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Sustainable Manufacturing and Its Impact on Consumer Perception

A Study on Swedish Manufacturing Organizations and the Perception of Swedish Consumers

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ABSTRACT:
As the environmental issues such as climate change and air pollution are increasing, the awareness and interest for sustainability has grown as well. Due to this, manufacturing organizations are put under more pressure from stakeholders, to manufacture products that have less negative impact on the environment. One of the stakeholders are the consumers who want to live more sustainably. However, they find it difficult to keep up with it due to the lack of information. Organizations are simultaneously investing more into spreading awareness. This study has conducted four interviews with individuals who work with sustainability in Swedish manufacturing organizations, and a survey with Swedish consumers. The findings show that Swedish consumers, for example, still believe that organizations are not spreading enough awareness and information despite the organizations' efforts and investments.

Content

Figures

Tables

1 Introduction

This introductory chapter presents the background for this study, followed by the problem area, research question and the purpose of the study. The delimitations are addressed as well.

In today's world, environmental issues such as climate change and global warming are increasing and becoming bigger concerns (Garbyal & Mittal, 2019; Milfont, 2010; Jeong, Cho & Lee, 2018). Research fields such as Information Systems (IS) have been exploring this topic more and the academic field of IS has been discussing and contributing to this area more frequently (Zeng, Lee & Lo, 2020). In connection with these issues, the concept of sustainability has grown and become more popular in recent years, both in theory and in practice (McMurray & de Waal, 2019; Singh, Keitsch & Shrestha, 2019; Linnenluecke & Griffiths, 2010; Giovannoni & Fabietti, 2013). However, more efforts could be made in order to achieve sustainability (Mustaquim & Nyström, 2014). The term usually focuses on the three main dimensions, which include the social aspect, the economical aspect and the environmental aspect (McMurray & de Waal, 2019; Linnenluecke & Griffiths, 2010; Singh, Keitsch & Shrestha, 2019; Giovannoni & Fabietti, 2013). These dimensions and the whole concept of sustainability have become important for organizations and for society and its individuals (Chofreh, Goni, Shaharoun & Ismail, 2015). Many organizations have realized that implementing it and becoming more sustainable can help them gain more opportunities in the market. They become more interested and involved in this topic and want to bring it into their business strategies. Organizations are also feeling that they have a responsibility to be part of and help dealing with the issues (Chofreh et al. 2015).

The manufacturing industry is considered as an important pillar of civilized lifestyle, and it is strongly affected by sustainability issues and has a major contribution towards establishing a sustainable way ahead (Garetti & Taisch, 2011; Abubakr, Abbas, Tomaz, Soliman, Luqman & Hegab, 2020). The significant goal of the manufacturing industry is to provide all sources of goods and services for living to support the quality of human life (Garetti & Taisch, 2011). In order to help organizations to achieve sustainability goals, Information Systems that follow design principles and open innovation concepts, could be used (Mustaquim & Nyström, 2014). Watson, Corbett, Boudreau and Webster (2012) argued that Information Systems could drive improvements in the sustainability area. They are more often present in society and could be used as a way of facing some negative impacts on the environment (Watson et al. 2012; Mustaquim & Nyström, 2014). Information Systems do also have an essential role in manufacturing organizations in particular and improvements for such systems for the entire business, including customer relationship management could be made (Zeng, Lee & Lo, 2020; Kuang & Gao, 2007). Using these systems could improve the exchange of information between different parties in a supply chain, which means a better transparency between consumers and manufacturers (Zeng, Lee & Lo, 2020).

In today's society, the awareness around sustainability and the demand for transparency have increased among stakeholders, that is why industries are under more pressure to produce products by using less resources, omitting less pollution and waste generated (Hami, Muhamad & Ebrahim, 2015). Due to this pressure, sustainable manufacturing (SM) has gained wide acceptance in the business world and especially in industries (Sartal, Bellas, Mejıas & Garcıa-Collado, 2020). The increasing cost of material resources and energy are connected to waste management problems, it is necessary for the manufacturer to discuss and approach these issues and improve the environmental performances (Despeisse, Mbaye, Ball & Levers, 2012). Sustainability involvement in the manufacturing context leads to the transformation of resources into valuable goods by operating environmentally responsible processes (Sartal et al. 2020). Having a complete plan and a strategy are necessary in order to accomplish and obtain sustainability in organizations (Khan, Wu, Saufi, Sabri & Shah, 2021; Chofreh, 2015). Many organizations that choose to ignore the sustainability aspect, due to negligence or lack of knowledge, have experienced financial losses (Yadav, Kumar, Luthra, Garza-Reyes, Kumar & Batista, 2020). An organization that cares about these topics and shows it through their policies and processes for example, could appear as more appealing for consumers (Xu & Gursoy, 2015).

The interest in sustainability among consumers have grown and they are gaining more awareness around the environmental issues and sustainability topic. It has become an essential way and approach for consumers to evaluate a product. Many prefer to choose products and services from organizations that are helping the environment in a positive way. A large number of consumers would also agree to pay for services by organizations that have good environmental behavior (Alsaati, El-Nakla & El-Nakla, 2020; Galbreth & Ghosh, 2012; Bianchi, Reyes & Devenin, 2020). They are also having high expectations of the organizations, expecting them to care more about the environment, focus on becoming more sustainable and offer products and services that are environmentally friendly (Schleenbecker & Hamm, 2013; Chofreh et al. 2015). An increased sustainability awareness is beneficial for organizations that are sustainable, but it could be damaging for the ones that have not managed to become sustainable (Galbreth & Ghosh, 2012). With the growing interest, having Information Systems in place could help organizations provide information about the impacts that the choices can have on the environment, and ensure that is correct and useful for the consumers (Alsaati, El-Nakla & El-Nakla, 2020; Watson et al. 2012). Watson et al. (2012) explained that having information is a way of creating perceptions. Moreover, Information Systems could provide an effective way for an organization to monitor its work regarding production output, usage of resource and waste generation emissions levels (Nambiar, 2010).

1.1 Research Problem

As the concerns around environmental and sustainability issues are growing globally, consumers' views and behavior are changing as well. Their behavior in their everyday lives is more influenced by sustainability thinking (Hami, Muhamad & Ebrahim, 2015; Jacobs, Robey, van Beaumont, Lago, Rietra, Hewett, Buvat, Manchanda, Cherian & B, 2020). A report from 2020 (Jacobs et al. 2020) showed that consumers' choices and preferences are influenced by sustainability. 79% of the responding consumers answered that they have changed what they prefer to purchase due to sustainability. This differs from the perception of the organizations, where only 36% think that consumers are prepared to make these types of changes. This gap could become a challenge and a risk that could lead to revenue loss for

organizations (Jacobs et al. 2020). Another report and survey (Haller, Lee & Cheung, 2020) present similar findings, where almost 60% of the respondents answered that they are willing to change their behavior in order to contribute to reducing the impact of the environment. Over 70% of the respondents, who view sustainability as something very important, would also pay more to environmentally responsible and sustainable organizations (Haller, Lee & Cheung, 2020). Despite the efforts of making more sustainable decisions and having this positive view of sustainability among consumers, and organizations, many are finding it difficult to keep up due to the lack of information (Watson et al. 2012). Information about the results and, in particular the consequences of the decisions made, are lacking. As mentioned earlier, information is necessary in order to share a perception (Watson et al. 2012).

With increasing environmental concerns and individuals searching for better quality of life and higher demands from stakeholders, manufacturing organizations are feeling the pressure and challenges of it. They have to produce a higher quantity of products and at the same time, use less resources and produce in a more sustainable, environmentally friendly manner. This has led to sustainable manufacturing getting more attention (Hami, Muhamad & Ebrahim, 2015). As the interest of this concept has grown in practice and has become an important area for research in many fields, the literature indicates that there is a gap between theory and practice when organizations are trying to integrate sustainability and monitor how it could increase customer loyalty (Abubakr et al. 2020; Jayaraman, Singh & Anandnarayan, 2012). Additionally, there is a lack of well defined and established terms and standards in the literature. This has resulted in organizations, in practice, experiencing challenges when implementing these concepts and approaches and they do not fully understand it and its benefits and opportunities. It has also led to mixed findings and conclusions from researchers (Chun & Bidanda, 2013; Morales, True & Tudor, 2020; Abubakr et al. 2020; Nakano, 2010).

1.2 Research Question

In order to address the above mentioned problem area, the following research question is proposed:

How effective are sustainable manufacturing efforts for Swedish manufacturing organizations and how do Swedish consumers perceive it?

1.3 Purpose

The purpose of this thesis is to explore the impact that sustainable manufacturing practices and sustainability could have on manufacturing organizations and on consumer perception. This means how effective it is for organizations to become more sustainable and how consumers perceive it. The study could contribute knowledge to the existing IS research regarding the impacts and benefits that sustainable manufacturing could bring and how that could change consumers' perception. It could also contribute with some insights for organizations, on consumers' thinking. This could lead to organizations getting a better understanding on how consumers think in order to have an improved communication with

consumers. The research could help consumers gain knowledge about organizations' efforts in making manufacturing more sustainable and spreading knowledge and awareness.

1.4 Delimitation

Sustainability is a broad term and has different dimensions, which includes the three main dimensions, social, economical and environmental. It can be part of various aspects of an organization and society. This paper will explore all three dimensions, however, the social impact will be focused on to a greater extent. Additionally, this paper will mostly study Swedish manufacturing organizations who mainly focus on packaging and also the perception of Swedish consumers. While most literature will be from a general perspective due to lack of literature from a Swedish perspective, the collected empirical data will focus on Swedish organizations and consumers.

2 Literature Review

To gain a better understanding of sustainable manufacturing, its related terms and concepts and customer perception, a comprehensive literature review is necessary. This section looks into the theory to describe definitions and concepts, the fundamentals of sustainable manufacturing, sustainability and consumers' attitude towards it. It also includes how Sweden works regarding this topic, a conceptual framework and a table to summarize the literature review.

2.1 Definitions

2.1.1 Definition of Sustainable Manufacturing

There are many child-concepts which support sustainable development at various levels, such as sustainable manufacturing, industrial ecology, ecological footprint, and cradle to cradle design (Despeisse et al. 2012). According to Garetti and Taisch (2011), sustainable manufacturing is considered as the major issue to address the bigger picture of sustainable development. As the interest of sustainable manufacturing has grown and organizations want to be able to use less resources and produce in a more environmentally friendly way. At the same time, they want to have the capacity of producing a larger number of products (Hami, Muhamad & Ebrahim, 2015). However, even if this concept started to gain popularity in the 1970s, there is still no global agreement and acceptance of the definition for sustainable manufacturing, especially among researchers and scholars (Moldavska & Welo, 2017; Nakano, 2010). There has been various interpretations of the concept and multiple definitions have been proposed but none of them is accepted on a larger, global scale (Rosen & Kishawy, 2012; Haapala, Zhao, Camelio, Sutherland, Skerlos, Dornfeld, Jawahir, Clarens & Rickli, 2013).

Some researchers describe sustainable manufacturing (SM) as simultaneous use of production methods and technologies can improve the economic, social, and environmental performances (Hami, Muhamad, & Ebrahim, 2015). Madu (2001) elaborated that with SM, manufacturers can add value to their products and services by effectively using the earth's limited resources, targeting the clean production system and by generating less pollution in the environment.

Moldavska and Welo (2017) explained that different definitions have been developed due to authors changing and making adjustments in their interpretation and definition for sustainable manufacturing. The authors also added that having a concept that is not well defined could make it more difficult for organizations to adapt the concept into practice (Moldavska & Welo, 2017). In this context, the organization does not form a clear picture of sustainable manufacturing, which is needed to implement associated practices. It also hinders them from getting a clear understanding and view of the concept, which is necessary when it comes to the implementation (Moldavska & Welo, 2017).

An empirical study by Ihlend and Roper (2014) gives an insight that the companies which do not make any attempt to explicitly describe the idea of sustainable manufacturing, they pursue it with unclear strategies (Sartal et al. 2020). Despeisee et al. (2012) argued that to enable the more effective communication to implement the SM practices, there is a need for more common terminology and vocabulary in the field of sustainable manufacturing.

According to Moldavska and Welo (2017), their study showed that the most broadly accepted definition for sustainable manufacturing was defined in 2008 by the US Department of Commerce. They define it as, the procedures when creating products should be through processes that decrease the usage of natural resources and energy, and should decrease the negative impacts on the environment. It should also be applicable and reasonable from an economical standpoint and safe for consumers, employees and the products (Moldavska & Welo, 2017; United States Environmental Protection Agency, 2020).

2.1.2 Definition of Sustainability

A reason why there is a lack of a definition of sustainable manufacturing that is broadly accepted, is because of the related term and concept, sustainability (Moldavska & Welo, 2017). There are several definitions and interpretations of sustainability and its related terms as well but there is a lack of a standard definition. It could be seen as different factors, for example sustainability could be viewed as a goal, an action or a push for environmental change or as a process. Some terms such as “being sustainable” could also be difficult to measure and there is a lack of agreed standards for how to measure it. Having many different definitions and terms in the field of sustainable manufacturing research have become an obstacle for organizations and researchers. They are experiencing difficulties when it comes to sharing knowledge with each other (Moldavska & Welo, 2017; Sartal et al. 2020; Missimer, Robèrt & Broman, 2017). Ihlen and Roper (2014) also argued that instead of identifying the crucial problems and difficulties that organizations are facing regarding the concept, they commonly look upon and accept sustainability as being true and uncomplicated and simple, they see it as a given.

Moore, Mascarenhas, Bain and Straus (2017) stated that the broadly accepted definitions that are missing in research and literature has made it challenging for the research field for sustainability. However, in many researches, the definition of sustainability has often been associated with three key dimensions, including environmental, economic and social. It shows the relationships between the dimensions and how these can have an impact on society (Rosen, 2018; Giovannoni & Fabietti, 2013).

2.2 Sustainable Manufacturing

Historically, the sustainability concept emerged in the 1970's when the business ethics was under debate (Schaltegger & Wagner, 2006; Hami, Muhamad & Ebrahim, 2015). During the 1970s and later, many started to realize and notice that the society was facing environmental problems and was affected by the growth of industries, increased usage of natural resources and increased pollution. The population among humans was also a crucial factor that had an impact on the environment. These concerns came mostly from researchers, governments and organizations (Robinson, Meadows, Meadows, Randers & Behrens, 1973; Sartal et al. 2020).

With regard to global issues such as resource distribution, inequality and population impacts, the World commission proposed a new concept in 1987 which is called sustainable development (Hami, Muhamad & Ebrahim, 2015). Sustainable development can be defined as a way to organize the society that meets the needs of the present without compromising the ability of future generations' needs (WCED, 1987; Hami, Muhamad & Ebrahim, 2015). That definition is more general and often used in many contexts to describe sustainability and sustainable development. Afterwards, more discussion regarding sustainability and unsustainability started to emerge and various goals for improving the environment and having sustainable development were set (Sartal et al. 2020).

Manufacturing organizations are feeling the need to manage their systems and processes in a more environmentally friendly way as the awareness around the environment is growing among stakeholders. It requires and drives them to search for practices that have less negative impact on the environment such as adopting greener practices and behaviors for resource and environment management (Khan et al. 2021). The increased awareness also pushes organizations to involve the three key dimensions of sustainability in different aspects of their business, including logistics, production, design and marketing. In addition, other factors that could contribute to organizations taking the environment, economic and social factors into consideration are stricter laws and regulations from governments, lower usage of resources leading to reduction of costs and growth and benefits from an economical view due to a higher demand and acceptance in sustainable products (Sartal et al. 2020; Bogue, 2014). Adopting environmentally friendly manufacturing practices could not only increase the market share but it could also lead to maximizing the customer loyalty (Jayaraman, Singh & Anandnarayan, 2012).

