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Closing the Loop: Exploring IKEA's Transition to the Circular Economy

Alexandra Seidel

In partial fulfillment of a Bachelor of Arts Degree in Environmental Analysis,

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Readers:

Bowman Cutter

John Jurewitz

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Chapter 1: Introduction

The Linear Model of Production

Two hundred years ago, we were living in a world with far more resources and a fraction of the population we have today. In that environment, resources could be extracted at rates greater than maximum sustainable yields for temporary periods without much consideration of the consequences. The opportunity cost of extracting resources was low with the abundance of exploitable resources. Due to this low opportunity cost, the most efficient system of production at the time was a linear model. In this model, resources are extracted, produced, distributed, consumed, and ultimately disposed of.



Figure 1 Stages in the Linear Economy. (“Closing the loop,” 2016).

The linear model continues to shape our methods of production and consumption today. However, the significant increase in population over the years has resulted in an increase in demand for resources—the days of extracting with low opportunity costs are over. At this point, fewer new opportunities for resource exploitation remain, and the opportunity costs are higher for today’s resources. Extracting more of one resource means having less of something else—perhaps fewer ecosystem services or resources that could have been used for a different purpose or saved for future use. With higher opportunity costs to extract resources, the linear model begins to be challenged.

Rising extraction opportunity costs is just one problem faced by the linear model. Each stage in the model—extraction, production, distribution, consumption, and disposal—creates various challenges for its long-term sustainability. At the extraction stage, companies decide on

the quality and quantity of resource to use. Resource extraction has many externalities associated—costs that are not incorporated into the cost of the resource—associated with the practice. The environmental degradation involved in resource extraction, from deforestation to groundwater contamination, is not taken into account. In the production stage, companies decide on product design and how durable products will be. Companies decide on fabrication techniques in which some will be more wasteful than others. Production often has externality costs as well that are not internalized in the price of the product. In distribution, companies have to decide on producing locally or centrally. Consumers buy goods and use them until they can either extend the products life through reuse or repair, or dispose of them. While consumers sometimes chose to extend the life of products, more often they chose to dispose of them, resulting in the last big problem of sustaining the linear model comes from the last stage.

Disposal has a couple of problems within the linear model. First, we often do not take into account the negative aspects of disposal. From decreased air quality from incineration, to the harmful leakage from landfills, disposal prices do not adequately address these environment and social issues. The other big problem with disposal is that more often than not, consumers are disposing of products prematurely, in the sense that products still contain some residual value. After throwing away a product, consumers usually replace the product with a new one. So, when consumers throw away a product they face the opportunity cost of disposal in addition to the cost of new material extraction and the energy cost to produce the new product. Rather than prematurely throwing away a product with residual value, it is much more economically efficient to reuse, repair, or recycle it. Therefore, throwing away a product prematurely with residual value left over, would be better economically to reuse it, repair it, or recycle it. Ultimately, the

problems with the linear model are inherent in the first and last stages in the model, and they will continue to challenge the long-term sustainability of the model.

Many observers believe the linear model of production cannot continue at its current rate. In the linear model with a rapidly growing population, the speed of resource depletion and waste generation will continue to increase (Lieder & Rashid, 2016). McDonough and Braungart (2001) conclude that, “due to the speed of resources at which the planet’s resources have been exploited, an industrial evolution to effectively extend usable value of material assets is crucial to sustain human activities in years to come” (McDonough & Braungart, 2001). In response to these ideas, a new idea emerged to try to rethink the way we produce and consume goods called the circular economy.

The Foundation of the Circular Economy

As the negative effects of the linear model started to become clear in the 1970s, a series of academics started to discuss alternatives to the linear model. They hoped to point out the flaws, the failed assumptions, and the detrimental results of the linear model of production. Through an amalgamation of ideas, the circular economy emerged as the alternative. The circular economy cannot be traced back to a specific date or author, but evolved from many ideas and principles, and has become a heavily researched topic today. The publication of *Silent Spring* sparked the discussion on the long-term unsustainable impacts of the modern system.

Rachel Carson’s *Silent Spring* was a catalyst for changing the current system. In her pivotal piece, Carson takes a deeper look into the negative effects of the industrial system, specifically through industry’s use of harmful pesticides (Carson, 1962). She accounts the harmful effects of pesticide use, like DDT, on the environment. Her parable of a silent spring, one without the chirping of the birds, awoke the country to the damaging effects of

industrialization. She enlightened the idea that there is interconnectedness between all living things and nature, an idea that prompted a change to the system. Although Carson aimed to return to traditional ways of agriculture, she illuminated the flaws in the industrial system, paving the way for an alternative.

After the publication of Rachel Carson's illuminating book, alternative ideas began to flourish. Walter Stahel, architect and industrial analyst published a report in 1976 titled, "The Potential for Substituting Man Power for Energy" (Stahel & Reday-Mulvey, 1976). Stahel reinvigorated the idea of thinking of the economy in loops, an idea that modern economic growth theory had mostly simplified out of modern models beginning earlier in the 20th century. He envisioned a system with life-long products and the reconditioning of goods, which would result in a reduction of waste. He concluded that an alternative economic model would be the best way to achieve these goals.

The next monumental idea that helped to shape the circular economy was Michael Braungart and Bill McDonough's Cradle-to-Cradle model. Braungart and McDonough combined their knowledge in chemistry and architecture to create the concept of Cradle-to-Cradle, an alternative to the linear "cradle-to-grave". Cradle-to-Cradle suggests an alternative where at its core promotes the idea that materials should be looped around and rebirthed into a new product. In their design philosophy, Braungart and McDonough suggest that there are two cycles in the industrial process: technical and biological. With these different processes in mind, the design framework hopes to design products with a positive impact, while reducing the negative impacts of commerce. To achieve this, the flow of technical materials must be designed for continuous recovery and reutilization of these materials.

There are specific goals within the Cradle-to-Cradle concept that will help build the main ideas in the circular economy. The first goal, “Waste equals food”, hopes to eliminate the concept of physical waste within the production system. This goal is formed on the basis of nature: in nature there is little waste. Each organism’s process contributes somehow to the health of the whole ecosystem; one organism’s waste is another’s nutrients or food (McDonough & Braungart, 2010). The next goal in the Cradle-to-Cradle framework is to, “use current solar income”. The system must be powered on renewable energy in order to make it a sustainable, ever lasting system. Lastly, the system hopes to, “celebrate diversity” by respecting human and natural systems. Businesses need to change to accept social responsibility for their practices and promote healthy ecosystems and respect local impacts. The Cradle-to-Cradle theory is an important development in the circular economy.

Another important idea that provides basis for the circular economy is the concept of biomimicry: the idea that nature knows best. Nature has existed far longer than any humans, and has worked through a lot of different variations to find the best technique to achieve something. In her book, “Biomimicry: Innovation Inspired by Nature,” Janine Benyus defines biomimicry as a way to study nature’s best ideas and then imitate nature’s designs in order to solve human problems. She presents three ways to use nature to solve problems: one must use nature first as a model by emulating forms, processes, or strategies; second, one can use nature as a measure through using ecological standards to judge the sustainability of innovations; lastly and most importantly, Benyus argues that one must use nature as a mentor. Nature has more to offer than simply the physical resources it provides. It also provides a prime example of how resources should be cycled. This idea builds off Braungart and McDonough’s goal to eliminate waste, by

enabling the most value to be extracted from resources through the workings of the ecosystem. Biomimicry summarizes the natural undertones that the circular economy functions on.

Natural capitalism was another idea that helped to form the circular economy. Natural capitalism, Paul Hawken, Amory Lovins, and L. Hunter Lovins' idea, describes the interdependencies between the production of human capital and the use of natural capital. The concept has a similar framework to ecological economics and industrial ecology. All three make it clear that the economy cannot exist without natural systems; thus the economy has certain ecological constraints. In Natural Capitalism, the goal is to radically increase the productivity of natural resources through changes in design and technology. Hawken, et al., builds off of Benyus' biomimicry with the goal to shift the system of production to one that is inspired by biological systems. Lastly, both natural capitalism and industrial ecology suggest creating circular loops, where waste can serve as an input, with the hope to eliminate bi-products. These ideas resurface in formal definitions of the circular economy. The circular economy functions with this natural capitalist framework.

From the transformative thoughts of Stahel with the performance economy, to the ideas to emulate nature through Biomimicry, to thinking about our production in a closed cycle as seen in Cradle-to-Cradle, all within the framework that our economy can only function within the limits of the ecosystem, these theorists formed the conceptual foundations for the study of the circular economy. The circular economy is a confluence of many ideas, which seek to create an alternative way to produce and consume goods. These founding ideas resurface today in current circular economy theories and business strategies.

The Circular Economy Today

Theorists present the circular economy as a transformative shift that can enable economic growth and environmental well being to coexist, and many have declared that there is a business case for the circular economy. However, the circular economy relies on businesses to be one of the main actors to help make the transition to the circular economy. Although in theory the circular economy is a worthwhile endeavor for businesses, a tension exists between transitioning to new circular models and traditional business motives. Transitioning to the circular economy is challenging for all actors involved, especially while the linear model is so ingrained for businesses and consumers. The transition involves changing to new business models, developing new products, evolving the customer relationship, creating complex reverse logistics, as well as altering the current meaning of waste; ultimately, transitioning to the circular economy is a difficult feat to achieve, making it possible for some companies but impossible for others. However, some companies today are taking steps towards the circular economy and are changing their business models and implementing circular strategies within their businesses.

In addition to consumer demand for disposable products, the manufacturing industry is largely responsible for the material flows and the exchange of energy between human society and the environment, and is one area that could benefit from transitioning to the circular economy. The circular economy theories present many strategies and tactics to implement at the business level. However, it is unclear what strategies and lessons from theory are actually being put into practice, and why which ones are implemented over others. This thesis hopes to illuminate which circular practices are succeeding and can make a business case for in order to accelerate the transition towards the circular economy.

Although there are many companies actively pursuing the circular economy, all with varying levels of success, one company stands out. Swedish retailer IKEA is a company working towards becoming a player in the circular economy, and with its size, has the ability to make a global impact. The ready-to-assemble furniture company is making strides towards a circular business in a variety of areas, from long-term product design, to the repair and remanufacture of goods, to the use of renewable and sustainable sources. IKEA will serve as a case study to explore circular models and strategies being pursued in practice today, with the purpose to discover how significant IKEA's progress is in the transition to the circular economy. The thesis will explore how and why the company has been able to achieve the success they have had. Lastly, it will explore the ways of replicating IKEA's success across the rest of the industrial sector with the hope to speed up the transition to the circular economy.

The thesis is structured as follows. The second chapter explores the theories surrounding the circular economy including the characteristics of what it means for a company to be working towards the circular economy ending with two hypotheses that will be tested in the third chapter. The third chapter examines six different companies pursuing the goals set out in the circular economy theories to see if the topics discussed in theory are being followed in practice. Chapter Four is a detailed case study of IKEA. Finally, Chapter Five draws conclusions about IKEA's circular efforts, explores the replicability of these insights, and discusses some other strategies to accelerate the transition to the circular economy.

Chapter 2: The Circular Economy in Theory

In theory, the circular economy presents an alternative, more sustainable form of production to the linear model through strategies to cycle the throughput of resources. In doing so, the circular economy strives to extract the maximum value from the physical throughput of resources. The literature lacks a coherent criteria for evaluating what it means to be a circular company, so by synthesizing the literature on the circular economy and circular business models, I craft my own criteria for what it means to be company engaged with the circular economy, with my goal to evaluate IKEA in a later chapter. In this chapter I will explore what the circular economy means in theory. After presenting the principles of the circular economy found in the theory, I will lay out some criticisms of the model. Next I will explore what the circular economy could be in reality and where the theory fits in at the business level: what does it mean to be a company working towards the circular economy? Included in this section will be a discussion on the end goal to maintain value. From there, I will present different strategies for circular businesses. Lastly, from the findings in the literature, I will create hypotheses about the circular business model. The following chapter will test the relevance of circular economy theories in practice by examining a variety of case studies.

The Circular Economy as a Whole

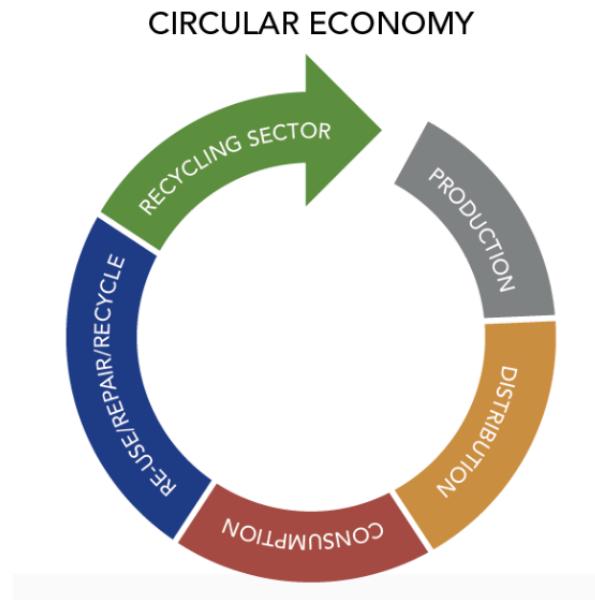


Figure 2 Stages in the Circular Economy. (“Closing the loop,” 2016).

The circular economy has been on the rise since its founding ideas first emerged in the 1970s. Much more attention has been given to this idea, especially in countries such as China—a country noticeably facing the effects of their production (Lieder & Rashid, 2016). Across the literature, the circular economy is seen as a more sustainable solution to the traditional take-make-dispose model because resources are kept in use for longer through durable, repairable, and recyclable design, instead of ending up in the landfill with residual value. Additionally, the circular economy creates opportunity for new business models that can assist in sustainable development (Bocken, Pauw, Bakker, & Grinten, 2016; Lieder & Rashid, 2016; McDonough & Braungart, 2002; Singh & Ordoñez, 2016). Additionally, the circular economy promotes a more responsible and environmentally sound use of resources. The circular economy can also be seen as a viable waste management strategy (Ghisellini, Cialani, & Ulgiati, 2016). In the past, waste management had solely been about getting rid of waste, often through landfilling or incinerating. These approaches however, may lead to huge losses in resource value, as well as

harmful environmental impacts, such as the leakage of chemicals into groundwater, or the release of particulate matter in the air. By the twentieth century, recycling emerged as a strategy to capture residual value from materials and became a popular strategy for paper and metals. Although not a new concept to recycle materials, the circular economy arose to take this idea of making value out of waste even further. In addition to recycling, the circular economy strives to not only recycle disposed products, but also finds ways to repurpose and remanufacture these waste streams. By doing so, the throughput of resources to the landfill slows, therefore, within the circular economy, waste management can be seen as a tool to recover resources and a way to decrease environmental impact (Ghisellini et al., 2016). The circular economy has the potential to reduce the environmental impact of extracting raw materials and landfilling of materials, benefiting the social good. Additionally, the circular economy can create opportunities for the private good through new avenues of waste management.

Principles of the Circular Economy

In the literature, the circular economy has six main principles: (1) reduction, (2) reuse, (3) recycle, (4) appropriate design, (5) reclassification, and (6) renewability. Within reduction, the circular economy strives to minimize the inputs of primary energy, raw material and waste, through improvements of efficiency in production and consumption processes (Ghisellini et al., 2016). Companies can reduce the flow of resources in two ways: they can either keep or increase the useful life of their products while reducing their environmental impact by recycling more of their mass and modifying the way in which they are ultimately disposed, or they can reduce the amount of resources per unit of value (Figge, Young, & Barkemeyer, 2014). Reduction of the physical volume of throughput per unit of time is a viable strategy to reduce ones environmental impact.

Reduction of throughput per unit of time is one way in which the circular economy strives to be more sustainable than the linear model, however, this conclusion is often debated. The sustainability of reducing throughput per unit of time is debated in the literature through the discussion of the distinction between the terms “eco-efficient” and “eco-effective”. Eco-efficient is the idea that products should be produced using the smallest amount of throughput per product, essentially making the same amount of products out of less material. Current production strives for this measure within the bounds of current market prices because it helps companies lower their bottom-line costs through decreasing costs by using fewer virgin resources (Braungart, McDonough, & Bollinger, 2007). However, such “eco-efficiency” may only be compatible with a fully linear model. One example of an eco-efficient technique is a company that develops a simplified form of packaging. Here, the company uses fewer resources per unit of product, in this case the packaging. While this eco-efficiency technique reduces resources if the number of products sold stays in a period of time remains constant. However, by being able to produce the same amount of products with fewer resources, the fear with eco-efficiency is that companies might begin producing a higher quantity of a more efficient product, which would speed up the flow of resources.

Alternatively, “eco-effectiveness” seeks to reduce resource use, while transitioning to a circular model. Eco-effectiveness, a term originating in Braungart and McDonough’s Cradle-to-Cradle, proposes a transformation of products and their material flows to create synergy between ecological systems and economic growth (Toxopeus, de Koeijer, & Meij, 2015). Where eco-efficiency hopes to minimize the negative impact of material flows, eco-effectiveness hopes to reduce the overall ecological footprint. The goal of eco-effectiveness is not to minimize the cradle-to-grave flow of materials in the linear model, but to create circular cycles of materials

(Braungart et al., 2007). Eco-effectiveness strives to maintain value in resources by finding ways to extend the useful life of resources. Although eco-efficient and eco-effective strategies might lead to the same results—a smaller environmental impact—the two strategies function in different models. The literature suggests eco-efficiency functions in the linear model, where eco-effectiveness takes root in the circular model.

In addition to reduction of throughput, the circular economy also engages with the reuse of materials. In the circular economy, materials can be reused in two ways. In the traditional sense of the word, products that are reused are used again in the same way they were intended to be used (Castellani, Sala, & Mirabella, 2015). Additionally, individual components and pieces of products can also be reused in the circular economy. For example, for a sofa with reusable covers that has reached the end of its life, the base of the sofa could be reused again, while only a new cover is needed to extend the life of the sofa. Because there is no need to produce an entirely new product—a whole couch in this example—the reuse of materials often requires fewer virgin resources and less energy to produce, making reuse an appealing strategy for companies.

Recycling is the next strategy within the circular-economy literature. Recycling entails recovering waste materials in order to reprocess into products, materials, or other substances for the original product or for another purpose (Ghisellini et al., 2016). Although recycling is often assumed to be one of the best environmental waste management strategies, the use of some materials makes recycling more difficult or a less attractive option. For example, some materials take more energy to recycle than would be used in extracting more virgin material. Or sometimes, like in the case of recycling solar panels, harsh chemicals are often used in the recycling process. However, the recycling of some materials can be environmentally beneficial. For example, Woolridge et al. (2006) performed a life-cycle assessment of the energy footprint

used in a recycling operation compared to the use of virgin materials. The authors found that 65 kWh of energy were saved for every kilogram of virgin cotton that was displaced by second-hand cotton. Additionally, replacing virgin polyester with recycled polyester saved 90 kWh. Therefore, the recycling of textiles is more energy efficient than producing textiles with virgin materials (Woolridge, Ward, Phillips, Collins, & Gandy, 2006). Recycling and remanufacturing create additional ways to keep resources out of the landfill. If disposal was priced at a level to discourage landfilling, the circular economy could open up opportunities for growth in the recycling and remanufacturing industries.

The Ellen MacArthur Foundation, one of the leading organizations promoting and inspiring the transition to the circular economy, describes the last three principles of the circular economy, which are echoed throughout the circular-economy literature. The next principle in the circular economy is appropriate design—a strategy that helps to reduce, reuse, and recycle. Through appropriate design, such as designing for durability and longer life, as well as for disassembly and repairability, companies can find solutions to avoid products ending up in the landfill. Building off of the Cradle-to-Cradle concept, the next principle is reclassification; in the circular economy, resources should be separated into non-biodegradable and biodegradable materials. The non-biodegradable materials are intended to cycle in loops, while the biodegradable materials should be non-toxic so they can safely return back to the biosphere. The last principle built into the circular economy is renewability. To promote a resilient and sustainable economy, the circular economy must be run on renewable inputs, for example with renewables for energy and sustainably managed forests for wood.

