SUPPLY CHAIN REDESIGN FOR A SUSTAINABLE FURNITURE INDUSTRY

SD5173 CAPSTONE REFLECTIVE THESIS
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From Linear to Circular: Supply Chain Redesign for a Sustainable Furniture Industry

by

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Abstract

Insights regarding sustainability among enterprises within industries are rapidly expanding. However, advice and guidance for firms to develop sustainable business model innovation are insufficient, especially for SMEs and start-ups that have limited resources to approach. For the furniture industry, the nature of the sector also causes more unnecessary carbon footprints throughout the sourcing, manufacturing, selling, and delivery processes. Most used furniture and interior finishes wind up in landfills without systematic sustainable practices. Therefore, this study aims to investigate the key factors and activities for the enterprises within the furniture industry to transform their linear supply chain model into a sustainable one to achieve sustainable development goals.

Before digging into the case studies, this paper identifies five key activities that involve in a furniture supply chain by investigating the current situation, which are Design, Source, Manufacture, Logistics, and Sales. After understanding current challenges and needs, three key factors are identified: Transparency, Collectiveness, and Policy. A process framework is illustrated by combining the key factors and activities. The article also suggests that firms should come up with their own strategies based on the proposed framework since it is a generic approach. Sustainability practices should be tailored to a company's level of sustainability maturity.

Keywords: Business innovation, Furniture industry, Supply chain management, Multiple case study

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Chapter 1: Introduction

1.1 How the Role of Business Changed

The economist Adam Smith stated more than 200 years ago that when businessmen participate in private market activities, they can frequently have an advantage, and that there would be an "invisible hand" in them that directs the market to achieve maximum advantages (Harrison, 2011). Over the last few decades, business's anticipated social obligation has shifted dramatically. In 1970, economist Milton Friedman stated, "There is just one social obligation of business: to utilise its capitals and join in activities geared to raise its profits." (Friedman, 1970) Friedman argued that a corporation's only social responsibility is to its shareholders and that it is not socially responsible to the general public or society. Along with Friedman's beliefs, this word has been used to support "shareholder primacy" as the basis of American capitalism. The majority of business executives are solely concerned with increasing profits and reporting to shareholders, while operators pay little attention to social development (Friedman, 1970).

In the 1980s and 1990s, management practitioners began to broaden their company's worldwide perspective in order to align with globalisation (McKinsey & Company, 2020). Despite the fact that technical improvements assisted globalisation, the tech bubble and following events, such as the global financial crisis of 2008, thrust the issue of corporate social responsibility into the public eye. According to Gray and Bebbington (2000), capitalism contributes to unsustainable development since it is built on short-term economic returns, consumption, and greed. With the growing focus on sustainable development and corporate social responsibility (CSR), as well as investors paying increased attention to the corporate ESG (environment, social and governance) effect,

how to combine profitability and social impact has become a crucial challenge for modern businesses (Gray & Bebbington, 2000).

1.2 Development of Sustainability

"Sustainability" is often characterised as "development that meets current requirements without jeopardising future generations' ability to fulfil their own needs" (Brundtland & Khalid, 1987). It is a term that is commonly used to characterise the influence of economic development on the earth and the environment, but it has a distinct meaning in the business world. Sustainable enterprise growth is more than simply an operating model that stresses a high rate of return; it is also a long-term strategy that considers the influence of businesses on the organisation, society, and the environment during the manufacturing process (Brundtland & Khalid, 1987). Supply chain management, healthy labour relations, consumer rights, and other aspects of corporate social responsibility, are all included in the philosophical conceptions of sustainability (Barbosa, Drach & Corbella, 2014).

Three interconnected and interrelated components may be identified among the various interpretations of sustainable development: society, environment, and economics. Vos (2007) comments in his synthesis of concepts of sustainability that virtually all definitions have key characteristics and are connected to economic, social, and environmental factors. These are in accordance with the concept of a triple bottom line (people, planet, and profit) (Seuring & Müller, 2008). These three factors mutually support each other and serve as the foundation for economic progress, environmental concerns, and social well-being.

1.3 Current Problems and Issues: Why Should Businesses Care?

Companies have started to take responsibility for global sustainability issues in recent decades due to their harmful impacts on society and the environment, and even the need for the corporate sector to contribute to the solution in order to actually shift away from normal operations and toward a sustainable world where every citizen lives well within the parameters of the planet (WBCSD, 2010). However, although executives all across the world offer their support for the concept, many companies are not actively engaging in it. According to a recent UN Worldwide Compact study (2013), a study of 1,000 CEOs from around the world found that 84% of them said businesses "should lead efforts to create and deliver new targets on global priority issues." To address the difficulties of the global environment, however, just a third of those surveyed agree that "business is doing enough."

There is a certain point of view that businesses should engage in sustainability development. According to Rockstrom et al. (2009), industrialisation has ushered in a new period in which activities of human beings are responsible for significant environmental change, which may have severe consequences in the future. We are projected to produce 27 billion tonnes of solid waste by 2050, according to Arora (2018), because of a business culture that prioritises speedy product manufacturing and revenue for maximum profitability, unchecked CO2 emissions are predicted to result in a two-degree temperature raise by 2050, raising sea levels and generating more extreme weather conditions. The Millennium Ecosystem Assessment (Reid, 2005) also states that human activity has harmed 15 of 24 ecosystem services over the previous 50 years, with only four in better shape. Arora (2018) claims that the current rate of extinction of plant and animal species due to human activity is hundreds of times higher than the

natural rate. Altogether, numerous species will be extinct in the twenty-first century if companies do not behave responsibly as global citizens.

Despite the fact that environmental challenges and their consequences attract a lot of attention around the world, the corporate world has a connection to the social component of sustainability. The term "social sustainability" refers to actively fostering democratic, egalitarian, and health treatment that allows for a high standard of living both within and outside of the workplace. Firms are accountable for the safety, health, and environmental conditions in the areas in which they operate (Diaconu & Tiplic, 2014). It also means actively promoting the development of new talents, preservation, and the capacities of next generations (McKenzie, 2004). However, it is not mandatory for businesses to develop and implement social responsibility and corporate sustainability policies. Even though corporate engagement to sustainable development has gained widespread acceptance in recent decades, neither the human environmental footprint nor the world's social problems have been significantly reduced as a result (Dyllick & Muff, 2015).

1.4 Why Sustainability Is Important in the Furniture Industry?

Furniture production can involve a lot of materials such as wood and upholstery, which causes sourcing to be a vital issue. Due to the coatings, adhesives, and treatments used on furniture, which leak gases long after leaving the production facility, furniture production may entail using hazardous chemicals. Also, furniture has often been packaged using single-use polymers like Styrofoam and airbags for many years (Figure 1.1, 1.2).

Fig 1.1, 1.2 Packaging of furniture delivery

It is unquestionable that the furniture sector is a major source of global pollution. The EU furniture sector employs over 1 million Europeans, making it produces about 25% of the world's furniture, accounting for a market of EUR 84 billion, or about 10.5 million tonnes of furniture annually, for the EU28 (CEPS, 2015). Despite the fact that recycling rates in the EU have grown as a result of legislative measures such as the Landfill Directive and its diversion aims, few activities are taking place in higher-value cyclical resource flows, with remanufacturing constituting for less than 2% of EU manufacturing revenue (Forrest et al., 2017). Besides, the European Commission (2022) also claimed that more than 80% of a product's environmental effect is decided at the design stage, which supports the importance of the initial phases of product development.

Currently, the European Federation of Furniture Manufacturers (UEA) state that 80% to 90% of the furniture waste is either burnt or disposed of in landfills, with just 10% recycled (Vanacore et al., 2021). Furniture is largely burnt in Sweden, where landfills account for around 0.8% of total garbage (Avfall Sverige, 2020). In Hong Kong, 3.96 million tonnes of Municipal Solid Waste (MSW) were disposed of at landfills in 2020,

of which 20% of it includes bulky items such as furniture (Environmental Protection Department, 2021).