Khan et al. (2021) mentioned that sustainability is an essential part for organizations in order to handle environmental issues. The authors also explained that, when it comes to manufacturing organizations, they used to overlook the environmental and social factors and primarily focus on the financial aspect and its growth (Khan et al. 2021). However, the growing awareness around the environment and sustainability among stakeholders has led to an increased demand for more sustainable measures at the manufacturing organizations. Especially since the carbon dioxide emissions have surged, it is necessary for the organizations to discuss and approach these issues that have an impact on the environment (Khan et al. 2021; Chofreh, 2015).

2.2.1 Sustainability Work in Sweden

The Environmental Performance Index makes analysis and comparisons on the environmental performances of 180 countries. In the 2020 index, the results showed that Sweden came in 8th place among the countries around the world (Environmental Performance Index, 2020). Another sustainability ranking that analyzes the three main dimensions placed Sweden in 1st place in 2020 (Robeco, 2020; Schieler, 2021). Sweden has also been named as the most sustainable country in EU and in the world (Månsson, 2016; Alptekin, 2015). Sustainability has also become a more important topic among consumers living in Sweden. A Swedish report by Insight Intelligence (2020) showed that 95% of the Swedish respondents see sustainability as important. Another result showed that even if over 60% answered that they are living a sustainable lifestyle, about the same percentage answered that they believe Swedish people in general are living sustainably only to an extent or to no extent at all. Additionally, the report indicates that sustainability affects the choices of workplace and

consumption. 77% also answered that they find it difficult to know if an organization or authority is sustainable and almost 30% do not put in effort to find out (Insight Intelligence, 2020).

Many respondents from the Insight Intelligence report (2020), almost 70%, think the government has the primary responsibility when it comes to the development towards a more sustainable society. The Swedish government is working on developing and improving their sustainability initiatives and also promoting and encouraging organizations to put more effort into their sustainability work. For example, in 2007, Sweden started to require state-owned organizations to make sustainability reports that satisfy the guidelines found in the Global Reporting Initiative (GRI). The country became the first one to do this. The government does also have an expectation from all Swedish organizations to recognize human rights and comply with different guidelines and principles from the Organisation for Economic Co-operation and Development (OECD) and the United Nation's Guiding Principles on Business and Human Rights, and Global Compact (Sweden, 2020; Embassy of Sweden, 2018). The increased awareness and understanding have, together with a more strict legislation regarding sustainability and environment, contributed to the efficiency and innovation efforts being more environmentally friendly amongst Swedish organizations (Sweden, 2020).

2.3 Approaches and Concepts of Sustainable Manufacturing

Many different approaches and concepts within sustainable manufacturing have been proposed throughout the years (Sartal et al. 2020). A lot of them focus on the environment aspect and could for instance help organizations to make assessments and control the impacts that their manufacturing performances have. These approaches and improvements could be applied in different stages and processes of the organizations' lifecycles, from the design phase to the end-of-life management phase. A common tool that is used by many organizations to help them improve these performances is the Environmental Management System (Sartal et al. 2020; Chavan, 2005).

In the past, sustainable manufacturing was covered under the label of environmentally conscious manufacturing (ECM). In ECM, the organization deals with the green principles in which they are more concerned with developing methods for manufacturing that start with conceptual design to product to final delivery to consumers and at the last end of life (EOL) disposal (Ilgin & Gupta, 2010). Now the manufacturer industry is more focused on lean manufacturing (Lewis, 2000; Yang, Hong & Modi, 2011; Despeisse et al. 2012). Lean manufacturing is about reducing the need to maximize the resource utilization through minimization of waste, overcome the need of managing large inventories, and provide the optimum quality at the least cost an immediate part of the manufacturing process (Čiarnienė & Vienažindienė, 2012**)**. Sundar, Balaji and Satheesh Kumar (2014) described that implementing a lean manufacturing system is considered as a core competency for any type of organization to sustain. Lean manufacturing aims to use less of everything, means fewer materials, less investment in machines and tools and less labor to design and manufacture the specific product (Womack, Jones & Roos, 2008; Sartal et al. 2020).

Liu, Cai, Jia, Zhang, Guo, Hu and Jiang (2018) argued that figuring out how to do the measurements and evaluations and how to improve the systems in sustainable manufacturing

could be a challenge in scientific research. The reason for that is because these systems is about adapting and balancing the social and environmental factors together with the production aspect, and at the same time, being able to acknowledge and manage resources and its effectiveness, how environmentally friendly the organization is, and also manage the costs and performances of the organization (Liu et al. 2018).

2.3.1 Triple Bottom Line

A more popular approach recently involves the Triple Bottom Line (TBL) perspective, also known as the 3P (people, planet, profit) and it was designed to include the social and environmental dimensions together with the economic one, instead of solely focusing on the economic aspect. It could relate to the definition for sustainable manufacturing proposed by the United States Environmental Protection Agency (2020), that the processes should reduce the negative impacts on the environment, use less natural resources and energy and in addition, improve the safety of the products and employees (Sartal et al. 2020; United States Environmental Protection Agency, 2020; Akbar & Irohara, 2018; Kisacik & Arslan, 2017). It points out that sustainable manufacturing manages and supports at least two factors of the Triple Bottom Line, which consist of the three dimensions that sustainability also includes (environmental, economic and social). This means that sustainable manufacturing manages the economical factor together with the social factor and the environmental factor (Akbar & Irohara, 2018). The connection between the factors of TBL and sustainable manufacturing have become beneficial and made this type of manufacturing more popular. However, most of the strategies in manufacturing are still restricted to one or two factors (Shankar, Kannan & Kumar, 2017). Braccini and Margherita (2019) argued that organizations behave sustainably when all three factors are supported.

The Triple Bottom Line makes it possible for organizations to measure the impacts that their operations have. For instance, they are enabled to measure environmental and social aspects, profitability and the organization's value seen from various stakeholders' sides. The concept is described as an accounting framework that connects the environmental, social and economic performances of an organization and could be used as a reporting tool. Many stakeholders are requiring more transparency and reliability in information regarding decision-making, performance and activities. TBL could help fulfill that requirement and gain trust among stakeholders. It is also common for organizations to publish these reports to show the stakeholders and the general public that they are being responsible and transparent (Kisacik & Arslan, 2017; Öztürk & Özçelik, 2014).

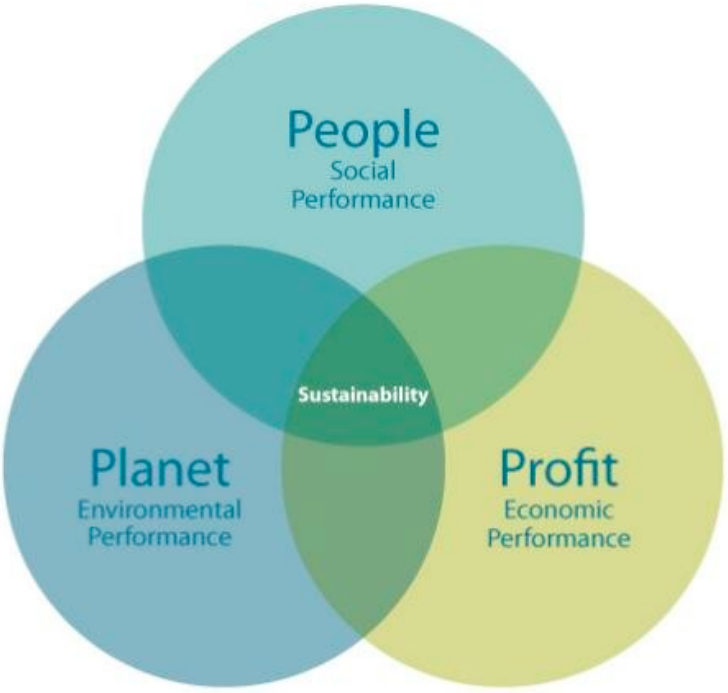


Figure 2.1: Triple Bottom Line (Kisacik & Arslan, 2017, p. 27)

Elkington, who introduced TBL, explained in an article 25 year later that rethinking the concept is necessary. A reason for that is because the original goal was to encourage changes in systems, encourage tracking and managing the gained or ruined values of the three main dimensions and focusing on the economic aspect, not financial. Even if the sustainability factor has grown and become successful many times, many organizations are still approaching management badly and the environmental issues are still increasing (Elkington, 2018; Kisacik & Arslan, 2017). Many leaders of organizations put a lot of effort into trying to reach the profit goals and be the best in the world but would not do the same for the other two Ps, planet and people and be what is best for the world. Failures that could put the organizations and lives at risk are also often hidden and the TBL reports that are published are often not being clear enough when it comes to the analysis of the data. The data should be analyzed to support the people making policies and decisions to understand and handle the activities and impacts caused by humans (Elkington, 2018; Kisacik & Arslan, 2017). Elkington (2018) further explained that measuring the successes or failures of goals regarding sustainability through profits and losses are difficult. It is necessary to instead do measurements with reference to the well-being of the planet and to the people. The Triple Bottom Line framework has become a tool for accounting and many have gained a mindset of compromise and trade-off (Elkington, 2018).

2.3.2 The 6R Concept

Moreover, to achieve sustainability in manufacturing needs a holistic view spanning not just the product and its manufacturing process, but also the whole process of supply chain and the manufacturing system across the multiple product life cycles (Jayal, Badurdeen, Dillon Jr. & Jawahir, 2010). For this, three integral interacting levels must be considered: products, processes and systems (Jawahir & Bradley, 2016; Kishawy, Hegab & Saad, 2018). In product level, organizations move beyond from the traditional 3R concept (reduce, reuse, recycle) that

promotes green technologies to the 6R concept (reduce, reuse, recover, redesign, remanufacture, recycle) which form the basis of sustainable manufacturing (Jawahir, Dillon, Rouch, Joshi, Venkatachalam, & Jaafar, 2006). Each factor of the concept does also have an impact and helps form the base of sustainability and its three main dimensions, environmental, social and economic (Yan & Feng, 2014). This methodology allows transforming an open-loop single life-cycle paradigm to a theoretical closed-loop multiple life-cycle paradigm (Jayal et al. 2010). Putting more attention on the 6R methodology could help the organizations to improve the implementation of sustainable manufacturing (Shankar, Kannan & Kumar, 2017).

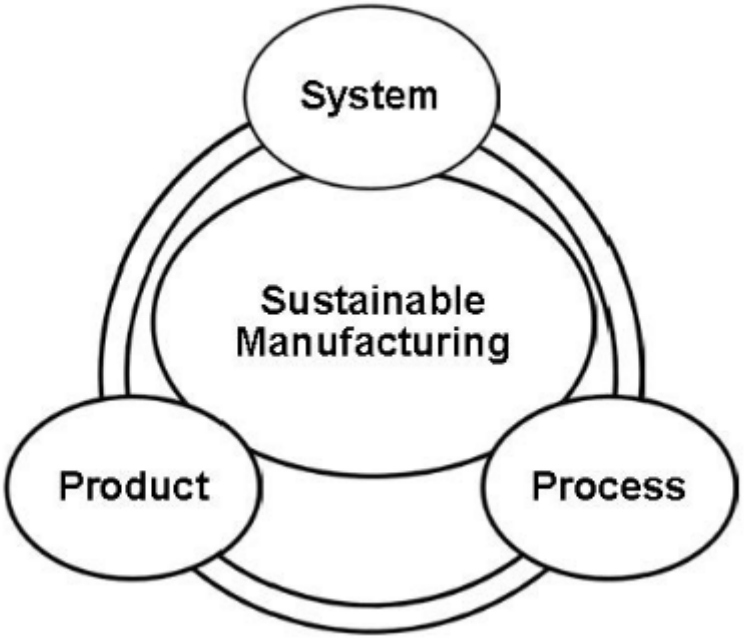


Figure 2.2: Three interacting levels in sustainable manufacturing (Kishawy, Hegab & Saad, 2018, p. 2)

The concept of the 6R is used in different sustainability aspects such as design and manufacturing. It helps organizations to expand a product's life and develop improvements after a product's first life cycle. It is, for example, expected that the raw materials that were used when producing and manufacturing the original product shall, after the first life cycle, recover and recycle before being used a second time, in another product (Yan & Feng, 2014; Jawahir & Bradley, 2016). The first factor of the concept, reduce, aims at the reduction of the usage and consumption of resources such as energy and raw materials, and also at the reduction of waste. It covers the reduction during the whole lifecycle of a product. The second factor, reuse, focuses on the products or parts of the products being reusable in other, similar products. Recycle, the third factor, is about modifying and reworking, and later improving materials in order to reuse it. The fourth factor, recover, targets the process during the end-of-life stage, which involves collecting the used products and later disassembling, sorting and cleaning them. The fifth one, redesign, is about improving the next products, making them more sustainable through innovation and facilitating processes for the future. The sixth factor, remanufacturing, focuses on the re-processes of used products or parts of a product (Yan & Feng, 2014; Kishawy, Hegab & Saad, 2018; Houshyar, Hoshyar & Sulaiman, 2014).

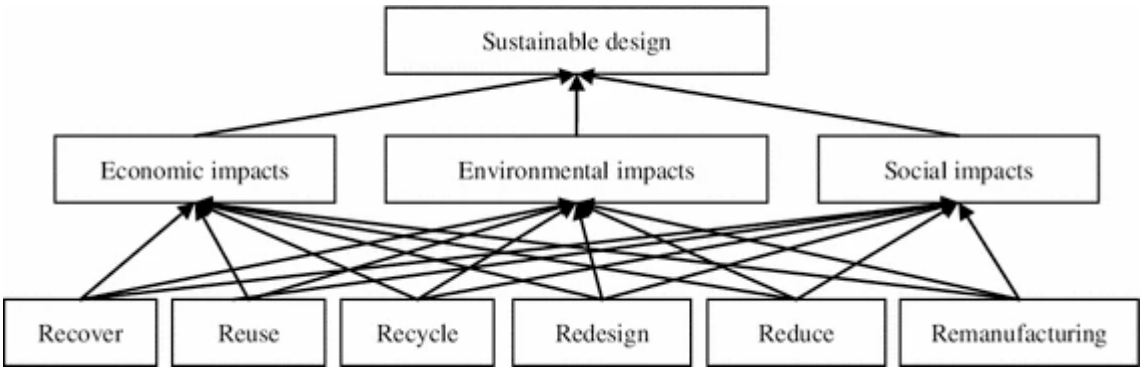


Figure 2.3: The 6R concept and its impact (Yan & Feng, 2014, p. 98)

In process level of sustainable manufacturing, there is need for an organization to achieve optimized technological improvements and process planning for reducing energy consumptions, wastes and occupational hazards etc, and for product life by manipulating process-induced surface integrity (Jawahir & Dhillon Jr., 2007; Jayal et al. 2010). At the system level, the organization should consider all the aspects of the entire supply chain and all major life-cycle stages such as pre-manufacturing, manufacturing, use and post-use (Badurdeen, Iyengar, Goldsby, Metta, Gupta & Jawahir, 2009). Traditionally, manufacturing organizations are mainly focusing on the phases including "pre-manufacturing", "manufacturing" and the "use stages of a product's lifecycle". This contributes to a large amount of waste. However, by implementing and practicing sustainable manufacturing, organizations could involve the whole lifecycle, which includes four stages, "pre-manufacturing", "manufacturing", "use" and "post-use" (Badurdeen & Jawahir, 2017; Huang & Badurdeen, 2017).