Based on these six main principles of the circular economy, many different definitions of the circular economy have evolved, yet most reach the same conclusions. First and foremost, the

circular economy is restorative by design which, “aims to keep products, components and materials at their highest utility and value, at all times” (Webster, 2015). Following this idea, Geissdoerfer et al. presents a comprehensive definition for the circular economy: “the circular economy is a regenerative system in which resource input and waste, and emission leakage are minimized by closing material loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling” (Geissdoerfer, Savaget, Bocken, & Hultink, 2017). The circular economy is a broad term to encompass many different ideas, all of which promote the transition to a more sustainable system of production that functions within the limits of our ecosystem.

Maintaining Value and the Waste Hierarchy

The six principles—reduce, reuse, recycle, appropriate design, reclassification, and renewability—lay the ground for the main goal of the circular economy, which is to extract as much value as possible before discarding. The circular economy hopes to keep resources at their highest value by using them for their primary use for the longest period of time. Subsequently, the circular economy continues to extract value from resources by making use of components for secondary uses, or the materials themselves for tertiary uses. Taking a carpet, for example, the circular economy would first strive to reduce the amount of material needed to produce the carpet. Then, the carpet would be used and reused in its original state. At some point, when it no longer has value as a carpet, the fibers would be recycled to form something else, such as insulation. Extracting the highest amount of value from resources throughout their lives, keeps resources in use for longer, which decreases the rate at which they end up in the landfills. Thus, the circular economy should result in a decrease in the demand for virgin resources.

A certain condition that denotes when a good should be recycled is not stated explicitly in the circular economy theory, however it is a topic discussed in the recycling literature. This condition might depend on the technicality of recycling certain materials, for example some materials have a certain level of degradation in which they cannot be recycled. It could also depend on consumer preferences, something that will be discussed further in the final chapter. Clear guidelines on the conditions for when to recycle or dispose of a good is lacking in the circular economy literature.

Crucial to understanding the concept of maintaining value for longer, it is important to discuss the concept of “the waste hierarchy”. The waste hierarchy consists of several levels: (1) reduction of material content; (2) re-use; (3) recycling (in the form of upcycling or downcycling; (4) energy recovery; and (5) disposal. The waste hierarchy helps set a framework for this idea and establishes the fact that not all forms of waste management are of the same environmental impact. Additionally, the waste hierarchy considers the amount of resources needed to extend the life of a good or material. According to the Environmental Protection Agency, reduction and reuse are at the top of the waste hierarchy (“Sustainable Materials Management: Non-Hazardous Materials and Waste Management Hierarchy,”). These strategies maintain resources at the highest level, often considered upcycling. Reduction and reuse are the most preferred strategies from an environmental standpoint.

Next on the hierarchy is recycling. Recycling can either be a form of upcycling or downcycling depending on if the product maintains or decreases in value. This often has to do with the material make-up of the resource. Aluminum and other metals can be recycled almost indefinitely due to the material complexity. However, most materials have a limit to the number of times they can be recycled and, for this reason, recycling is third in the hierarchy.

The last two levels in the waste hierarchy are energy recovery and disposal. Energy recovery converts non-recyclable material into useable heat, electricity, or fuel, thus capturing some of the value of the product. However, once this material is converted to a form of energy, it can no longer return to its original state. Thus, all of the value from the original resources is gone once the energy is used. Lastly, disposal is at the bottom of the waste hierarchy. In disposal, unless the landfill is mined for methane or other resources, most value is lost and it is the most environmentally degrading form of waste management. Currently, in the United States, the most typical form of disposal is done through landfills.

The first waste hierarchy was presented in 1970, and since then there have been several amendments to address the idea of waste. These amendments include measures of prevention, preparation for reuse, and recycling. Also, the scope of the waste hierarchy presents some limitations. Depending on some factors, such as materials, recovery and recycling costs, the waste hierarchy may be ordered differently for some industries. Other authors have presented alternative hierarchies measured on value of waste. Additionally, other limitations have been presented about the concept of the waste hierarchy. For example, businesses lack guidance and support from government for choosing the appropriate level in the hierarchy (Gharfalkar, Court, Campbell, Ali, & Hillier, 2015). Although the waste hierarchy has some drawbacks, it is an important framework when considering the circular economy. The circular economy hopes to keep resources at their highest value by focusing its efforts on the first two levels of the waste hierarchy. Reduction, reuse, and recycling are the preferred options and the strategies practiced in the circular economy.

The Circular Economy at the Business Level

The circular economy is a term that ideally focuses on the entire economy, with the hope to alter the current system of production. The literature presents the foundation and principles necessary to create a circular economy as a whole. However, businesses are the main actors to lead the economy into a new, more sustainable direction. Transitioning to the circular economy will need to take place at the micro level with individual businesses models. A business model is a holistic approach to how a firm “does business”, and defines the way a firm creates and delivers value to customers (Teece, 2010; Zott, Amit, & Massa, 2011). By exploring different circular business models and strategies presented in theories, this thesis hopes to craft a more general definition and framework for a business model in the circular economy.

Characteristics of a Circular Business

The circular economy presents many opportunities for businesses to pursue circularity through new business models that include product design and better use of resources. Circular business models hope to achieve the goals of the circular economy through the way a firm does business. Linder and Williander declare that a circular business model is one in which value is created based on utilizing the economic value retained in products in the production of new goods (Linder & Williander, 2015). In a more typical business model framework, Metink defines a circular business model, as “the rationale of how an organization creates, delivers, and captures value within closed material loops” (Metink, 2014). Lastly, incorporating an important factor, Bocken, et al., determine that circular models, “enable economically viable ways to continually reuse products and materials, using renewable resources when possible” (Bocken et al., 2016). The literature presents many interpretations as to what makes a circular business model.

Within the circular business model, many different characteristics make up what a circular business entails. The Ellen MacArthur Foundation presents one approach for a circular business with the acronym 'ReSOLVE'—Regenerate, Share, Optimize, Loop, Virtualize, and Exchange ("Delivering the Circular Economy, Toolkit for Policymakers,"). "Regenerate" represents a shift to renewable energy or materials. "Share" comes next with the goal to maximize the utilization of products through sharing among users as well as reusing products and prolonging life through repair and maintenance. The 'O' stands for "optimize"; through increases in efficiency, a circular company can remove waste from the production process and the supply chain. A company needs to aim to keep materials in closed loops, hence the 'L'. "Virtualize", the 'V' in ReSOLVE, aims to deliver utility virtually instead of materially. Lastly, 'E' stands for "exchange", meaning a company should replace old materials with renewable ones. The ReSOLVE principles create a solid framework for thinking about what makes a circular business. However, I am skeptical about the applicability across multiple industries, specifically with the goal to virtualize. For example, the manufacturing industry will continue to create value through material products. Ideally in a circular business, these products will be created efficiently and with reclaimed materials, but they will never be virtual products. Although virtualize does not work for every business and industry, the ReSOLVE principles create an overarching framework for circular business. Additionally, the ReSOLVE principles are not the only guiding principles for a circular business.

In a more simplified approach, Renswoude et al. (2015) boils down circular characteristics into three main principles. The first is that products and services are maintained, through repair and adjustments, ultimately extending the lifecycle of existing products and processes. Second, resources should cascade down the waste hierarchy to be used for subsequent

uses by creating new combinations of products from upcycled waste streams. And lastly, the business should be run entirely on renewable energy and sustainably harvested renewable materials (Renswoude, ten Wolde, & Joustra, 2015). Building off of that, the authors suggest four requirements for the business model. The business's value proposition must reflect the balance of economic, ecological, and social needs. The business should be actively engaged in supply chain management. Additionally, the business should engage with customers, to motivate them to take responsibility for their consumption and disposal decisions. And lastly, the business's financial model should reflect a holistic distribution of economic costs and benefits among actors involved.

Renswoude et al.'s inclusion of customer engagement is unique compared to the previous circular economy authors. Most other authors, including the Ellen MacArthur Foundation, fail to mention business engagement with customers on sustainability. This is an area I'd like to explore with IKEA, to determine how IKEA engages with their customers about their circular products and programs. Renswoude et al. (2015) assumes customer engagement is crucial for a circular business model. This belief might only hold true for certain varieties of the circular business model. For example, customer engagement would be crucial for any business models that hinge on creating value from recovering resources, thus need customer involvement in take-back programs. Additionally, businesses must engage and inform customers on the circular agenda to help create an advantage over non-circular competitors. However, customer engagement might not be necessary for all companies pursuing the circular economy. For example, a company that remanufactures goods from a different waste stream does not have to rely on customers bringing back their own products to remanufacture. Customer engagement might not be necessary in all

aspects of the circular business, but engaging with customers on sustainability agendas might lead to an added benefit.

Design Strategies and Business Models

The above characteristics start to establish a framework for what it means to be a business pursuing the circular economy. Although the circular economy can be made up of different attributes, the end goal is always to maintain value of components of a product in order to extract all of the value of the resources before disposal. Maintaining value can be done in a variety of ways, and Bocken et al. (2016) developed a specific framework to differentiate the different approaches. The authors build on previous literature surrounding the variation in different resource cycles, such as technical and biological loops, and create terminology of slowing, narrowing, and closing the loop (Bocken et al., 2016). The terms they introduced encompassed topics that were already being discussed in the literature, but no one else had felt the need to classify the different terms. While closing the resource loop strives to cycle resources in a closed cycle, slowing and narrowing refer to throughput in the system. Slowing means reducing the speed of throughput in the system, while narrowing refers to decreasing the amount of throughput entering the system at a time. Having specific terms, like slowing and narrowing throughput, and closing the loop allows for more specificity within design and business strategies compared to simply using the broader and more open-ended term, “closing the loop”. I use Bocken et al.’s (2016) terminology of slowing, narrowing, and closing going forward in discussing various strategies to achieve circularity in a business.

First, businesses can engage in the circular economy through actions that will slow the rate of throughput. Slowing the rate of throughput entails designing products for the prolonged use of goods over time. By extending the lifecycle of a product, the period that a product will be

utilized is extended. Therefore, the resources necessary for that one product will slow down, ultimately slowing the rate of extraction and waste disposal. Companies should consider some key design features when designing their products. With the goal in mind to ensure a long utilization period of a product, products should be designed for emotional and physical durability. Emotional durability entails creating products that, “will be loved, liked, or trusted longer”. Most circular design strategies only focus on the physical durability, but Bocken et al. realizes the multi-dimensionality of keeping products in use for longer. However, it is also important that products are designed to last physically. Thus they should be designed for service loops; maintenance and repair allows products to be maintained in their top condition, making sure the functional capabilities remain. While maintenance loops cannot continue indefinitely as products eventually become unrepairable, having the ability to repair products makes it possible to extend a products life. Another key design feature for slowing the rate of throughput is standardization and compatibility. By creating products with parts or interfaces that fit other products well, it is easier to maintain products or to upgrade. It is also beneficial in slowing the loop to design products for dis and reassembly. This helps with material and component reuse. Many different design features help to slow the rate of throughput.

In addition to specific design strategies for slowing the rate of throughput, a series of business models also falls under this category, including extended product value and long-life models. Extended product value is a business model that captures the residual value remaining in its used products and adds additional value through reconditioning and refurbishing. The value proposition comes from manufacturers being able to deliver the customer a “new” product as a replacement for the old one. This business model can only function if take-back systems are in place to enable the return of products to businesses so they can capture new value. Another

business model for slowing the rate of throughput is the long-life model, in which businesses focus on delivering long-life products that are designed for durability and repair (Bocken et al., 2016). In this model, businesses often offer high levels of customer services through various repair programs. An example of this business model can be seen in companies that encourage sufficiency by seeking strategies to reduce the rate of end-user throughput and disposal. These companies create products that last and allow users to hold on to them as long as possible through principles of durability, upgradeability, warranties, reparability, and non-consumerist approach to marketing and sales (Bocken et al., 2016). A great example of a company pursuing this strategy is Patagonia, with their famous “Don’t buy this jacket” ad campaign (“Don’t Buy This Jacket, Black Friday and the New York Times,” 2011). All of these business models hope to slow resource use, by keeping products in utilization for longer periods of time.

Another approach businesses can take to transition to the circular economy is narrowing the amount of throughput. Narrowing the amount of throughput aims to use fewer resources per product, as well as fewer resources in the production process. The challenge with narrowing the amount of throughput is the distinction between eco-efficiency and eco-effectiveness. Bocken et al. (2016) takes an eco-efficiency standpoint and argues that strategies that narrow the amount of throughput with resource efficiency can speed up linear resource flows by selling greater quantities of a more efficient product, an example of the Jevons Paradox. Additionally, using less resources per product could potentially reduce the durability of a product, resulting in shorten life span of the product. Thus, Bocken et al. (2016) is skeptical that narrowing the amount of throughput could lead to an actual reduction in resource throughput rates, and therefore does not accept resource efficiency as a valid circular practice. However, Braungart et al. (2007) argue that resource efficiency is a worthwhile effort, taking the eco-effective stance (Braungart et al.,

2007). Resource efficiency is a worthy attempt to take steps towards circularity if businesses are cognoscente of the implications of speeding up the resource flows. Narrowing the amount of throughput can be put into practice by reducing the inputs per product and production.

Lastly, closing the loop is the final category of circular strategies. Closing the loop aims to connect and direct products at the end of life back to the manufacturing process. For design strategies, it is important to design in non-biodegradable and biodegradable loops. The biodegradable materials can be recycled continually, while biodegradable materials should be designed with safe and healthy materials for biodegradability. In closed-loop practice, products should be designed for disassembly and reassembly (Go, Wahab, & Hishamuddin, 2015). The business model associated with closing the loop is extended resource value. In this model, businesses exploit the residual value of collected resources and create new forms of value in new products.

Closed Loop as an Ecosystem

While businesses have a variety of different ways to engage with the circular economy through various design strategies and business designs, it is important to keep in mind that the circular economy must function as an ecosystem. In theory, collecting and reintroducing discarded products back into a company's manufacturing process to capture residual value is the goal of closing the loop, however in reality potential challenges arise on an individual company level. The ecosystem, the biomimicry inspiration for the circular economy, illuminates some of these challenges. An ecosystem functions together with producers, consumers, and decomposers. The producers, companies extracting raw resources, produce resources for the consumers. The primary consumers, say a company's supply chain, consumes those producers to create components of a good. A secondary consumer, say a manufacturing company, consumes that

primary consumer to create a product. Lastly, a tertiary consumer consumes the secondary consumer, say a customer buying a product. Primary, secondary, and tertiary consumers all produce waste that is decomposed by decomposers, and the resources are returned to the producers. While there is very little waste in an ecosystem as a whole, individual organisms still produce waste. The ecosystem as a whole is able to close the resource loop, not necessarily an individual organism. Closing the loop is an area businesses do not necessarily have control over, thus making it challenging to complete this goal on an individual basis. An individual firm pursuing a circular business model cannot by itself create the circular economy. Additionally, if all businesses tried to pursue circular business models to the extreme, there would likely be a sub-optimization of resources from the lack of coordinated action. Lastly, in the circular economy, decomposers are not the only actors responsible for eliminating waste, thus the design strategies and business models developed for slowing and narrowing throughput, and closing the loop enable all actors to reduce resource use.

Criticisms of the Circular Economy

The theories describe the circular economy as a regenerative, circular model, in which resources can be cycled continuously in a closed loop, leading to a multitude of both economic and environmental benefits. In theory, the economy should transition from the linear model completely over to the circular model as if it is binary decision, suggesting businesses should aim for closed-loop practices. Although the circular model presents itself as a more sustainable version of the linear model, there are some aspects to be critical of.

First and foremost, the circular economy in the extreme sense is impossible. The ability to cycle resources continually in a closed loop cycle that is discussed in the theory violates the first and second law of thermodynamics. The first law—energy can be transformed from one

form to another but cannot be created or destroyed—demonstrates that what goes into the system must come out. All economic activity creates the material outcome of physical waste, which cannot be returned into the loop. Thus, we must introduce new materials to a certain extent. The second law states that in a closed system, the amount of energy available to do work constantly declines. However, energy is needed to recycle and remanufacture goods, thus the system cannot continue without addition energy inputs.

Based on these fundamental laws of physics, a 100 percent closed-loop system is not feasible. Additionally, there are economic and environmental factors that make such a transition inefficient. First, transitioning completely would require a tremendous amount of energy. Second, sometimes it takes more energy to recycle materials than it does to extract new virgin materials. Achieving a fully closed-loop is illogical from a physical, economic, and environmental standpoint.

The system of production and consumption should be thought of as a continuum with the linear model on one end and the circular economy on the other. Businesses can move towards the circular economy by taking steps to incorporate more recyclable material, to make more from less, or by adopting other characteristics of circular business. While in theory the circular economy strives to close the resource loop, in reality, the circular economy is an unattainable goal to make progress towards, but a goal that will never be met. The diagram below depicts a more realistic representation of the circular economy with resources entering in and out of the system, while also incorporating ways to slow throughput through repair and narrow the amount of throughput in product design. Going forward when discussing closed loop practices and companies pursuing the circular economy, these terms will be used cognoscente of the fact that the circular economy is more of a direction than an attainable end goal.

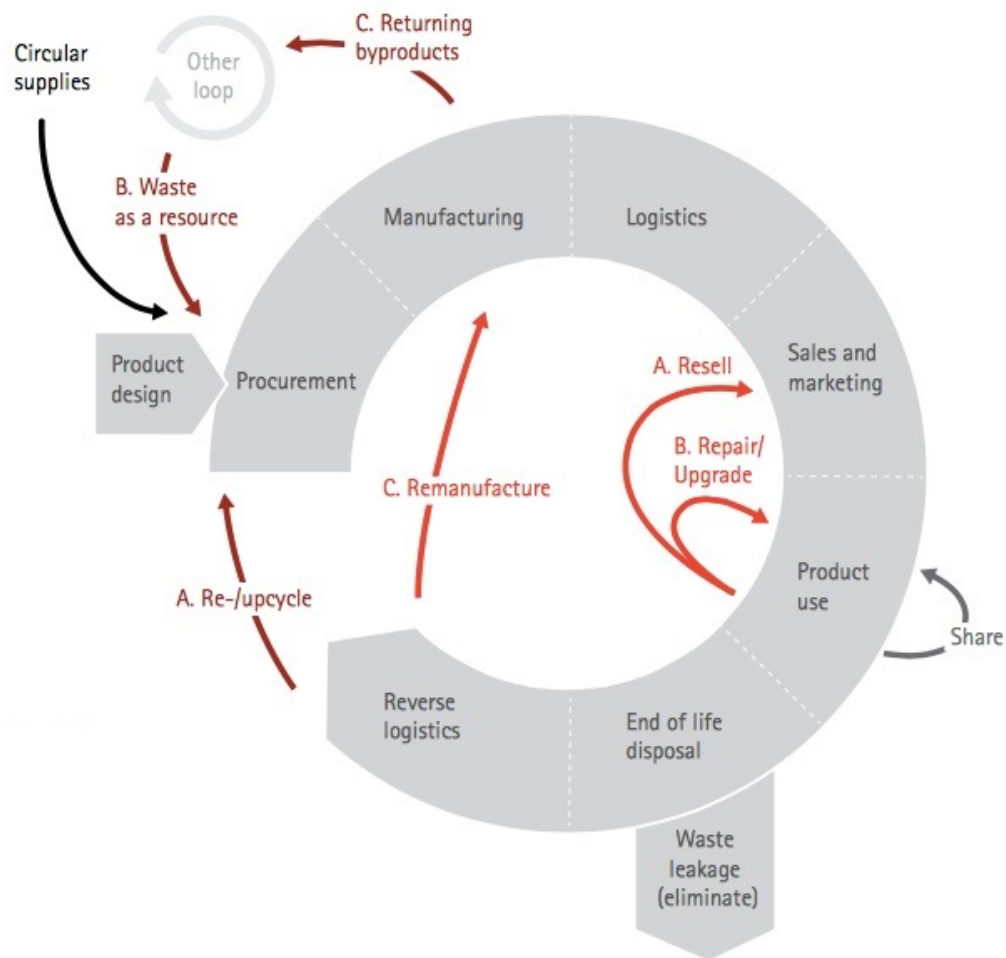


Figure 3 A more realistic diagram of the circular economy. (“Circular Advantage”).