1.5 Research Purpose, Objectives, and Implications

As mentioned above, insights regarding sustainability among enterprises within industries are rapidly expanding. However, advice and guidance for firms to develop sustainable business model innovation are insufficient, especially for SMEs and start-ups that have limited resources to approach. For the furniture industry, the nature of the industry also causes more unnecessary carbon footprints throughout the sourcing, manufacturing, selling, and delivery processes. Most of the used furniture and interior finishes wind up in landfills without systematic sustainable practices. Therefore, this study aims to investigate the supply chain key activities and crucial factors so as to design a sustainable supply chain. The enterprises who want to reshape their linear supply chain model into a sustainable one could employ the proposed transformation model to achieve sustainable development goals within the furniture industry. Below are the research objectives:

1. Understand the current challenges and needs of transforming into a sustainable supply chain model
2. Review and analysis the existing furniture businesses and key activities
3. To identify the crucial factors for the transformation to a sustainable supply chain in the furniture industry

1.6 Methodology

This paper employs secondary resources (literature review and case studies on existing sustainability supply chains and business practices of globally recognised brands) with an explorative approach where the POEMS (people, objects, environments, messages, and services) and Descriptive Value Web are applied in order to identify the crucial factors for the sustainable supply chain transition. POEMS is a framework that aids in directing observation and note-taking during an ethnographic research project. Descriptive Value Web is used to organise the insights generated and show how sustainable practice value is created and exchanged among the context and stakeholders. The completed POEMS analysis framework is located in the appendix. The flow of this study is shown below:

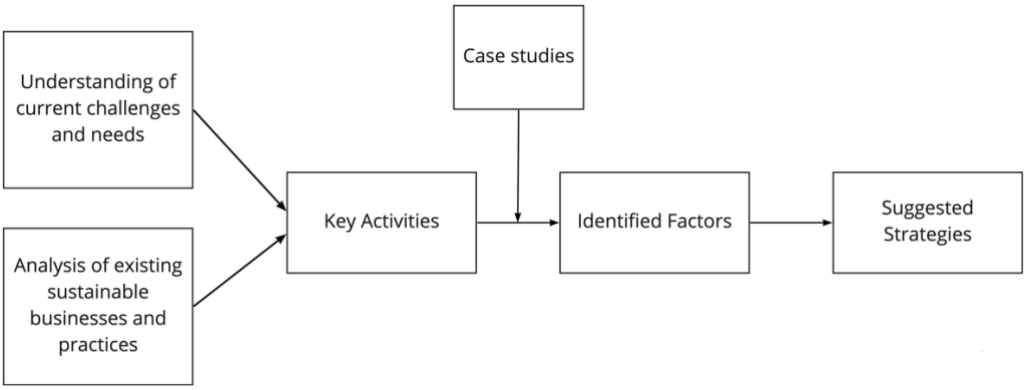


Fig 1.3 The study flow followed

Chapter 2: Defining Supply Chain Management

2.1 What is a Supply Chain Management?

Before getting to explore the current furniture industry's sustainable business practices and analysing case studies, we first need to clarify the brief concept of what supply chain management includes. Supply chain management enables the organising and control of product, data, and financial resource flows across intricate manufacturing processes (Sanders, 2020). The transportation and conversion of goods from the extraction of raw materials to the final consumer, as well as information exchanges, are all included in the supply chain. The supply chain allows for the movement of both information and goods. Supply chain management (SCM) incorporates these activities through enhanced supply chain interactions to obtain a long-lasting competitive advantage (Handfield & Nichols, 1999). A supply chain, in its widest sense, consists of two or more legally different units that are linked by flows of materials, information, and revenue. These companies might be businesses that manufacture parts, components, and finished goods, logistic service providers, or even the end-users themselves. As a result, the target market, or end consumer, is included in the above-mentioned definition of a supply chain (Stadtler, 2008).

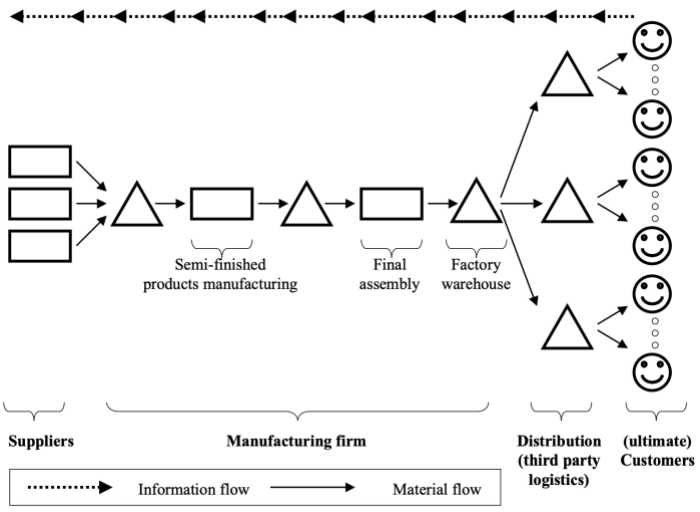


Fig 2.1 A typical supply chain model (Stadtler, 2008)

2.2 The Growth of Sustainable Supply Chain Management

Simply said, a linear supply chain is a straight route from raw materials through manufacturing to disposal. It goes without saying that this is not very economical. At some time, the consumer will still throw the things away. Consequently, the old product is dumped in a landfill when a new one is released. Besides, organisations frequently want to focus on their core strengths in order to deal with intense competition in the business world while also achieving significant cost reductions by outsourcing parts of their goods and services to suppliers (Klassen & Vereecke 2012). In order to satisfy the growing demands of clients for better business deals involving lower cost, higher order flexibility, and shorter lead times, suppliers, especially those who profit from lax regulatory domains, frequently turn to unprincipled actions, some of which can amount to slavery practises nowadays, such as child labour, forced labour, health and safety concerns (Alghababsheh et al., 2020).

In this setting, sustainability has become a top concern in the design and management of supply chains due to society's ongoing environmental consciousness (Sundarakani et al., 2010). The ideas behind green and sustainable supply chain management are generally in line with a utilitarian environmentalist viewpoint, according to which organisations can incorporate environmental concerns by reducing material flows or by lessening the negative effects of production and consumption flows (Sarkis, 2011).

There are several variations of supply chain sustainability. Global supply chains are addressed by the Sustainable Development Goals (SDGs) set out by the United Nations (UN). A plan for establishing a better and more sustainable future for everybody, the

SDGs are a group of 17 interconnected global objectives (United Nations, 2022). The SDGs were established in 2015 by the UN General Assembly and are part of a UN Resolution called the 2030 Agenda, meant to be accomplished by the year 2030. In which, Genovese et al. (2017) believe the idea of circular economy has also been broadly applied to create a sustainable supply chain that aims to reduce resource use and waste. Circular systems employ re-use, sharing, repair, refurbishing, remanufacturing, and recycling to create a closed-loop system that minimises resource inputs, waste, pollution, and carbon emissions. The secret to developing this economy is to employ goods, machinery, and infrastructure for extended periods of time, which increases the value of these vital resources (Genovese et al., 2017). The choice to reuse, renovate, remanufacture, or recycle contributes significantly to the development of a circular economy and more sustainably run supply chains.

Chapter 3: Current Furniture Industry Supply Chain Management

In recent years, several global challenges, including climate change, hunger, illness, and poverty, have drawn significant attention to sustainable design as a component of overall sustainable development in the furniture industry. The launch of a new business design task has been the subject of several academic and non-academic arguments during the past ten years. In an effort to find different methods to harm the environment less, ideas like “eco-design”, “green design”, “environmental design”, and “sustainable design” have arisen (Moreno et al., 2016).

Similar to other industries, the furniture market is driven by client demand (Singh, 2021). As a result, in contrast to other industries like automotive, electronics, and so on, the manufacturing cycle is not as straightforward. For instance, it is simpler to meet consumer demand when producing automobiles in large quantities since the size, style, and form are the same for the specific brand. In contrast to the furniture industry, customer needs fluctuate based on individual preferences (Singh, 2021). Therefore, bulk furniture product design and manufacture become challenging.

Also, supply chain management in the furniture business mostly focuses on logistics in terms of moving tangible goods (raw materials and finished goods) from one place to another (Singh, 2021). Following that, the distance travelled from the supplier’s hub to the producer and the transportation from wholesalers to retailers have a significant impact on the environment.

As consumer perceptions of sustainability change, it is more crucial than ever for retailers and brands to support environmental activities and create goods and procedures that are more sustainable (McDonald & Oates, 2006). Global consumers are demanding increasingly sustainable products across a wide range of market areas, and businesses are moving swiftly to adapt. It is the same in the furniture industry, where more and more customers are seeking environmentally friendly furnishings for their homes and workplaces. Before digging deep into the selected case studies, we shall look at how the two well-known furniture brands below make the sustainable approach and identify the major supply chain activities that exist in the furniture industry.

3.1 Herman Miller: Transitioning to Environmental Sustainability

Herman Miller is an American producer of office furniture, equipment, and home furnishings. It stands apart from other businesses thanks to the extraordinary company culture it employs. The firm's employees are expected to share a mentality of inquiry, openness, transparency, inclusivity, and other similar values, which results in good ratings in polls on workplace happiness (Lee & Bony, 2008). The company is also viewed as serving a moral purpose.

William McDonough, who co-owned a consulting firm, contacted the company with a history of environmental awareness inside Herman Miller. They collaborated in the late 1990s to develop a strategy for developing cradle-to-cradle goods ("cradle to cradle" refers to the development of cycles in which biological and technological nutrients must be separated during the manufacturing process) (Lee & Bony, 2008). This partnership resulted in the development of a tool called the Design for Environment (DfE) product evaluation tool, which assesses progress toward cradle-to-cradle goods. Herman Miller

chose to take an existing product and rethink its design and manufacture to make it compliant with the cradle-to-cradle protocol since it elected not to fundamentally alter its existing supply chain (Lee & Bony, 2008). Therefore, the Mirra chair was the first product built from the ground up using the DfE product assessment methodology. Several design modifications were made to the chair because of the DfE process, including the selection of a totally different material for the chair's spine, an increase in the recycled content of chair components, the elimination of all PVC (polyvinyl chloride) components, the creation of a chair that can be quickly disassembled with basic tools–and unexpectedly, the certain parts turned out to be even less expensive after being revised (Lee & Bony, 2008). This breakthrough led to Herman Miller's dedication to developing Cradle to Cradle Certified goods and establishing brand awareness as a company committed to sustainability. Herman Miller is regarded as an environmental pioneer in the business as a result.