2.4 Consumers' Perception

As the awareness is increasing among consumers, the consumer demand for more sustainable products is growing as well (Hami, Muhamad & Ebrahim, 2015; Bogue, 2014; Khan et al. 2021). The number of requirements they set for these products are also rising (Zarte, Pechmann & Nunes, 2019). Bhattacharya and Sen (2004) stated that consumers are a key group among the stakeholders that have gotten a more influential role in organizations' sustainability practices. Gouda and Saranga (2020) argued on that point, while customers form an important part of stakeholders but there is conceptual difference between consumers' willingness to pay and stakeholder pressure. The authors stated that stakeholder pressure pushes the organization to be more authorized in their business practices and on other side, customers' willingness to pay gives a customer's valuation for environmentally and socially responsible products and processes. From this willingness to pay point of view, organizations choose sustainability management practices which are strongly influenced by customer pressure, because that pressure directly affects the firms' top line (Gouda & Saranga, 2020). Customers are well aware of environmental issues, they are therefore not willing to pay for a product that is produced from destructive environmental practices. Hence, it becomes more beneficial for organizations to produce sustainable products and gain financial growth (Bogue, 2014; Hami, Muhamad & Ebrahim, 2015; Khan et al. 2021).

It seems to be evident that the adoption of environmentally friendly manufacturing practices are not only perceived to increase market share but it also leads to customer loyalty

(Jayaraman, Singh & Anandnarayan, 2011). Presenting necessary information about sustainability and targeting it to the right group of consumers in order to broaden the benefits could be essential for organizations. The reason for that is because customers want information about the products they are purchasing. It is a way for them to make sure that the products are sustainable and safe to use (Amran, Ooi, Mydin & Devi, 2015; Sheikh, Mirza, Aftab & Asghar, 2014). Applying Information Systems for these types of cases, improves the transparency between consumers and manufacturers, and other actors in the supply chain (Zeng, Lee & Lo, 2020; Meacham, Toms, Green & Bhadauria, 2013).

Although there is a positive approach towards sustainability amongst people, many individuals find it difficult to keep up with a more sustainable living (Watson et al. 2012). They do not know how to uphold that behavior and a reason is because of the lack of necessary information. In order to have better information, each choice and decision should be associated with information about its impact on the environment. Therefore, having Information Systems that could inform people, in a clear, useful and correct way, about the consequences and overall effects of the decisions. Information in general is essential for creating a perception (Watson et al. 2012). How valuable the information on a website is for consumers, for instance, depends on how much usefulness it contains. It does not have to include a large amount of content in order to be a positive and decisive factor for the consumers and their behavior (Dvir & Gafni, 2018; Coker, 2013). Watson et al. (2012) explained that there are three ways where information could affect a consumer's perception on sustainability. The first one is information regarding a product, second one is information in sustainability reports from organizations and the third one is information in feedback about a consumer's impact on the environment (Watson et al. 2012).

2.4.1 Creating Awareness and Engagement

Studies have shown that awareness among consumers has a connection to consumer behavior (Cogut, Webster, Marans & Callewaert, 2019; Buerke, Straatmann, Lin-Hi & Müller, 2017). In the past years, the demand for sustainable products has steadily grown among customers due to increasing awareness about natural resources consumptions and environmental pollution has been addressed with responsible actions (Garetti & Taisch, 2011). Awareness, and engagement, play an essential role in becoming more sustainable. This means that consumers who are becoming more aware of sustainability and environmental issues, could also change their behavior and make more sustainable choices (Cogut et al. 2019; Buerke et al. 2017). In a study by Johnstone and Lindh (2017), they concluded that awareness could be linked to age. As people grow and age, awareness usually increases as well (Johnstone & Lindh, 2017).

It has become popular for organizations to use strategies and tools that are often used in a marketing context, to create awareness and advertise their brand and products (Ahmad, Musa & Harun, 2016). The use of social media and technology are also examples of tools used to share and spread information and awareness. It could encourage consumers to engage more with the organizations (Cata, Patel & Sakaguchi, 2013; Ahmad, Musa & Harun, 2016). However, the acceptance of the use of technology among individuals could differ depending on how used they are to technology and their ages (Asare & Asare, 2015).

Studies have tried to explore the effects of using tools such as games or gamification to spread sustainability awareness, if there is a link between these two. Gamification could be used as a

way of breaking habits and motivate changes in behavior that last (Knol & de Vries, 2011; Ro, Brauer, Kuntz, Shukla & Bensch, 2017; Paravizo, Chaim, Braatz, Muschard & Rozenfeld, 2018; Chappin, Bijvoet & Oei, 2017). The results of a study from Ro et al. (2017) revealed that games that have included sustainability concepts could influence the sustainability attitude and behavior of individuals. It is a way to educate and increase knowledge about sustainability and environmental issues as well. By playing games, the player could for example have different choices to make and if the sustainable options were taken, the player could get a reward with points (Ro et al. 2017; Chappin, Bijvoet & Oei, 2017).

2.4.2 Types of Consumers

In a report from 2020, the findings showed that customers feel happy after buying sustainable products (Jacobs et al. 2020). The products that are sustainable could have an impact on customer experience (Jacobs et al. 2020). Another report from 2020 looks into four types of consumers, "value-driven consumers", "purpose-driven consumers", "brand-driven consumers" and "product-driven consumers" (Haller, Lee & Cheung, 2020). The first type is described as those individuals who mainly care about getting good value from their money and choose brands and products based on convenience and price. They prefer to not change their habits in order to have less negative impact on the environment. The second type is more willing to pay a higher price for products and services with better quality. They care more about environmental issues and are willing to change their habits to reduce the environmental impact. The third type has the highest income on average, compared to the other types and they also spend more money. They trust organizations and their brands and they are willing to spend more for products and services that match their lifestyles. The fourth type is not as interested in purchasing products and services but when they do, they do research for most of their purchases. This type cares about the authenticity of a product and would pay a higher price for the transparency. The results showed that over 80% of the respondents fall into the first two categories (Haller, Lee & Cheung, 2020).

2.4.3 Corporate Social Responsibility

Corporate social responsibility (CSR) is a concept that presents the idea of organizations satisfying their responsibility and requirements within the financial and legal aspects, and at the same time have performance standards for their environmental and social factors (Ashrafi, Adams, Walker & Magnan, 2018; Hernández, Yañez-Araque & Moreno-García, 2020). This concept is popular among scholars, organizations and the society and the interest is still growing (Hernández, Yañez-Araque & Moreno-García, 2020). Taking such practices by an organization not only serves the main social purpose but also reveals that the company is green and makes the stakeholders such as customers and consumers satisfied about them (Garetti & Taisch, 2011). Through CSR, an organization can fulfill the highest expectations of citizens, consumers and investors concerns about environmental protection, economic growth and social cohesion (Alvarado-Herrera, Bigne, Aldas-Manzano & Curras-Perez, 2017).

Corporate social responsibility is a growing topic among the academic and management particularly regarding its effect on consumer behaviour variables (Maon, Lindgreen & Swaen, 2010; Peloza & Shang, 2011; Alvarado-Herrera et al. 2017). Bhattacharya and Sen (2004) explained that the consumer group is a key stakeholder that could more easily be affected by an organization's CSR drive and actions. There is a positive connection between the CSR

actions from an organization and how the customers react to that organization and their products. These positive results have led to organizations pushing to dedicate more resources and energy into CSR (Bhattacharya & Sen, 2004). Organizations could perform strategic CSR, which makes it possible for them to gain a competitive advantage long-term. It could also affect the social and financial aspect in a positive way (Yu & Liang, 2020).

2.5 Challenges

The major factors that motivate companies to adopt sustainable development are social responsibility, investor demands, government regulations and international standards, and increased customer consciousness (Li, Zhou & Liu, 2020; Nambiar, 2010). These factors also create a challenging environment for an organization to make a sustainable product. The governments and public organizations are issuing some regulations and standards which have a deep impact on the sustainability attitude to business, creating very compelling challenges for companies compliance (Garetti & Taisch, 2011). These regulatory forces and public environmental concerns have potential to influence the business operational processes and also change the market system (Jayaraman, Singh & Anandnarayan, 2012). Therefore, researchers have more focus on environmental aspects such as energy consumption and the challenges associated with reducing the carbon footprint (Mouzon, Yildirim & Twomey, 2007). Another major challenge that companies face is regarding customer behaviour that is changing dramatically in the past few years and a steady increase in this change is expected (Garetti & Taisch, 2011).

2.6 Summary Of Literature Review

The table below summarizes the literature review by dividing it into different categories that include the related factors. The authors that were referred for a specific category and its factors are also shown.

Table 2.1: Summary of the literature

Category	Factor	Author
Definition of Sustainable Manufacturing	● Sustainable manufacturing ● Definition	Despeisse et al. 2012; Garetti & Taisch, 2011; Hami, Muhamad & Ebrahim, 2015; Moldavska & Welo, 2017; Nakano, 2010; Rosen & Kishawy, 2012; Haapala et al. 2013; Madu, 2001; Ihlend & Roper, 2014; Sartal et al. 2020; United States

		Environmental Protection Agency, 2020
Definition of Sustainability	● Sustainability ● Definition	Moldavska & Welo, 2017; Sartal et al. 2020; Missimer, Robèrt & Broman, 2017; Ihlend & Roper, 2014; Moore et al. 2017; Rosen, 2018; Giovannoni & Fabietti, 2013
Sustainable Manufacturing	● Increased awareness ● Key dimensions ● Pressure	Schaltegger & Wagner, 2006; Hami, Muhamad & Ebrahim, 2015; Robinson et al. 1973; Sartal et al. 2020; WCED, 1987; Khan et al. 2021; Bogue, 2014; Jayaraman, Singh & Anandnarayan, 2012; Chofreh, 2015
Sustainability Work in Sweden	● Ranking ● Sweden ● Swedish consumers ● Guidelines ● Sustainability work	Environmental Performance Index, 2020; Robeco, 2020; Schieler, 2021; Månsson, 2016; Alptekin, 2015; Insight Intelligence, 2020; Sweden, 2020; Embassy of Sweden, 2018
Approaches and Concepts of Sustainable Manufacturing	● Approaches ● Concepts ● Frameworks ● Sustainable manufacturing	Sartal et al. 2020; Chavan, 2005; Ilgin & Gupta, 2010; Lewis, 2000; Yang et al. 2011; Despeisse et al. 2012; Čiarnienė & Vienažindienė, 2012; Sundar, Balaji & Satheesh Kumar, 2014; Womack et al. 2008; Liu et al. 2018
Triple Bottom Line (TBL)	● Approach ● Triple Bottom Line ● Social, environmental & economic	United States Environmental Protection Agency, 2020; Sartal et al. 2020; Akbar & Irohara, 2018; Kisacik &

		Arslan, 2017; Shankar, Kannan & Kumar, 2017; Braccini & Margherita, 2019; Öztürk & Özçelik, 2014; Elkington, 2018
The 6R Concept	● Concept ● 6Rs	Jayal et al. 2010; Jawahir & Bradley, 2016; Kishawy, Hegab & Saad, 2018; Jawahir et al. 2006; Yan & Feng, 2014; Shankar, Kannan & Kumar, 2017; Houshyar, Hoshyar & Sulaiman, 2014; Jawahir & Dhillon Jr., 2007; Badurdeen et al. 2009; Badurdeen & Jawahir, 2017; Huang & Badurdeen, 2017
Consumers' Perception	● Growing awareness ● Consumers ● Demands	Hami, Muhamad & Ebrahim, 2015; Bogue, 2014; Khan et al. 2021; Zarte, Pechmann & Nunes, 2019; Bhattacharya & Sen, 2004; Gouda & Saranga, 2020; Jayaraman, Singh, & Anandnarayan, 2011; Amran et al. 2015; Sheikh et al. 2014; Zeng, Lee & Lo, 2020; Meacham et al. 2013; Watson et al. 2012; Dvir & Gafni, 2018; Coker, 2013
Creating Awareness and Engagement	● Awareness & engagement ● Behavior and attitude ● Marketing ● Games ● QR codes	Garetti & Taisch, 2011; Cogut et al. 2019; Buerke et al. 2017; Johnstone & Lindh, 2017; Ahmad, Musa & Harun, 2016; Cata, Patel & Sakaguchi, 2013; Asare & Asare, 2015; Knol & de Vries, 2011; Ro et al. 2017; Paravizo et al. 2018;

		Chappin, Bijvoet & Oei, 2017
Types of Consumers	● Individuals ● Types	Jacobs et al. 2020; Haller, Lee & Cheung, 2020
Corporate Social Responsibility (CSR)	● Social Responsibility ● Concept ● Organizations ● Consumers	Ashrafi et al. 2018; Hernández, Yañez-Araque & Moreno-García, 2020; Garetti & Taisch, 2011; Maon, Lindgreen & Swaen, 2010; Peloza & Shang, 2011; Alvarado-Herrera et al. 2017; Bhattacharya & Sen, 2004; Yu & Liang, 2020
Challenges	● Legislation ● Behavior & attitude ● Demands	Li, Zhou & Liu, 2020; Nambiar, 2010; Garetti & Taisch, 2011; Jayaraman, Singh & Anandnarayan, 2012; Mouzon, Yildirim & Twomey, 2007

2.7 Conceptual Framework

The conceptual framework will help with the structure of this study, to identify relevant categories for the interviews and for the survey. After investigating the whole literature, suitable categories were created. These categories are inspired by the literature and are used as a guide to help structuring this research. They are therefore applied as headings in the empirical findings chapter and in the discussion section. Additionally, the framework is also used for the coding part.

The framework is divided into two main sections. The first section, which is the upper box (see Figure 2.4), is about the work, effects and challenges of sustainability and sustainable manufacturing and about consumer perception and awareness from an organization level. The second section (bottom box) represents the consumer perception on sustainable manufacturing and sustainable products.

The main goal of this study is to analyze the consumer perception of manufacturing organizations' work around sustainable manufacturing and sustainability in general. Therefore, the organizational view is divided into 8 themes and these are based on the sustainable practices that are adopted by the organizations to increase the customer value and get a competitive advantage (Jayaraman, Singh & Anandnarayan, 2012). The first two themes

deal with how organizations view sustainability and sustainable manufacturing. To address these themes, different definitions of these terms are discussed. This is followed by the theme, effects of sustainable manufacturing. This theme is about how an organization is affected by sustainable practices, financially and what effects it has on their brand image after adopting such practices. This is necessary in order to understand what changes an organization has noticed after applying sustainable manufacturing.

Apart from the themes mentioned above, concepts and approaches that the organization is using in their product lifecycle are included. The next theme is about the corporate social responsibility concept. This is important for those organizations who work with sustainability because this concept covers some performance standards that organizations should follow (Ashrafi et al. 2018; Hernández, Yañez-Araque & Moreno-García, 2020). The following two themes are about awareness around sustainability. The first one describes the increased awareness about sustainability among stakeholders. The next one is to create awareness, which means what organizations do to educate and create awareness among consumers. The last theme is the challenges that organizations face regarding sustainability and sustainable manufacturing.