Even though the complete circular economy is not the end goal, the circular economy can still be used as a tool for businesses to become more sustainable by partaking in the business models and strategies discussed in theory. So, what does it mean to be a company taking steps to transition to the circular economy?

Hypotheses

The theories on the circular economy suggest that businesses must be working in a variety of different ways as they transition to be part of the circular economy. Based on the definitions and strategies of a circular business from the literature, my first hypothesis is that to

be a company transitioning to the circular economy, the business must engage in five different areas. The first area is the recycling of materials. Second, products are designed and maintained for a lifespan meaningfully longer than chosen by a typical firm in the same industry. Third, the company should be taking extraordinary steps to reduce waste compared to a typical firm in the same industry. Fourth, production processes should be powered by renewable energy. Finally, resources should be sustainability sourced.

My second hypothesis is that because of the more complex and challenging nature of closing the loop, businesses today are more likely to implement strategies that slow the rate of throughput and narrow the amount of throughput than strategies to close the loop completely. These hypotheses will be tested in the following chapter by analyzing a variety of business case studies to evaluate what is actually being done in practice.

Circular Business: Measurement, Challenges, and Opportunities

Measuring Circular Business

In addition to the findings about circular models and strategies, the literature also discusses some important topics relevant to the spread of the circular economy. Although not specifically in reference to the circular economy, change methodologies will be useful to make judgment on broader business model change. Gauthier and Gilomen (2016) present a business change methodology. Business model as usual is the first change, in which business models undergo no transformations to business models. A business that continues to operate under the linear model of production is business as usual. Next is business model adjustment if marginal modifications to one element of the business model occur. For example, a business that expands their operations to include a repair service for their goods could be classified as business model adjustment. Business model innovation occurs when major business model transformation is

implemented. For example, a business that pursues multiple areas of circularity, like using renewable energy and sustainable sources, and incorporating waste as a resource has achieved business model innovation. Lastly, in the case that a company rethinks the organization of the business model, which results in new value propositions, the business model has been redesigned (Gauthier & Gilomen, 2016). One way a business could achieve business model redesign is by incorporating many circular principles and changing its business model entirely, by becoming a service-based model where the ownership of products remain with the business and customers rent products. This framework for business model change can be applied to businesses transitioning from the linear model to the circular economy model.

Although a metric for business model innovation exists, due to the relatively new nature of circular business models, relatively few metrics to measure circularity within a business exist. Laubsher and Marinelli (2014) present one framework to measure circular business that only includes three factors: ecological footprint, value of recovered materials and assets, and an increase in revenue through new business models (Laubsher & Marinelli, 2014). The simplicity of this framework allows for businesses to apply multiple strategies to achieve some circularity. Additionally, this framework is beneficial because it takes into account economic growth of a business, which is an important factor. A circular business still needs to turn a profit. Metink (2014) presents another, more detailed set of metrics that could be used to evaluate a circular business. Included in this framework are indicators that capture the percentage of revenue from repairs, reused parts, refurbished products, and second-hand products. He also includes the lifetime value of products, the times of reuse of resources, as well as the amount of toxic materials used (Metink, 2014). These indicators draw from all of the different strategies to close the loop and slow and narrow throughput, making it easier for businesses to measure the result of

a strategy they implemented. Lastly, the Ellen MacArthur Foundation creates another broad framework. The foundation's circular indicators measure the virgin and recycled and reused material use, the lifespan of products, the amount of material that goes into landfill, energy recovery, or recycled, and the efficiency of the recycling processes used to produce new products ("Circularity Indicators,," 2015). No consistent metrics to measure a circular business exist, but the indicators from Laubsher, Metink, and the Ellen MacArthur Foundation create a starting point for an evaluation of a circular business. Additionally, as the circular economy spreads to more and more business, a more standard metric might be created, which would help to get businesses all on the same page.

Barriers and Opportunities of Circular Business

The circular business model opens up many new opportunities for businesses. However, with all new business models, the circular business model does have some barriers and challenges. First, environmental culture of business leadership can factor into whether or not the company plans to pursue green business strategies, such as the circular economy. Another barrier for circular business is the lack of internal technical skills. Lacking the time or expertise to engage in green strategies could prevent the business from taking advantage of circular opportunities (Rizos, Behrens, Kafyeke, Hirschnitz-Garbers, & Ioannou, 2015). Implementing circular strategies can be challenging due to financial barriers, for example through large investments in recycling machinery or renewable energy sources (Lawrence, Collins, Pavlovich, & Arunachalam, 2006). These investments often have longer payback periods, which can be challenging. Another barrier to implementing circular business models is lack of reverse logistics, making the return and remanufacture of products difficult. Additionally, another challenge businesses adapting circular models face is the modern consumer. Compared to earlier

times, consumers are less interested in products that will be around for a century to pass down to family members. Additionally as the cost of repair has increased, consumers are more inclined to buy new. Many similar market barriers inhibit the spread of the circular business model.

Although the circular business model has many challenges and barriers, businesses have many incentives to introduce circular practices. Circular business helps to build resilience by using more sustainable inputs and being run on renewable energy, both creating economic benefit in the long run (Lewandowski, 2016). A circular business can lead to improved customer interaction and loyalty. For example, with take-back and repair programs, the customer becomes a user as opposed to a consumer, thus extending the relationship between business and customer. Businesses can see reduced input costs by implementing closed-loop practices that recirculate components and materials (“Circular Economy Report - Towards the Circular Economy Vol. 1,”). Additionally, by embracing a more environmental business strategy, businesses might attract more conscientious consumers. The theory on the circular economy suggests that the circular business model is good for business and the planet. The following chapter explores the reality the circular economy theory in practice.

Chapter 3: The Circular Economy in Practice

The theory of the circular economy developed beginning with some of its earliest ideas back in the 1970s. The previous chapter analyzed the literature to synthesize the theories, strategies, and ideals of the circular economy. The theories on the circular economy present the idea as a successful alternative to the current system of production, both environmentally and economically. In order to achieve the ideals of the circular economy—an economy that is restorative by nature—the real change must come at the business level. The literature presents multiple different business models and strategies for businesses to help pursue the circular economy, including strategies to slow and narrow resource throughput and to close the loop. With a variety of different strategies and models, the theory of the circular economy suggests that any business, in any industry can work towards the circular transition. The theories suggest the transitioning away from the linear towards the circular economy is worthwhile, feasible, and beneficial for everyone involved.

The theories claim the circular economy is the solution to decouple growth from resource use, enabling businesses to continue to grow while decreasing the negative environmental impacts of business growth. In theory, the circular economy is an important and significant concept. However, are businesses today actually implementing the theories in practice? Are businesses using any of the strategies to slow, narrow, and close the manufacturing/consumption loop? And are business leaders seeing value in sustainability and the circular economy, enough to make significant business model changes?

This chapter hopes to figure out whether what is presented and advocated in theory is actually being acted on in practice by analyzing the business practices of six different manufacturing companies. All of these companies are actively working to engage in the circular

economy. By examining business practices and strategies, this chapter will test my five-point framework for what it means to be a circular business. Looking at recycling of materials, long-term product design, waste reduction, renewable energy use, and sustainable sourcing of raw materials, this chapter will determine what these companies are or are not actually doing and accomplishing. Additionally, this chapter will examine their business tactics and stated intention to try to figure out why these companies are able to achieve what they have. Lastly, exploring other companies' efforts in the circular transition will create some context for evaluating how well IKEA is performing in making the transition toward a fully circular business model. The chapter is broken into sections based on company, starting with some company background and the company's overarching sustainability agenda. Then, strategies for each area will be examined. Lastly, each section will explore the business tactics and rationale offered by each company pursuing a more circular model.

Interface

One of the most prominent companies pursuing the circular economy is US carpet manufacturer Interface. Former CEO Ray Anderson helped to transform his company to be one of the most sustainable companies in the country. Interface is the world's largest manufacturer of "modular" carpet, a special approach to the carpet business that the company pioneered about fifty years ago. Today, Interface operates in over 80 countries providing affordable and elegant carpet tile to commercial and residential buildings.

Interface's sustainability journey started in 1994 when former CEO Ray Anderson had a personal epiphany about his business. This epiphany resulted in a paradigm shift in the way Interface did business. Ray Anderson set the company on a new path called Mission Zero, with the goal to eliminate any negative impact Interface has on the environment by 2020 ("Our

Mission”). Mission Zero includes seven different goals, five of which are applicable to circular business: (1) eliminate waste from every area of business, (2) eliminate emissions and toxic substances from products, (3) operate facilities with 100 percent renewable energy, (4) close the loop and redesign products and processes efficiently to close the technical loop using recycled and bio-based materials, and lastly (5) redesign commerce to create new business models. With Mission Zero as the driving force behind the way Interface does business, the company has made significant progress in their goals.

Area 1—Recycling of materials: through their efforts to close the loop, Interface is making an impact in Area 1, recycling of materials. Interface created a new process called ReEntry to enable them to close the loop. The ReEntry process makes it possible to cleanly separate the carpet fibers from the backing. This allows Interface to gather the maximum amount of post-consumer material to be recycled into new products. The plastics that cannot be used in again in Interface carpets are distributed to other industries. The ReEntry process has lead to significant increases in the recycled content of products from post-consumer waste. In 1996, less than one percent of material was coming from recycled content. However, Interface’s current technologies allow manufacturing with up to 80 percent recycled content (“Manufacturing”). Interface’s efforts to incorporate post-consumer products into new products, demonstrates a successful implementation of a closed-loop practice.

Area 2—Long-term design: Interface fails to mention this area in detail. The company is more focused on ways to recycle and remanufacture their products compared to designing the products for an extended time or using especially high quality materials.

Area 3—Reducing waste: Interface has made large strides in reducing waste in their operations. By using what Interface calls “dematerialization”—an eco-effective approach—

Interface saves on material costs, reduces raw material extraction, energy use, and transportation costs. One way Interface has achieved dematerialization is through reducing the face weight and backing weight of its carpet tiles, which decreases the amount of raw materials to produce a square yard of carpet by ten percent (“Waste”). Additionally, Interface has also created a way to install carpet tiles without glue in their TacTiles. By eliminating the need for glue, Interface saves about three ounces of material per square yard of carpet installation. These strategies have led Interface to a 91 percent reduction in the company’s waste stream.

Area 4 and 5—Use of renewable energy and sustainable sources: Using renewable energy is another one of Interface’s goals in Mission Zero. Through investments in renewable energy, Interface has successfully achieved their goal; 100 percent of their manufacturing electricity comes from renewable energy sources. Because of the switch to renewable energy, Interface has reduced 95 percent of their net greenhouse gas emissions per unit of product (“Environmental Footprint”). Lastly, for Area 5 –use of sustainable sources of raw materials—Interface is in the process of researching renewable materials, and is experimenting with fibers from flax, hemp, and wool.

Company’s stated rationale and goals: Interface has implemented a number of practices for turning their sustainability goals into reality. The company has worked closely with their supply chain through Supplier Summits, workshops and educational trainings that enable suppliers to work towards Interface’s sustainability goals. Through collaborating with suppliers on sustainability and life-cycle assessment, Interface has been able to develop sustainable innovations for the carpet industry. Interface also strives to be transparent in their progress toward Mission Zero (“Supply Chain”). Rather than hiding their strategies and techniques as “proprietary secrets”, the company finds transparency as a way to share knowledge and

experience, ultimately to help be a catalyst for change. Interface's commitment to sustainability and transparency is evident as they were the first company to publish a sustainability report back in 1997. Interface also makes use of EDPs, a life cycle assessment tool that measures the materials and environmental impact of their products. EDPs help Interface work with suppliers to make changes throughout the value chain.

The most important driver of Interface's circular transition is the personal determination and drive of Ray Anderson. Anderson has said that his epiphany came after he read Paul Hawken's *Ecology of Commerce*, which resulted in a total shift in mindset and the determination to change every aspect of his business ("Ray's Life"). Interface managers quickly realized that there was a competitive advantage to be captured. The rest of their competitors were failing to address social or environmental sustainability. Thus, Interface could gain a competitive advantage by providing the sustainable option in the carpet industry. Additionally, as carpet manufacturing is a resource-intensive business, cost savings through increasing the efficiency of their operations drove Interface to start developing cost-beneficial ways to recycle materials (Rajala, Westerlund, & Lampikoski, 2016). Lastly, crucial to transforming Interface was a mindset shift to reimagine the company's purpose. Interface brought in sustainability consultants to catalyze a new way of thinking to incorporate sustainability into the values, culture, and leadership of the company. Interface's circular and sustainability efforts have resulted in large savings; by 2010, the company had saved more than \$400 million dollars from their waste reduction activities (Rajala et al., 2016). Interface has gone through tremendous change and continues to work towards Mission Zero.

Desso

Dutch, private commercial retailer, Desso specializes in providing high-quality carpet tiles and broadloom with an emphasis on cradle-to-cradle design. The company is active in more than 100 countries and operates two factories and a major distribution center in Europe. One of the company's main focus areas is cradle-to-cradle; Desso acknowledges that the linear model is unsustainable and strives to design all of their products according to cradle-to-cradle principles by 2020.

Area 1—Recycling of materials: Desso is taking steps towards material reutilization by offering a program to collect used carpets in order to remanufacture. Within their production process, Desso identifies material streams that can be taken back and reincorporated into the production process and works with their customers to take back carpet. Then, they separate the yarn from the backing, and return the yarn to the yarn manufacturer for future production. The bitumen from the carpet backing is recycled in roofing, and concrete. Desso has also worked with suppliers to help develop new technology for recycling old products. One of their suppliers, Aquafil, developed technology to recycle old yarn from used carpet into a new material, called Econyl. This new material is made from 100 percent recycled nylon from post-consumer yarn. Currently, over half of Desso's carpet tile range is available with Econyl yarn ("C2C & Corporate Responsibility").

Areas 2 and 3—Long-Term design and reducing waste: Area 2 and 3 are missing within Desso's business model. Similarly to Interface, the company is more focused on the recycling of materials and processes to achieve that compared to making products more long lasting.

Area 4—Use of renewable energy: Desso realizes the importance of the circular economy being run on sustainable power and aims to achieve 100% renewable by 2020. The company covered their roofs with 25,000 m² solar cells, helping to achieve this goal. However, as of 2015, 27% was from renewables, while the rest was natural gas. Thus, Desso still has a ways to go to reach 100 percent renewable energy.

Area 5—Use of sustainable raw materials: While Desso does not clearly state the sustainability of its sourced materials, the company focuses more on the quality and health of their materials. This work is in line with their goal to improve the health of the environment and people. Desso has a third-party assessment of the safety of each material used in production, and currently up to 97 percent of the materials used are positively defined, meaning the products are safe for people and the environment (“Cradle to Cradle”).

Company’s stated rationale and goals: Desso’s first step in transitioning to the circular economy came from the vision that creating cradle-to-cradle products would be a design and quality initiative to boost the company’s innovation, and convinced shareholders that it was a way to build business (Mendoza, 2010). The company then set out to foster strong relationships with its suppliers who shared their vision, and in turn could be dedicated to improving their products and operations towards environmental and social excellence. The company manages their suppliers and products with two assessments. The Material Health Assessment analyzes the product and material ingredients, in which products must be defined as positive in order to be considered as a purchasing option. Secondly, Desso assesses their suppliers on Social Risk, which examines the circumstances under which products are made. This assessment analyzes how suppliers run their operations on promoting health and safety of employees the environment. These two assessments help Desso engage suppliers on their sustainability and closed-loop

agendas. Desso also values transparency in their sustainability goals and is open to feedback. Desso finds its motivation and drive for circularity in the alignment of its sustainability goals with the UN's Sustainable Development Goals. The motivation for Desso being a part of the solution to the UN's goals is felt throughout the value chain, all the way up to the CEO. Current CEO, Alexander Collot d'Escury, believes designing all products to be cradle-to-cradle is a way to help achieve these goals (Desso, 2015). Desso has seen its circular efforts pay off. The company's incremental earnings from their investment in carpet tile recycling increased from 1 to 9.2 percent from 2006 to 2010, notably at a time when the carpet industry dropped by 30% due to the recession (Beavis, 2012). Desso is making progress towards becoming a circular business, especially through recycling carpet in its take-back programs, but the company might need more attention to designing products for a longer life, as well as creating ways to extend the life of their products.

Steelcase

Founded in 1912, US furniture company Steelcase specializes in office furniture, from seating to desks and tables, to storage and waste bins. Steelcase is making efforts to transition to the circular economy. Steelcase operates globally, working with a network of channels, including 800 dealer locations. Steelcase is a large, publicly traded company; it saw revenue of 3.0 billion dollar revenue in fiscal year 2017.

Area 1—Recycling of materials: Recycling of materials is an area Steelcase has made little effort in. In their current product line, 50 products have been certified for cradle-to-cradle. To be certified cradle-to-cradle, the product must be made with safe, renewable, and recyclable materials, produced with renewable energy in socially responsible supply chains. Product assessments are performed by an independent organization. Although the cradle-to-cradle

certification incorporates material recycling, only a small portion of their product range is certified.

Area 2—Long-term design: Although Steelcase has done little to recycle materials, Steelcase is innovating and offering many ways to reduce and slow the flow of throughput. Steelcase provides many avenues to extend the life cycle of their products, through repair and refurbishment, or by finding their products new homes. Steelcase makes it possible to refurbish their products with new fabrics and finishes, in addition to adding new components. Steelcase encourages their customers to use these services instead of buying brand new products; for example, Steelcase makes it clear that by reusing existing furniture in projects may help the project earn credits toward the LEED certification. Additionally, because the products are designed for easy disassembly, it is easy to separate pieces efficiently for repair or recycling. Steelcase also makes it easy to keep their products in use for the longest time possible by working with their customers to sell or connect with non-profits or charities to donate the used furniture, giving Steelcase furniture a second home and life (“Sustainability,”-a). Steelcase is making it easy to slow throughput in its system of production.

Area 3—Reducing waste: Steelcase is also progressing in other circular areas. Since 2010, Steelcase has reduced their waste output by 44 percent (Steelcase, 2016).

Area 4—Use of Renewable Energy: Additionally, to date Steelcase has offset all of their electricity use with renewable energy credits.

Area 5—Use of sustainable raw materials: Lastly, not only do they design their products for end of life with sustainable resources, but also Steelcase is working to eliminate toxic chemicals from their supply chain. Steelcase has assessed over 1,600 materials and is working to eliminate and phase out materials of concern and to develop alternative materials.

Company's stated rationale and goals: Customer and stakeholder expectations are a primary driver of Steelcase's sustainability efforts. The company surveyed their customer base and other partners and then aligned their efforts to help advance their environmental performance to align with the views of their shareholders. Steelcase collaborated with suppliers to develop and share best practices, although the company fails to include specific examples of these efforts. The company strives to achieve a supply base that can provide products at low costs, while ensuring social and environmental responsibility. Additionally, Steelcase uses life-cycle assessment to measure the overall impact of their products in order to improve them. In regards to Steelcase's end-of-life options, CEO Jim Keane described these programs as a way for the company to grow as none of their competitors offered anything like it (Keane, 2016). Steelcase is leading the way in keeping resources in use for long periods, but the company does not include closed loop practices as much in their business.

Walmart

An unexpected company to enter the circular conversation is global retailer Walmart. The company has simplified their sustainability agenda into three goals: to create zero waste, operate with 100 percent renewable energy, and sell products that sustain resources and the environment ("Walmart 2017 Global Responsibility Report"). To achieve these goals, Walmart plans to use strengths within their own operations.