However, some type of relocation was unavoidable because Herman Miller chose not to significantly alter its current supply chain. Two full-time professionals were employed to work on the two most crucial tasks for the approaching redesign process: establishing disassembly rules and building a database for supplier materials, which makes the chemical evaluations of all materials alone cost US$300,000, and vendors showed strong reluctance to disclose the components of their goods (Kruse, 2017). Many difficult problems could only be resolved after a tremendous effort was put into persuading and directing the suppliers, feedback loops, teamwork, and, eventually, the use of the argument of Herman Miller's purchasing power.

Moreover, given that the cradle-to-cradle protocol was being implemented for the first time, there were no anticipated issues (Bardelline 2009). The choice of PVC, the synthetic material for the armchairs of Herman Miller's chairs, was one of the topics that generated the most heated debate. Durability, scratch resistance, and affordability were among its benefits, but the environmental impact was different since PVC cannot be recycled. Finding an affordable substitute material proved to be difficult and time-consuming, therefore PVC was still used in the production of the original Mirra Chair model. It has only been eliminated from the most recent version of the chair, which was given a silver certificate in 2014 (Bardelline 2009).

Figure 3.1 The Mirra Chair with Cradle to Cradle design concept (REMONDIS SE & CO, 2015)

Herman Miller has up to now worked to bring about genuine and long-lasting change through both big and small solutions. In 2018, Herman Miller joined NextWave

Plastics, a collaborative open-source initiative the world's first ocean-friendly plastic supply chain network, as one of the first founding members and has since been researching how to use ocean-friendly plastics in various solutions (Adams, 2021). The company improved the Aeron range of chairs in 2021 by utilising marine-friendly plastic for the seat's body and up to 90% recycled materials for the chair's components in all the line's seats. According to estimates, 15 million PET bottles or 150 metric tons of plastic that would otherwise enter the environment each year may be avoided (Bio Market Insights, 2021).

3.2 IKEA: A Sustainable Supply Chain

IKEA is a pioneering company that integrated sustainability into all aspects of its business (Alänge, Clancy, & Marmgren, 2016). Its business philosophy is to create a better everyday living for people and provide a wide choice of ingenious, functional home furnishing items at affordable prices that as many people as possible will be able to purchase them (IKEA Supply AG, 2008).

According to IKEA Group (2021), the company has signed the Ten Principles of the United Nations Global Compact, which include sections on labour, the environment, and anti-corruption. Additionally, IKEA actively tracks its sustainability progress in relation to each principle. IKEA's sustainability ambitions and commitments for 2030 are also in line with the Sustainable Development Goals (SDGs), a set of 17 objectives set forward by the United Nations to combat climate change, eradicate poverty, and fight inequality and injustice (IKEA, 2021). The SDGs' objectives for sustainability and SCM are used to gauge IKEA's development in this area as well.

The IWAY Standard, the supplier code of conduct for IKEA for acquiring goods, supplies, and services, is crucial to the company's advancements. (IKEA Supply AG, 2008). When acquiring goods, materials, and services, it defines the minimum standards for environmental, social, and working conditions. IKEA's inbound logistics for purchasing and procurements, as well as operational and production choices for the product's design and manufacture, are all included in IWAY Standard.

IKEA is distinctive in that IWAY Standards require first-tier suppliers to apply such measures to second-tier suppliers and upwards. According to Darnall, Jolley, and Handfield (2008), first-tier suppliers have a direct influence on the environment when they provide inputs that result in more waste being produced during storage, transit, processing, usage, or disposal. The term "indirect environmental impacts" describes how a company's second-tier suppliers, who provide inputs for the first-tier supplier, indirectly affect the environmental consequences of the end producer (Darnall et al., 2008). Organisations that implement sustainability initiatives aimed at decreasing environmental impacts typically only pay attention to and assess their first-tier suppliers (Darnall et al., 2008). Apart from involving in inbound functions, operations and production, IKEA also efforts in sustainable outbound functions of packaging, marketing, and reverse logistics, such as using loading ledges to provide better cube utilisation and redesigning the supply chain to control the product flows or parts destined for remanufacturing, recycling, disposal and effective resources usage.

And yet, the supply chain has continued to have issues. IKEA is allegedly utilising wood from illicit harvesting in Russian areas under protection to produce its children's furniture (Lehren, Dan & Schecter, 2021). A UK-based advocacy organisation called

Earthsight has produced two reports in the past 18 months identifying problems with wood imported from Russia and Ukraine that found its way into IKEA's supply networks. According to Lehren, Dan and Schecter (2021), Earthsight, the timber was cut without permission and using prohibited methods. Despite the fact that IKEA declared that it ceased utilising wood from Russian logging companies in March 2021, it dismisses any claims that it intentionally purchased illegal timber, and it did not answer a query about whether it intended to take any goods sourced from illegal Siberian logging off the market (Moskowitz, 2021). The largest furniture firm in the world's inadequate response also exposes a horrifying lack of leadership in the fight against illicit deforestation.

3.3 The 5 Key Activities in Supply Chain Stages

As observed, there are several essential activities for incorporating a sustainable supply chain strategy throughout the whole supply chain. Design, Source, Manufacture, Logistics, and Sales are internal activities within firms, while the Source and Sales involve external stakeholders such as suppliers and customers.

1. **Design**

   The application of supply chain sustainability should base on two basic principles: maximising the cycle of recycling, reproduction, and refurbishment, and prolonging the life of the resources. Sustainable product design principles are used in both areas. Regardless of the sectors and types of organisations, product design is the first step towards conscious decision.

2. **Source**

Common issues to think about throughout the sourcing process include suppliers' qualifications, locations, and routes. Responsible businesses frequently care about working conditions and standards for both their own employees and suppliers.

3. **Manufacture**

Considering using sustainable and organic raw material with high levels of recycling capacity and ease of repurposing are essential for achieving minimal environmental impact. Also, utilising renewable electricity sources such as solar and wind power at manufacturing facilities helps reduce energy use during the intensive production.

4. **Logistics**

The use of a sustainable supply chain relies on both traditional and reverse logistics. In which, reverse logistics promote the return of goods, necessitating the development of circular business models, such as remanufacturing, reuse, repair, refurbishing, and recycling.

Also, supply chain management in the furniture business mostly focuses on logistics in terms of moving tangible goods (raw materials and finished goods) from one place to another. Following that, the distance travelled from the supplier's hub to the producer and the transportation from wholesalers to retailers have a significant impact on the environment.

5. **Sales**

Customers perform a passive role as last stakeholders in the linear supply chain. However, consumers are required to actively participate in product recovery and material recycling in a sustainable supply chain. Therefore, it is essential to take into account clients outside of business relationships beyond sales in a variety of sectors.

Chapter 4: Case Study on Sustainable Approaches or Successful Practice in Other Industries

As discussed above, although some of the major brands in the furniture industry strive to expand their sustainability practices, improvements and integration regarding the supply chain activities are still expected. To design a sustainable supply chain for the furniture industry, we shall explore the below cases to take reference from their sustainable development plans. The complete analysis can be found in Appendix.

4.1 Patagonia

As an outdoor and adventure clothing brand, Patagonia is well renowned for setting the bar for environmental and social responsibility. The brand actively promotes environmental initiatives, which involve stakeholders in the supply chain.

To conduct research and develop more environmentally friendly products, Patagonia has strategically employed product life-cycle assessment. The company takes strict regulations during the production stage, such as incorporating recycled material to the tune of 87% in clothing, and using organic cotton that is produced by employing sustainable agricultural techniques (Kamprad, 2021). In order to reduce material waste, they also make every attempt to repurpose their textiles to create new items and prevent landfills by using recovered textiles and factory floor cuts into their products. (Apparel Resources, 2014). It's simple to label Patagonia one of the most sustainable outdoor wear businesses when it comes to their materials because 87% of their goods are created using recycled materials, and they continuously work to increase this percentage and be upfront about it (Kamprad, 2021). In terms of production, they have a strong Code of Conduct that their supplier chain must adhere to, and they go there to check. Compared

to other garment firms, they sew with Fair Trade over 80% of the time, and a larger proportion of their employees get a liveable wage (Kamprad, 2021). Additionally, Patagonia encourages recycling of the plastic packaging used to send clothing in safety (Patagonia, 2014). Patagonia is also working in collaboration with academics, researchers, and other garment companies to address the core causes of the plastic pollution problem (Patagonia, 2019). They have so far provided funding for five initiatives exploring ways to reduce microfibre contamination.

Speaking of the product usage stage, products from Patagonia are regarded as slow fashion that endures. Their "Worn Wear" programme gives their clothing a two-year lifespan extension. "Worn Wear" rejects rapid fashion in favour of offering durable, high-quality products that are simple to repair, delaying purchase cycles and extending the lifespan of clothing (Esposito et al., 2016). Patagonia started the Buy Less campaign in 2012 with the goal of encouraging individuals to purchase less of the brand's new gear in order to lessen the environmental effect of their rising consumption patterns. The campaign's theme urges consumers to think about purchasing second-hand goods rather than brand-new ones (Lowitt, 2011). Purchasing second-hand garments extends their life by around two years and reduces its carbon footprint in terms of waste, water and carbon emission by 73% (Patagonia, 2018).