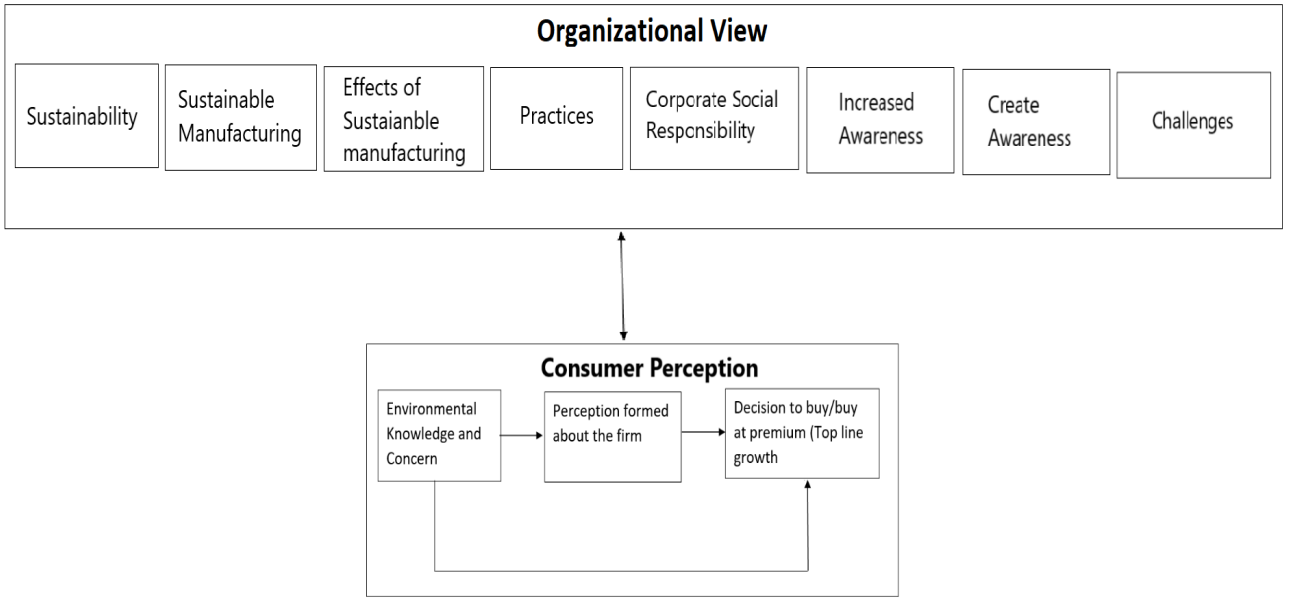


Figure 2.4: Our conceptual framework with another conceptual model (Jayaraman, Singh & Anandnarayan, 2012, p. 1403)

The next box represents the consumer perception related to sustainable products. This is based on three steps in a theory of what consumers think about before buying a product (Jayaraman, Singh & Anandnarayan, 2012). The first step is about environmental knowledge and concerns, which means how knowledgeable and concerned a consumer is. The following step is the perception that a consumer has on the firm. This means, if they have a positive view towards that firm or a more negative one based on, for instance how environmentally friendly the organization is, if the final product is sustainable and the process of manufacturing that product has a low negative impact on the environment. The last step focuses on whether the

consumer decides to purchase the product from that firm, and if he or she is willing to pay at a premium price (Jayaraman, Singh & Anandnarayan, 2012).

3 Research Method

This chapter is an overall description of research methodologies used to investigate and answer the research question. This section explains the preliminary methodological choices and consideration to introduce the bigger picture of how the empirical study was conducted.

3.1 Research Approach

For this research the authors wanted to gather knowledge about consumer perception on sustainable manufacturing. To obtain the answer to the created research question, the research approach was to use mixed methods. Mixed method approach has the features of both qualitative and quantitative research and combines them both in a unique way to answer the research question (Recker, 2013). The research question of this study begins with the word 'How' and according to Recker (2013) that type of question is explanatory and researcher's focus on explaining the causal mechanisms that are at work regarding a particular phenomenon. Moreover, for the research question, the study is targeting two groups, organizations and consumers, to collect the empirical data. The study looks into how both groups can get advantages from the practices that are adopted by an organization. This mixed method approach gives this study a greater diversity of divergent views regarding the research question and allows the authors to strengthen the research from this pluralistic approach (Recker, 2013).

To get the answer for the first part of the question, the qualitative approach is the best choice to understand the phenomena. Silverman (2020) described that through this qualitative research, the authors could understand particular human experience regarding the topic. Moreover, the qualitative approach would focus on non-numerical data which means people's beliefs, behaviours and experiences (Recker, 2013). Therefore, this approach will help analyze which practices are adopted by an organization to make manufacturing more sustainable. It is argued that the qualitative approach is suitable and more applicable for those phenomena that are not research enough and are still emerging (Creswell, 1994; Recker, 2013).

Moreover, to get knowledge about consumers regarding sustainable products and their perception, the study used a quantitative approach. A quantitative approach focuses on quantities and numbers which identifies the values and levels of theoretical concepts. The interpretation of numbers is viewed as strong scientific evidence of how a phenomenon works (Recker, 2013). As Patton (2015) explained, the major advantage of quantitative approach is measuring the reactions of people, limited to a set of questions about a topic. In this, the data is collected from the real world domain which is considered as a measuring variable to test a theory or to collect evidence in support of that theory (Recker, 2013).

3.2 Data Collection: Literature Review

At the start of the research, the systematic literature review was conducted. This literature review is considered as a foundation of this research. Moreover, it has gained importance before executing the data collection method because it gives an understanding of the problem and helps with finding new and interesting concepts which are useful for the empirical study (Recker, 2013). A careful and systematic literature review makes the authors avoid irrelevant approaches and provides new insightful perspectives (Randolph, 2009). The process to search the literature related to the topic was intense and time consuming.

The primary sources to find academic studies were Google Scholar and LUB Search, the latter is the library search engine of Lund University. LUB Search was also an essential part of the data collection as it was used multiple times as a way to access various journals and databases. The table below shows a smaller part of the process for searching, selecting and eliminating articles found in Google Scholar and used in the literature review. It includes keywords used when searching, the chosen articles and the number of hits from that search. After discussing the themes of this study and brainstorming some keywords and mixing and matching them, the words were added into the search bar. In order to narrow down the articles and the number of hits, the authors would sometimes limit the year range, for example from 2017- 2021 and many keywords were added into one search. Afterwards, the authors would go through some of the articles and select the relevant ones.

Table 3.1: Process of searching articles

Keywords	Year range	Article chosen	Number of hits
"sustainable manufacturing" "company" "organization" "industry" "overview" "concept" "approach" "dimensions" "environmental" "social" "economic" "definition" "sustainability" "impact" "waste"	Since 2020	• Sartal, Bellas, Mejıas & Garcıa-Colla do (2020)	461
"sustainable manufacturing" "impact" "consumer" "perception" "consumer perception" "sustainability" "environment" "product"	2010-2021	• Jayaraman, Singh & Anandnaraya n (2012)	53

"organization" "benefit" "growth" "attitude" "behavior"			
"sustainable" "manufacturing" "sustainable manufacturing" "sustainability" "issue" "environmental" "environment" "social" "economic" "challenge" "approach" "assessment" "system" "process" "product" "concept" "approach" "framework"	2010-2021	• Rosen & Kishawy, (2012) • Garetti & Taisch, 2011 • Zarte, Pechmann & Nunes, 2019	3340
"sustainable" "manufacturing" "sustainable manufacturing" "sustainability" "organization" "business" "issue" "environmental" "environment" "social" "economic" "approach" "system" "process" "product" "concept" "approach" "framework" "stage" "life-cycle"	2010-2021	• Kishawy, Hegab & Saad, 2018 • Zarte, Pechmann & Nunes, 2019	2250

3.3 Data Collection: Interview

Due to the mixed method approach, both qualitative and quantitative research methods for the data collection processes were used. To collect the data in a qualitative approach, the authors conducted interviews. Interviews give contextual information, based upon thoughts, feelings and emotions of informants (Oates, 2006). There are many different types of interviews, for example structured, semi-structured and unstructured interviews (Myers & Newman, 2007). For this research, semi-structured interviews were made. According to Recker (2013),

semi-structured interviews emphasize the two way communication among the interviewer and interviewee. Moreover, in semi-structured interviews, the researcher has a fully prepared script but they are not fully relying on the script and have room for improvisation to generate useful insights that were not expected by the interviewer before the interview began. In interviews, a symmetric conversation was adopted to establish the trust between the two parties and encourage the informants to express their thoughts and feelings freely (Kvale & Brinkmann, 2009). All the interviews were conducted remotely due to the current circumstances of the pandemic. Having the interviews on video calls were therefore useful but it was not mandatory. Online meetings made it possible to contact people that were out of the geographic range as well. It gave the authors the opportunity to broaden the selection of interviewees and not become limited to individuals who are located within a specific area. The authors could also be more flexible when deciding and scheduling a time for a meeting.

3.3.1 Design of the Interview Guide: From Literature to Questions

The interview guide was developed according to the presented themes and key terms. To ensure that the interview question and the answers target the identified problem, the authors categorized the questions related to the themes. In the themes column, keywords, quotes and elements were selected from the articles that are listed in the table below. The main focus was on choosing essential keywords the article proposes and form simple questions related to the main topic of research. The predetermined questions are used as a guide during the interview process (Recker, 2013).

Table 3.2: Interview guide inspired by the literature and themes

Theme & key terms	**Interview question**	**Author**
Definition ● Sustainable manufacturing ● Sustainability	1. How would you define the term sustainability? 2. What do you think about sustainable manufacturing?	Moldavska & Welo, 2017; Nakano, 2010; Rosen & Kishawy, 2012; Haapala, 2013; Hami, Muhamad, & Ebrahim, 2015; Madu, 2001; United States Environmental Protection Agency, 2020; Sartal et al. 2020; Missimer, Robèrt & Broman, 2017; Moore et al. 2017; Rosen, 2018; Giovannoni & Fabietti, 2013
Sustainable Manufacturing ● Main drivers ● Effects	3. How long has the organization been focusing on sustainable manufacturing?	Khan et al. 2021; Sartal et al. 2020; Bogue,

● Pressure ● Awareness ● Stakeholders	4. What are the main drivers that push the organization to make manufacturing sustainable? 5. What changes has the organization noticed after applying sustainable manufacturing? a. Financially b. Brand image and customer perception 6. Has the increased awareness from stakeholders put some pressure on the organization? If so, how does the organization handle it?	2014; Jayaraman, Singh & Anandnarayan, 2012
Approaches and concepts ● Triple Bottom Line ● 6R concept	7. Which practices has the organization adopted in order to have less negative impact on the environment? a. What approach and concept does the organization use in their product lifecycle? b. Are some popular approaches and concepts such as Triple Bottom Line (TBL), the 6R concept (“reduce”, “reuse”, “recycle”, “recover”, “redesign” and “remanufacture”) applied in the organization?	Liu et al. 2018; United States Environmental Protection Agency, 2020; Akbar & Irohara, 2018; Kisacik & Arslan, 2017; Öztürk & Özçelik, 2014; Elkington, 2018; Jawahir et al. 2006; Shankar, Kannan & Kumar, 2017
Other concepts ● Environmentally conscious manufacturing ● Lean manufacturing	8. Does the organization focus on environmentally conscious manufacturing (ECM) or lean manufacturing?	Ilgin & Gupta, 2010; Lewis, 2000; Yang et al. 2011; Despeisse et al. 2012; Čiarnienė & Vienažindienė, 2012; Womack et al. 2008; Sartal et al. 2020

Consumer perception ● Increased awareness ● Creating awareness and engagement ● Behavior and attitude	9. What does the organization do to create awareness around sustainability? a. What does the organization do to spread information about their work regarding sustainability and sustainable manufacturing? 10. How has the increased awareness from consumers affected the organization? Do you feel that consumers have a bigger impact and more power now?	Hami, Muhamad & Ebrahim, 2015; Bogue, 2014; Khan et al. 2021; Zarte, Pechmann & Nunes, 2019; Bhattacharya & Sen, 2004; Gouda & Saranga, 2020; Jayaraman, Singh, & Anandnarayan, 2011; Amran, 2015; Sheikh, 2014; Garetti & Taisch, 2011; Cogut, 2019; Buerke, 2017; Ahmad, Musa & Harun, 2016; O'Rourke and Ringer, 2015
Consumers ● Types of consumers	11. Is the organization targeting any specific groups of consumers? (Eg. consumers who want to purchase green products, consumers who do not care, etc.)	Haller, Lee & Cheung, 2020
Corporate social responsibility ● Concept ● Environmental, social, economic ● Brand image	12. Does the organization work with Corporate social responsibility (CSR)? If yes, how?	Ashrafi, 2018; Hernández, Yañez-Araque & Moreno-García, 2020; Bhattacharya & Sen, 2004; Yu & Liang, 2020
Challenges ● Responsibility ● Demand ● Legislation ● Changes	13. What challenges has the organization faced when changing their systems? 14. What are the current challenges that the organization is facing today? 15. Do the challenges that the organization had before implementing sustainable	Li, Zhou & Liu, 2020; Nambiar, 2010; Garetti & Taisch, 2011; Jayaraman, Singh & Anandnarayan, 2012

	manufacturing differ from the current ones? If so, how? 16. What challenges is the organization currently facing regarding their work with consumers? a. Any possible future challenges?	

At the beginning of the interview guide, some ethical and general questions were included which are important to start the interview process. Bhattacherjee (2012) stated that the interview process could start with questions that the interviewee finds non-threatening, such as questions related to the organization and what position he/she possesses. Other details to give the respondent is the authors' role as researchers and give him/her an overview of the topic. Additionally, asking the respondents for permission to record and transcribe the interviews and if he/she would prefer to be anonymous or not in this research are necessary. Recording and transcribing are considered as the most important phase of an interview process (Recker, 2013). At the end of the interview, the recordings were transcribed carefully with the awareness of the fact that transcribing is a time consuming process (Oates, 2006).

3.3.2 Selection of Respondents

The main focus of this study is on manufacturing companies who work on sustainability. The authors wanted to determine some criterias to select the respondents for the interviews. The main criteria when selecting was that the respondent should be from a packaging manufacturing company that is specifically based in Sweden. The interviewee should have some work experience and knowledge in sustainability in order to provide answers regarding sustainable manufacturing in their organization. After setting these criterias, organizations who fulfilled the requirements were found. The organizations were selected and the individuals who are working with sustainability were contacted. The first three interviewees were contacted via LinkedIn and the last informant was contacted by email.

Table 3.3: Overview of the participating interviewees

Organization	**Name of the interviewee**	**Role**	**Date**	**Place**	**Interview length**	**Recorded**
Duni Group	P1	Responsible for sustainability	April 28th 2021	Video call on Zoom	Approx. 35 min	Yes
Tetra Pak	Julian Fox (P2)	Director, Sustainable Sourcing & Operations	May 5th 2021	Video call on Microsoft Teams	Approx. 50 min	Yes

Anonymous	P3	Director of sustainability	May 6th 2021	Video call on Microsoft Teams	Approx. 35 min	Yes
Anonymous	P4	Market Sustainability Expert	May 10th 2021	Video call on Zoom	Approx. 55 min	Yes

3.4 Data Collection: Survey

For the data collection of the quantitative approach, surveys were conducted and sent out to individuals that live in Sweden. The quantitative study gives the possibility to reach out to a number of people, and obtain the generalizable findings after the data analysis process (Patton, 2015). The main purpose of conducting the survey is mainly to get the individual perspective on sustainable practices which are adopted by an organization. A major aspect to conduct this survey is to get a reaction from a number of people to get the knowledge about the common people and their perspective regarding sustainable products. Moreover, the anonymity provided by a survey can be helpful to acquire the truthful answers (Schlienger & Teufel, 2003). The collected data is used to look for patterns that can generalize the larger population (Oates, 2006).

3.4.1 Design of the Survey: From Interview Questions to Survey Questions

To design the survey questionnaire, some key factors were kept in mind. According to Oates (2006), there is a need to find what data requirements are and the question generated on the survey is associated with the research question. So the authors designed the questionnaire by connecting them with the interview guide questions to get the perspectives from both sides. This also enabled the authors to connect the study overall, especially the qualitative and quantitative data. The questions in the survey were comprehensible for the individuals, who may not have much knowledge about the topic. At the start of the survey, information related to the research issue was added and definitions of the terms used were given as well. This survey was created through the help of an online software tool (Google Forms).

The table below describes how the interview questions were transformed into survey questions. The authors separated the two types of questions in two different columns and the third column shows the comparison of the interview and survey questions. In the connection column, the interview question (IQ) represents the organisational aspect and the survey questions (SQ) are more general questions that are directed to the individuals responding to the survey.