Area 1—Recycling of materials: Area 1 is Walmart's weakest area, although the company is making a small impact in closing the loop. One way Walmart is closing the loop is by working with suppliers to help recirculate materials. For example, Walmart is working with Metrolina to recycle potting trays. Walmart runs a take-back program for used floral containers and delivers them to Metrolina to be recycled. In the last year, 1.4 million pounds of plastic trays

were returned and then recycled into new flowerpots (“Walmart 2017 Global Responsibility Report,” n.d.). Walmart plans to work with other suppliers to create more processes to close the loop.

Area 2—Long-term design: Walmart is also working hard to keep products in use for longer. The company is working with suppliers to improve package and product design. Walmart also offers solutions to refurbish products. Across the US, Walmart operates four refurbishing centers to repair damaged phones, tablets, televisions, computers, and more, and then the refurbished products are sold at a discounted price. Walmart kept six million electronic items out of the landfill in fiscal year 2017. In addition to repairing damaged products, Walmart works to prevent unsold goods ending up in the landfill. Walmart works with charities, including Good 360, Harvest Time, and United Way, to donate unsold goods. This past year, Walmart donated 13,000 tons of unsold products in the United States (“Eliminating waste in our operations”). Walmart strives to keep resources out of landfills by offering ways to repair goods, as well as finds homes for their unsold goods.

Area 3—Reducing waste: Waste, one of the main goals of Walmart’s sustainability strategy, is an area Walmart is putting a lot of effort into. The company has diverted 82 percent of materials away from the landfill that was previously considered waste. One way the company has been able to achieve this goal is through the implementation of a data management system for waste. The data management system can measure waste diversion performance at the country, region, and store levels. Additionally, Walmart has increased the number of trade-in programs like tablets, smartphones, and video games, in order to recycle those goods. In order to decrease waste in packaging, in Canada, Mexico, United Kingdom, and the United States, Walmart is transitioning to using reusable packaging containers, or RPCs to replace cardboard

and shrink-wrap. Walmart is also working with its suppliers to implement eco-efficiency measures in their packaging. For example, Walmart worked with suppliers to reduce the thickness of plastic bags used for shipping apparel (“Eliminating waste in our operations”). By decreasing the amount of resources per item, Walmart saves resources and money. By changing the way packaging is traditionally done, Walmart is seeing results in its waste reduction.

Area 4—Use of Renewable Energy: Use of renewable energy is also a part of the Walmart’s sustainability agenda. The company aims to power 50 percent of their operations with renewable energy by 2025, through onsite generation and through purchases of green energy. Currently, Walmart has over 460 renewable energy systems installed at their stores and distribution centers. Additionally, by investing in energy efficiency, Walmart has reduced energy use per square foot by 12 percent since 2010 (“Reducing energy intensity and emissions in our operations”).

Area 5—Use of sustainable raw materials: Lastly, Walmart is taking a unique approach for sustainable sourcing. Although the company is not directly attempting to source sustainably or encourage their suppliers to, the company is doing something to try to conserve resources. In the US, Walmart collaborated with the National Fish and Wildlife Foundation to establish the Acres for America program. The program set out to permanently conserve one acre of wildlife habitat for every acre of land developed by Walmart, or about 100,000 acres. However, this goal has been significantly achieved and been exceeded ten times (“Walmart 2017 Global Responsibility Report”). Walmart is making a small impact on resource conservation.

Walmart relies on its power of influence to make sustainability changes within its supply chain. With Walmart’s supplier relationships, physical assets and capabilities in logistics, Walmart is able to make a significant difference in their sustainability efforts. Walmart’s scale

enables the possibility to continue transitioning to the circular economy, but also presents challenges in terms of managing and monitoring their large number of suppliers.

Company's stated rationale and goals: The driving force behind everything Walmart does, including sustainability and the circular economy, is the bottom line. To Walmart, the business case for sustainability is the predominant reason to pursue sustainability measures. In many of Walmart's effort to engage in sustainability and the circular economy, cost savings are always mentioned. For example, with the thinner plastic apparel bags, saving money is the first benefit Walmart lists. This is also the case when it comes to reducing the energy intensity of their operations. Transitioning to the circular economy is just another opportunity to cut costs, reduce prices, and make higher profits. Ultimately, Walmart is taking steps in the transition towards the circular economy.

Kingfisher

Kingfisher is an international home improvement company offering a variety of products. The company operates five different brands in ten countries across Europe, Russia and Turkey. One Kingfisher is Kingfisher's plan to become the leading home improvement company. This plan includes the goal to become NetPositive: creating positive change in business and the world. KingFisher's focus areas include wood and paper, energy, products and innovation, and communities.

Area 1—Recycling of materials: Kingfisher makes use of closed-loop cycles. Kingfisher currently has 818 products in their range with closed-loop credentials. These closed-loop credentials are a list of 10 factors developed by KingFisher to help gage its products' circularity, including factors recyclability and repairability ("Sustainability,"-b). These products

with closed-loop credentials are made from a composite of recycled waste that includes plastics, boxes, and pallets.

Area 2—Long-term design: In terms of Area 2, Kingfisher does not go into detail on designing their products for longevity. However, Kingfisher's primary focus is on creating products that promote sustainability within customers' homes. These products are developed to be quality, affordable, and enable customers to save energy or water. Although enabling customers to live more sustainably is beneficial, Kingfisher fails to mention how their products can be utilized to their fullest potential.

Area 3—Reducing waste: Kingfisher is also finding ways to cut down waste in their operations. They are another company that is practicing eco-efficiency in their packaging. The company is in the process of slimming down the amount of packaging needed for their goods. For example, many of their kitchen faucets now come in boxes that are 30% smaller than the previous design. By cutting down on the amount of packaging, Kingfisher ends up saving 45 tons of packaging a year. This enables more efficient transportation, and decreased fuel costs.

Area 4—Use of Renewable Energy: Kingfisher is attempting to increase the generation of renewable energy within their facilities. Currently, renewable energy generation is installed in their headquarters, as well as at two stores, and three distribution centers. The company has plans to expand their renewable generation in the coming year.

Area 5—Use of sustainable raw materials: Lastly, Kingfisher has made the largest strides in sustainable sourcing. As one of the first major retailer to launch a sustainable timber policy over 25 years ago, Kingfisher takes responsibility for the sourcing of their wood by purchasing responsible sourced wood and paper from the Forest Stewardship Council and the Program of the Endorsement of Forest. To date, 96 percent of wood sourced for Kingfisher

Products is sustainably sourced (“Wood and Paper”). With one third of their products including wood or paper, Kingfisher feels the need to manage their resources wisely.

Company’s stated rationale and goals: Kingfisher has been able to work towards a circular business by integrating sustainability into the foundation of their business. Sustainability falls under the responsibility of the CEO, demonstrating how important the topic is to the company. Additionally, sustainability is valued as a tactic to promote long-term success of the company. To Kingfisher, sustainability is an avenue for revenue opportunities, customer preference, supply chain resilience, and efficiency and productivity. In order to embrace each of these areas, Kingfisher has a very detailed sustainability management structure, that is proudly displayed on the company’s website (“Managing Sustainability”). Top leadership is at the front of the sustainability agenda, followed by sustainability teams that implement strategies with stakeholders and the supply chain. Products and sourcing is the next category in their sustainability management, which consists of sustainability integration within supplier relations and products. Tracking of performance is done annually which allows the top leadership to review the progress on the company’s targets. Kingfisher also includes sustainability in employee training as well as makes sure that their leadership has the knowledge and skills to lead on sustainability. The last piece of their sustainability management system is learning and engaging with stakeholders to better understand their views. Having an extensive sustainability management plan enables Kingfisher to make the changes to transition to a circular business. Lastly, Kingfisher realizes the connection between its success and the sustainability of the natural world, which creates a driving force for a sustainability agenda.

Marks & Spencer

The last company working towards the circular economy is UK retailer Marks & Spencer. With over 1,433 stores globally, Marks & Spencer is a big company trying to make a large impact. Plan A, Marks & Spencer's sustainability strategy, guides the company towards leading the retail sector in sustainable production and consumption.

Area 1 and 2—Recycling of materials and long-term design: Marks & Spencer makes no efforts to close the loop with materials recycling, however it does offer some strategies to extend the life of their products. For example, Marks & Spencer donates all of their damaged or unsold clothing to Oxfam or Newlife, two prominent UK charities. They have also started a program called Shwopping with the goal to encourage customers to donate unwanted clothing to Oxfam to be resold, reused, or recycled. Marks & Spencer eventually aims to recycle as many clothes as the company sells. This idea, and the lack of a long-term design strategy, raises questions as to their the success in this area.

Area 3—Reducing waste: Waste is an area Marks & Spencer is putting a lot of effort into. Marks & Spencer are committed to zero waste from operations and construction activities for their activities in the UK and the Republic of Ireland, their two biggest markets. As of 2012, the company achieved their goal and diverted the entirety of all their operational and construction waste from the landfill from their stores, offices, and warehouses. Additionally, Marks & Spencer also redesigned their packaging to reduce material by 25 percent per item, and redesigned their packaging to be 90 percent recyclable. Marks & Spencer is making a good effort to reduce their waste.

Area 4—Use of Renewable Energy: Use of renewable energy is an area Marks & Spencer is doing well in. As of 2017, all of the electricity purchased for stores and offices was

renewable. Their efforts in renewable energy have enabled their UK stores and operations to be carbon neutral.

Area 5—Use of sustainable raw materials: Marks & Spencer takes sustainable sourcing seriously as wood is an essential commodity for the company. Wood provides the base material for many of their products. As part of the idea about a sustainable company is a better long-term company, Marks & Spencer currently uses 99 percent responsibly sourced wood. Cotton, another large input for the company, is only sourced 49 percent sustainably (Marks & Spencer, 2017).

Company's stated rationale and goals: Marks & Spencer works toward the circular economy by using the initiatives and goals set out in Plan A. This plan is grounded and aligned in the UN Sustainable Development Goals, which provides an overarching objective for the company. Marks & Spencer claims that Plan A is an integral part of the M&S brand. Another important factor for the company's circular success is their stakeholder involvement in the development of Plan A. The company worked with customers, suppliers, and their retail advisory board in order to craft the best Plan A for the company, the customers, and the environment. While Marks & Spencer sees benefits from the savings from their circular efforts, the company also claims to have become more attractive of an employer for embracing the triple bottom line.

Evaluation

The companies analyzed in this chapter help test whether the strategies and practices that are discussed in the circular economy theory are truly happening in practice. The companies ranged from privately owned firms to large publicly traded firms, with the hope to gain an understanding of circular efforts going on across a range of different companies. For all of the above companies attempting to transform into circular businesses, it is clear that no company is

making monumental shifts to becoming a circular business. These companies, however, can see the benefits and opportunities of a circular business that are discussed in the theory, and are taking initiative to try to move along the continuum from a linear model to a circular model.

These case studies served as tests for the two hypotheses. The first hypothesis suggested that companies pursuing circularity had to be engaged in five different areas. The case studies demonstrate that no one company is doing well in all five areas. Even Interface, the company that has made the largest transition, fails to engage with long-term product design. However, when looking across all six companies, the five different areas presented in the hypothesis are the areas that companies are working towards. This demonstrates that a company does not have to engage in all five areas in order to make significant progress towards circularity at this point in time. However, the theory still presents these five areas as characteristics of future circular businesses.

The second hypotheses predicted that fewer companies were pursuing strategies to close the loop, and more companies were engaging with other strategies slow and narrow throughput. Interface and Desso are the only companies truly taking back their own products to recycle into new products. The rest of the companies either certify their products with Cradle-to-Cradle, which takes into account material health and reutilization, but does entail closed loop that is discussed in the theory. Steelcase is the best example for a company not focusing as much on closed loop, but more on decreasing the rate of throughput. Based off of these six case studies, more companies are pursuing other ways to take steps toward circularity on the production continuum without closing the resource loop and recycling their own products.

Besides answering these hypotheses, some other common themes emerged from these case studies. The first is that supplier relationships are incredibly important to make circular

change. Most of these companies were able to achieve the circular progress they had by working closely with their suppliers, whether through helping to source products sustainably or working with them on resource efficiency. Additionally, many companies were using life-cycle assessment to gauge the impact of their products as a tool to produce more sustainable and circular products. Using a tool to measure product impact helps guide companies to produce better, less environmentally impactful products. The last theme drawn from these case studies is the use of eco-efficiency strategies. The theory presents eco-efficiency as a less sustainable option as it often ignores the speed of resource flows. However, these case studies confirm that eco-efficiency is a worthwhile strategy used by many companies to reduce their resource use. Many companies use eco-efficiency in their packaging, like Walmart and Kingfisher, as well as in their products, like Interface's reduction in the backing weight of their carpet.

These companies had different motivations to pursue circular practices. Many found circular practices to be a competitive advantage, which gave them an edge over their competitors that were operating at business as usual. Some companies found that circular practices opened up new opportunities for design and innovation, as well as even new ways for value creation by working with products at the end of their lives. Customer and stakeholder values also drove companies to pursue sustainability. Lastly, while the business case for the circular economy is clear in some cases, like with Interface, the business case for other companies is unclear.

Lastly, while most of the companies are working to become part of the circular economy ecosystem, Interface and Desso, both carpeting companies, are working to close the loop within their business. Perhaps carpeting is an industry that can be set up as a closed loop. Interface and Desso both work with their customers to take back their products in order to recycle the material into new carpet. Possibly because the material itself is easier to remanufacture than say furniture,

or because carpeting is an easier product to promote a follow-up sale, making the take-back process easier. Interface and Desso suggest that carpet companies might be able to play the consumer and decomposer role in the circular economy ecosystem.

The following chapter will dive deeper into IKEA's circular efforts towards the circular economy. It will assess IKEA in each of the five areas, as well as the business strategies IKEA is using. These case studies hope to offer some comparison when looking at how significant is IKEA's progress is.

Chapter 4: IKEA and the Circular Economy

IKEA, a company known for its flat pack furniture and Swedish meatballs, is embracing the circular economy and attempting to take steps towards becoming a circular business. The blue and yellow company is implementing programs and strategies to slow and narrow throughput and to close the resource loop. However, are these attempts to become circular worthwhile? Are these programs and strategies lessening IKEA's environmental impact? Is IKEA making significant progress on becoming a circular company and how are they able to achieve this feat? This chapter is broken into two main sections. The first section will evaluate IKEA's circular efforts based on the five-point framework created in the previous chapters: recycling of materials, long-term product design, waste reduction, use of renewable energy, and use of sustainable natural resources. Each area will be examined at the company level and will be supported by specific programs and strategies. The second part of the chapter will analyze the business strategies and tactics utilized in IKEA's circular transition. This chapter hopes to illuminate the circular success IKEA has been able to achieve.

IKEA the Company

For a company that started as a small mail order business in southern Sweden, today IKEA is the largest seller of furniture in the world. Founded by 17-year-old Ingvar Kamprad back in 1942, IKEA is a retail company that designs and sells ready-to-assemble furniture, appliances and home wares. IKEA's values, hard work and resourcefulness, stem from its humble beginnings in Småland, Sweden. Although the company has grown out of the confines of Småland into a major global company, IKEA's values remain true to its roots, and can be seen in many aspects of the company—from the design of products to employee engagement. IKEA's resourcefulness led to the development of a range of products consisting of well-designed,

functional home wares at cost-conscious prices, which has allowed IKEA to become accessible to a large market making it possible for them to create a better everyday life for many people.

Most known for their self-assembled furniture, IKEA offers a wide product range with 9,500 items. All IKEA products are designed according to the principles of “Democratic Design”. Democratic Design hinges on five key areas: quality, function, sustainability, form, and low price. Products should be able to withstand some wear and tear, while remaining fully functional. They should be produced in a sustainable manner and be true to Scandinavian design heritage with clean and simple design. Lastly, all of these characteristics must be achieved at very affordable prices.

The accessibility of IKEA products helped the company grow to the dominant size they are today. As of fiscal year 2016, IKEA operated 340 stores in 28 countries and had 783 million customers visit its stores, with an additional 2.1 billion visits to ikea.com. IKEA saw total sales of 34.2 billion euros, resulting in a net profit of 4.2 billion euros (IKEA Group, 2016, p. 20). To make all of this happen, IKEA employed 163,000 people, notably called co-workers, throughout retail, distribution, shopping centers, and IKEA Industry.

IKEA relies on a large network of suppliers to produce all of its goods. IKEA designers in Sweden design and develop products, and then IKEA works with suppliers all over the world to turn these designs into products. For home furnishing alone, IKEA utilizes 1,028 suppliers (IKEA Group, 2016). IKEA buys from manufacturers primarily located in Europe (64%), followed by Asia (33%), and the rest in North America (3%) (IKEA Group, 2016). The IKEA Way, or IWAY, is the supplier code of conduct for purchasing, materials processing, and services that sets minimum requirements on environmental, social standards, and working

conditions. IKEA prides itself on good relationships with its suppliers, which help to form a stable, efficient, and creative supply chains.

IKEA's ownership structure is designed for an independent long-term approach. Stichting Ingka Foundation, based in the Netherlands, owns the IKEA Group. The Foundation can either reinvest its funds back into the IKEA Group or donate its funds to charitable organizations through the Stichting IKEA Foundation. A Supervisory Board, headed by President and CEO, Peter Agnefjäll, leads Ingka Holding B.V., the parent company of the IKEA Group. The IKEA Group operates shopping centers, retail interfaces, and customer fulfillment, in addition to managing sustainability. IKEA's ownership structure allows for long-term thinking, making sustainability initiatives more feasible to achieve.

IKEA's "Take" on Sustainability and the Circular Economy

Creating a better everyday life for people entails having a positive impact on the planet. IKEA sees value in sustainability, which the company defines as "meeting the needs of people and society without compromising the ability of future generations to meet their needs (i.e., the same as the classic Brundtland Commission definition), thus acting in the long-term interests of the many people and not just the few" (IKEA Group, 2012). IKEA uses sustainability to drive innovation and transformational change throughout the entire value chain to decrease their environmental impact.

IKEA's sustainability strategy, "People and Planet Positive", seeks to make a positive impact on the planet. The strategy is broken down into three main pillars; the first two connect to the company's efforts at the circular economy. The first pillar is to inspire and enable customers to live a more sustainable and healthier life at home. The second pillar strives for resource and energy independence. Resource independence includes securing long-term access to sustainable

raw materials, promoting recycling, and using resources within the limits of the planet. The last pillar of People and Planet Positive encompasses the social aspect of sustainability and aims to create a better life for the people and communities impacted by the business (IKEA Group, 2012). People and Planet Positive sets clear goals for IKEA's sustainability agenda.

Part of IKEA's sustainability agenda includes transforming to a circular business model. Steve Howard, IKEA's Chief Sustainability Officer shed light on the need for the circular economy when he declared that the world had reached "Peak Stuff". At the Guardian Sustainable Business Debate in January of 2016, Howard explained that: "If we look on a global basis, in the West we have probably hit 'peak stuff'. We talk about 'peak oil'. I'd say we've hit peak red meat, peak sugar, peak stuff...peak home furnishings" (Ferrell, 2016). Even though the notion of peak stuff has the connotation of declining production, to Howard and the rest of IKEA, peak stuff creates opportunities to change the way business is done while maintaining business goals of increasing profits. The circular economy presents a way to produce and consume within the peak stuff world we live in.

In the 2016 Sustainability Report, IKEA acknowledges that the linear model is unsustainable and that resources are not unlimited, and calls for a shift to a more circular model (IKEA Group, 2016, p. 23). IKEA has actively been engaging in the dialogue over the circular business model and the circular economy. In FY16, IKEA joined CE8, a coalition aimed to help European businesses and consumers' transition to the circular economy. As a member of the Ellen MacArthur Foundation's Circular Economy 100, IKEA works with businesses to promote the circular economy at the corporate level. IKEA sees value in the circular economy and is actively engaged in making the transition happen.