As a fashion retailer, Patagonia takes advantage of every single way possible to spread its stands and messages regarding social and environmental issues. In 2020, the brand created a woven label with the political message regarding the presidential election on some of its new shorts as a novel method to encourage its consumers to voice their worries about the environment (Peña, 2020).

Besides, several significant environmental initiatives are being worked on by Patagonia. In which, “1% for the Planet” is an organisation of businesses that recognise the demand for environmental protection. They acknowledge that profit and loss are closely related to their health, and they are concerned about the industry’s social and environmental backlashes. Patagonia was the first company to pledge 1% of annual sales as an “Earth Tax” to environmental causes when Yvon Chouinard, the founder of Patagonia, formed “1% for the Planet” in 2002 (Patagonia, 2022). They have given more than $140 million to local, national, and international grassroots environmental organisations thus far through the “1% for the planet” initiative (Patagonia 2022). To ensure the collaboration with suppliers is sustainable, Patagonia regulates suppliers to comply with their strict Code of Conduct, which inspected 90% of its supply chain to ensure environmental and social obligations of their suppliers, and make sure they are also treating workers fairly (Patagonia 2022). In such a case, Patagonia’s overall B Corp score has had no significant change (151.5 to 151.4) since 2016 (B Lab, 2022).

Despite intricate relationships between stakeholders, supply chain management as a whole is relatively sustainable. It should be noted that Patagonia emphasises openness and transparency, which results in an efficient and reliable sustainable supply chain management, which is why we are able to illustrate the traded values in full.

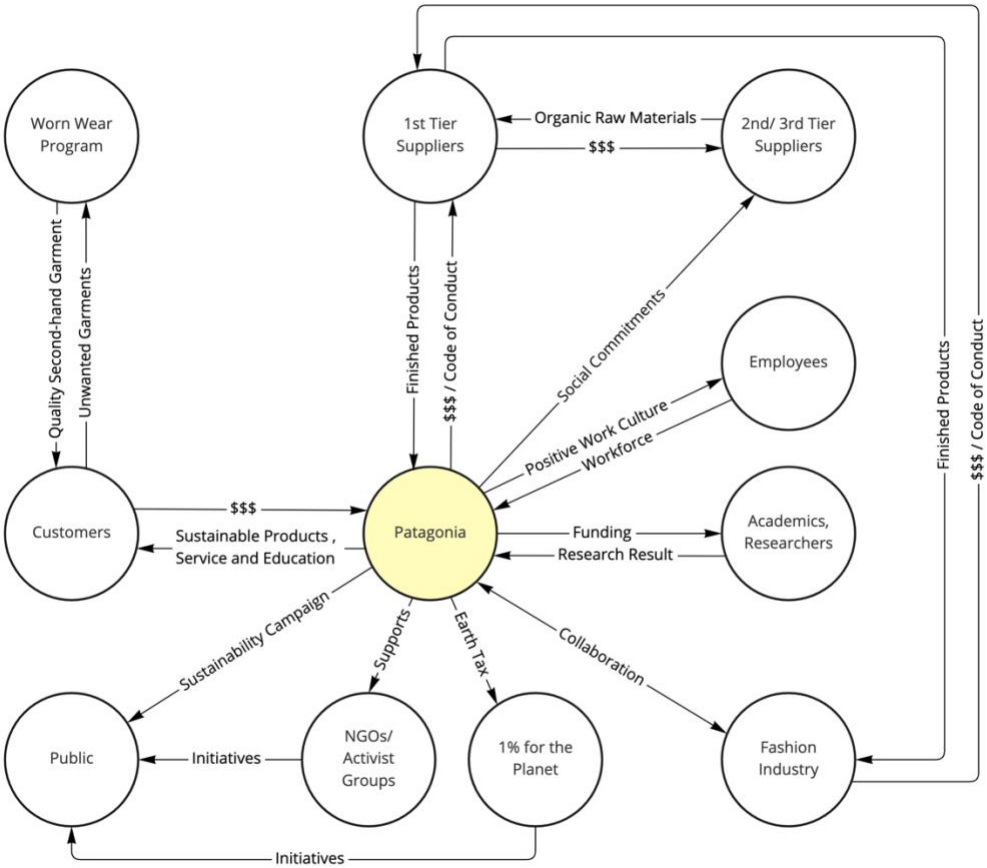


Fig 4.1 Value web of Patagonia

4.2 BMW: The Recyclable “i Vision Circular” Car

BMW aspires to be the most environmentally friendly producer of personal transportation as one of the top luxury automakers in the world (BMW, 2022). In order to achieve total CO2 neutrality by 2050, the BMW Group does seek to build a thriving circular economy (BMW, 2022). To do this, though, the design, development, and production processes must be reviewed at each level. Additionally, the supply chain must be monitored throughout the use and disposal cycle, and the energy needs must be evaluated. This research project is intended to promote the company’s ideas, culture, and inventions both within and internationally rather than becoming a glitzy show vehicle, and the concepts shown through the i Vision Circular, depicting automakers’ definitions of what cars will look like in 2040 (Banks, 2021).

The i Vision project, which has the year 2040 in mind, presents a network of ideas on how to effectively approach materials and production while firmly taking the afterlife into consideration (Banks, 2021). The phrase “Circular” refers to the “circular economy”, in which every auto part, including the batteries, is recyclable. The whole automobile, including all its surfaces and parts, is made entirely of recycled materials. Resource-saving design required revaluating how materials are used in the automobile and ensuring that they can be separated at the end of the product’s life cycle easily and fast so they can be recycled and utilised more effectively (Hahn, 2021).

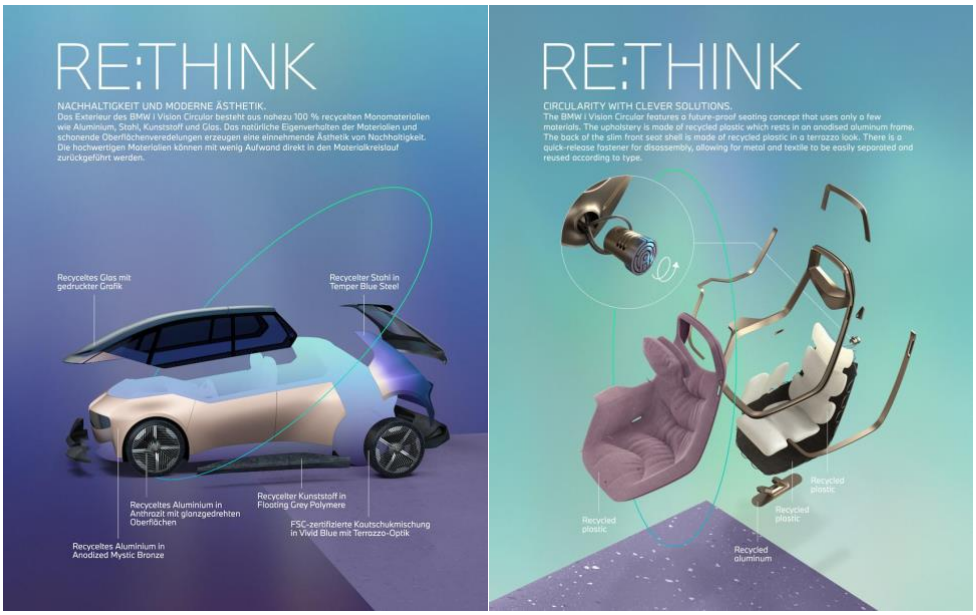


Fig 4.2 The BMW i Vision Circular (BMW Group, 2021)

The car’s individual parts each show how innovative design decisions may affect the carbon footprint. The group is investigating the most effective ways to find answers that offer the required qualities without wasting resources, such as composite materials that are widely used to create automobiles but are challenging to recycle (Banks, 2021). In other locations, the traditional chrome kidney grille’s frame and bars are replaced with

a flat digital surface that spans the width of the front end of the car and encloses the headlights. This allegedly simple activity saves on materials and equipment by avoiding the need to work on various light and bumper geometries, and even the insignia is laser-cut to save superfluous components and increase the car's driving economy (Banks, 2021).

According to Banks, BMW Group and Hahn (2021), the i Vision Circular's body is not coated with typical chemical paint. It is not painted and anodized with light gold made from secondary aluminium, protecting the metals' primary constituents for recycling. The bumper is made of recyclable polymers that prominently showcase any flaws in order to demonstrate the beauty of imperfection. The tires, on the other hand, are made of rubber that is naturally growing and has been ethically collected. Other interior spaces are built similarly to Ikea furniture, with elements attached via wires, buttons, and quick-release fasteners rather than traditional bonding. When a component's life is up, the pieces may be easily separated so they can be recycled and reused, if possible. As they can be recycled so well, mono-materials are usually used instead of composites. The surplus is progressively reintroduced back into the material cycle once they are made utilising 3D printing processes to fit properly for fewer offcuts.

It's not as thrilling to talk about a sustainable supply chain and end-of-life recyclability as it is to talk about the greatest new tech hitting show floors, but BMW's i Vision Circular concept car seeks to do both. The value web below depicts how the BMW recyclable i Vision Circular Car exchanges values with different stakeholders. It is noticeably that BMW has the authority to impose its rules on its suppliers as it aims to

reduce carbon emissions from supplier and vehicle production by 40% (Akierstein, 2021).