Table 3.4: Creation of the survey questions based on the interview questions

Interview question (IQ)	**Survey question (SQ)**	**Connection**

1. Has the increased awareness from stakeholders put some pressure on the organization? If so, how does the organization handle it?	1. How aware are you about sustainability?	IQ1: If the increased awareness has led to more pressure for organizations SQ1: If the individual is aware of sustainability and to what extent
2. Has the increased awareness from stakeholders put some pressure on the organization? If so, how does the organization handle it?	2. How aware are you about sustainable manufacturing?	IQ2: If the organizations is feeling more pressure due to the growing awareness among stakeholders SQ2: If the individual is aware of sustainable manufacturing and to what extent
3. What does the organization do to spread information about their work regarding sustainability and sustainable manufacturing?	3. Do you think manufacturing organizations are spreading enough awareness about their work with sustainable manufacturing and sustainability?	IQ3: The organization's work to inform about their sustainability work and sustainable manufacturing SQ3: The individual's own thought on if organizations are informing enough their work
4. What does the organization do to create awareness around sustainability?	4. From which medium do you get awareness about sustainability and sustainable manufacturing?	IQ4: How the organization creates awareness about sustainability SQ4: Where the individual get awareness
5. What does the organization do to spread information about their work regarding sustainability and sustainable manufacturing?	5. From which medium do you think is the best way to get your attention and educate people and spread information about sustainability and sustainable manufacturing?	IQ5: How the organization spread information about sustainability and sustainable manufacturing SQ5: Which mediums the individual thinks are the best way to get their attention
6. How has the	6. Has the awareness	IQ6: How the

increased awareness from consumers affected the organization? Do you feel that consumers have a bigger impact and more power now?	changed your way of living?	organization is affected by the increased awareness, especially among consumers SQ6: If the individual's living and lifestyle have changed due to awareness
7. Is the organization targeting any specific groups of consumers? (Eg. consumers who want to purchase green products, consumers who do not care, etc.)	7. Which of these following types of consumers are you?	IQ7: If the organization is targeting and putting consumers into different groups and categories SQ7: What type of consumer the individual is
8. Does the organization work with Corporate social responsibility (CSR)? If yes, how?	8. Do you think an organization who does sustainable manufacturing and works with Corporate social responsibility (CSR) gives you a positive image of them?	IQ8: The organization's work with Corporate social responsibility, if they work with it SQ8: If the individual thinks that taking responsibility in society gives them a good impression of an organization

3.4.2 Selection of the Survey Participants and Publication of the Survey

To select the survey participants, there were no specific criterias to target a certain group. This research is on the Swedish organizations, which is why the authors wanted to investigate the perception of Swedish consumers regarding sustainable manufacturing and sustainability. That is the reason for the following question in the questionnaire "Do you live in Sweden?" to make sure that the respondents are living in Sweden. The questionnaire was sent out to social media platforms such as Facebook in order to reach out to a broader range of individuals. It is important to take into account that the respondents do not have a correlation with the organizations interviewed, which could have an effect on the results. The questionnaire was sent to different types of individuals such as students, employed and unemployed.

3.4.3 Assumptions

While reviewing the literature and gaining more knowledge around the topic of this research, some assumptions, or hypotheses were formed. It guided the authors during the making of the survey questions, together with the interview guide. In addition, these assumptions enabled

the authors to facilitate the comparison and discussion between literature and the survey. Especially since the literature is mainly about awareness and perception in general and how consumers are affected and how they are affecting manufacturing organizations on a more general level and not specifically about Swedish consumers' which is what this research aims to study. The assumptions are listed in the table below and it also includes which references the assumptions were inspired by. They are later discussed in the discussion section.

Table 3.5: Assumptions

Assumption	Article
1. The awareness about sustainability has increased in Sweden	Hami, Muhamad & Ebrahim, 2015; Khan et al. 2021; Jayaraman, Singh, & Anandnarayan, 2011; Garetti & Taisch, 2011
2. The awareness about sustainable manufacturing has increased in Sweden	Hami, Muhamad & Ebrahim, 2015; Bogue, 2014; Khan et al. 2021
3. It has changed the way Swedish consumers are living	Zarte, Pechmann & Nunes, 2019; Gouda & Saranga, 2020; Jacobs et al. 2020; Cogut et al. 2019; Buerke et al. 2017
4. It has changed the way Swedish consumers view organizations	Gouda & Saranga, 2020; Jayaraman, Singh, & Anandnarayan, 2011; Watson et al. 2012
5. There are different types of consumers	Haller, Lee & Cheung, 2020; Jacobs et al. 2020
6. CSR could have a positive impact	Garetti & Taisch, 2011; Bhattacharya & Sen, 2004

3.5 Data Analysis

As this study is performing a mixed method approach, according to Recker (2013), data collection and analysis consist of vast amounts of data which are interlinked and dependent on each other. The authors analyzed both types of data separately first and then connected them by comparing and identifying similarities and differences.

3.5.1 Analyzing the Interviews

For the qualitative analysis, the inductive analysis approach was used. In this approach the authors built up the patterns, themes and concepts by examining the collected data (Recker, 2013). Moreover, in this the study performed a bottom-up approach during the analysis, which means by using the views from different respondents, broader themes are built and then generated the theories by interconnecting these different themes (Soiferman, 2010). The authors started the analysis of qualitative data by transcribing the interviews, which can be found in Appendix 4 to 7. In this transcription process, the oral data were transformed into a written structure to perform the analysis (Kvale & Brinkmann, 2009). By listening to all the recordings again and again, it could ensure that the respondents had not been misinterpreted and the quotes are said correctly while conducting the analysis. The authors transcribed these interviews after getting permission from the respondents. After finishing the transcriptions, a coding method was used to reduce and make sense of the vast amount of data that had been collected.

In the coding method, the authors categorized all the collected data to distinguish the irrelevant data from the relevant data. The categories used for the coding are identical to the ones in the upper part of the conceptual framework. They are also aligned with the main themes of the interview guide. After having finished transcripts, the authors read through all of them individually and assigned the relevant color and code to each answer. Relevant quotes were also selected for the empirical findings section and these were, together with the transcripts, sent to respective interviewee. A table of the categories and its respective coding and color is presented below (Table 3.6).

Table 3.6: Coding table

Category	**Code**	**Color**
Sustainability	O-S	Orange
Sustainable Manufacturing	O-SM	Yellow
Effects of Sustainable Manufacturing	O-ESM	Green
Practices	O-P	Cyan
Corporate Social Responsibility	O-CSR	Brown
Increased Awareness	O-IA	Pink
Create Awareness	O-CA	Beige
Challenges	O-Ch	Purple

In order to give a better understanding of how the coding was used in the transcripts, a short excerpt of one of the transcripts is presented in the table below (Table 3.7).

Table 3.7: An excerpt of the transcription of the fourth interview

Line	Person	Transcription	Code
24.	Int	And what do you think are the main drivers that push the organization to make manufacturing sustainable?	
25.	P4	Today, I would say sustainability is a must-have, at least here I would say.	O-S
26.	Int	Ok, so maybe it's a little bit difficult to answer this since you guys have had it from the beginning but what changes has the organization noticed after applying sustainable manufacturing from a financial point of view?	
27.	P4	As you said, it's hard to answer that question so maybe that's not possible to answer but we can see certainly that the shift in society, to more sustainability-focus has impacted us. We see that our customers have more demands when it comes to sustainability and more sustainable products and processes than before.	O-IA

By doing this, the work with the analysis of the findings and the identifications of similar and contradictory responses from the interviewees were facilitated. The empirical findings and discussion chapters were divided into the same categories as the ones from the coding table, which helps this study to hold its structure and it also makes it easier to work with the empirical findings and discussion sections.

3.5.2 Analyzing the Survey

After getting a total of 72 responses, the survey was closed and the authors started to look through it and analyze the data. With the help of the survey tool, Google Forms, the authors could look at the results in various ways. It could for example be viewed as a summarized version of the results with pie charts or go more in depth and study the amount of responses on each question and how many chose a specific option. It was also possible to view how each individual filled out the survey but not who answered it. During the analysis process, the summarized pie charts were mainly used since they gave a better overview of Swedish consumers' thinking and a better understanding of the general view. However, the authors did go through each answer together to get a more detailed picture. After that, a discussion was held between the authors to select the relevant categories from the coding table and apply them to the results of the survey. This facilitated the compilation of the collected data from the interviews and survey, especially for the discussion section.

3.6 Ethics

Taking ethical considerations is essential when doing research according to Recker (2013). It is necessary to include the ethical aspect into various parts of the research process, for example, during the process of collecting and storing the empirical data and during the process of writing and reporting the study. By taking this aspect into consideration and making sure that the principles and guidelines are followed, it provides us, as researchers, some guidance. It helps determine and understand what an acceptable behavior is and what kind of behavior is unacceptable. This is a useful way of improving and correcting the behavior when making decisions and choices (Recker, 2013). Ethical considerations focus largely on the moral factors and questions of what is good and bad, and what is right and wrong. These have been viewed as important factors for a long time and have been applied in the field of Information Systems, both in theory by researchers and in practice, by organizations (Stahl, Eden, Jirotka & Coeckelbergh, 2014; Recker, 2013).

Taking responsibility in research overall is essential. A key guideline in ethics is to take responsibility to ensure that permission is granted from participants. This could be necessary in the Information Systems field because it includes social science (Recker, 2013). Recording the interviews is useful for the study and Bhattacherjee (2012) suggested that it is crucial to ask for permission before recording an interview. Walsham (2006) also highlighted that it should be tackled at the beginning of the interview. The authors followed these guidelines by including a contract section in the interview guide, which was used at the beginning of each interview. Every interview started with the questions in the contract part, which includes permission to record and transcribe.

The authors also made sure to be transparent and inform the interviewees about necessary information such as the purpose of the study, who they are and that the collected data would solely be used for research purposes and for the publication of a Master thesis. This was done at the beginning of each interview, as recommended by Walsham (2006). Making a disclosure is another ethical factor that should be taken into consideration. Showing transparency and informing participants about the researchers, the purpose and so on, helps the researchers to assure that the participating individuals are receiving the essential information (Bhattacherjee, 2012; Patton, 2015).

Ethical factors such as anonymity, voluntary participation and confidentiality should be considered, especially when conducting interviews. The participating interviewees should have the right to be anonymous and be sure that there is confidentiality (Recker, 2013, Patton, 2015; Bhattacherjee, 2012). The readers should not be able to identify the interviewees that chose to stay anonymous (Walsham, 2006). The authors made sure to ask all the participants, at the beginning of each interview, if they were allowed to use their name and the name of the organization or if they wanted to be anonymous. This question was included in the contract section. Additionally, the authors explained that they could cover any confidential information afterwards if necessary. Recker (2013) added that having physical interviews could make it difficult for the interviewee to stay anonymous. However, all of the interviews were online, which for example makes it possible for the interviewees to choose if they want to have their cameras on or not. The authors also informed them that they had the right to withdraw and cancel the interview anytime they wanted, which ensured voluntary participation.

This study includes a survey and ethical considerations need to be taken into account when collecting this type of data as well. Factors such as voluntary participation, anonymity and

disclosure are some examples that should be covered (Bhattacherjee, 2012; Patton, 2015). The respondents got to decide for themselves whether or not they wanted to participate in the survey by answering the questions. They could also choose to cancel it anytime they wanted by closing the survey. This ensured that the participation was voluntary. The respondents were responding to the survey anonymously, which ensured anonymity. Additionally, the authors made sure that there was disclosure by explaining the purpose of the study at the beginning of the survey.

Researchers should be transparent about their findings, good and bad (Bhattacherjee, 2012). It is therefore important that all of the findings are shown throughout the research paper. Recker (2013) also highlighted the importance of ethical considerations regarding the transcription, analysis and storage of the collected data. They should be stored in a safe and appropriate place and only for a limited time. The authors took this into consideration and made sure to store it where other, unauthorized individuals could not access the data.

3.7 Research Quality

3.7.1 Validity

Validity is an essential aspect to acknowledge when it comes to measuring and studying the quality of a research. This aspect looks at the collected data and the chosen instruments to see if they are actually measuring what they are supported to. Furthermore, it looks at how suitable and appropriate they are for the research (Leung, 2015; Recker, 2013; Mohajan, 2017). The choice of using a mixed method approach to collect relevant data is explained in the "Research Approach" section and throughout this methodology chapter. Leung (2015) and Oates (2006) explained that a research has validity if the chosen and used approach, along with the findings and conclusions answer the research question. This is often focused by a type of validity, called internal validity. There are other types of validity and one of them is the external validity. This one is more about generalizability and transferability. It looks at the generalization of a research, which means if the findings and results can be generalizable and transferable and therefore be suitable for another time, environment, context or for other people (Oates, 2006; Recker, 2013). Using a positivist approach, which could be applied when collecting quantitative data in form of surveys for example, could also give a research a higher level of validity (Ambrose, Goodchild & O'Flaherty, 2017; Oates, 2006). For these reasons, the survey in this study can therefore give a higher external validity.

3.7.2 Reliability

Reliability is another aspect that focuses on analyzing and measuring the research quality. This aspect measures if the results or conclusions of a research would remain the same if someone else is conducting the same research again (Mohajan, 2017; Recker, 2013; Bhattacherjee, 2012; Leung, 2015). The instruments and tools used are also included when analyzing this element. Researchers could for instance be an instrument during interviews and that way create reliability. To get to a higher level, interviewers need to be more consistent when asking questions. This means that they should ask all the participants the same questions (Mohajan, 2017; Oates, 2006). An interview guide was made and included

questions that were used in every interview, and it helped the authors to be consistent and ensured that everyone was asked the same questions.

The questions that are found in a survey is another example of an instrument for reliability measurements. It is important that the wording is clear and every question should be easy to understand for the respondents in order to avoid misinterpretations and confusion. The survey should also be impartial and neutral. Otherwise, there is a risk that the respondents are being led to answer the survey a certain way (Lee, 2004; Oates, 2006). In order to ensure that the survey had reliability, the authors made sure that all the respondents received the same questionnaire by only having one link, the set of questions included were all neutral and objective. The authors did also use a language that was easily understandable to avoid confusion. Recker (2013) stated that coding could affect the reliability since it often involves interpretations and could become subjective. Hence, both researchers of this study worked on the coding, both separately and together. By doing this, the researchers' work could be analyzed and compared.

4 Empirical Findings

This section presents the findings collected from the interviews and from the survey. The collected data is summarized and follows the structure of the conceptual framework with similar headings, presented in the literature review section. When referring to an interviewee, the transcript is referred to by including the code of the interviewee and its line number. For example, P1:37 refers to Interviewee 1, line 37. All four transcripts and survey results can be found in the appendices section.

4.1 Interviews

4.1.1 Presentation of Interviewees

The first interviewee, P1, is responsible for the overall sustainability work of an organization that works with manufacturing, including packaging (P1:12; P1:14). They manufacture and package for example napkins, single-use paper tablecloths and take-away bowls (P1:18). The main responsibilities for P1, is to make sure that they are responding with the sustainability aspect throughout the whole value chain, from suppliers, selecting materials, production, logistics, sales and End-Of-Life solutions (P1:16).

The second interview was with P2, who has been working with the current organization, Tetra Pak for about 16 years and is part of their central sustainability team (P1:23; P1:25). A large part of the organization is about food processing, manufacturing and packaging. The team is responsible for sustainable sourcing and operations. P1 explains that they work to reduce the environmental impact with their suppliers and purchase environmental materials when it comes to sourcing (P1:25). For operations, they manage their environmental impact, which includes energy, water and waste (P1:25).

The third interviewee, P3, works as a director of sustainability within a health and hygiene organization that, for instance manufactures and provides personal care products, soft tissue products and medical products (P3:8; P3:10). The main responsibility area for the individual (P3) is climate actions, which involves coordination of activities that meet the science-based targets. This includes the entire value chain of their products (P3:8).

The fourth participant, P4, works as a market sustainability expert for an organization that for example produces dairy equipment, packaging materials, lines and machines and provides finished packages as well (P4:13; P4:15). P4 is mainly responsible for the Nordic countries,

which includes Sweden, and the individual is in charge of the sustainability questions which for instance includes recycling and circular economy (P4:13).