IKEA has a specific agenda for their circular transition. The strategy has three areas of focus: products and services, buildings and transport, and customer support. Products and Services must last as long as they are needed, be made with recycled, renewable, or sustainable materials with the most efficient use of resources, and be designed for repair, disassembly and reassembly, and adaptability. For Buildings and Transport, IKEA plans to work across operations and with their suppliers to produce and distribute products in the most efficient way, while using all renewable energy. Additionally, IKEA plans to reduce waste across operations and turn unavoidable material residuals (now regarded as “waste”) into useful resources. Lastly, IKEA plans to increase customer support by providing them ways to prolong the life of their products through repair programs. Additionally with customer support, IKEA plans to find ways to rent and share products, as well as creating the opportunity to return unwanted IKEA products in order to give products a second home or to be recycled into a new product. IKEA’s circular agenda establishes a firm commitment to the goals of the circular economy.

Area 1: Recycling of Materials

Recycling of materials, or closing the loop, is the ultimate ambition of the circular economy. Closing the loop entails bringing back products that would have been wasted and connecting that back into the manufacturing process. Thus, by closing up the resource loop, waste is eliminated from the production/consumption system. Closing the loop is the one of the most challenging aspects to achieve of the circular economy because many new steps are needed to make it function successfully. For example, in order to get the resources returned, take-back systems, often referred to as “reverse logistics”, need to be put in place. Additionally, new technology for recycling and remanufacturing is also often needed to close the loop. IKEA is

working on ways to close this notoriously resistant loop with their design team, as well as with their supply chain.

Creating products from waste is one of the ways circular businesses create value, and this can be done from waste associated with IKEA's own products or from other streams of waste. IKEA developed and continues to work on creating products out of waste. The PS vase and the TÅNUM rug are two products produced with waste from the manufacturing process (IKEA Group, 2016, p. 23). After gathering up glass that had been rejected in other IKEA products due to bubbles or defects, IKEA manufacturers melt down this glass to mouth blow into new PS Vases. Because the glass used to manufacture the vases is coming from a variety of different IKEA products, this allows the PS vase collection to have an assortment of different colors, making each one unique. The TÅNUM rug is another product that makes use of wasted material. Created from the leftover fabric from the production of bed linen, this rug makes use of recycled cotton from IKEA's own operations. Similarly to the PS vases' unique color make-up, the TÅNUM is also individual and distinctive because of its recycled material composition. Not only does IKEA make use of waste in its own production, but the company also finds ways to make use of other people's waste. For example with the TOMAT spray bottle, IKEA incorporates recycled plastic from waste plastic in stores, like plastic water bottles. The recycled plastic has come to replace the virgin plastic that used to be used to manufacture these spray bottles. Additionally, the KUNGSBACKA kitchen fronts also make use of recycled plastic bottles. Plastic PET bottles are recycled into a plastic foil that covers parts of the wood front. Making use of waste, whether the waste from IKEA's own production or the waste from others, is a way to help achieve the goals of the circular economy by keeping resources in use for longer and keeping them out of landfills. With the examples of the PS vase and TÅNUM rug, IKEA was

able to create value from their own waste. The TOMAT and KUNGSBACKA are two products where the value of the plastic bottles has decreased—no longer can the plastic bottle be bottles—yet, the value of these resources remains higher in new products than if the bottles were simply thrown away. IKEA closes the loop with these four products.

IKEA also engages with suppliers on ways suppliers can recycle materials. One of their mattress suppliers, Dendro Poland, has created a method to chemically recycle mattress foam that is wasted in the manufacturing process (IKEA Group, 2016, p. 39). By taking and recycling mattress foam from the production process (a very important and potentially voluminous category of waste known as “prompt waste”), the mattress manufacturer can take this foam and replace more of the petroleum-based raw inputs that traditionally go into a mattress. Not only is Dendro taking waste and turning it into something new, the company is also decreasing the amount of non-renewable inputs in the products making the foam recycling a win-win solution. Mattress recycling is a worthwhile strategy for closing the loop.

Area 2: Long-Term Product Design

Designing products for longer life is one of the strategies to slow the rate of throughput. To create products that are kept in use for the longest time possible, products need to be designed to be durable, flexible, easy to repair, and easy to disassemble and reassemble. Creating long-lasting products is one of the focus areas in IKEA’s circular economy strategy, and the company is implementing strategies and products with this in mind.

Democratic Design, IKEA’s five-point framework, is the basis for all products, geared to better the lives of everyone. Two pillars of democratic design stand out to that encompass sustainability goals: quality and sustainability. Quality denotes that products must be high quality and long-lasting products that weather the wear and tear of everyday life. With sustainability,

products are to be made in ways that are good for people and good for the environment. Both quality and sustainability are important design features IKEA takes into account.

IKEA is developing products to be long lasting and versatile. These characteristics can be seen in two IKEA products: VALLENTUNA and the EKTORP (IKEA Group, 2016, p. 35). The VALLENTUNA is a sofa designed to be entirely modular, with the ability to change in and out the seats, armrests, backrest, and cushions. This flexibility allows customers to change and repurpose their sofa based on changing needs, as well as making it easier to move. By allowing versatility within products, IKEA is opening up ways to slow the loop by keeping resources, like the frame and base of the sofa, in use for longer. The EKTORP is another product that slows the loop by having removable sofa covers. The removable covers can be machine washed and replaced if customers want to revamp their sofa. Removable covers allow customers to keep their products in use for longer because they do not have to replace their sofa as often compared to if they could not remove the covers. The VALLENTUNA and the EKTORP are just two examples of ways IKEA is slowing the rate of throughput.

IKEA also makes it possible to extend the lifetime of products by providing ways to repair IKEA products. The company encourages customers to keep their products in use for longer and supports them by offering ways to repair their products. As part of IKEA policy, IKEA offers spare part replacement. The use of this service is growing; in fiscal year 2015, 155,000 repair kits were sent out to customers (IKEA Group, 2015). By the following year, however, IKEA Components sent out 1.3 million repair kits to its customers, resulting in a 739 percent increase (IKEA Group, 2016, p. 36). These repair parts help customers maintain their products, and keep them functioning for longer.

IKEA not only helps customers extend the life of their own products, but the company also extends the lives of products their customers' no longer want by finding them second homes. For example, this past Earth Day, IKEA USA partnered with Goodwill to put on a national furniture take-back day. Customers were encouraged to bring furniture they no longer wanted to IKEA parking lots where Goodwill trucks were stationed to deliver to these products to their stores to be sold again at lower prices. In exchange for the unwanted products, IKEA customers were given a twenty-dollar coupon (IKEA Corporate News, 2017). Furniture take-back creates the opportunity to keep products in use for longer, another way the company is slowing the rate of throughput.

Area 3: Waste Reduction

Waste reduction, the third pillar of a circular business, entails reducing waste in all aspects of a business. From the designing and manufacturing of products, all the way through operations, waste reduction is necessary at every step of the way. Waste reduction is important environmentally to keep resources out of the landfill, but it also makes business sense as it can help increase the bottom line. IKEA focuses on reducing waste in operations and finding efficient ways to recycle these reduced levels of waste. The flat-pack package design, often a defining characteristic of IKEA products, is a notable way IKEA is reducing waste in their operations. IKEA revolutionized the flat-pack concept around 1955 ("Milestones in our history," n.d.). Flat packs are a quintessential example of eco-efficiency because flat packs require less cardboard and other packaging materials. Flat packs not only decrease the amount of material and resources used in packaging, but they also lead to more efficient transportation. By being able to pack products more efficiently in trucks and other forms of transportation, IKEA cuts down the number of trips needed, and thus decreases its carbon emissions (IKEA Group, 2016,

p. 42). This method of packaging also opens up more space in distribution and storage facilities. IKEA's flat pack system provides multiple benefits to the company and the environment, while decreasing waste.

By focusing on resource efficiency within their wood furnishing products, IKEA has been able to implement another eco-efficient strategy. In fiscal year 2016, IKEA used two percent less cubic meters of wood than in fiscal year 2015, even though they increased the volume of products containing wood that was sold that year (IKEA Group, 2016, p. 25). Producing more products with less wood is a perfect example of eco-efficiency. In theory, eco-efficiency was seen as a less attractive option than eco-effective strategy if the speed of resource consumption increased, through the sales of a more efficient product. However, in this case, IKEA is able to sell more, while cutting down on overall wood use, therefore eco-efficiency is a viable strategy to achieve a smaller environmental impact.

IKEA also influences their suppliers to cut down waste in their suppliers' operations. For synthetic textiles, IKEA is working with suppliers to improve the sustainability of their production techniques and methods. For example, one of IKEA's suppliers, Hilong, introduced a fiber dying technique called dope dying. Traditional textile involves multiple steps and is very water intensive. Dope dying, however, dyes fabric in fewer steps, using eighty percent less water than traditional dying. Using this technique, Hilong saves about 300,000 liters of water annually (IKEA Group, 2016, p. 39). These savings inspired more of IKEA's suppliers to switch to dope dying. As of fiscal year 2016, half of the polyester used in the IKEA supply chain is dope dyed. Hilong dope dying is one way IKEA has reduced waste within its supply chain.

IKEA is also working to reduce the amount of waste within its own operations, ultimately by decreasing the amount of waste being sent to the landfill. The company has been able to

increase the amount of waste being recycled by adding in bailing machines into their operations. With the bailing machines, IKEA is able to compress packaging waste into neat bales, which makes it much more efficient to recycle. Additionally, IKEA has been able to increase their recycled material by eliminating expanded polystyrene foam from their packaging. Expanded polystyrene foam was traditionally used in packaging because of its durable and lightweight characteristics, as well as its cheapness. But, the foam is made from fossil fuels, and could not be recycled. Intrigued by the challenge to find ways to reduce waste, IKEA developed a new material for packaging. The new material is light, yet strong, is honeycomb shaped and can absorb shock. Furthermore, it is made from fiber-based materials, so it can be recycled. As of fiscal year 2016, IKEA has phased out all expanded polystyrene foam from all of their flat packs, another way the company has been able to decrease the amount of waste going to landfill.

IKEA's recent efforts have been focused on decreasing waste sent to landfill. As of fiscal year 2016, only 10.8 percent of IKEA's waste stream is going to landfill. 77.6 percent is recycled, 11.1 percent is incinerated for energy recovery, and .5 percent is incinerated without energy recovery, as can be seen in Figure 1 (IKEA Group, 2016, p. 50). To decrease the amount of waste sent to landfill, IKEA must increase the waste that can be recycled or incinerated with energy recovery. As seen in Figure 2, IKEA made significant improvement in decreasing landfill waste, while increasing recycling and energy recovery from fiscal year 2013 to 2014. However, from 2014 onward, that positive trend has been reversed. Even though the percentage of landfilling has decreased slightly, the percentage of waste that is recycled has increased since fiscal year 2014. While increasing the amount of waste that can be recycled or incinerated for energy recovery is beneficial, IKEA is now transitioning their focus to reduce waste relative to

the volume of goods sold by focusing on ways to reduce the amount of throughput within its production.

IKEA has also been able to cut waste within operations by creating ways to reduce product damage. Damaged products and packaging are responsible for a significant amount of waste within IKEA's operations. IKEA implemented two programs aimed to combat damaged products. Handle with Care is an initiative to ensure that every product is package well and arrives at its end destination in perfect condition. Every co-worker is tasked to monitor each delivery and correct and report damaged goods. Another program to decrease waste from damaged products was launched in fiscal year 2014 called Recovery Direction. The goal of this program was to give damaged products a second chance by repackaging, repairing, or selling the products at a discounted price. IKEA installed repackaging machines in 250 stores, as well as in 80 percent of distribution centers. In fiscal year 2016, IKEA was able to repackage 29% of products in which packaging was damaged, and the rest could be sold at discounted prices (IKEA Group, 2016, p. 51). This is another example for the business case for sustainability; resources are staying out of the landfill, while additional sales are being made. IKEA's efforts to reduce waste throughout the value chain are making a positive impact.

Area 4: Renewable Production

The circular economy, and therefore circular businesses, must be run on renewable energy in order to be a regenerative process. Renewable energy is also a strategy IKEA is implementing to tackle climate change. The company is putting the money where its mouth is; since 2009, the company has invested 1.5 billion euros in purchasing its own wind turbines and solar panels. As of fiscal year 2016, IKEA owns and operates 327 wind turbines and has installed 730,000 solar panels (IKEA Group, 2016, p. 43). Additionally, IKEA is also utilizing biomass to

generate electricity for their buildings. Additionally, IKEA's renewables produced 3,209 gigawatt hours in fiscal year 2016 (IKEA Group, 2016, p. 43). IKEA aims to be a leader in renewable energy and is striving to produce more than they consume by 2020. The company is making significant progress toward its goal, but still has a ways to go with three years left to meet their 100% renewable goal, as seen in Figure 3. Renewable production has grown since fiscal year 2010, when just under half of energy consumed was renewable. But by fiscal year 2016, 71% of purchased or on-site energy generation was renewable. IKEA is still in the process of becoming energy independent.

The growth of IKEA's renewable energy investments has led to large reductions in the company's carbon footprint. This reduction is exemplified in the product carbon efficiency metric, the carbon footprint per product sold. From fiscal year 2010 to 2016, the carbon footprint per product was almost halved with a 49.3% decrease, as seen in Figure 4. For fiscal year 2016, the carbon footprint per product sold was 17.5 kg CO₂ per cubic meter of product (IKEA Group, 2016, p. 42). From investing in renewables to increases in production efficiency and more efficient transportation of products, IKEA has made great improvements.

Area 5: Sustainable Sources

Sourcing sustainable materials is crucial to the success of the circular economy, especially as companies are in the process of making the transition. A sustainable resource is a resource that is replenished at a rate equal to its consumption that takes into account environmental and social factors. No company can be completely closed loop and will always rely on an input of virgin materials. Therefore, sourcing materials sustainably is necessary to sustain production while functioning within the limits of the ecosystem. Additionally, with the goal to separate into biological and technical loops and materials, materials need to be natural

and biodegradable. IKEA is taking steps to achieve both of these goals, which are in line with their People and Planet Positive strategy.

Sustainable Forestry

As the largest furniture retailer in the world, wood and paper are essential to the success of IKEA. Two-thirds of IKEA home furnishing products contain wood, as well as notebooks, napkins, and packaging that require paper. IKEA uses about one percent of all the world's commercially used wood (IKEA Corporate News, 2015b). Due to the scope of IKEA operations, there is an opportunity, as well as a responsibility for IKEA to protect the earth's forests. The size of IKEA's operations also makes it possible to achieve large impacts even through small changes. To take responsibility for forests, IKEA has pledged to become forest-positive by 2020, a goal to source 100 percent of its wood from sustainable sources, while also working to increase the area of forests that are managed sustainably. According to IKEA, 'sustainably sourced' means timber from forests that are certified to the Forest Stewardship Council Forest Management Standard. The Forest Stewardship Council is an international, independent, non-profit organization working to protect forests across the world for future generations. The Certification ensures that wood is coming from responsibly managed forests that provide environmental, social, and economic benefits and is evaluated on ten different criteria ("Certification," n.d.). While the Forest Stewardship Council has been criticized for the true sustainability of its certified forests, the organization is still responsible for sustainable forest practices across the world. IKEA is taking their commitment to sustainably sourcing wood seriously, and have made progress toward their goals. From fiscal year 2011 to fiscal year 2016, IKEA's percentage of sustainably sourced wood has increased 281%, increasing about 10% each year over the last five years, as seen in Figure 5. As of fiscal year 2016, 61% of the wood

sourced is from more sustainable sources. Because of their commitment to more sustainable sources of wood, IKEA is one of the world's biggest users of Forest Stewardship Council certified wood, purchasing about 9 million cubic meters annually (IKEA Group, 2016, p. 25).

Although IKEA is working with the Forest Stewardship Council to decrease its impact in the forests, the company is still responsible for using an enormous amount of wood resources. These amounts have grown over the last five years, as seen in Figure 6. Although IKEA saw a 2.3 percent decrease in total wood used from fiscal year 2015 to 2016, the company's total wood use has increased 14.3 percent since fiscal year 2011. In fiscal year 2016, IKEA's total wood use amounted to 15.75 million cubic meters of wood. 61 percent is sourced from Forest Stewardship Certified wood. What about the remaining 39 percent? Perhaps this wood is coming from forests that are being deforested, which is leading to the loss of habitat, and increased erosion and run off. IKEA has work to be done to sustainably source the last 39 percent.

Sustainable Cotton

The next resource that IKEA has a dominant presence over is cotton. Cotton is found in a variety of IKEA products—from bed sheets and blankets, to pillows and tablecloths. IKEA uses about one percent of the world's cotton supply, and is committed to sourcing the entirety of its cotton from sustainable sources (IKEA Group, 2016, p. 29). IKEA defines 'sustainably sourced' to mean a variety of different standards or organizations that the company deems as sustainable cotton. First, cotton is more sustainable if it is recycled cotton. Next, cotton grown at the Better Cotton Initiative Standard is considered a sustainable source. The Better Cotton Initiative Standard is an international non-profit promoting better global cotton production, and bases its Standard on environmental, social, and economic factors ("About BCI -- Better Cotton Initiative," n.d.). Cotton is sourced from farms working towards Better Cotton. IKEA also

sources sustainable cotton from the e³ Cotton Program, Bayer CropScience's program to promote sustainable cotton farming ("e3 -- Sustainability Grown Cotton," n.d.). By working with these organizations and certified farmers, IKEA has made significant gains in its sustainable cotton. In fiscal year 2010, only 13% of their cotton was from sustainable sources. By fiscal year 2016, IKEA achieved their goal of sourcing 100% of their cotton from sustainable sources (IKEA Group, 2016, p. 29). This tremendous progress can be seen in Figure 7. Similar to its scale in the forest industry, IKEA can also assert its dominance in the cotton industry and inspire change by other corporations. Director of the World Wildlife Market Transformation Initiative Richard Holland argues that, "cotton from sustainable sources across all IKEA products is a potential game-changer for the global cotton market because it demonstrates the clear business case for sustainability. We need more companies to follow IKEA's lead" (IKEA Corporate News, 2015a). IKEA's recognition of the business case for sustainably is evident in their commitment to sourcing sustainable cotton.

Sustainable Water Use

Additionally, water is another resource that IKEA is striving to manage sustainably. IKEA is committed to becoming "water positive" meaning it will use water as efficiently as possible in operations, while promoting good water stewardship throughout and beyond IKEA's value chain. To achieve water positive, IKEA plans to focus their efforts on reducing the impact within their operations, as well as their suppliers' operations. The company is also supporting water management in river basins, and working to increase people's access to clean water. With these goals in mind, IKEA understands the importance of water and the responsibility it has for good stewardship.

Non-toxic Chemicals for Natural Cycles

In addition to sustainably sourcing wood and cotton, IKEA is implementing strategies to decrease harmful chemicals within their supply chain. Decreasing chemicals is necessary for separating materials into technical and biological loops, as the biological components should be able to break down naturally. While some chemicals provide benefits for products, such as adding color, creating texture, and providing protection through paint and other coatings, some chemicals can be detrimental to the health of the environment and to workers along the supply chain. IKEA aims to eliminate the use of chemicals that are potentially harmful to people and the environment. The company's entire product range must comply with the strictest laws and safety standards in all of their markets. The European Union's chemical policy REACH is currently the strictest, thus all products must adhere to these chemical restrictions ("IKEA and the new EU legislation on chemicals, REACH,"). To comply with this policy across the whole range, as well as accomplish its goal of eliminating harmful chemicals, IKEA created a chemical strategy for its products and suppliers (IKEA Group, 2016, p. 37). Two examples of this strategy in action include IKEA's ban of PVC, a synthetic plastic, in all of their products, as well as the elimination of lead from its mirrors. IKEA has also worked to substitute chemicals with more natural alternatives in some of its products. For example, IKEA worked with suppliers to introduce a new water-based wood surface treatment for solid wood replacing the traditional chemical-based operation (Ivarsson & Alvstam, 2011). By continuing to eliminate harmful chemicals and substituting them for alternatives, IKEA will continue to create more natural products that can be broken down into technical and biological loops.