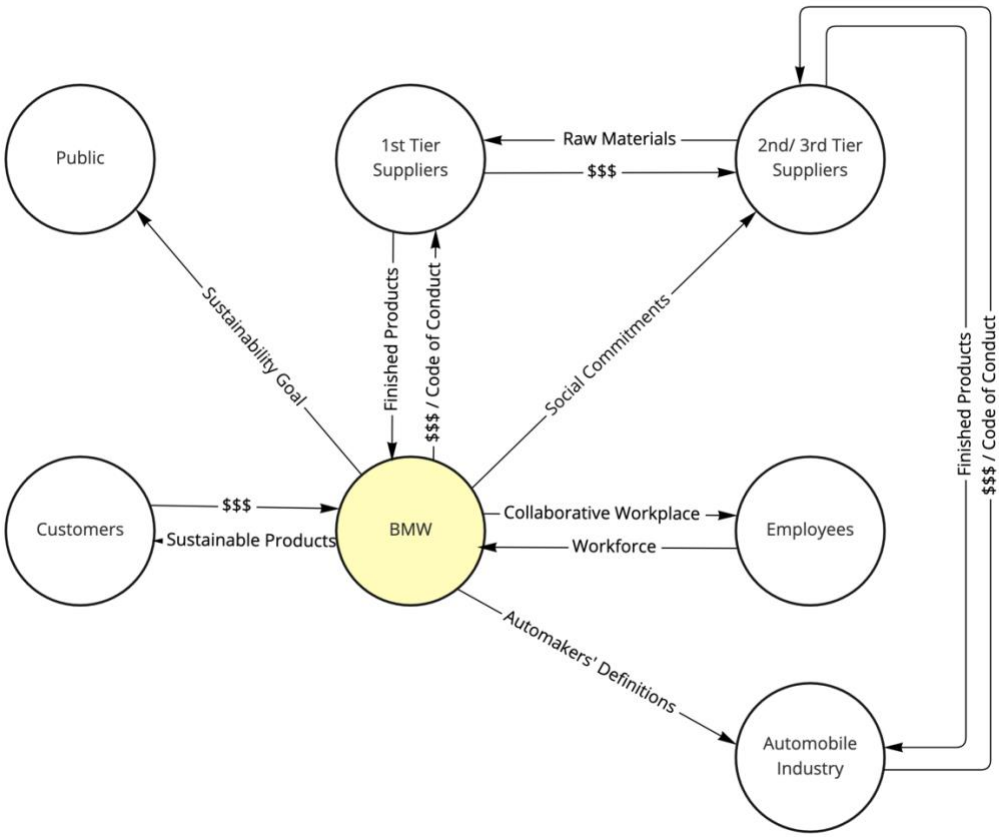


Fig 4.3 Value web of BMW i Vision Circular

4.3 H&M: Partnership with Hong Kong Textile Researcher

The H&M Foundation and The Hong Kong Research Institute of Textiles and Apparel (HKRITA) collaborated in 2016 (H&M Foundation, 2020). The recycling of mixed textiles is the subject of an initiative called “Recycling Revolution”. The ultimate goal of the project was to create at least one technique that might be used to recycle clothing made of textile mixes into fresh fabrics and yarns. A novel technique developed by HKRITA in September 2017 allowed mixed textiles to be recycled into new fabrics and yarns without any quality being lost, and it simply required the use of water, heat, and pressure (H&M Foundation, 2020). According to Joe (2021), in 2018, the hydrothermal

technology advanced from the laboratory to the pre-industrial scale, and in 2021, Kahatex will build a complete recycling facility in Indonesia. In addition, a number of additional projects were completed. For instance, Monki was the first clothing company to market items created using the Green Machine in 2020, and Garment-2-Garment (a Red Dot awarded miniature recycling system created to change customer behaviour and knowledge around textile recycling) is now publicly accessible at the Mills in Hong Kong and an H&M shop in Sweden (H&M Group, 2020).

The Planet First initiative is an expansion of the Recycling Revolution with HKRITA (H&M Group, 2020). It seeks to identify planet-positive technologies that will take into account all facets of the natural support systems of the earth in addition to circularity and climate change. Beyond circularity and climate change, the five-year Planet First initiative will examine all facets of the planet's natural support systems, including land, water, seas, temperature, and biodiversity (H&M Group, 2020). The goal is to identify technological advancements that can support a sustainable fashion future. This entails not only reducing or eliminating the harmful effects that the fashion industry may have on the environment but also enhancing those effects through the value chain's procedures and activities (H&M Group, 2020). According to H&M Foundation (2020), the program's several research initiatives are organised according to speed, scale, and effect:

Speed: undertaking applied research and presenting advances along the way in order to obtain input and advance more quickly.

Scale: Focus on the worst pain spots and work with business from the outset in order to assure rapid scalability of solutions.

Effect: Freely share all of the discoveries and technology in order to maximise the impact of their work.

Gap Inc., a speciality garment store based in the US, is also on board, supporting a two-year HKRITA initiative to discover techniques for removing spandex from textiles and decolorizing denim prior to recycling (Barrie, 2021). In both situations, the created technology will thereafter be available for the licence within the sector. The Hong Kong Government's Innovation & Technology Fund contributes extra cash based on the H&M Foundation's USD 12 million (SEK 100 million) grant under the current financing system, resulting in a total anticipated budget of USD 100 million over five years (H&M Group, 2020).

The simple value web shown below is another characteristic of their collaboration. All the main stakeholders work closely together and are directly related to the partnership, allowing a transparent and efficient sustainable solution.

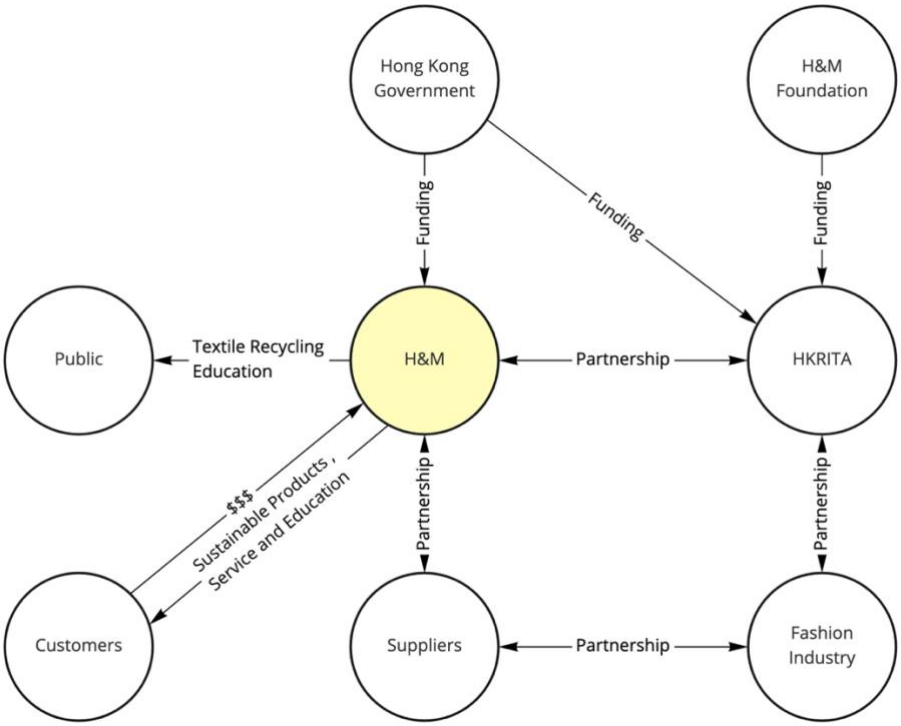


Fig 4.4 Value web of H&M Partnership with Hong Kong Textile Researcher

4.4 Insights From Cases: The Factors of Sustainability Transformation

Although there are slight differences between the above cases, three key factors can be noticed in designing and encouraging sustainable practices throughout their supply networks: Transparency, Collectiveness, and Policy.

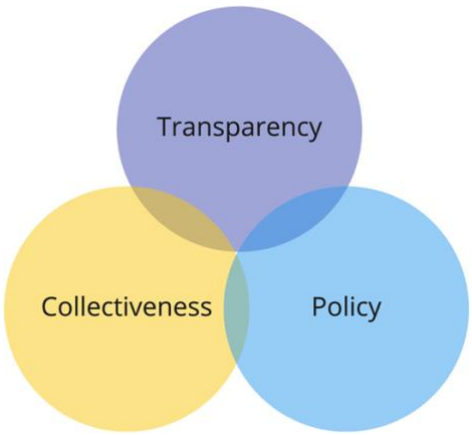


Fig 4.5 Three key factors of sustainability transformation

1. **Transparency**

Greater transparency can also help consumers make better decisions and communicate to producers what is important to them and what it takes for businesses to have loyal customers, which can lead to much higher security and safety, the preservation of our planet, as well as greater profitability and longevity (Hadavi, 2022). In terms of where, how, what resources, and under what circumstances things are created, supply chain and sustainability transparency are becoming more crucial.

Transparency was embraced by Patagonia early on. Even though they are not required to do so since they are not a publicly traded company, Patagonia goes out of its way to describe how they utilise environmentally friendly materials and work to minimise their production effect on the planet. Patagonia scored highly in terms of openness in the 2021 Fashion Transparency Index, which was created by the Fashion Revolution. They had an overall transparency grade of 51 to 60%, which is greater than the majority of other fashion firms assessed in this index (Fashion Revolution, 2021).