4.1.2 Sustainability

When talking about sustainability and the definition of it, P1 and P3 mentioned that there are many different definitions and the area of it is broad (P1:20; P3:12). P1 usually leans towards the definition from John Elkington, which includes the Triple Bottom Line and the three dimensions of sustainability, financial, environmental and social (P1:20). P2 works with the same three aspects when it comes to sustainability, which means environmental, social and economic, and the Triple Bottom Line is also mentioned (P2:31). P2 further explained that being sustainable enables you to do something for a longer period of time and not exhausting the resources that are being used (P2:31). Reducing waste is one of the roads towards sustainability according to P2 (P2:41). The three dimensions of sustainability is also mentioned by P3, who explained that the organization defines the term in three different activity platforms (P3:12). The social dimension is covered by the importance and the work within the well-being aspect. This is an area they work on and is striving to improve in. The well-being of the consumers is essential for them (P3:12; P3:44). Having circularity when it comes to environmental factors and doing more from less resources cover the environmental dimension of sustainability. The economical aspect is also covered in the organization's definition of sustainability (P3:12).

Regarding sustainability, P2 also brought up that sustainability did not receive real recognition in the beginning when the organization first started, but it has grown (P2:37). As sustainability has become a larger issue, especially in parts of the world where air emissions and pollution are more concerning, consumers are becoming more worried (P2:69). The individual (P2) also commented that making sure and asking suppliers to be audited according to sustainability principles, and in their case, to Sedex principles, is essential for sustainability. Sedex audits companies in various aspects such as human rights, environment and business ethics (P2:59).

P4 explained that sustainability, from a packaging point of view, is when the materials and the amount of materials selected for a package is able to protect it and facilitate the handling (P4:79). It is essential to have proper materials and enough of them in order for the package to meet the needs of the organization, which includes protecting the products and meeting the needs that a package could face during its journey through the supply chain (P4:79). The interviewee (P4) also added that sustainability is a "must-have" today (P4:24). P4 further explained that the organization used to have a sustainability department that would assist and consult the marketing department. However, sustainability has now been implemented into the entire organization. The marketing department is receiving training in sustainability related topics (P4:35).

4.1.3 Sustainable Manufacturing

Regarding the definition of sustainable manufacturing, every respondent defined it by their own thinking. As P1, P2 and P4 talked about the materials that are used should be environmentally friendly (P1:22; P2:35; P4:20). Moreover P1 said that by using sustainable resources such as materials and energy, they create a positive work environment for the

employees, especially those who work in a production environment (P1:22). P2 explained that when we think about sustainable manufacturing we might think of the life cycle assessment and the environmental impact categories (P2:35). Furthermore, P1 defined that sustainable manufacturing is also about reducing waste and this waste would be in all sense such as material waste, energy waste and waste of time (P1:28). Related to the product, P1 said that manufacturing is not solely the customers, it is more about the products themselves (P1:30). P3 defined sustainable manufacturing as there are many different aspects included in that, one is the efficiency part, which means that energy and materials are used in the best possible way (P3:16). Moreover, P3 described the sustainable manufacturing as following:

" (...) we always talk about more sustainable or less sustainable because we do think that none of the activities are sustainable to the fullest extent." (P3:14)

P3 gave more detail on this, that to some extent the footprint will always be present but whether a small footprint is sustainable or not is arguable (P3:14). P3 also explained sustainable manufacturing or rather sustainable supply chain, that whatever they do up until the product they sell reaches their customers, is basically involved in that (P3:14). P4 explained sustainable manufacturing as their aim to make sure that the products and the processes are as sustainable as possible (P4:21).

When it comes to why they work on sustainability, P2 explained why they are motivated to do sustainable manufacturing, he talked about doing the right things (P2:39). Additionally, when talking about doing the right things, P2 talked about their brand promise that says that they protect what is good and has three aspects, protecting food, protecting people and protecting the planet (P2:65). P1 also explained that they provide their customers with a sustainable solution when customers select a product from the organization (P1:26). The customer should feel good, that it is the right choice, it is manufactured the right way and uses materials in the right way (P1:26). P2 described that the design of the product should be sustainable which means in the whole life cycle they should use less material or the materials that are used are easy to be recycled (P2:57). P3 talked about the life cycle as well, that they do the full life cycle assessment to understand from which part of the value chain they have the biggest impact on the overall footprint and to improve the overall footprint they should be looking at their own manufacturing production (P3:20). P3 described that the main driver for sustainable manufacturing is to maintain or increase their market shares since they feel pressure from their customers and users to give them more and more sustainable products (P3:20)

Furthermore, P1 explained product materials, that manufacturing has more internal focus than external, and external is about what comes out from manufacturing, that is the products, needs to be sustainable in terms of material choice and on package labeling (P1:30). P2 also talked about product material, that they do not just look at the package in its used phase, which means they are looking at the packages all the way from the materials used, the manufacturing, the filling and transport distribution (P2:37). As P4 described, product material in terms of an example, that if they did not consume the milk on the same day, it becomes spoiled, therefore by protecting the food and also the possibility to distribute and store it over a longer period of time without the need of refrigeration, P4 thought certainly made an impact (P4:23). P3 described that to understand the alternatives of materials and their footprint is also important because if they have a full understanding of sustainable materials then they will be sure that they provide the best possible alternatives (P3:58).

4.1.4 Effects of Sustainable Manufacturing

When talking about the effects of sustainable manufacturing all the interviewees gave a positive answer, P1 talked about employee satisfaction that people who are working in their company feel that they are working for that company who has a strong agenda on sustainability (P1:30). The interviewee (P2) described that the major effect of sustainable manufacturing is that they have made significant reduction in waste and they are continuing to reduce their waste, through reduction they save material and energy and save time which is all very aligned with sustainability objectives related to reducing environmental impact (P2:41). P3 explained that their brands are strongly linked with sustainable performance to a certain level, therefore their big customers are very progressive regarding sustainability and want from them to deliver more and more sustainable products (P3:24). The individual (P4) said that sustainable manufacturing is very important from the perspective of consumers, customers, NGOs and authorities, also for the perception of their brand and the reputation of the organization in the long run (P4:29).

When it comes to the financial point of view, P1 said that:

" (...) financial and sustainability go hand in hand" (P1:28)

Similarly to this, the interviewee (P3) said that there is a link between finance and sustainability because if they increase their efficiency for material and the energy then they reduce their invoice (P3:22). P3 further explained the additional financial impact, which is that some of tenders they have responded to big customers in which sustainable performance upto a certain point plays an important role, if they do not meet their requests then they will not get that order (P3:22). One more effect of sustainable manufacturing is the pressure from stakeholders, especially from customers who are more interested today and

"*So they set out in many different ways, to actually meet these requests from all the different stakeholders that they see*." (P3:26)

4.1.5 Practices

Talk about the practices that organizations adopted to make sustainable products. The interviewee P1 explained that their main focus is on the key actions that help to drive and make the decision to choose the raw materials (P1:38). The organization in which P1 works is avoiding fossil plastic, using renewable resources and going for more and more paper based and wood based products. Moreover, to detect the defect on a paper board they unwind it, process it and then wind it back, so the defect has been located on a map of the roll that is produced, and at the end of production stage they have to remove the defect (P1:55). They use a lot of gas in their manufacturing but that is renewable gas, and they are also switching to renewable energy and electricity in their production (P1:38). P1 also commented that:

" (...) since the past four or five years at least, the focus on going towards renewable energy has been around." (P1:24)

Similarly the respondent P3 said that in their operations, the energy they have used shifts to more and more renewable energy (P3:28). The interviewee (P2) mentioned that they have a central sustainability team that does the life cycle assessment which considers as the basic and

covers the environmentally impact categories (P2:45). Moreover, in their methodology, they measure what their status is to create a baseline, and then set the targets for improvements (P2:45). In the organization where P2 works they require that their suppliers supply those materials which are certified by sustainability standards (P2:35). Similarly the individual P3 said that they evaluate their suppliers in terms of the footprint and it is mostly about intensity footprint (P3:28).

The respondent P3 also explained that how they evaluate the materials, they said when they look at the materials in their value chain which are used in their products, they understand the opportunities to change with other materials (P3:28). P3 further explained that in production they have to make prioritization in their operations according to the customer's request, they cannot do all of it but they need to do what is most important at least (P3:26).

According to P4, the packages they have produced have quite low impact from an environmental perspective in comparison to the impact that the food has, that it contains, therefore they are more focused in prolonging the shelf life and make it available everywhere. (P4:21). P4 described that they have a design for environmental procedures and in the product development lifecycle they have certain steps to pass (P4:37). Related to the climate, the respondent P2 described that climate is a very important aspect among stakeholders, to satisfy their stakeholders they made the carbon calculator which is available in Tetra Pak website, this calculator can measure the carbon of each package of the company (P2:45).

To work on the changing consumer behaviour P3 discussed the system in their organization to investigate the consumer behaviour related to their product (P3:56). He explained as:

"We have our system to investigate the use of bathroom toilets, public bathrooms. During the pandemic for instance, we see that one out of three visits to such rooms actually only involves cleaning your hands, which we did not see at all before. So there are shifts in this behavior and that is something that we see in many different countries, not necessarily only in Sweden". (P3:56)

When it comes to the using of the 6R concept every respondent has different experiences with it. P1 described that:

"*When it comes to end-of-life, recycling, collection, end-of-life treatment, that's a big area where we are running a lot of projects to see how our products can turn into new valuable raw materials for new products." (P1:38)*

Furthermore he explained that it follows the value chain and they have to find the most important action which means that they do not only work at end-of-life and recycling but they need to have work with start-of-life and design of the product (P1:38). By giving full information on how P1 organization works on the 6R concept. The details are:

"*We try to move as far up the waste hierarchy as possible. So with recycling being sort of the bottom level where we want to see our products end up. We don't want them to go to incineration or landfill. So we start from recycling, composting and biogas generation as the sort of bottom line and then see how we can also reduce the amount of material. Especially when it comes to plastics, we try to reduce as much as possible. And then we are also exploring opportunities in reusable solutions, or instead of paper cups, to have refillable*

coffee mugs and salad bowls and stuff like that. So I think we work up and down that hierarchy but the further up you go, the more difficult it becomes." *(P1:51)*

The informant P2 said that in their organization they have the policy for all those areas that are covered in the 6R concept (P2:47). P2 discussed one of the policies which is a waste policy and that is implemented by procedure, when waste comes to recycling they send most of the waste to recycle because they consider this as a valuable material (P2:47). P3 commented on this concept that all words are in their vocabulary, with the exception of remanufacture to some extent and reuse that is a strong coming trend now within their products (P3:30).

When talking about environment conscious manufacturing and lean manufacturing, the informant (P1) said that they do both but they are not exclusive in world class manufacturing. (P1:51). P1 explained in more detail that both environment conscious manufacturing and lean manufacturing are supported by the pillars, which are not functionally found. The individual (P1) gave an example of two pillars: the improvement pillar which increases the value added time in the journey of the product from start to finish, the other pillar is the environment and each factory of the organization has its own performance and targets for those, so that is part of their lean manufacturing approach. P4 commented on these two approaches and said that their organization is working beyond these approaches. The respondent (P4) explained that material they have used is a part of circular flow and when organizations look for impact they do not only see their operation but also the whole value chain (P4:43).

4.1.6 Corporate Social Responsibility

When asking about the organization's work with Corporate Social Responsibility, all the interviewees answered that the respective organizations engage in this topic and gave some examples. P1 answered that the organization is engaged in social work and programs through partnerships with other organizations. Some examples are "Keeping the oceans clean" and "Mitt liv", or "My life" in English. The latter helps newly arrived immigrants to get jobs (P1:65). The respondent (P1) also added that doing charity projects and being more engaged in those types of work and projects is more common in countries such as Australia than in Europe (P1:65). P2 explained that their organization has initiatives such as school feeding programs and they also help smallholder farmers in different parts of the world to make food safer and available everywhere, which is a promise that the organization has (P2:73). They, for instance, help farmers with appropriate food processing locally and with being more effective (P2:73). According to P2, differentiating between CSR and sustainability is difficult, because they have the same purpose (P2:73).

The organization that P3 works in, is engaged in various community activities all around the world and they are also showing engagement at a more local level where they can help and provide people in need with products (P3:50). The fourth interviewee (P4) talked safety first and having high standards. They aim to have high standards everywhere (P4:63). A more recent example was given, where higher demands in safety and in the work environment are crucial. Most of the employees are working from home and digital meetings have become more common, even with more important customers. Providing the employees with necessary equipment in order to make the home office a better workplace, has also been a responsibility taken by the organization (P4:63).

When talking about this topic, P1 argued that having a social responsibility and showing it gives value for the brand. However, P1 is questioning if it adds enough value for the organization and its brand (P1:67). Doing these types of projects could be associated with being a good citizen and it gives you a good feeling, but it is difficult and complicated to capture that as a value from a sales perspective, according to P1. Other work such as environmental sustainability could be measured and assessed with proper assessments or adjusted with appropriate actions, for example by using less plastics. Social work is much more complex (P1:67).

4.1.7 Increased Awareness

The increased awareness among stakeholders is noticeable according to all four respondents (P1:32; P1:44; P1:57; P2:43; P2:71; P3:56; P4:27; P4:53). When it comes to the customers, P2 said that their customers are one of the stakeholders who are very interested in what they do and in particular, in sustainable manufacturing (P2:43), and added:

"Our sustainability actions are very important for our customers' sustainability brands." (P2:43)

The interviewee (P2) further explained that they help their customers highlight the sustainability factor of the packaging that contains their products (P2:69). Similarly to this, P4 also described that their organization has customers who sell products that are more marketed towards environmentally concerned consumers (P4:59). In order to support them, the organization highlights the sustainability part of the products and informs the consumers who are aware of the environment and sustainability. This helps their customers to meet the needs and demands from consumers and legislators (P4:59). P4 also commented that the largest change for them is the responsibility for sustainability on an organizational level. Taking responsibility for this topic and communicating around it has become more spread across the organizations. It does not solely involve the employees who are specifically working with sustainability. It is a responsibility everyone has now (P4:53). Regarding customers, P3 and P4 said the following:

"And as I mentioned, at least our bigger customers are really progressive and requesting us to deliver more and more sustainable products all the time." (P3:24)

"We see that our customers have more demands when it comes to sustainability and more sustainable products and processes than before." (P4:27)

P1 has a similar view on this, that customers are more interested in sustainable products today (P1:32). Both P3 and P4 mentioned that there is a change related to sustainability, in society (P3:56; P4:27). P3 sees a trend that is moving sustainability higher on the agenda. However, the individual (P3) also added that, what people say and answer in questionnaires is different to how they really act on a daily basis (P3:56). P4 said that there is more focus towards sustainability in society now, which has impacted them as an organization due to more demands about sustainability and sustainable products and processes from customers (P4:27). When talking in particular about consumers, P4 reflected the following:

"But I would say that to some extent, the consumer power has increased over time and the focus, (...). I mean it takes time but I believe that the aware consumers are getting more

knowledge and deeper knowledge over time and can make more informed choices over time." (P4:57)

Furthermore, the individual (P4) added that consumers are, in a way, limited to the products that exist on the market but the increased awareness could lead to some changes and an example of toothpaste packaging in Sweden was given. Toothpaste with an outer paper packaging is not as common anymore in Sweden and that is, as explained by P4, a consumer-driven change. The reason behind it is that many consumers purchased the sustainable alternatives instead (P4:57). P4 continued explaining that if there are no products in various packages to choose among, the consumers do not have many choices to choose from and it could be difficult to use the power to drive changes (P4:57). In cases where different options are available for the consumers, there could be a power for them (P4:57). P2 did also talk specifically about Swedish consumers and said that some countries are more conscious when it comes to sustainability topics and gave Germany and Sweden as examples (P2:71). Additionally, P2 explained that Swedish consumers are paying more attention and more recently, more focus has been placed on plastics in packaging. The consumers in Sweden are asking food manufacturers to use packages with less plastics and continued with:

"So instead of having a milk carton with screw cap, they want to have just the original gable top where you have to unfold it." (P2:71)

P3 said that understanding consumers is essential and the reason for doing so is explained by following the quote:

" (...) I mean understanding the trends among consumers is basically building your ability for the future, to be successful as a company." (P3:46)

P1 said that the consumers are important because they are the primal users and set the demands. The individual (P1) believed that the increased awareness among consumers and individuals in general are due to social media (P1:34; P1:57). It enables individuals to be more visible and organizations are more approachable and it is easier for consumers to hold them accountable. If an organization has done something that has upset a lot of consumers, they will get questions that could make them feel uncomfortable (P1:57). Additionally, P1 said that every organization, including business-to-business companies, feel more responsible now when the consequences of mistakes are more severe (P1:57). The awareness among investors was also brought up by both P1 and P3. The former mentioned that investors are progressively increasing their awareness around sustainability and adopting the changes and trends (P1:34). The investors are also mentioned by P3, as important external stakeholders who are becoming more knowledgeable about sustainability work in organizations (P3:26). Requests about reports that show the organization's progress towards their sustainability goals, in a transparent way, is more commonly asked now (P3:26).