IKEA is implementing strategies and designing products to help achieve the goals of the circular economy. The company is recycling waste to create new products, as well as designing products and offering strategies to extend the lifecycle of their products. IKEA is striving to

reduce waste in their operations, while powering production on renewable energy, and sourcing sustainably to keep resources flowing. But why has the company been able to achieve such steps in the transition to a circular business and why is IKEA able to see the larger picture of the circular economy? The next section explores these questions and examines the business strategies and tactics IKEA is implementing in their transition to becoming a circular business.

Managerial and Business Strategies for the Circular Economy

IKEA has been able to achieve their sustainability success and integrate circular practices into their business because of a variety of managerial and business strategies. By integrating sustainability as a key driver into their business since the beginning, while having a long-term view, IKEA has been able to push circular practices throughout their business. Two key tools IKEA uses to make design and operations more sustainable are their Sustainability and Supplier Sustainability Scorecards. These tools have allowed the company to measure the impact of their products, making it possible for IKEA to then improve the sustainability of their products. Lastly, IKEA's vast network of sustainability managers throughout the business enables IKEA to make use of its scale to make a large sustainable impact. IKEA's business strategies and tactics have enabled their progress towards becoming a player in the circular economy.

IKEA's Structure and Commitment to Sustainability

First, IKEA's business structure allows the company to more easily make sustainability changes. As a privately owned company, owned by the Stichting Ingka Foundation, IKEA can function with a longer outlook. Publicly traded companies are often challenged in sustainability agendas by shareholders who expect earnings in quarterly returns, thus most decisions are made for profit maximization. However, as IKEA is not beholden to shareholders, the company is able to pursue any objective it wants. This can lead privately owned firms to pursue behaviors other

than profit maximizing behavior, such as companies wanting to be more sustainable. Because these companies do not have solely profit maximization, these companies are able to take advantage of opportunities that might have a longer payback period. These companies also can take a longer outlook on their business, something important in sustainability. Just because IKEA is a private company does not automatically make it a company that wants to pursue sustainability and the circular economy, but it allows the company to choose to take advantage of more opportunities.

IKEA's dedication to sustainability since the foundation of the company has been an important factor for pursuing the circular economy. Sustainability has been a common thread throughout the company's history (IKEA Group, 2010). In 1956, flat packs became a part of the IKEA concept, making it more efficient to package and transport IKEA products. By 1989, IKEA appointed its first-ever environmental manager followed by IKEA's first environmental policy published in 1990. By 1991, IKEA banned the use of tropical wood not coming from sustainable forestry or plantations. Later, in 1993, IKEA became one of the founding members of the Forest Stewardship Council. IKEA appointed its first forestry manager in 1998. In 2003, IKEA released its first Social and Environmental Responsibility Report, which discusses ways to create maximum benefit for its consumers from minimum impact. In this report, IKEA presented its 'eWheel' method, a tool providing a systematic approach for gathering information on the environmental impact of a product throughout its life cycle (IKEA Group, 2003). Fourteen years ago, IKEA was already looking into ways to perform eco-efficiency strategies, use recycled raw materials, manufacture production waste into new products, and reclaim products at the end of their lives. By 2006, IKEA launched "IKEA Goes Renewable", a goal to become powered solely on renewable energy. In 2010, IKEA developed a Sustainability Direction for 2015 with key

priorities and goals. Sustainability has been a driving force for IKEA since the beginning, and it remains an integral part of the company's growth agenda, and "essential for business success" (IKEA Group, 2016, p. 6). Sustainability for IKEA is a driving force behind innovation, and is a way to create transformational change, to challenge the old ways and embrace the new innovative ways to take action (IKEA Group, 2012). Sustainability has been a driving force for IKEA throughout the company's existence, and transitioning to the circular economy is the next way IKEA will continue making change.

One explicit way IKEA has sought to integrate sustainability within their business is seen in the alignment with the United Nations Sustainable Development Goals within their own goals. In 2015, world leaders came together at a UN Summit and created 17 Sustainable Development Goals as part of the 2030 Agenda for Sustainable Development ("The Sustainable Development Agenda," 2016). The SDGs can provide inspiration for businesses to turn environmental challenges into opportunities for new markets, products, services, and models. By acting as a blueprint, the SDGs enable businesses to create more positive social and environmental change, which can ultimately create value for investors and stakeholders (United Nations Industrial Development Organization, 2017). The Chief Sustainability Officer of the IKEA Group, Steve Howard, describes the Sustainable Development Goals as, "the master plan for a cleaner, fairer world. We [at IKEA] want to lead with passion and purpose to help make that world possible" (IKEA Group, 2016, p. 10). To make that happen, IKEA has aligned its sustainability strategy, People and Planet Positive, with the SDGs. For a business to gain the most from the SDGs, it is crucial to focus in on the goals toward which the business can make the biggest impact (Scott, 2017). IKEA identified seven goals to guide the company in their sustainability journey, three of which are in line with the goals of the circular economy: Goal 7, Affordable and Clean Energy;

Goal 12, Responsible Consumption and Production; and Goal 15, Life on Land. Using the SDGs for the foundation and inspiration for their own goals demonstrates IKEA's commitment to making serious change, and leading the way for the rest of the industry.

IKEA's Sustainability Metric for Products and Suppliers

In addition to integrating sustainability into their business, IKEA has implemented a series of business tactics to achieve sustainability success. The Sustainability Score Card is an internal tool developed in 2010 to encompass the sustainability of IKEA products, taking into account the sustainability of a product at every stage in its life cycle. IKEA uses the scorecard to see how products have been progressing in the sustainability area in Democratic Design. There are 11 different factors on the score card: more from less, renewable materials, reused and recycled materials, materials from more sustainable sources, recyclability at product's end of life, quality, transport efficiency, energy in production, renewable energy in production, raw-material utilization in production, and sustainable life at home. These 11 factors are all weighted differently (IKEA Group, 2016, p.35)¹. A product is deemed "sustainable" if the product scores higher than 120 points on the Scorecard and is IWAY approved (IKEA Group, 2012).

Additionally, products are only approved for production if the new product scores higher than an existing product. For example, one of IKEA's table lamps passed this sustainability test by having a wider base to eliminate the need to use a metal weight to hold the lamp upright, as well as a rectangular flat cloth attached with Velcro to decrease the amount of material used.

Additionally, the lamp components were designed for disassembly (Hayles, 2011). Since 2010, IKEA has designed more sustainable products like the table lamp with the help of the scorecard. As of fiscal year 2016, 55 percent of total sales value came from home furnishing products that

¹ The factor weights, as well as product scores from the scorecard are not published to the public.

were classified as sustainable (IKEA Group, 2016, p.35). IKEA's goal is to increase the share of sustainable products to 90 percent by 2020. IKEA has been working with designers and product developers to update the criteria and scorecard tools throughout FY16 in order to make sure the tool stays relevant for the future. The new scorecard will include 9 criteria organized around design, material, and supply. IKEA finds that by developing the tool with the people using it, the new scorecard will be able to scale up successfully. Designing and producing products with the scorecards enables IKEA to improve its performance by focusing on specific criteria with measureable progress.

Many of the factors on the Sustainability Scorecard can be used to engage with goals of the circular economy. Such factors, like increased recyclability at the end of a product's life, and raw-material utilization are factors that could be weighted more heavily to incentivize designers and product developers to design for circularity. These circular factors could potentially be developed into a circular scorecard in the future to help gauge a product's circularity. As IKEA continues its transition to a circular business, these measurements of circular performance will be increasingly important for the company to focus on.

Building off of the Sustainability Score Card, IKEA also utilizes a Supplier Sustainability Index to assess the sustainability of its suppliers. Partnering with suppliers on the sustainability agenda is crucial for making products more sustainable. The Supplier Sustainability Index evaluates suppliers on four different areas: strategy and management systems, sourcing and procurement of energy, water, chemicals, and sourcing materials, manufacturing processes, and non-utilized resources including waste, chemicals, materials and water (IKEA Group, 2016, p. 38). The results of this index feed directly into the Sustainability Score Card. The Index helps IKEA track their suppliers' performance on sustainability criteria, with the ultimate goal to help

develop and improve the impact of their suppliers. In FY16, IKEA took feedback from suppliers and updated the Sustainability Supplier Index to make it easier to use and more action oriented (IKEA Group, 2016). IKEA values strong relationships with its suppliers, demonstrated by the average supplier relationship being 11 years (IKEA Group, 2016, p. 62). Long relationships help IKEA to foster positive change at the supplier level.

Managing Sustainability within the Business

In order to push the sustainability agenda throughout their company, IKEA has made use of environmental and sustainability managers since 2003. In IKEA's first environmental responsibility report in 2003, the company stated that environmental coordinators and managers help support each IKEA business unit with their operational responsibility for social and environmental issues (IKEA Group, 2003). By 2010, the environmental manager role transitioned to become sustainability manager, which oversaw sustainability training, waste management, and water and energy conservation projects (IKEA Group, 2010).

Today, IKEA has developed these positions even more to help drive the sustainability agenda to its suppliers. IKEA created specific sustainability managers to work within each category of purchasing. The purchasing structure is broken down into seven categories: flat line wood, wood and fibers, textiles, electronics, metal, plastic and float glass, and home furnishings. Each category has a sustainability developer that supports the suppliers and business teams in implementing the sustainability agenda. Additionally, sustainability managers are working at various levels across the value chain. The Chief Sustainability Officer, who reports directly to the IKEA Group President, chairs the Sustainability Management Group, which brings together sustainability players from across the business. The Sustainability Management Group includes sustainability managers from Policy and Compliance, Innovation, Communication, from Range

and Supply, IKEA Industry, and Retail and Expansion (IKEA Group, 2016, 84). From the supply chain to product design and innovation, a specific person is in charge of making sure sustainability is happening at every step of the way. The Sustainability Management Group works to evaluate IKEA's progress in its sustainability goals. By employing many people to ensure sustainable practices are taking place within IKEA's operations and the operations of IKEA's suppliers enables IKEA to make progress on their sustainability and circular performance goals.

For a company that relies on continually selling products, sustainability has to be managed with the bottom line in mind. In order for sustainability to happen, business must happen first. IKEA has managed the challenge of being sustainable while turning a profit by integrating sustainability into its business, making sustainability the responsibility of everyone working at IKEA. They also provide cross-organizational working groups that provide leadership, best practices, research and support for sustainability topics, making sure that management and co-workers are continually informed and updated on sustainability matters. Additionally, IKEA Sustainability managers work to make the business case for sustainability initiatives, demonstrating the profitability in sustainability. For example, UK and Ireland Sustainability Manager, Joanna Yarrow, made the business case to turn waste from a cost into a revenue stream by increasing the amount of waste recycled. IKEA UK has not only achieved zero waste going to landfills, but even turns a small profit on its recycled uses of the waste ("Ikea Has Some Very Surprising Uses For Its Recycled Material," 2017). Additionally, IKEA does not plan to reduce product sales or revenue streams to achieve its sustainability goals. Instead, the company plans to focus on sourcing products sustainability, designing for long life, and

transitioning to a circular model. Through these strategies, IKEA hopes to meet the needs of its customers, while making a positive impact on the environment and society.

Although IKEA employs specific people as sustainability managers, IKEA emphasizes to its co-workers that everyone in the company is responsible for achieving its sustainability goals. This is just another way sustainability is integrated throughout the business. IKEA engages co-workers as actors in the sustainability agenda as co-workers are the ones interacting with customers on a daily basis. Thus, co-workers are the ones learning and understanding the needs of customers. Additionally, co-workers are ambassadors for sustainable lives at home. To get co-workers on board with IKEA's sustainable life at home products, IKEA created a co-worker engagement project dedicated to giving the opportunity for co-workers to take home these products. Since fiscal year 2014, about 3,300 co-workers have participated in the program (IKEA Group, 2016, p. 20). IKEA's engagement with co-workers allows the sustainability agenda to permeate all stakeholders within IKEA.

IKEA Evaluation

Home furnishing giant IKEA is making progress in becoming a circular company. From working with suppliers to remanufacturing waste, to offering components to repair products, to sourcing sustainably, and running on renewables, IKEA is actively pursuing ways to enter the circular economy. But how significant is the company's progress? Is IKEA close to becoming circular? After evaluating IKEA on my 5-point framework, the company is making progress, yet has room improve in all of the areas. However, the business strategies and tactics IKEA has implemented are setting the company up well to continue the journey towards circularity.

IKEA's Efforts in Each Area

Of the five-areas, IKEA is making progress on each front. Area 1, Recycling of Materials, is most likely the weakest area for the company. As confirmed by the previous chapter, this area is the weakest for most companies pursuing circularity. Closing the loop and remanufacturing of products is still in early stages, as recycling technology and reverse logistics are still being researched and implemented. Ultimately, more companies, including IKEA, are pursuing strategies to close the loop compared to slowing it. However, the work IKEA has achieved so far with their suppliers, and designing products like the TÅNUM rug, appears promising for the development of more closed-loop products in the future.

IKEA is making more progress on Area 2, Long Term Product Design. However, this is another area where the company can continue to improve. The versatility and flexibility of some IKEA products enables resources to be kept in use for longer, thus slowing the flow out of the loop. Additionally, the growth in repair kit use signals more customers are taking advantage of the opportunity to repair their IKEA products instead of buying a whole new product. Other ways to slow the flow out of the loop could be improved though, including the expansion of take-back programs.

IKEA is making a positive impact in reducing waste within their operations by only sending a small fraction of their waste to the landfill. With eco-efficient strategies in place, IKEA is lessening their environmental impact through resourcefulness. However, more attention needs to be placed on reducing waste in the first place. Additionally, IKEA should engage in even greater dialogue with its customers to help them reduce waste at the end of the product's life cycle.

Use of renewable energy is an area IKEA can continue to improve on. The company is making progress towards their 100 percent renewable goal, but has a ways to go to reach the 100

percent goal by 2020. Additionally, there is some ambiguity on the use of renewable energy by the company's suppliers, making it difficult to assess how well IKEA is actually doing in this area. IKEA must continue to invest in renewables and encourage its suppliers to do the same.

Lastly, IKEA has made significant progress in the sourcing of sustainably produced materials. Specifically in regards to wood and cotton, IKEA's two largest inputs, IKEA has worked hard with its suppliers to source sustainably. Although sustainably sourcing is important, the magnitude of resources IKEA consumes is worth considering when evaluating this area and it leads to questions on whether a company like IKEA could ever be considered sustainable if they are consuming resources at such magnitudes? Additionally, while the certifications are from outside organizations, IKEA is still responsible for picking and choosing which sources are considered 'sustainable', something that leads to a bit of skepticism. Nonetheless, sourcing from sustainable sources is more beneficial than not sourcing from them at all.

Overall, according to the business model change methodology, as described in chapter two, IKEA is currently at the stage of business model innovation. The company has moved far beyond "business as usual". IKEA has made more than make a marginal modification to one element of the business model. Nonetheless, the company has not yet rethought the organization of the entire business model. Therefore, business innovation is continuing to happen at IKEA as the company transitions to the circular economy.

Transformational Change

IKEA has focused on sustainability throughout the history of its company, from being a founding member of the Forest Stewardship Council, to employing environmental and sustainability managers, to designing products with its lifecycle in mind with the 'eWheel'. However, IKEA has really buckled down on their sustainability agenda since the late 2000s.

While no one explanation accounts for the shift in mindset, customer values is one catalyst for the change. IKEA prides itself on designing and producing in a way to improve the lives of its customers by visiting homes and talking to customers. In addition to product design, IKEA found that more customers were concerned about IKEA's impact on the environment and the working conditions of the people making their products. In order to fulfill the wants of customers, IKEA started taking bigger steps on its path to sustainability. This increased effort can be seen in the company's sustainable cotton and LED lighting range. Chief Sustainability Officer Howard described the situation as, "we could have a niche range of Better Cotton products or a niche range of LEDs but if it's better for the customer and better for the company, why offer alternatives? Why not go all-in?" (Murray, 2015). When it became clear that sustainability and sustainable options were what customers desired, IKEA started a more serious transformative change.

Success from Sustainability Scorecards and Scale

Part of this transformational change included the development of the Sustainability Score Card in 2010. The Sustainability Score Card is another tactical strategy that will continue to help IKEA pursue circularity. IKEA is actively engaged in creating sustainable products and is taking into account the sustainability of a product at every step of its life cycle. The Sustainability Score Card creates a framework to measure progress toward this goal. And as IKEA progresses to become more circular, the factors on the Scorecard that apply to the circular business will become increasingly important. In addition to the Sustainability Score Card, the Supplier Sustainability Index will also continue to be helpful in the transition. With a company the size of IKEA with hundreds of suppliers, it is crucial that the sustainability of each supplier is monitored. The Index enables IKEA to continually push their sustainable and circular

performance agenda to their suppliers. Lastly, IKEA's creation of sustainability managers and developers to work with suppliers on sustainability will be valuable as IKEA implements more circular strategies. IKEA is making progress on transitioning to a circular business, and its tactics and business strategies have set the company up to continue improving its sustainability.

IKEA serves as a great case study because of its size. The IKEA case study demonstrates that sustainability and the circular economy are not reserved solely for small, higher-end, niche sustainability companies. These companies, like Patagonia, have been able to create a niche market for sustainable products, which attracts a certain consumer willing to buy products at a higher price. However, IKEA demonstrates that any company, regardless of whether it's in a sustainability-marketing niche, is capable of creating sustainable products with a low impact. Additionally, the IKEA case study identifies scale as a tool to make a global impact. Chief Sustainability Steve Howard describes, "scale [as] an enabler for sustainability...we make products incredibly efficiently, transport them effectively, and drive economies of scale" (Confino, 2017). By influencing close to one percent of the world's commercial timber, in addition to their large share of cotton, to using efficient logistics to manage their supply chains, IKEA has the ability to change multiple industries, in addition to making their own products more sustainable. IKEA is making it possible for everyone to buy sustainable products, not just the few able to shop at places like Patagonia. The IKEA case study demonstrates to other large companies that it is possible to pursue sustainability and circularity at a company its size.

Lastly, it is important to note that most of the data gathered for this case study came from IKEA publications. The bulk of my sources were IKEA annual sustainability reports. These reports synthesize and report IKEA's sustainability efforts, often portraying the results in the most positive light. That being said, my analysis on IKEA is limited by the lack of variety in my

sources. To further my case study analysis, I would have loved to dive in deeper to gain a better understanding of how the company is truly performing. How many raw materials are used in the manufacturing processes; how much physical waste is produced; has the company reduced the amount of throughput? What proportion of its product line is made from manufacturing waste? Are customers actually swapping out couch covers instead of buying a whole new couch? Are there other ways the company is working to support customers besides part replacement? These are just a few of the questions I would ask in a future, more extensive analysis of IKEA.

Chapter 5: Replicability and the Spread of the Circular Economy

The circular economy is still in early stages and there is a ways to go in the transition. IKEA, in addition to the companies discussed in Chapter 3, is just one of many companies that is working to transform their business model into a more circular and restorative one. This final chapter explores the possibilities and opportunities to promote the transition to the circular economy. First, this chapter will discuss the conclusions that can be drawn from IKEA's circular efforts, as well as how these findings can be replicated across the industries. Next, the chapter discusses challenges for spreading the circular economy, including a discussion on consumer mindset and the throwaway society. Lastly, the chapter will explore other ways to further the transition.

Lessons Learned From IKEA

IKEA is engaged with the goals of the circular economy, and the company is using a variety of business tactics and strategies to make circular changes. IKEA's efforts as a circular business reveal some conclusions about circular business as a whole and how these conclusions lead to circular success. Additionally, IKEA uses some strategies that help the company in the transition that would be beneficial for other companies to emulate to help speed up the transition for the entire economy.