To demonstrate that the innovative technology discovered by H&M and HKRITA can be used in genuine industrial production, its application scale will be increased and evaluated. Once completed, it will be extensively licenced to assure acceptance by the whole industry. If successful, it will serve the worldwide fashion business. The outcomes are important since they enable the textile business to develop an unending cycle of textile usage that offers the most

numerous advantages, not just for the environment but also for locals and society at large.

Although the “i Vision Circular” Car is a conceptual model at this moment, BMW has revealed the entire process of design, development and manufacturing, the concept car was conceived in line with the principles of the circular economy. It helps the company to achieve the brand’s sustainability goal on time by demonstrating its progress to the public in an open and transparent manner. Therefore, it can be observed that profiting from supply chain openness has an impact on the whole industry rather than just one company.

2. Collectiveness

Supply chain collaboration has become a major issue for companies aiming to meet their objectives for sustainability on the economic, social, and environmental aspects. The majority of academics define supply chain cooperation as a partnership process in which at least two separate parties collaborate to plan and execute supply chain activities in order to achieve shared objectives and mutually beneficial outcomes (Cao & Zhang, 2011).

The best chance to promote change in a shared supply chain is through collaboration with suppliers and other brands. Patagonia has contributed to the founding of various partnerships that use these instruments to assess and share their environmental impacts. Another opportunity is collaborating with a research institute (such as the H&M case), where the company can seek

professional knowledge to discover new technologies that can be applied to the industry's supply chain.

In order to develop a brand-new working atmosphere that may inspire internal engineers and designers to embrace risky new concepts, BMW thinks that a team should cooperate and be adaptable. It appears to be a more democratic way of working that is less macho, ego-driven, and top-down. As consequence, collectiveness among different parties leads to more interesting exchanges, and the conversation about sustainability opens up new possibilities. It is beneficial rather than a design limitation.

3. Policy

To achieve the sustainability goal, indeed, the company need to set up rules and policies. Establishing corporate sustainability standards, also known as "supplier codes of conduct" (Jiang, 2009; Locke et al., 2013; Jia et al., 2018), and communicating them to their suppliers as a means of preventing potential misconduct is a widely used sustainable supply chain programme. Firms therefore use a variety of tools to guarantee suppliers' compliance.

This method relies on procedures such as supplier appraisal, auditing, and monitoring to make sure suppliers are complying. Additionally, they might threaten suppliers with consequences like reduced orders or ending business relationship to encourage them to adopt sustainable business practices (Locke et al., 2009; Huq & Stevenson, 2018). As a consequence, even though sustainability is not something they value fundamentally, suppliers are possibly

to be encouraged to comply with corporate sustainability standards. This is in line with the impact hypothesis, which uses the term compliance to describe behavioural conformity rather than attitude change.

In the above cases, Patagonia has set a strict Suppliers are required to abide by the Supplier Workplace Code of Conduct, and monitor factories, mills, and farms to check that all new plants are in accordance with local laws and labour contracts on social and environmental issues so that the brand can promote and sustain its environmental responsibility. To consumers, the Worn Wear Program delivers a clear message of how to participate in fashion sustainability by recycling unwanted clothes and purchasing refurbished garments. BMW's capacity to impose regulations on its suppliers in order to lower carbon emissions and vehicle production also demonstrates that all business partners doing business with the firm are required to achieve compliance criteria as the first step in becoming a sustainable business.

Chapter 5: A Sustainable Supply Chain Transformation Model for the Furniture Industry

As mentioned above, transparency, collectiveness and policy are identified as the three crucial factors that the industry may want to consider during the approach to sustainability. The reason why the furniture industry should be aware of its current supply chain management has been discussed in Chapter 1 and 3. A design framework (Figure 5.1) has been generated to facilitate the ideation process of transforming of the linear supply chain into a sustainable one through applying insights discovered in case studies previous sections. The full analytical framework can be found in Appendix.

Both the linear and sustainable supply chain in the proposed framework focuses on five steps, or stakeholders: Environment, Suppliers, Productions, Distribution, and Customers. There will be the end of product usage on the consumers' side, and here is the difference we aim to make. The linear supply chain essentially follows a straight line from raw materials to production and disposal. In any case, the items are eventually rejected by the consumer. As a result, when a new product is released, the old one is dumped in a landfill. Furthermore, leftover raw materials employed in production suffer the same fate. A sustainable supply chain, on the other hand, recycles the raw materials utilised in the manufacturing process. They are reused for the creation of another product. Therefore, the sustainable model of product flow is encouraged by the sustainable supply chain as opposed to the linear one. The sustainable supply chain model uses resources and commodities for as long as is practical, resulting in less waste and unfavourable effects than the standard linear supply chain model, in which enterprises take, create, and discard.

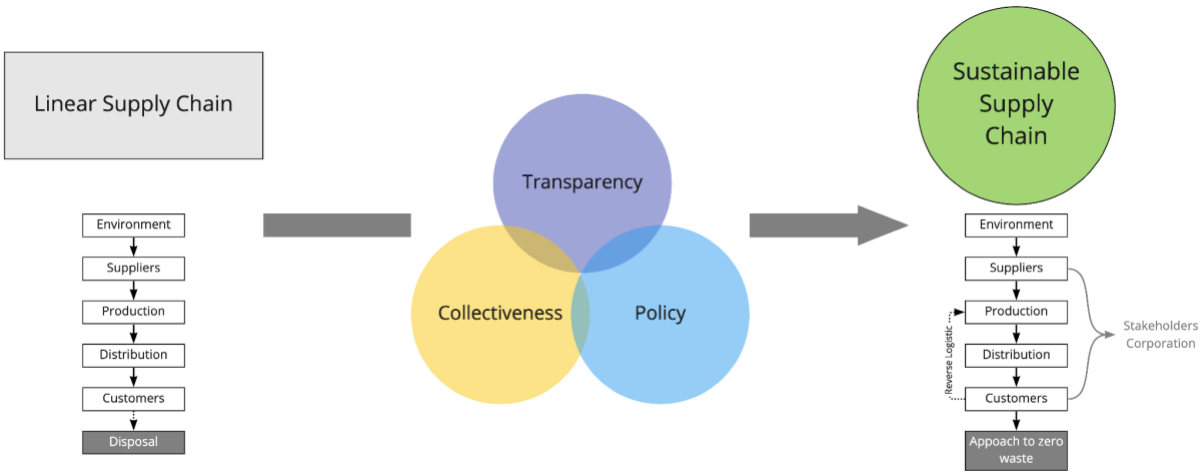


Fig 5.1 Sustainable supply chain transformation model

Numerous parties are involved throughout supply chain management. As a result, collaboration among internal and external stakeholders promotes the transition from a linear to a sustainable supply chain. Internally, the corporation drives the process of product creation, manufacturing, and distribution, allowing it to be a crucial factor in the supply chain because its strategy and actions affect all other actors. Externally, we consider stakeholders such as suppliers and consumers from the perspective of relationship structure. The essential activities discussed in Chapter 3 for incorporating a sustainable supply chain strategy throughout the whole supply chain, which are Design, Source, Manufacture, Logistics, and Sales. In the Source and Sales stages, external stakeholders such as suppliers and customers are examined.

As mentioned above, the linear supply chain aims to maintain economies growth. The involved stakeholders have less value exchange other than that of commodities and profits (Figure 5.2). To approach a sustainable supply chain, not only is identifying the crucial factors and activities needed but strategies of how to integrate both are also required. Below are the suggested strategies that furniture firms and practitioners can

reference when considering a sustainable supply chain transition. Additionally, the value web below highlights the advantages of the new approach (Figure 5.3).

Design

Transparency

- *Share resources such as research outcomes with industries to create joint value and foster sustainable achievement*

Collectiveness

- *Create a working atmosphere that can inspire employees to embrace new sustainable concepts*
- *Promotes the reduction, repair, re-use, re-distribution, and recycling of furniture by giving priority to the redesign of products and business models*

Policy

- *Create product design rules to direct the creation of each furniture and ensure that all of them would be circular eventually*

Source

Transparency

- *To source responsibly, seek materials from sustainable sources, such as wood harvested from sustainable forests*

Collectiveness

- *Share resources with rival businesses and significant suppliers through trade associations to meet sustainable objectives*
- *Assist suppliers in obtaining full membership in trade associations*

Policy

- *Select local suppliers close to the operation markets to reduce travel, warehousing, inventory carrying, and duty expenses in the circular supply chain system*
- *Develop and abide by industry-wide sustainability standards, review suppliers' sustainability performance regularly*

Manufacture

Transparency

- *Show how firms work to minimise their production impact on the environment and employ eco-friendly materials*

Collectiveness

- *Using recycled materials for furniture, packaging and production processes*

Policy

- *Switch to renewable energy such as solar panels, wind turbines and water power that are already in use at some furniture manufacturers*

Logistic

Transparency

- *Use sustainable materials in packaging that are strong, light, durable, and recyclable, or reduce the size of packaging*

Collectiveness

- *Timely product delivery to customers in order to decrease supply chain process resources overall*

Policy

- *Take note of reverse logistics, which has been redesigned to control the flow of goods or components going to recycling or disposal*