P1 highlighted the pressure from regulators and legislators (P1:34). The increased awareness among them, including politicians, have led to more engagement in sustainability related questions today and making regulations, especially regarding issues of the End-Of-Life processes has become more common (P1:34; P1:44). The initiatives from non-governmental organizations (NGOs) have also been influential when it comes to changes in laws and regulations (P1:34). Due to increased awareness and pressure, the European legislators have introduced the Single-Use Plastics Directive which is planned to be implemented this year

(P1:34; P1:44; P2:65). This will have an extensive impact on the manufacturing industry, and in particular the packaging sector, according to P1 (P1:34).

4.1.8 Create Awareness

The interviewees brought up various ways of communicating with customers and consumers in order to create awareness and spread information. P1 mentioned that the organization does not have much communication directly with the consumers, hence the products, the designs and labels become the main channel for communicating (P1:53). P2 and P4 answered similarly, that since they are business to business companies, they have contact with consumers but to a lesser extent compared to business to consumer companies (P2:29; P2:63; P4:51). P2 said that the organization gets in contact with consumers with the aim of understanding consumers' preferences better and that way helps the customers make the packages that could draw more attention (P2:63).

Communication with customers helps both parties to better understand each other. Customers could describe their requests and needs and the organization gets to inform and make them more aware about their sustainability work and what they have to offer (P2:59). Continuous discussions enable the organization to share knowledge about essential analysis and data that could be beneficial for the customers. Additionally, customers could get support on how to communicate with consumers about their packages from a sustainability perspective (P4:51).

Engaging in campaigns is a common way of reaching out to consumers (P2:61; P3:42; P4:51). P2 talked about doing marketing campaigns that for instance tell consumers about their sustainability journey and ambitions regarding their sustainable products (P2:61). They also go out to consumers to do sustainability surveys in order to understand their behavior (P2:63). Related to this, P3 said the following:

"We do quite a lot of communication, both in relation to our products but also in social media for instance. We also reach out to engage in different campaigns." (P3:42)

P4 did also talk about having campaigns and going to various events, trade fairs and conferences to get a closer connection to both customers and consumers (P4:51). In a particular event, the organization meets consumers and teaches them about recycling and the importance of it (P4:51). The individual (P4) did also add this about creating awareness around recycling:

"And that's also one thing that we have been really eager to communicate, that recycling is not a burden, it's not something boring but it can actually be fun. You can have fun with your friends, going and recycling. And it's a positive thing and it's easy and you do a good deed because it's a valuable resource for new products. And I believe that is really important." (P4:77)

Furthermore, creating and spreading awareness through kids and education have also been highlighted by the interviewees (P1:55; P2:79; P3:42; P4:51; P4:69; P4:73). P1 gave an example from a previous job where teachers could sign up to classes and get access to teaching and lesson materials about recycling and its benefits (P1:55). Environmental sustainability has also started to become a part of the school curriculum which could lead to

more educated consumers, which P2 sees as a positive factor (P2:79). P3 explained that their organization is engaged in education in order to reach out and start discussions about health and hygiene issues (P3:42). P4 talked about a school competition that the organization organizes to teach students about recycling, for example how to do it, why it is necessary and what a package is made of (P4:51). When talking about engaging children in general, P4 said the following:

"I believe that planting good behavior and knowledge among children is really important because they are easily adapting to new information and they can bring along sound habits throughout their lives." (P4:69)

The individual (P4) further added:

"I mean, really changing the behavior of someone who is older, that is important as well but maybe spreading knowledge among kids, that's really the future. And the kids do also have really good impact on their parents and other adults in their closeness. So I believe that is key to change and also change that will remain for a long period of time." (P4:69)

P2 believes that anything that can engage people, such as games and humor, could be successful ways of teaching them. Factors that connect with people on an emotional basis, they become successful educational strategies (P2:81). P2 did also mention that essential information about the organization's work towards sustainability could be found on their website (P2:25; P2:27; P2:45; P2:63; P2:73). This was brought up by P3 and P4 as well (P3:60; P4:51). The latter explained that they have different ways to spread their information about sustainability, which include their website and their sustainability report (P4:51).

Another way of raising awareness and providing essential information is by labeling and this was mentioned by all four respondents (P1:53; P2:61; P3:54; P4:75). The importance of showing certifications through labeling is highlighted by P1 (P1:53). The organization put labels such as, FSC certified to show responsible forestry, Nordic swan on their tablecloths and napkins and OK Compost on some of their products to highlight the sustainable packaging, on their final products (P1:53). The interviewee (P1) explained that labeling is essential because:

"So labeling is important to enable consumers to understand why it's a good choice, so that we do." (P1:53)

Labels such as FSC and Bonsucro are also used on packages from Tetra Pak. It is a way of showing the environmental claims on the packaging (P2:61). P3 did also say the following about the value of having labels on packages:

"That is an extra important area because that is someone else telling the consumer that this product is up to a certain standard. (...) to be able to put that logo on your package, that is building the credibility of the communication as such." (P3:54)

P4 did also believe that labeling on packages is important and added that the school competition that teaches children about recycling, includes a task that lets them design a message or campaign about this topic for a milk package. The customers of the organization

get to select their favorite and put it on real packages (P3:75). P3 argues that this is an important way to send messages to everybody and the individual also added that packages reach millions of people in Sweden (P3:75).

Regarding the topic about targeting specific groups of consumers, P1 answered that the organization does not do that (P1:61). P2 explained that their organization does some type of segmentation and has knowledge about consumers having different behaviors in different parts of the world (P2:62). The respondent, P3, mentioned that they reach out to a large audience and do have consumers in different groups depending on their needs and problems (P3:48). P4 said that the organization does not target any specific groups of consumers. However, they do make sure that their customer's brand name, package and product have a matching message to send to consumers. For instance, the more sustainable products are marketed, in particular to the environmentally concerned consumers in mind (P4:59).

4.1.9 Challenges

When asking about the challenges, P1 responded that the need to learn new things is a challenge (P1:36). Competences that have not been as essential before, have become a requirement. The organization needs to have employees who are skilled and able to handle new, emerging sustainability challenges (P1:36). P1 continued explaining that this is one of a challenge most organizations are facing and added:

"So I would say that's one of the bigger discussions that we have, how do we ensure that our colleagues are competent in the area of sustainability." (P1:36)

The individual (P1) argued that there is a need for a competence lift within organizations (P1:36). Both P2 and P1 brought up the challenges regarding regulations (P1:44; P2:77). P1 highlighted the Single-Use Plastics Directive as challenging and also, finding End-Of-Life solutions such as composting, recycling and reusable options, is a major and demanding area (P1:44). Many politicians, regulators and legislators are often focusing and engaging on End-Of-Life questions, which are easier to understand and regulate. However, it may not be the only area to look into (P1:44). Areas such as material selections and upstream value chain could have a more significant positive impact, but politicians are making the organizations look more downstream and mainly focus on End-Of-Life (P1:44). The latter is also a crucial question, but it is not the only one, according to P1 (P1:44).

The European Union Green Deal was pointed out by P2, who explained that it is a challenge that they have been discussing (P2:77). The deal includes a deforestation law that enables organizations to show the risks of deforestation in their supply chain (P2:77). P2 mentioned that the focus on this topic is not new for the organization. However, being able to prove that and satisfy the legislation is challenging, especially since the legislation has not been released yet. The deal is about any consumer and commodity with a land footprint connected to deforestation and it does not only affect European organizations, but also organizations who are operating in the European market (P2:77). The individual further added:

"So that's something that's on top of mind and we know that there are many other similar challenges coming our way and this is really what sustainability is all about, we can't do this on our own. We have to work with our suppliers. We have to work with organizations (...). We

have to work with the legislators in order to create a more sustainable future." (P2:77)

With NGOs who are continuously enhancing the consciousness among consumers about environmental issues and pressuring regulators to improve, that is leading to more challenges in the future, for organizations (P2:79). According to P2, people need to be more educated in environmental related topics, including himself (P2:79). It was also mentioned by P2 that food waste in general is a major problem that has not been recognized on a global scale (P2:71). Some factors will not change even if organizations change their manufacturing systems or select other solutions, according to P1 (P1:46). The individual (P1) continued explaining that they cannot control what happens to their products once they have been used (P1:46).

P1 and P2 highlighted the technological challenges, that there is a need for technological developments (P1:44; P2:53; P2:55). P2 explained that the human factor involved when scanning, identifying and collecting data about waste and defects, could lead to mistakes. To develop technologies that enable organizations to scan the production in order to identify defects is a challenge (P2:53; P2:55). P1 explained that a technological development and improved industry capacity is needed in order to deliver sustainable materials in volumes that could cover used plastics (P1:44). In relation to this statement, P1 described that many companies are realizing that they need to change from fossil materials to renewable materials. However, the availability of these renewable materials is not fully there, which makes this major change difficult to achieve (P1:44). Hence, technological development is needed (P1:44). The issues with the availability of more sustainable materials that could replace the plastic packaging such as bio based or plant based materials, was also brought up by P3 and P4 (P3:38; P4:45; P4:47). The number of suppliers, globally, is limited and there needs to be a balance between supply and demand (P3:38). This could also lead to increased prices (P3:38). P4 said the following about the availability:

"The challenges today are, I would say, in some parts it's the availability of raw materials, when it comes to sustainable and plant based raw materials." (P4:45)

The individual (P4) also added that it is difficult for a larger organization, such as themselves, to reach a large amount of volume quickly. Legislators and society want to see a change overnight but it is not possible for an industry to do so. It has to progressively evolve (P4:45; P4:47). The increased awareness about sustainability and sustainable manufacturing among stakeholders has also put pressure on the organization, which has led to the goals becoming even tougher (P4:35).

Making investments for decoupling energy, for instance and finding earning margins for products used on a daily basis are challenges mentioned by P3 (P3:34). Making or finding these investments is a struggle that the organization is regularly facing. They could sometimes get support from various governments with subsidies in order to finance parts of the investments (P3:36).

When it comes to the challenges regarding the consumers, meeting more severe demands from them is constantly a challenge (P4:65). P1 mentioned that the main challenge for them is:

"I think the main challenge, working towards consumers is always a matter of scale and money. (...) I think to get a reasonable reach towards your consumers, it's always going to cost a lot of money." (P1:71).

It is expensive to reach out to consumers and to do marketing (P1:71). The individual (P1) did also talk about the competition for consumers' attention. Many organizations and advertisers want to draw consumers' attention towards their own marketing (P1:71). The competition is any type of medium is strong, according to P3 (P3:52). In addition to this, making sure that the consumers are getting correct facts is also a challenge. Many decisions are made based on emotions, rather than on facts (P1:75). P1 continued by adding:

"That is going to be an increasing challenge for all companies, to get people to make decisions based on more factual information whereas we are emotional animals." (P1:75)

P4 said that reaching out to consumers through communication is a difficulty (P4:65). P3 did also bring up that there is always a struggle to reach out and have conversations about sustainability (P3:52). Communicating in a simple way, being clear on what you mean and at the same time providing true information to the consumers is challenging but important according to P3 (P3:52).

The complexity of the entire consumer perception is a challenge (P4:67). The organization has a number of aspects to focus on today, but it is difficult to know which aspects the focus is on the day after. Furthermore, P4 said:

"And foreseeing those things and really taking a sound, holistic perspective in producing products before they emerge as a global crisis, I would say is really the challenge." (P4:67)

In relation to this, an example was given where plastics and microplastics in the ocean have been a problem for a long time but it has become a hot topic for many more recently (P4:67). The respondent (P4) was questioning what the next hot topic that consumers will become aware of, is (P4:67).

4.2 Survey

4.2.1 Gender, Age, Occupation and Swedish Consumers

The survey that was conducted for this study received a total of 72 responses. Among the respondents, 50% of them are females, 47.2% are males and 2.8% others. The majority of them are either between 16-25 years old (47.2%) or between 26-49 years old (50%). Only 2 respondents are in the 50-65 age group and no one is over 65 years old.

When asked about occupation, almost 46% answered that they are employed and nearly 32% responded that they are students. Almost 14% belong to the unemployed group and over 8% answered "Other" which could consist of individuals who are both students and employed. A majority of the participating respondents live in Sweden. Only 4 individuals answered "No" on the "Do you live in Sweden?"-question. In order to present the responses that represent

Swedish consumers, the authors deleted those four who do not live in Sweden in this remaining presentation of the survey results. This means that there are a total of 68 responses after removal. 51.5% are females, 45.6% are males and 2.9% others. The age group 16-25 consists of 45.6%, 51.5% belong to the age group of 26-49 and 2.9% are 50-65 years old. The student group and employed group under occupation went up approximately 0.5-1%. While the unemployed and others descended with around 1% as well.

4.2.2 Awareness About Sustainability and Sustainable Manufacturing

Two questions were asked regarding the awareness of both sustainability and sustainable manufacturing among the respondents. 30 individuals answered that they are aware about sustainability on a moderate level. 21 respondents are aware of it on a high level and 14 individuals answered “Very high” awareness. Only 1 person answered “Very low” and 2 people chose “Low”. The results regarding sustainable manufacturing showed that over half of the individuals (approx. 52%) have a moderate level of awareness about this type of manufacturing. Approximately 19% answered “High” and around 22% on “Low”. Solely a few people have a very low (approx. 3%) or very high (approx. 4%) awareness. For the question regarding if organizations are spreading enough awareness, most respondents answered “No” (approx. 46%), 34% answered “Yes” and the rest (21%) answered “I do not know”.

A question about changing your way of living due to awareness was asked. 39 out of 68 (approx. 57%) responded that the awareness has changed their way of living. 17 people (25%) were not sure if it had changed but answering “I do not know”, and almost 18% responded “No”. Their way of living has not changed due to the awareness around sustainability and sustainable manufacturing.

4.2.3 Awareness Through Medium

There were two questions that were asked regarding awareness through medium. One was specifically about their own experience, where the responding individuals are getting their awareness of these topics. The options were tv, games, social media, articles, billboards or posters, labels on products and other. The individuals could type in another option under “other” if they wanted to and they had the opportunity to select more than one. “Social media” got selected the most, 52 individuals chose this medium as one of the places where they get awareness. “Labels on products” came in second place with 37 votes and “articles” came closely after with 33 votes. “Tv” got 21 votes, billboards or posters received 7 votes and games got the least votes (3 people). Some individuals added their own options which included “educational premises, webinar”, “school”, “documentary”, “(...) read one course on sustainability management”, “work”, “company sustainability channels” and “political engagement”.