Circular Value Creation within IKEA's Operations

The first conclusion drawn from the IKEA case is that current gains from circular practices are achieved largely within a company's own operations. The theory of the circular economy suggests that the largest gains are had when companies can create value from wasted products that are retuned at the end of the life cycle. However, the theory also suggests that to reach the end goal the circular economy must function as a whole sustainable ecosystem. While

companies like Interface and Desso may be able to close the loop and take back products, other companies may create value within their own operations. IKEA's circular gains happen within their own operations, instead of in closed-loop products. In this case, IKEA is acting as the decomposer within its operations to produce more resources to consume. For example, IKEA makes use of waste within its own supply chain to create products, which is seen in the creation of the vases made out of broken glass, or the rugs made out of scrap fabric. In these examples, IKEA is making use of resources that were previously regarded as waste before they developed the capabilities to extract the residual value from these resources. In doing so, IKEA can extract more value out of its raw materials, enabling the company to reduce their overall volume of throughput. Additionally, IKEA engages with circular product design to help keep products in use for longer by designing for versatility, disassembly, as well as offering to replace parts to enable customers to repair products. By producing and designing these products more efficiently, IKEA sees gains by being more resourceful with resources. IKEA's circular gains come from the way they design and produce their goods.

The IKEA case study demonstrates the challenges of extending its logistics past the point of sale. In order for a single company to successfully achieve closed-loop practices, the company must be able to master reverse logistics. Reverse logistics entails many challenges and hurdles for a company, such as policies around transporting waste, the geographic challenge of collecting materials, the variability of return flows, and the high cost (Moigne, 2016). For an individual company, pursuing closed-loop practices is challenging because it involves not only creating the product, but also managing the reverse logistics chain and the remanufacturing process. Another important factor required for closed-loop cycles to work is the transition of customers from consumers to users. As users, customers no longer end all contact with the company at the point

of sale, but continue to engage with the company to repair, upgrade, or take-back products.

Ultimately, many logistic challenges exist to make closed-loop practices achievable for one individual company.

This conclusion exemplifies the concept that the circular economy must function like an ecosystem, instead of one individual organism. For the circular economy to function as suggested in the theory, companies specialized in reverse logistics and remanufacturing must be created, to act as the decomposers in the ecosystem. These decomposers will capture and process materials to be used again as resources. Increasing the scale of reverse logistics will help lower the marginal cost for collecting, transporting, and sorting operations, ultimately making more effective and efficient return flows (Moigne, 2016). Companies have achieved incredibly complex supply chain networks, and now the same has to be done with post-consumer streams across another network (“Set up global reverse networks,”). Although perhaps not as complex as supply chains, a reverse chain would include actors responsible for recycling, remanufacturing, and refurbishing of materials, broken down to insert back into the production of new products. In the circular economy, some companies would be responsible for the production and consumption of resources, while others would work to decompose and recycle those resources back into the production stream. However, this might be the case only for large multi-national companies who have the logistics and capabilities to run both supply and reverse logistic chains. Additionally, this might also be dependent on the type of material used in products. For example, IKEA uses a wide variety of different materials, but a company like Interface, that specializes in carpet fiber, is better able to recycle their older carpets back into their manufacturing stream to produce new carpets. In that case, product type and material make it possible to be an individual company with closed-loop capabilities.

IKEA as a Technology Transfer Hub

Another conclusion drawn from IKEA's efforts in the circular economy is the way IKEA acts as a hub for technology transfer. The best example of the way IKEA has acted as a hub to transfer knowledge and technology is through their work with Hilong, one of their key suppliers. IKEA helped Hilong develop a more sustainable, water efficient dying technique. From there, IKEA was able to spread this technique across the rest of their textile suppliers, with a large proportion of their suppliers using the technique today. By taking the best practices from one supplier, and spreading the technique to the rest, IKEA is able to create a much bigger impact. IKEA also transferred knowledge with one of their printing suppliers, Antezza Tipografi. The graphics supplier redesigned their production system to eliminate the older pre-press printing system to reduce its environmental impact. IKEA saw this technique and embraced their role to diffuse this knowledge across the rest of their supply chain (Martucci & Schirone, 2015). By transferring technique and technological knowledge among their suppliers, IKEA is gaining long-term competitive advantage (Martucci & Schirone, 2015) and promoting a more sustainable supply chain in the process.

IKEA's role of transferring technology and knowledge could be a sustainability-focused form of supplier development. Watts (1993) defines supplier development as "long-term cooperative efforts between the buying firm and its suppliers to upgrade a suppliers' technical, quality, delivery, and cost capabilities for ongoing improvement" (Watts & Hahn, 1993). Chief Sustainability Officer Howard describes that "part of doing business with IKEA is driving improvement" (Holder, 2016). Supplier development has been found to result in positive performance. IKEA engages in supplier development, especially with their wood suppliers. For example, IKEA assists suppliers to source certified wood and natural fibers, as well as

contributes to expanding and upgrading production technology. IKEA has also worked with suppliers to introduce friendly, water-based treatment technologies across all of their wood suppliers (Ivarsson & Alvstam, 2010). In a technology transfer study on IKEA's Chinese and South East Asian suppliers, Ivarsson and Alvstam (2011) found that IKEA had a strategy of technology transfer, which often resulted in providing suppliers with long-term technological support to master new products and process technology (Ivarsson & Alvstam, 2011).

Additionally, with an average supplier relationship of 11 years, IKEA has put in the effort to create worthwhile relationships, which helps to foster the spirit of supplier development. Howard also notes that, "supply chains are very powerful—you can share best practice, you can co-invest, you can share education around techniques...a huge lever for change" (Holder, 2016). Howard describes that "part of doing business with IKEA is driving improvement. Supplier development and transfer of technology and knowledge is a beneficial practice for IKEA in their transition to the circular economy and will continue to be a good tool as more circular processes and technology are developed and introduced.

The replicability of the technology transfer role is mostly limited to large multi-national companies. Small, vertically integrated firms have no suppliers to spread technology and knowledge across. Medium-sized firms with suppliers could take advantage of this role to some extent, but have less of a knowledge and technology base to work from. Therefore, large firms with extensive supply chains have the most to gain from the technology transfer role. These companies have a wider base of knowledge and technology to spread to their suppliers, which means these firms will have a larger impact when they implement a new technology or practice across their entire supply chain. Additionally, this role could be applied across any industry and is not dependent on the type of products that are produced.

Replicating the Sustainability Scorecard

Lastly, another beneficial practice that should be taken from IKEA is the use of the Sustainability Scorecard. Sustainability Scorecards are not necessarily unique to IKEA. Among the companies analyzed in Chapter 2, Walmart and Marks & Spencer both use some type of scorecard in their businesses. These two companies use their sustainability scorecards primarily to assess and monitor the sustainability of their suppliers. IKEA makes use of a Supplier Sustainability Scorecard, but also uses a unique Sustainability Scorecard to assess each product. By assessing each product on eleven different sustainability factors, IKEA can help assure that not only are the products being produced in a sustainable way, but also that they are designed with sustainable and circular principles from the start.

IKEA's Sustainability Scorecard is a tool that can be replicated across a range of companies and industries. The Scorecard takes into account eleven different factors that have to do with material composition, recyclability and more, making it a tool that can be applied to different industries. Additionally, the Scorecard can be applied to companies of any size, making it a versatile tool. As the transition to the circular economy continues, the Scorecard could be adapted more to place more emphasis on the attributes needed to achieve a truly circular business model.

Many lessons can be gained from IKEA's efforts to become part of the circular economy. From the gains in one's own operations compared to fully closing the loop, to acting as a hub to transfer knowledge across a supply chain, to the use of a sustainability assessment at the product level, the lessons drawn from IKEA can be spread across other companies and industries to help further the transition to the circular economy.

Challenges and Opportunities for Promoting the Business Transition to the Circular Economy

Although companies are working on ways to integrate circularity within their businesses—many of them in an effort to try to gain competitive advantage or to meet the demands of their customers—the business case for going circular is unclear at this point. Some companies have seen significant cost savings from some practices, like reducing waste and being more efficient with resources, but business benefits garnered from making the switch are uncertain or unknown. The spread of the circular economy is hindered by a variety of barriers that make it hard to make the business case for an individual company.

The barriers fall under four main areas: funding, reverse logistics, resource pricing, and consumer behavior. Circular business is hindered by a lack of sufficient investment in recycling and recovery infrastructure, as well as investment in circular skills and design. Investment is often a challenging area as circular programs and changes often take a while to produce visible results. The development of reverse logistics is crucial in order to enabling the full use of waste as a recycled resource, but the limited investment, research, and collaboration in this area hinders the spread of circularity (Eco-Innovation Observatory, 2016). Another challenge that slows the circular transition is resource pricing. Current resource pricing does not promote sustainable management of resources, especially as the prices of many virgin materials do not take into account the adverse environmental impacts associated with extracting these resources. Furthermore, a case can be made that some non-renewable mineral resources should be priced more highly to avoid premature depletion and protect the interests of future generations. Lastly and perhaps most importantly, the business transition to the circular economy is hindered by the consumer mindset of our current throwaway society.

Changing the Consumer Mindset

Consumers have not always been so quick to toss. Goods used to be passed down, like the old antique chair in the corner of the living room, the silver cutlery, and the cast iron skillet. Items were repaired before being thrown away. Products were built with higher quality resources and built to last a long time, especially goods like furniture that were expected to be passed down across generations. But the Industrial Revolution dramatically increased the availability of consumer goods with the spread of mass production. The rise of consumerism has led to a greater consumption of goods that are of a lower quality.

The increase of consumerism has resulted in a decrease in thriftiness and resourcefulness. This relationship is due in large part to the changing costs of products and repair. Over time, the cost of repair has increased compared to the price of a new product. Therefore, consumers weigh the relative costs of repairing a product versus replacing it when making a disposal decision. With cost as a huge determinant, repairing a good versus replacing it has become more difficult to justify (McCollough, 2009). As the opportunity costs for repair and refurbishment have increased, consumers are more inclined to buy new. Thus, consumers' demand for goods with circular features, such as upgradeability or repairability, has lessened.

In addition to the changing relative costs of repair versus replacement, consumers have faced a couple of other reasons to increasingly dispose of products. The first obstacle is fashion obsolescence where products simply lose their appeal because of the introduction of a new product in the market. Another reason to dispose of a product is due to functional obsolescence in which products physically fall apart (King, Burgess, Ijomah, & McMahon, 2006). Functional obsolescence could also be a version of planned obsolescence, a strategy that entails the substitution of lower cost materials into their products in order to decrease product life span. Rapid

technological progress is the last reason for the rising rates of disposal. Especially in consumer electronics and computers, rapid technological change creates newer models of products that make outdated versions obsolete. Consumers have faced a growing number of reasons to buy new instead of repairing and maintaining current products, a key factor inhibiting businesses from pursuing circular products and business.

The rise of cheap consumer products has led western, wealthy nations into the throwaway society we live into today. Vance Packard first reveals the “throwaway society” in his 1960 book, *The Waste Makers*, a commentary on how the rapid growth of disposable consumer goods has degraded the environmental, financial, and spiritual character of American society (Packard, 1960). Waste streams have continued to rise even after this term was first popularized. In the period from 1960 to 2014, municipal solid waste generation increased 193 percent. Also in that period, the municipal solid waste generated per capita per day increased 66 percent, as seen in Figure 8 (US EPA, 2015). Waste streams have been on the rise due to rising levels of affluence, cheaper consumer products, functional and fashionable obsolescence, the increase of packaging, the demand for convenience products, as well as the underpricing of disposal. (O’Brien, 2013). McCollough (2012) found positive and significant relationships between increases in household income and the consumption of more products. Additionally the percentage of disposable goods has increased over time (McCollough, 2012). As products become more accessible and cheap, many products that were once considered reusable are now considered disposable, a fact that businesses have to be aware of.

It is important to note that the throwaway society has multiple connotations. Some wealthy societies and consumers take advantage of the throwaway society in order to not be "hassled" with the repair of old and worn out goods. They would rather simply replace them

with new goods. Most wealthy people have a high opportunity cost to the expenditure of their own personal time. Not every society or consumer has the wealth and luxury to behave this way and, therefore, chooses to repair and extend the life of products as long as possible. However, it's the practice of disposing undamaged goods and goods that could have been repaired and reused that has proliferated in wealthy societies and promoted the environmental problems discussed at the beginning of this thesis.

Circular Public Procurement

Changing the consumer mindset to be more open to circular products is just one way to help businesses transition to the circular economy. Another tool to enable companies to go circular is implementing a circular public procurement. Public procurement is a method to use the government's purchasing power to stimulate a demand for goods. Green public procurement has the specific agenda to increase the demand for green products. The European Union is leading the way in this area and finds that by choosing environmentally friendly goods and services, they can help create a demand for more sustainable goods and services which might otherwise be difficult to get into the market by strictly relying on private purchasing behavior ("Green Public Procurement"). The European Commission recently published a brochure on Public Procurement for a Circular Economy. This approach recognizes the role public authorities can have in supporting the transition towards the circular economy. The European Commission defines circular public procurement as, "the process by which public authorities purchase works, goods, or services that seek to contribute to closed energy and material loops within supply chains while minimizing and avoiding negative environmental impacts and waste creation across their whole life cycle" (European Commission, 2017). The brochure highlights circular public procurement programs across the EU with different examples of purchases. The circular

purchases included recycled concrete, biogas busses, and energy efficient appliances. The public sector can financially help businesses that are implementing circularity by purchasing their products, helping to enable businesses to go circular.

Circular Indicator

Lastly, another tool to make the transition to the circular economy easier for businesses would be the creation of a way to measure circular progress. There is no single framework that enables organizations to assess and report their circular progress, which is one of the greatest opportunities and needs for the circular economy (Szellner, 2016). At the very basic level, there should be some measure to understand how well resources are being circulated through the supply chain compared to using virgin materials or disposing of products in the landfill. The US Chamber of Commerce suggests that a circular metric should include some of the following metrics: amount of material recovered, percent of material composition, percent of material recovered and recycled (Szellner, 2016). The Ellen MacArthur Foundation was the first to release a measurement tool called the Material Circularity Index that analyzes the amount of materials that are recirculated (“Circularity Indicators,,” 2015). The MCI is a promising start to increasing the momentum behind creating an indicator.

As more businesses take steps towards the circular economy, the more a circular measure would be beneficial. The demand for a circular measurement is increasing with more businesses looking for guidance on the circular transition (Egerton-Read, 2017). Adrian Wain, a business advisor at UL EHS Sustainability, a sustainability management company, describes the situation that within business, “there is an understanding of circular economy and a direction of travel, but companies don’t truly know yet what their new Key Performance Indicators should be” (Egerton-Read, 2017). Creating a metric would also help compare companies in order to gauge

how much progress is being made. Such a metric would also help to keep companies accountable to their circular goals. Ultimately, a circular measurement should focus on throughput in the system, looking at the quality and quantity of resources entering and exiting the loop. By measuring this throughput, companies will be able to see if the processes happening within the loop are resulting in a reduction in throughput. With the increase of large data sets, the Internet of Things, and more technologies like Radio-frequency identification, a measurement for circularity could be used across companies in the near future.

Circular Business Going Forward

The transition to the circular economy cannot be achieved by business alone. As a privately owned company, IKEA is in a unique situation that enables them to make circular changes. However, the transition to the circular economy relies on all businesses in order to function as an ecosystem, including big profit-maximizing firms. In order to incentivize all companies to take steps towards circularity, public policy is required. Policies are needed to rationalize the rates of resource extraction and disposal to reflect the true costs. By targeting the input and output of resources in the system, businesses will be incentivized to make change towards more circular practices.

The transition to the circular economy will be in conjunction with businesses, government, and other non-profit organizations like the Ellen MacArthur Foundation. Additionally, for circular change to occur, consumers need to move away from the throwaway society and embrace sustainable consumption. Consumers have the ability to change the market by voting with their wallet on what products they want. There must be a realization that when one throws products “away”, there is often residual value leftover. Millennials are starting the movement towards sustainable consumption. Consumers have to embrace the repair

opportunities put on by companies, participate in product take-back, and change their standards for cheap, low quality, disposable goods. By doing so, businesses will follow and the economy will transition to a generative, sustainable model.

Conclusion

The linear take-make-dispose model cannot persist sustainably given the finite base of non-renewable resources, the limits on the Earth's assimilative capacity to deal with waste, and the economic and ecological opportunity cost of ever-expanding landfill space. The circular economy presents an alternative form of production and consumption that enables economic growth to decouple from the volume of resource throughput. By slowing and narrowing throughput, and closing the resource loop, the circular economy makes it possible to function within the finite limits of the planet. Through the exploration of circular economy theory and current practices of companies pursuing circularity, it is clear the circular economy still has a long way to develop in order to truly decouple the environmental impact of business on economic growth.

IKEA is making strides in its transition to the circular economy. By designing with waste as an input and focusing on long term product design, to reducing waste through eco-efficiency, and producing with renewable energy, as well as incorporating sustainability within the core of the business, IKEA is well on its way to being a leader in the circular economy. Additionally, IKEA also demonstrates that circular change is possible even at a company of its size. However, IKEA cannot make the transition alone. IKEA's efforts to transition into a circular business enlightened the idea that the circular economy must function as an ecosystem with many companies working together. Company collaboration can combine to form a synergy to close the loop, by enabling the spread of reverse logistics and the development of recycling and remanufacturing technology.

For the circular economy to be truly embraced public policies directed at resource extraction and disposal must be created to incentivize businesses to make circular changes.

Additionally, there must be a transformation away from the throwaway culture we live in today towards a more sustainable, restorative model of consumption and production.

Appendix

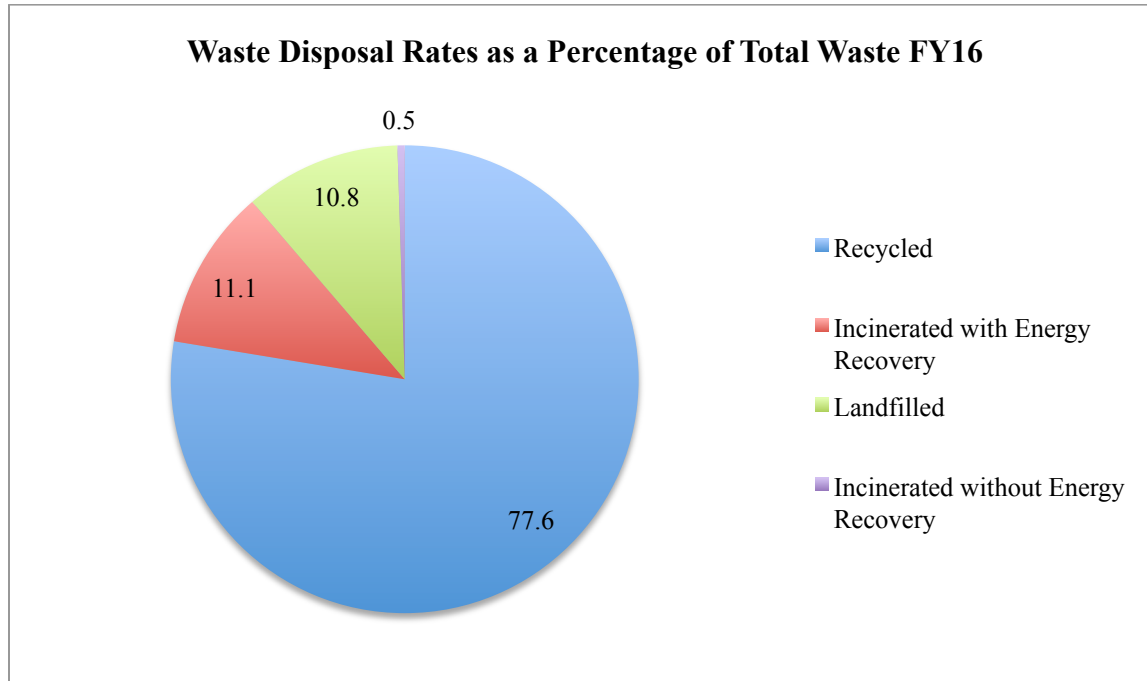


Figure 1. Data from IKEA Group Sustainability Reports FY16.