Customers

Transparency

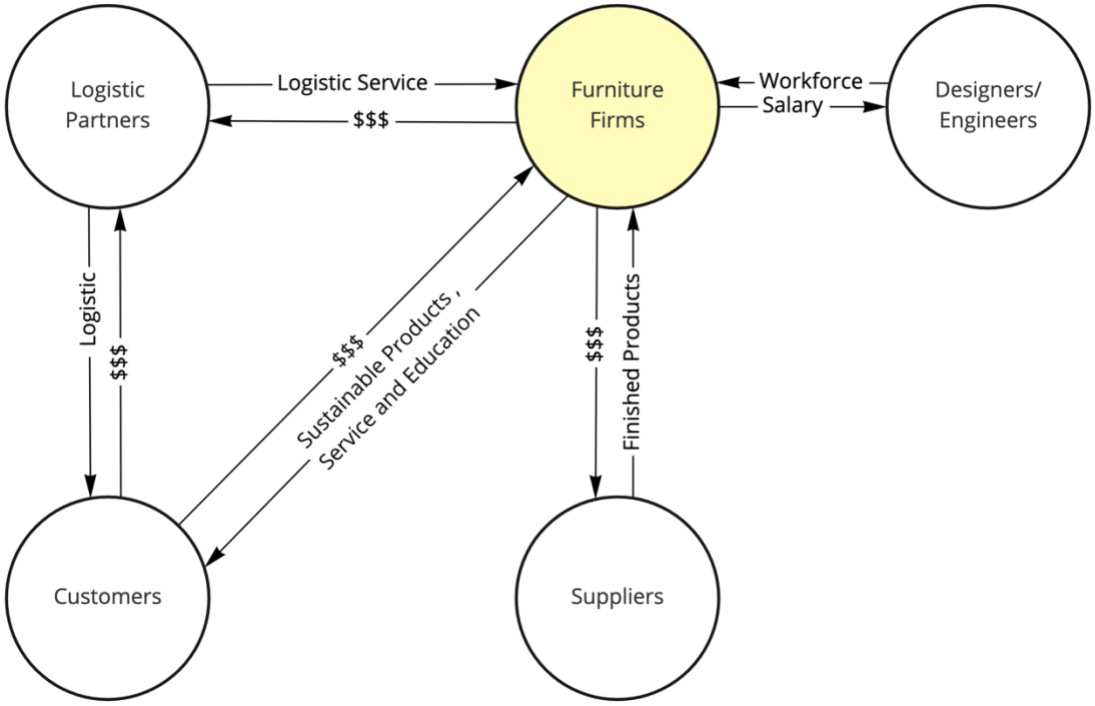
- *Be open about the progress to motivate the public to participate in sustainability*
- *Provide users with clear flow of how the recycled furniture or components will be reuse manufacturer*

Collectiveness

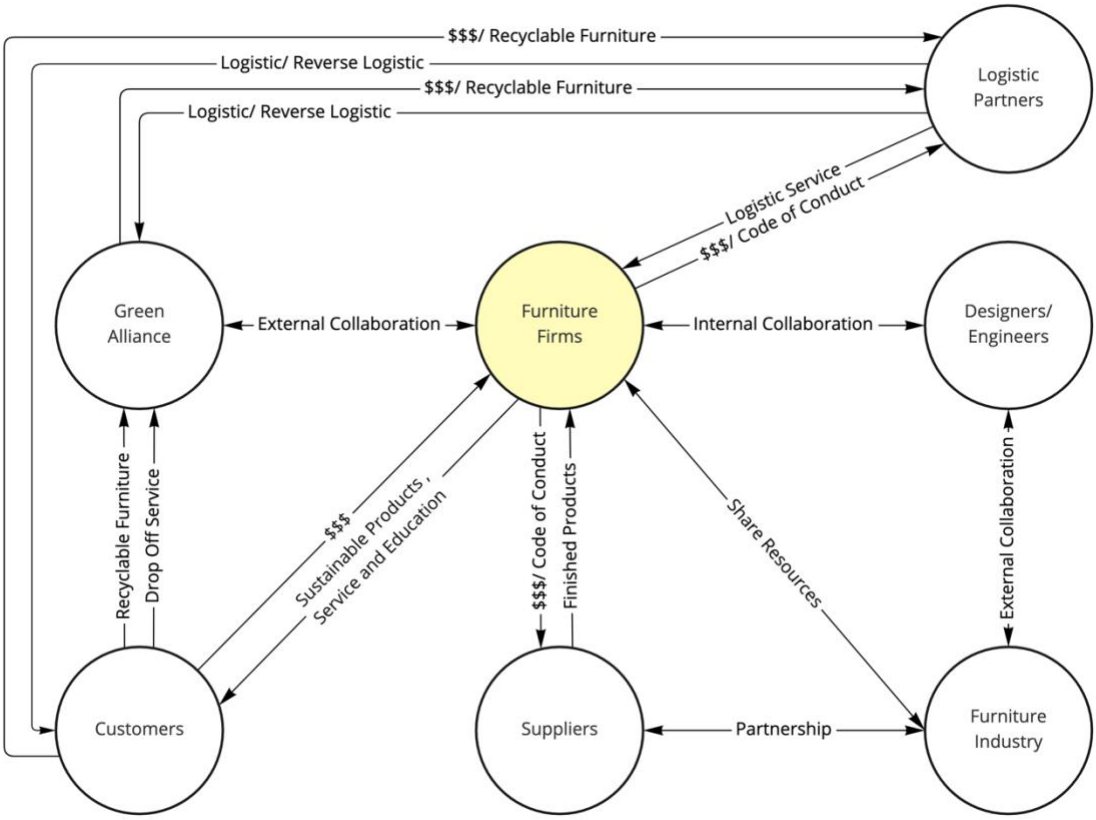
- *Campaigns to educate customers about sustainability and motivate sustainable consumptions and recycling of unwanted furniture, such as rewarding scheme*

Policy

- *Implement comprehensive furniture recycling guidance and instruction regarding how to recycle or dispose of furniture correctly, such as forming green alliances with the community and collaborating with local delivery that makes consumers feel like recycling furniture is convenient*



Fid 5.2 Value web of the traditional linear supply chain



Fid 5.3 Value web of sustainable supply chain with transformation model

The value web for the suggested transformation model is a bit more complex than the traditional linear one (Figure 5.2). A more sustainable and circular supply chain would be expected because of the transparent, collective and regulated management and the comprehensive value exchanged (Figure 5.3).

We have explored how three major brands across industries approach sustainability by related stakeholders and practices in the supply chain. Patagonia is more than just a retailer of eco-friendly clothing. Sustainability is a constant in all they do. Indeed, if every firm made products that performed as much good for the environment as Patagonia does, our society would be far closer to becoming sustainable. In the example of organic cotton, Patagonia was successful internally by using only organic cotton in all of their products, but the outside industry did not adopt the change due to a number of factors, including cost and decentralised agriculture. For H&M, despite its efforts, it is still the target of criticisms that it is concentrating on disposal-incentive solutions rather than making fewer, higher-quality clothing that are used for longer periods of time.

The same situation could happen in the furniture industry. Manufacturing furniture has inevitably a large carbon footprint as the materials are raw elements that are natural and derived from scarce resources. There is also a generation of toxic waste throughout the furniture life cycle. Synthetic materials are frequently the cause of an excessive amount of toxic waste for the environment and human health (polished, heavy metals, VOCs, formaldehyde, etc.). Additionally, as the majority of domestic production in wealthy nations has moved abroad, moving furniture across the globe increases its carbon

footprint dramatically. Even the most effective supply chain cannot make up for the sheer number of miles travelled. in such a case, furniture firms and suppliers should consider paying extra attention to collectiveness among the industry so as to lower the carbon footprint by producing bulkily.

When firms seek collectiveness with overseas suppliers, the destinate regulations also affect the suppliers' motivation to comply with the Code of Conduct that is set by the firms. For many developing countries, like Vietnam, achieving sustainable development was a lofty goal. Socio-economic issues including excessive unemployment and poor infrastructure cast a shadow on daily life. Simply put, environmental preservation was not a top concern. Besides, some suppliers may have higher bargaining power throughout the supply chain activities (especially to SME and start-ups), which lead to their reluctance in complying firms' sustainability goals. Those situation are not under the company's direct control if the industry keep operates without collectiveness.

Also, the effectiveness of implementing the suggested transitional factors may vary across regions, especially from the consumers' side. While second-hand and recycled goods are widely accepted in Western countries, Asian countries tend to have the opposite attitude towards refurbished furniture. Take Hong Kong as an example. Hong Kong people's motivation to refurbish furniture is relatively low according to the waste data. Besides, no systematic home waste recycling program is provided by the government, which leads to the low acceptance and knowledge of furniture recycling. Most organisations or households would consider refurbished furniture from NGOs such as Sustainable Office Solutions when they are under budget. Being transparent in

companies' sustainability strategy may enhance consumers' trust and motivation to engage in green furniture supply chain.

As a result, the presented framework and strategies for furniture firms may ignore the firms' maturity, unique requirements, and preferences of various businesses. Firms should and must interact with several frameworks that help them at the stage they are at, mirroring the complexity and multi-levelled nature of sustainable practices.

