares it with others, saying "This is what you like and this is what I like". Fashion is more about 'feeling with the body' than understanding the head. The more people are happy when clothes touch their skin, and they can feel and experience the local climate and comfort, the more people will rebuild their relationship with things. Fashion enriches the senses and is an excellent way of creating a natural cycle that connects people and systems. Because of its underdevelopment, urgent legislation and a behaviour change beyond existing corporate values are expected.

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