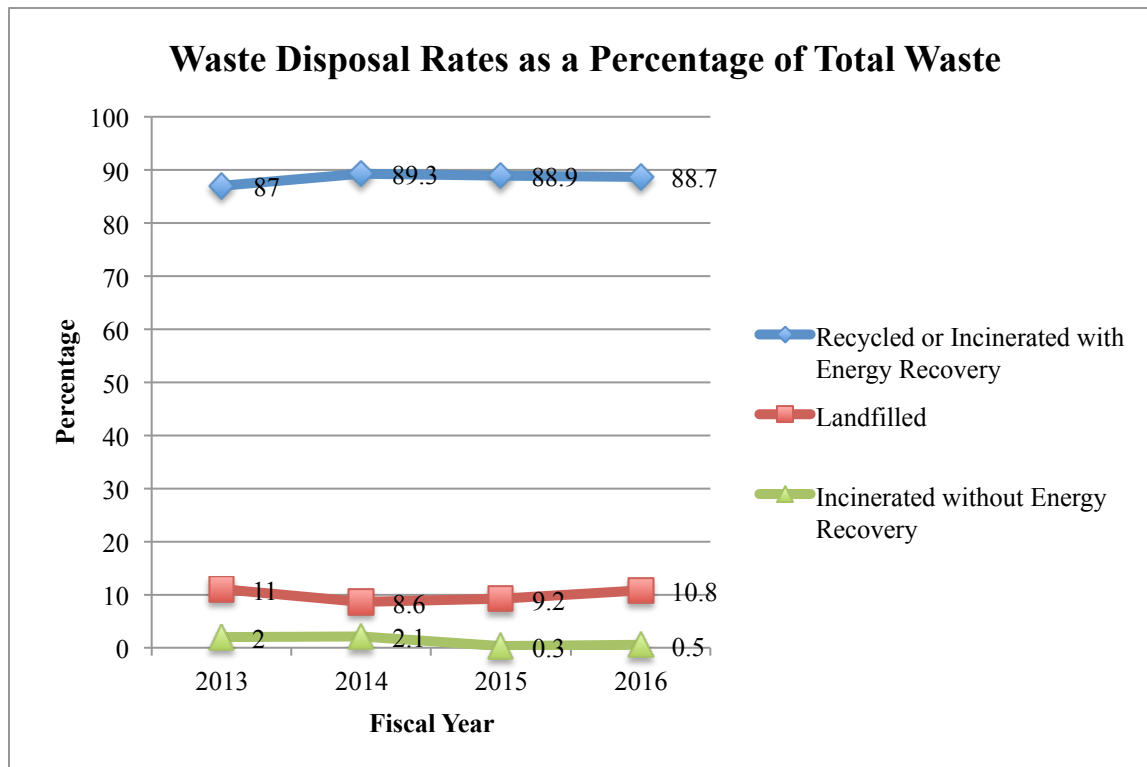


Figure 2. Data from IKEA Group Sustainability Reports FY10-16.

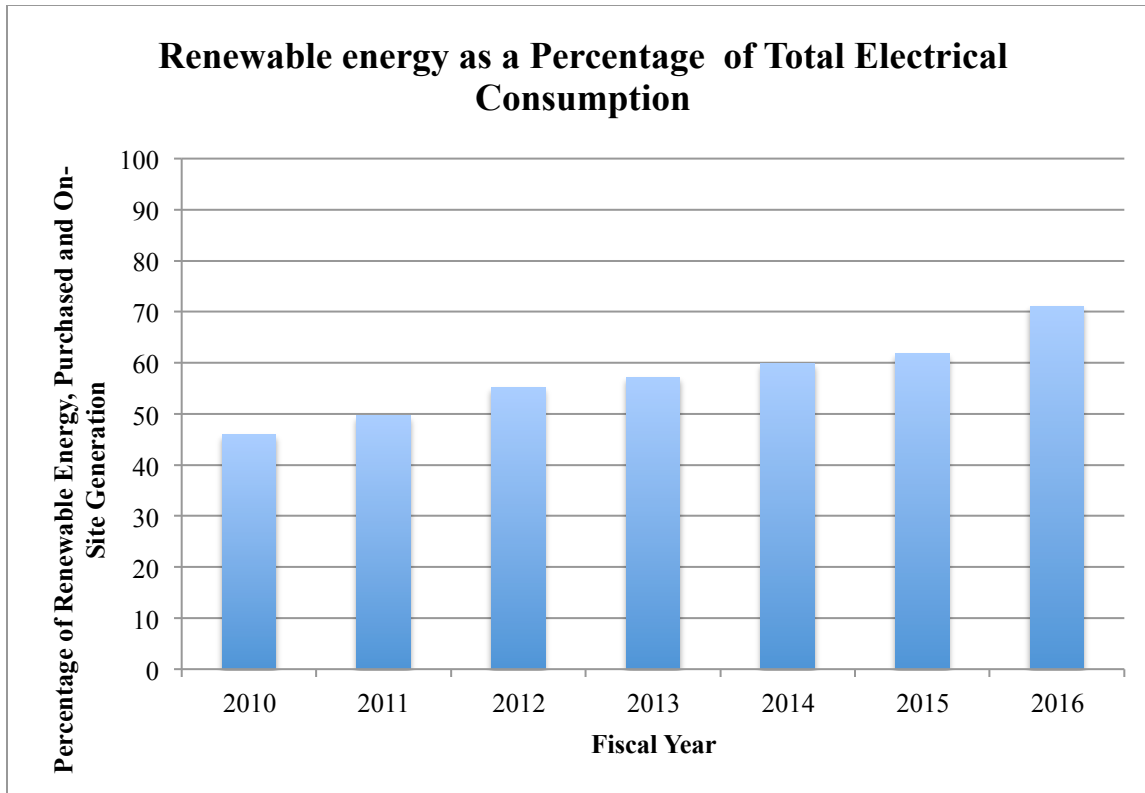


Figure 3. Data from IKEA Group Sustainability Reports FY10-16.

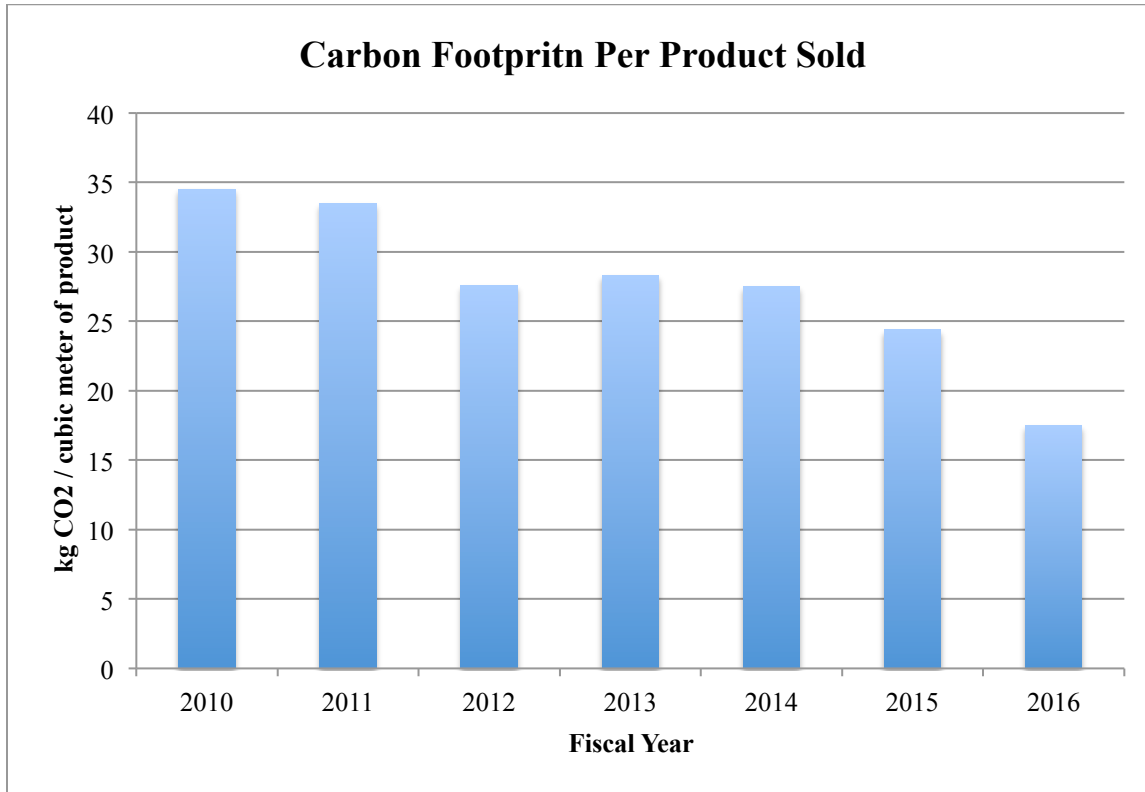


Figure 4. Data from IKEA Group Sustainability Reports FY10-16.

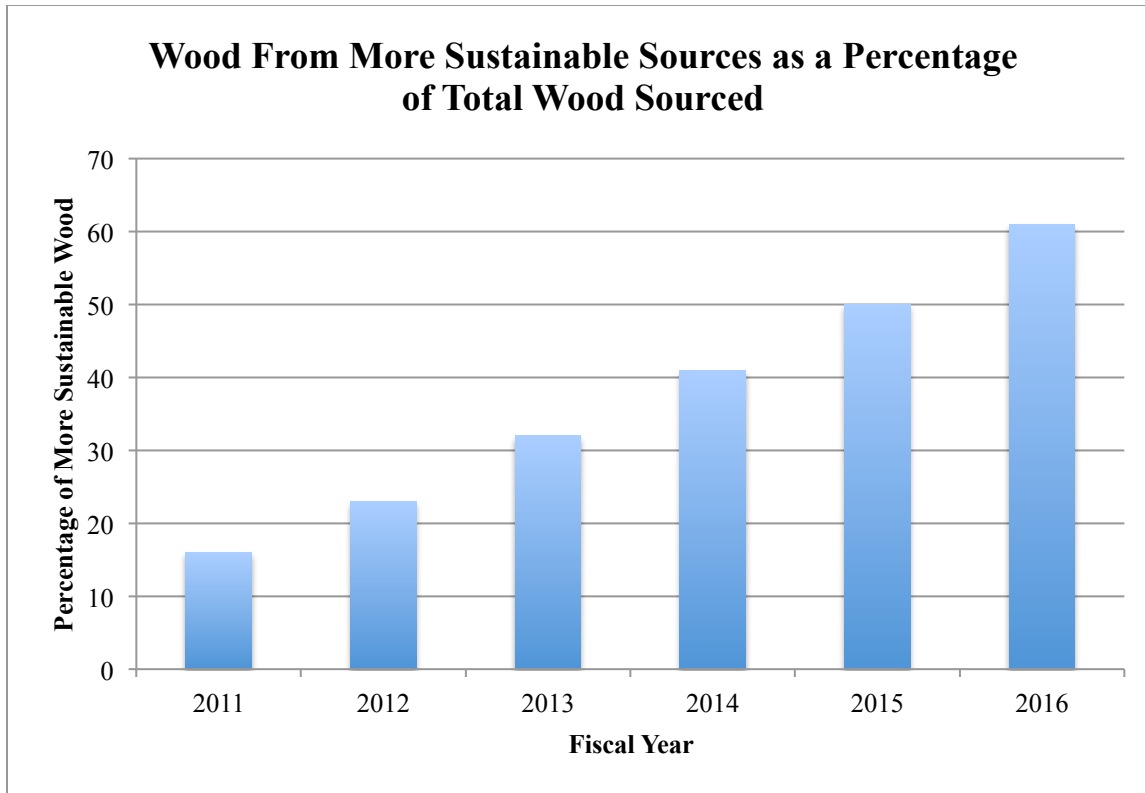


Figure 5. Data from IKEA Group Sustainability Reports FY10-16.

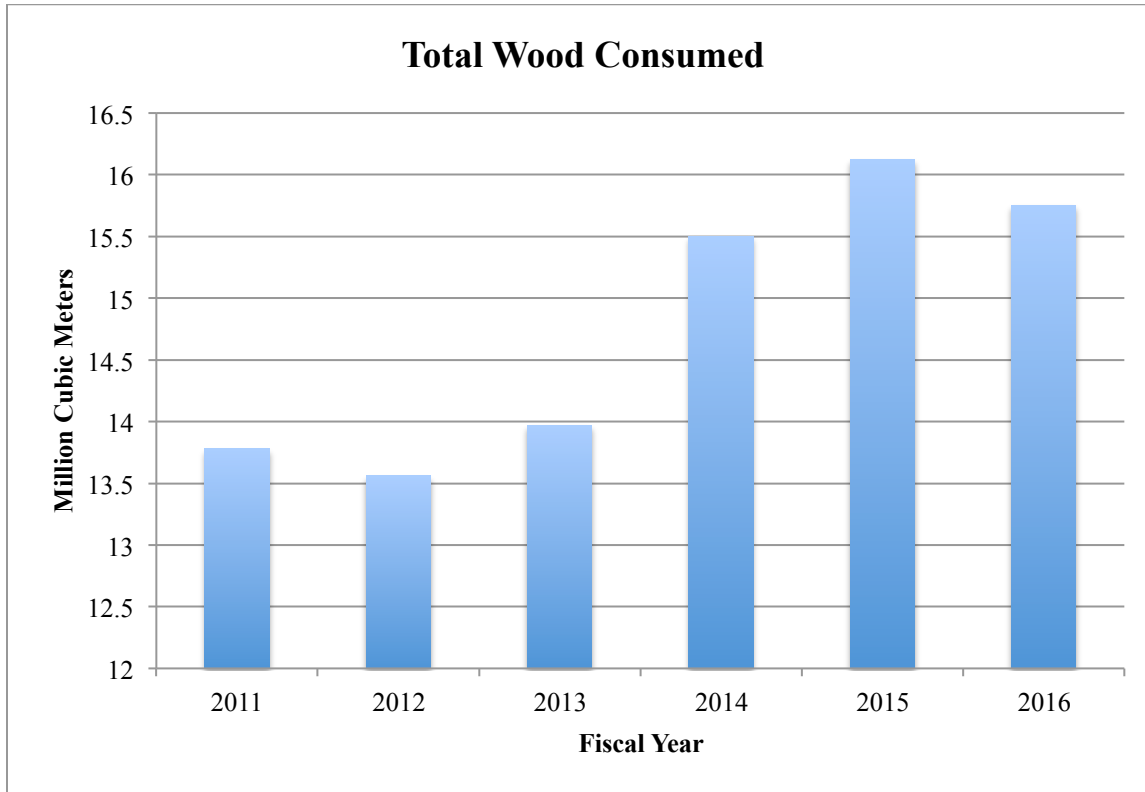


Figure 6. Data from IKEA Group Sustainability Reports FY10-16.

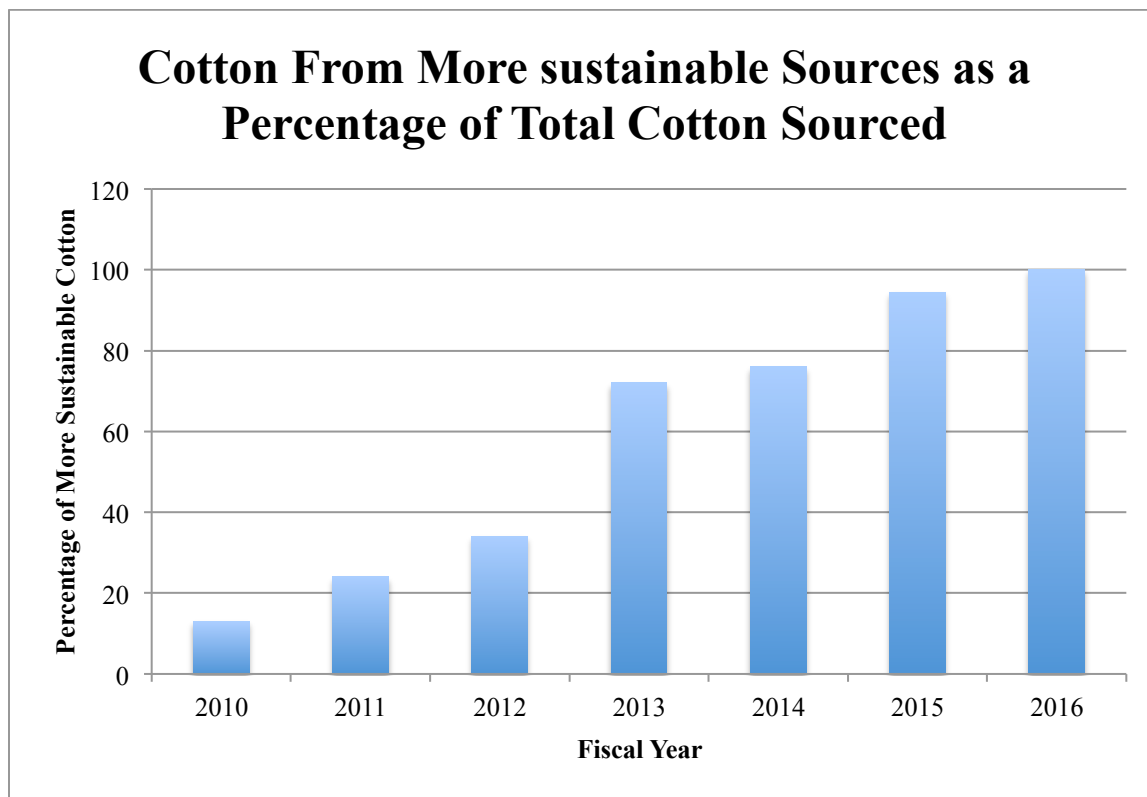
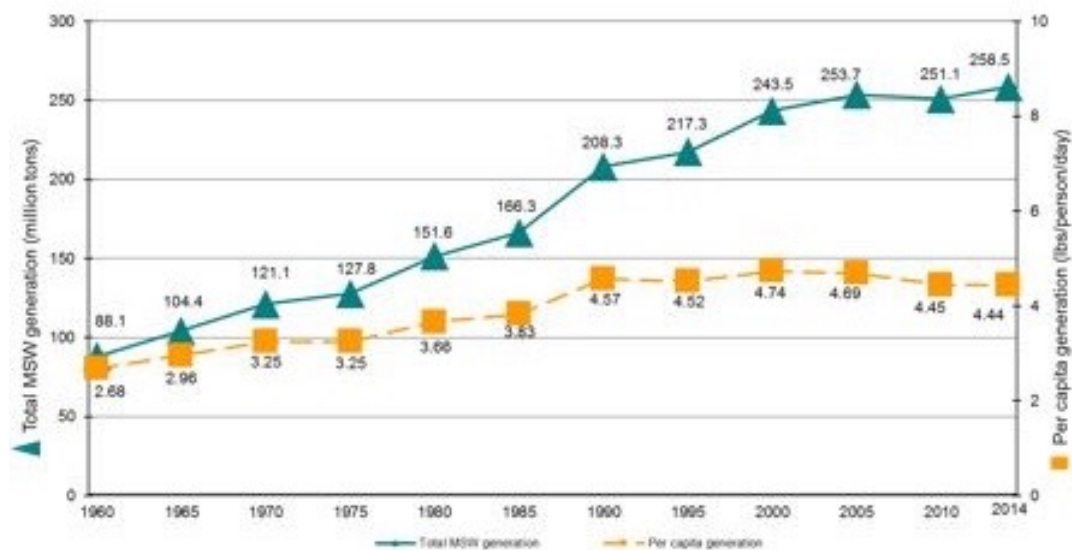


Figure 7. Data from IKEA Group Sustainability Reports FY10-16.



MSW Generation Rates 1960 to 2014

Figure 8. (“Municipal Solid Waste | Wastes | US EPA”).

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