Chapter 6: Conclusion

6.1 Overview of Research

As a result of economic globalisation, environmental pollution is a major issue in recent decades. Environmental concerns and corporate social responsibility are currently becoming more prevalent in many spheres of society. Business activities within the furniture industry are one of the major pollutions. Given that the supply chain activities such as sourcing, manufacturing, distributing, and product usage leave massive carbon footprints as of the nature of the industry. The creation of furniture employs a variety of synthetic materials, which contribute to pollution both during the manufacturing process and after the furniture has served its purpose. The furniture business contributes to environmental degradation by employing these raw materials.

The way to adapt to this change over time is to transform from linear to sustainable, circular supply chain management. Firms are starting to pay attention to this management strategy. Although businesses are eager to use this management model and have recognised the benefits of sustainable supply chain management, there is still room for improvement in this area to hasten the uptake of this cutting-edge model by businesses. Identifying the transitional factors of sustainable supply chain management is the subject of an empirical investigation in this article.

Through a literature review, this paper gains conceptual ideas and relevant assumptions regarding the change in businesses' role in sustainability, the reason why the furniture industry should care, and its current sustainable supply chain management. It can be observed that there are five major activities involve in the current furniture supply chain: design, source, manufacture, logistic, and sales. After exploring the current contexts,

this paper performs case studies to explore the existing sustainable businesses and practices of companies in other industries: Patagonia, BMW, and H&M. From the results of the studies, the following conclusions were drawn.

First, being transparent in supply chain management helps firms in delivering their stands toward sustainability clearly as it communicates to manufacturers what matters to them and what it takes for companies to have dedicated consumers. The whole industry can also be benefited from open resources when transforming into a sustainable supply chain. Second, collectiveness among different stakeholders is also the driver of transforming to sustainable supply chain management. By planning and executing supply chain operations, firms and stakeholders can accomplish common sustainable goals and win-win results. Third, a set of policies helps firms and stakeholders from suppliers to customers to identify their roles and missions at different stages, prevent misconduct and clear guideline on how to participate in sustainable supply chain management in the furniture industry. Furthermore, practical directions for businesses to adopt sustainable supply chain management are given as a theoretical foundation for the industries to establish sustainable industrial policy.

6.2 Limitation of Study

The three research objectives of this thesis have been achieved. Nonetheless, limitations in the methodology and outcome justification can be identified.

The limitations of this study lie in the fact that the insights of the current furniture industry sustainability supply chain management, sustainable approaches or successful practices in other industries are based on personal experience, literature, and case

studies. Rather than observing through online materials, first-hand research such as interviewing practitioners might be undertaken to discover the true perspective and feelings regarding their sustainable activities. Furthermore, in addition to interviews with enterprises, interviews with customers or suppliers might be performed to provide a more thorough picture of the existing issues and constraints of furniture sustainability.

Furthermore, even though the recommended elements and suggestions were implemented in practice using the transformation model (Figure 5.1), such visionary proposals are only discussed on a roughly paper without examination. Simple surveys might be conducted with stakeholders in the furniture supply chain to learn their perspectives and recommendations, allowing for additional substantiation of efficacy.

6.3 Possible Future Studies

Since this paper provides a broad view of how the whole furniture industry can approach sustainable supply chain transformation without specifying a research location, further study can be done by investigating the effectiveness of the process framework within a specific region. As the furniture supply chain may involve stakeholders across regions, socioeconomic and cultural aspects could be studied to better understand their impact on sustainable behaviour among various stakeholders, and relationship and benefits between each stakeholder may also be examined to better cater the industry's needs.

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Appendix

POEMS Analysis of Reference Cases of Sustainable Approaches or Successful Practice

Case	Sustainable practice	Insight	People	Object	Environment	Message	Services/ System
Patagonia	A world leader In sustainability Production ● Materials: 87% of Patagonia apparel contains organic and recycled material ● Manufacturing: regulate suppliers to comply with their strict Code of Conduct ● Packaging: recycle plastic packaging to be turned into plastic lumber. multiple initiatives for the environment: ● The Worn Wear program - offers a repair and reuse program, extends apparel life by 2 years ● 1% for the planet - founder co-founded the NGO, companies will donate 1% of their sales as "earth tax"- renowned members include Honest Tea and Boxed Water ● Action works - allows people to connect to local/regional environmental protection groups	+ve: Cradle to Cradle in clothing industry Works on not only minimising waste but also tries to be sustainable at the beginning -ve: Unable to fully maintain sustainable practice during recession Criticised for the lack of an animal welfare policy and use of animals (feathers, and wool)	Ensure suppliers treat workers fairly, will discontinue working with suppliers that not doing so In 2010 it audited 90% of its supply chain to ensure environmental and social commitments of their suppliers. A founding member of the Fair Trade Association Ensured payment of a living wage The founder himself is a environmental activist, sports lover Provide consumers sustainable product + promises of taking care of the planet	Source sustainable materials Conducted research with industry bodies on the impact of microplastics Campaign that aligns with brand Formal animal welfare policy aligned with the Five Freedoms Recycle plastic packaging to be turned into plastic lumber Pitons - replace pitons and other bash-in gear with chocks and hexes, new kinds of protection that were easily removed and less damaging to the rock	Allow employees to organise engagement meetings in retail stores after opening	Sustainability strategy (Don't buy our products on black friday, etc)/ repairing and reselling program, to send out the message to consumer of do not over purchase, educates consumers about the value of buying less by making things last  Patagonia Tags The phrase "vote the a--holes out" refers to politicians from any party who deny or disregard the climate crisis and ignore science  Clean Climbing encourage the climbers to rely on their judgment and skill rather than gears. left no evidence of climbing to the environment	Campaign: The Worn Wear program offers a repair and reuse program for customers. buying used extends a garment's life by about two years, which cuts its combined carbon, waste and water footprint by 82% 1% for the planet The NGO founded by the founder, companies will donate 1% of their sales as "earth tax"- renowned members include Honest Tea and Boxed Water Business practice: Regulate suppliers to comply with their strict Code of Conduct
BMW - i Vision Circular concept compact car	2040 i Vision Circular concept compact car ● Name "Circular" comes from the idea of a "circular economy" 100% recyclable, including the battery Sustainable materials ● natural fibres to replace plastic, combine synthetic leather, recycled polyester, and cork for upholstery ● synthetic textiles that are 100% recycled material and recyclable themselves ● 3D printed steering wheel Composite design ● Use bonded connections and composite materials → opted for replacements that would be easier to break down and recycle Future Plan ● make at least half of their global sales for the main brand electric; ● look at sustainable materials to further reduce emissions	+ve: Works on not only minimising waste but also tries to be sustainable at the beginning -ve: Consumers' acceptance is uncertain. The appearance preview is not widely accepted nowadays	Providing a more sustainable option to customers Allow internal engineers and designers to freely exchange ideas regarding the project to boost progress	Design to use sustainable materials for the concept car	Collabroative working environment, boost sustianbtily performance	Name "Circular" comes from the idea of a "circular economy" Depicting the future automobile	Has goals to meet the sustainable business practices

	• investigate recycled plastic "bioplastic" to replace newly-manufactured petroleum-based plastic						
H&M - partnership with HKRITA	Planet First program 2020-2024 Recycling Revolution 2016-2019 Planet First: seeks technologies that can contribute to a planet-positive fashion future, not only by eliminating the negative impact fashion can have on the planet, but also by adding environmental benefits to the planet through the processes and actions taken throughout the value chain. Key project with Planet First • Open Lab - enabling collaboration and research • Green Machine - recycle blend textiles at scale, powder is used to improve cotton farming and completely eliminate the need for irrigation • Absorboost - cellulose powder improving cotton quality • Carbon Looper - CO2 capturing textiles • G2G - miniaturized recycling machine to change consumer perception All solutions and learnings are shared openly with the industry, to ensure maximum impact on the planet. H&M funding + Hong Kong Government's Innovation & Technology Fund	+ve: Helps to reduce the waste and environmental pollution made by them - one of the largest fast-fashion brands Share results with industry, hope to make a transformation - not a greenwashing branding strategy -ve: Not actively sourcing sustainable materials doing garment to garment instead, not solving the problem from root (their business model)	Collaborate with HKRITA, a Research Institute in HK, fund the project to boost sustainability research performance Provide consumers with environmental friendly choice Hoodie below is made by green machine - provide recycled material without damaging fibre Supplier and farmers worldwide (indonesia, india, turkey and hopefully cambodia) started implementing the green machine tech from 2020	2020 - 2024 Green Machine - recycling blend textiles at scale + powder improve farming cotton Absorboost - cellulose powder improving cotton quality 2016 - 2019 Green Machine - recycling blend textiles at scale + powder improve farming cotton G2G - miniaturized recycling machine to change consumer perception	2020 - 2024 Open Lab - enabling collaboration and research (will be open in 22/23	Encourage cusoers to purchase environmentally friendly garments 	Share the research result to the whole industry Invite brands and other stakeholders to visit the A pre-industrial sized green machine system, encourage implementation within their own operations The program is guided by speed, scale and impact: **Speed** - conduct applied research and present developments along the way to get feedback to improve and progress faster **Scale** - target the biggest pain points and partner with industry from day one to ensure quick scaling of solutions **Impact** - give away all findings and technologies to maximise the impact of work