The other question were about which medium the respondents think is the best way to get their attention and to educate people and spread awareness. “Social media” received the most votes (59 people). “Labels on products” was viewed as the second best way to draw attention, with 23 votes. “Tv” came after with 18 votes, games with 12 votes, articles with 9 votes and billboards or posters with 6 votes. Three other options were added as well, including “school”, “(...) should be in our education” and “legislation”.

4.2.4 Types of Consumers

When asked about which of the four types of consumer an individual is, 31 respondents out of 68 answered “Purpose-driven consumer”. They are willing to pay more for a better quality on products and services and they are also willing to change their habits in order to reduce environmental impact. “Value-driven consumer” came in second place with 19 votes, “Product-driven consumer” came third (12 people) and lastly, “Brand-driven consumer” received 6 votes. A smaller number of individuals view themselves as a consumer who is willing to pay more for products that fit their lifestyle (“Brand-driven consumer”).

4.2.5 Positive Brand Image Through Corporate Social Responsibility

The last question asked in the survey was about corporate social responsibility, if an organization’s work with this concept could give the Swedish consumers a positive view of them. According to the results, a majority of the respondents, consisting of 58 people, think it gives the organization a positive image. However, 8 people answered that they do not care and 2 individuals responded with “No”, it does not give them a good image of the organization.

5 Discussion

This section presents the discussion of this study. It compares and identifies similarities and differences from the findings in the literature review and the empirical findings, which includes the interviews and survey. The many headings for this chapter are the same as the categories in the conceptual framework and the headings in the empirical findings in order to make comparisons and connections easier.

5.1 Sustainability

To understand the concept of sustainable manufacturing it is important to understand what sustainability is. There are many definitions and interpretations of sustainability in the literature but also the lack of standard definition of sustainability (Moldavska & Welo, 2017; Sartal et al. 2020; Missimer, Robèrt & Broman, 2017. Most of the informants (P1; P3) said that sustainability is a broader concept and they also accepted that there are lots of definitions of sustainability. It is very difficult to generalize the word sustainability in both practice and research. Sustainability is associated with a Triple Bottom Line and with three key dimensions; economic, social and environmental. By getting the response from all of the respondents the authors came to know that all of the organization is generally working with these three aspects to make their system sustainable.

Missing of the broadly accepted definitions of sustainability in literature is challenging in the research field (Moore et al. 2017). Based on the interviewees' responses to the definition of the term sustainability, the authors found that not having a widely accepted definition does not seem to be as challenging in practice as literature indicated. Ihlen and Roper (2014) stated that instead of identifying the organization's difficulties related to the concept, they commonly look upon and accept sustainability as being true, uncomplicated and simple, they see it as a given.

5.2 Sustainable Manufacturing

When talking about sustainable manufacturing, this term has still no global acceptance of standard definition especially among the scholars and researchers (Moldavska & Welo, 2017; Nakano, 2010). There have been various interpretations of definition and concepts that have been proposed in the literature. When the authors asked the interviewees questions related to sustainable manufacturing, all the respondents gave their views of this term based on their knowledge. Moldavska and Welo (2017) stated that the concept, which is not well defined, could make it difficult for organizations to implement in the practice. Therefore, in this context the organization does not form a clear picture of sustainable manufacturing. This study can say that, both in academia and in the industry, everyone works and views this term according to their own knowledge and perceptions because of the large number of definitions.

Moreover, Moldavska and Welo (2017) explained that the reason why there is a lack of a definition of sustainable manufacturing is because of the term sustainability. The authors agree with this point because sustainability and sustainable manufacturing have a strong connection. The authors noticed that both in the literature and mostly in the interviews, when discussing sustainable manufacturing, the focus was sometimes automatically moved towards sustainability because the major goal of sustainable manufacturing organizations is to achieve sustainability (Khan et al. 2021; Sartal et al. 2020; Bogue, 2014; P1; P2; P3; P4).

The respondents P1, P2 and P3 explained that sustainable manufacturing is mostly about using less material, reducing waste, and using renewable energy in their production. Every literature has talked about the same thing related to sustainable manufacturing organizations, that they want to be able to use less resources and produce in a more environmentally friendly way (Garetti & Taisch, 2011). When it comes to the adoption of the above practices, interviewee P1 said that by using the sustainable resources, they create a positive work environment for the employees, especially for those who work in the production environment. In comparison, P3 argued that not all of the activities are sustainable to the full extent which means the footprint is always present to some extent but whether a small footprint is sustainable or not. Therefore, from that point it is impossible to say that by adopting all these above practices the whole production is fully sustainable.

Regarding the drivers that motivate the Swedish organizations to do sustainable manufacturing. In the literature, different researchers represent different drivers like growing awareness among stakeholders (Khan et al. 2021) and strict laws and regulations from governments (Sartal et al. 2020; Bogue, 2014). Based on the interviewees' response, P2 mentioned that they are motivated because of their brand promise which is to protect what is good, has three aspects, protecting food, protecting people and protecting the planet. According to the informant P3, in their organization the main driver is to maintain and increase their market share since they feel pressure from their customers to provide them more and more sustainable products.

5.3 Effects of Sustainable Manufacturing

In this category, the authors and interviewees discussed how sustainable manufacturing affects the Swedish organizations. Every respondent answers this question in a positive way which means that adopting sustainable manufacturing gives Swedish organizations a lot of advantages and benefits in their business. As P1 explained, the major effect their organization's get is employee satisfaction means people who are working in their organization feel that they are working for that organization who has a strong agenda on sustainability. Moreover, the main effect of sustainable manufacturing noticed in the organization where P2 works at, is significant reduction in waste. Through the reduction, they save material, energy and time which are related to reducing the environmental impact (P2). Apart from that, the respondents P3 and P4 talked about the increasing stakeholder and customer pressure, who are very progressive regarding sustainability and want from them to deliver more and more sustainable products. In the literature, this point has also mentioned that the increasing awareness around the environment and sustainability among stakeholders can increase the demand for more sustainable measures at the manufacturing organization (Chofreh, 2015).

When talking about the financial growth due to sustainable manufacturing, Khan et al. (2021) explained that when sustainability comes to manufacturing organizations, they used to overlook the environmental and social factors but primary focus is on the financial aspects and its growth. The interviewees P1 and P3 have the same view on the financial growth, they said that finance and sustainability have a strong connection and go hand in hand. From this point the authors came to know that sustainability gives a financial benefit to the organization.

5.4 Practices

There are lots of approaches and concepts in sustainable manufacturing that have been proposed in the literature (Chavan, 2005; Sartal et al. 2020). The authors mentioned in this study four different approaches and concepts: environmentally conscious manufacturing lean manufacturing, Triple Bottom Line, and 6R concept. When the authors talked to the respondents about the approaches they described their approaches in many different aspects. The interviewee P1 explained their approach in terms of resources they have used. Their main focus is on the key actions to choose the materials, avoiding fossil plastic, using renewable energy resources and going for the paper and wood based products and also switching to renewable energy and electricity. P2 gave the information about what the sustainability team of their organization do. He mentioned that the sustainability team does the life cycle assessment and covers the environmental impact categories, also they measure their status to create the baseline and set the targets for improvements. Moreover, the organization buys those products which are certified by sustainability standards.

Respondent P3 explained their approach as, in production they make a prioritization in their operations related to their customer request, he mentioned that they cannot do all of it but they need to do what is the most important at least. Individual P4 talked about the food that they contained in the package. That package has quite a low impact environmentally but in comparison to the impact that the food has, that package contains. The organization of P4 is more focused on prolonging the shelf life of food and making it available everywhere. The respondent P2 and P3 described the system that they have used to check the environmental impact and consumer behaviour. P2 said that they design a calculator which measures the carbon of each package of the company. P3 also described the system which their organization uses to check consumer behaviour. The authors can say that these two systems are great initiatives regarding sustainability and consumer behaviour because these two areas are very crucial for the organization to get the competitive advantage.

Regarding those approaches which are mentioned in the literature review, when the authors asked the respondents about the Triple Bottom Line and 6R concept. P1 and P2 said that they implement the 6R concept in their organization but P3 commented on this concept that all the words of the 6R concept are there in vocabulary with the exception of remanufacture and reuse. Related to the environmental conscious manufacturing and lean manufacturing the respondent P1 that they do both but they are not exclusive in world class manufacturing. The interviewee P4 said that they are working beyond these concepts. From these findings, the authors came to the point that every organization accepts the concept and approaches according to their needs.

5.5 Corporate Social Responsibility

Bhattacharya and Sen (2004) highlighted that the consumer is a stakeholder that could react positively towards the CSR actions of an organization and its products. The survey showed a similar result where over 85% thought that these types of work gives them a positive view of an organization. Positive results like this lead to organizations investing more time and resources into CSR (Bhattacharya & Sen, 2004), and looking at the answers from the interviews, Swedish manufacturing organizations are also investing in this, at least the organizations that are part of this study. By engaging in CSR, for example by being more engaged in social work and programs (P1; P2; P3) and helping and educating people (P1; P2; P3; P4), P1 said that it shows that the organization is taking a social responsibility, which gives value for the brand, but the individual (P1) is also uncertain if it add enough value. The authors found that it could give some type of value from a reputational perspective, based on the survey. Swedish consumers are more likely to perceive those organizations more positively, which means it can change the way they view an organization. This proves that the fourth and sixth assumptions are correct. CSR could also achieve expectations and address concerns (Alvarado-Herrera et al. 2017) that stakeholders have expressed. These stakeholders include the ones that have been mentioned by all the interviewees, such as investors and consumers.

P2 did also mention that it is difficult to differentiate between CSR and sustainability and the reason is because they have the same purpose. Both concepts are striving to meet the needs of the three dimensions, social, environmental and economic (Sartal et al. 2020; Bogue, 2014; Khan et al. 2021; Garetti & Taisch, 2011; Ashrafi et al. 2018; Hernández, Yañez-Araque & Moreno-García, 2020). It also, as P1 mentioned, shows that an organization or the individuals behind it, are being good citizens and it gives them a good feeling.

It is also important to note that a majority of the respondents from the survey are on the younger side of the age scale, between 16-25 years old and 26-49 years old. Most of them consider themselves as a male or a female and there are mainly employees or students among the respondents. Therefore, the results mainly represent a Swedish group of consumers that include the attributes mentioned above. This could have had an impact on the results that were collected for the survey and for the overall study. In addition, interviewee P3 emphasized that people act differently to how they answer in surveys, which is with taking into consideration. Additionally, it is worth noting that having four interviews could also affect the outcome of this study. More interviews could for instance lead to more similar answers or different ones.

5.6 Increased Awareness

Several studies in the literature highlighted that the awareness among different stakeholders has increased (Hami, Muhamad & Ebrahim, 2015; Khan et al. 2021; Chofreh, 2015; Jayaraman, Singh & Anandnarayan, 2011; Bogue, 2014; Garetti & Taisch, 2011). This was also discussed during the interviews. All four respondents said that there is an increased awareness among stakeholders, such as customers, investors, consumers, regulators and legislators and politicians (P1; P2; P3; P4). This shows that the awareness has led to the Swedish manufacturing organizations being put under more pressure to become more sustainable and they are facing tougher demands (P1; P2; P4). As was also stated in the

literature by Hami, Muhamad and Ebrahim (2015), Gouda and Saranga (2020) and Zarte, Pechmann and Nunes (2019).

In connection with the findings in the literature and interviews, the survey did also show that Swedish consumers in general, seem to be aware of sustainability and sustainable manufacturing. This is proving that the first and second assumptions are true. However, the level of awareness varies. For both sustainability and sustainable manufacturing, most of the respondents answered that their awareness is on a moderate level. The awareness about sustainability, on a high level, is larger than sustainable manufacturing, among Swedish consumers and that was also the second most picked option. The third most picked option was "very high", few individuals chose "low" or "very low". The results for the awareness about sustainable manufacturing differed a little. While the third most picked option was "high", the second most picked option was "low". This means that 22% thought that their awareness regarding sustainable manufacturing is on a low level. A reason could be found among the answers from the interviewees. Overall, when talking about creating and spreading awareness, the respondents were mostly talking about different ways to inform and educate consumers about sustainability in general and about their sustainable products. For example putting labels on products (P1; P2; P4), engaging in campaigns (P2; P3; P4) and educating consumers about recycling for example (P1; P3; P4). Based on the data collected from the interviews, more engagement around creating awareness among consumers is occurring through communication directly with them such as events, and indirect communication through labeling. Whereas sustainable manufacturing and their whole sustainability journey is available on the organizations websites (P2; P3; P4). This means that consumers have to search for that information themselves.

P2 did also elaborate on customers being more interested in their work and in their sustainable manufacturing because the manufacturing organization's actions are important for the customer's sustainability brands. Requests on sustainability reports are being asked by customers who want transparency (P2). This could be linked to Watson's et al. (2012) statement, that Information Systems are useful for informing about environmental consequences. Information could also help shape perceptions among consumers and sustainability reports are examples of information that could affect individuals' sustainability perception (Watson et al. 2012). This shows that communicating through reports is a helpful way of changing someone's perception on, in this case sustainability.

Watson et al. (2012) elaborated that information is necessary for perceptions. When asking the Swedish consumers about where they get their awareness from, over half of them answered social media. This was also mentioned by P1 and P3. P1 emphasized that the increased awareness is due to social media. The visibility, accessibility and approachability facilitate the information intake among individuals (P1). Other options that received a larger amount of votes in the survey were labels on products and articles. Labeling was highly emphasized by P1, P2 and P4. Articles were not mentioned at all and tv, which came in fourth place out of six, were not mentioned by the interviewees either. Some respondents added school and education as a medium where awareness is gained. This was also brought up by P1, P3 and P4. They all use education as a way of increasing awareness (P1; P3; P4).

The increased awareness has affected the Swedish organizations in how they operate and manage various aspects, as mentioned by all the interviewees. The survey showed that the awareness has affected most of the Swedish consumers' way of living as well. However, over 42% responded that they are either unaffected or they do not care. This shows that there are

consumers in Sweden, mainly under 50 years old who are still having similar lifestyles as before, when they were not as aware. This is also showing that the third assumption about changing the way Swedish consumers are living, is partially true. Since the results showed that over 40% have not changed their lifestyle despite an increased awareness. It is also worth reminding that the results represent primarily individuals under the age of 50.

5.7 Create Awareness

The interviewees highlighted different ways of creating awareness, some of them were through labeling (P1; P2; P4), campaigns (P2; P3; P4) and education (P1; P3; P4). When the Swedish consumers were asked about which mediums they thought were the best in order to create and spread awareness and information, the responses differed a little from the answers received regarding mediums they actually get awareness from. They thought social media and labels on products are the best ways here, similar to where they get awareness from. However, the percentage is higher on the social media answer, in the creating awareness-question. The biggest difference is that games received more votes on the creating awareness-question and articles got fewer votes. It is the opposite in the getting awareness-question, articles received more votes than games. These results could be linked to the literature where Cata, Patel and Sakaguchi (2013), Ahmad, Musa and Harun (2016), Ro et al. (2017) and Chappin, Bijvoet and Oei (2017) talked about using social media and games to raise awareness. However, it is essential to observe that the technology acceptance differs depending on ages (Asare & Asare, 2015). This means that digital games, social media and other digital outlets may not be the best solution for all ages. Since this study received data mostly from Swedish individuals under 50 years old, it could be difficult to draw a conclusion of what the best way of spreading awareness is, solely assumptions can be made. For instance, older individuals are not likely to use social media and get information there. P2 also added that anything, such as games and humor, that engages people could be a successful way of spreading awareness. To is similar to what the literature said (Cogut et al. 2019; Buerke et al. 2017).

P4 emphasized on the importance of spreading knowledge and planting good behavior, especially among kids. The respondent believes that it is easier for kids to adapt new information, maintain a sustainable behavior and influence adults in their surroundings. This is in line with the statement by Johnstone and Lindh (2017), that awareness grows as people age.

Most of the organizations, from the interviews are business to business companies (P2; P4), and they do not have a direct contact with consumers often (P1; P2; P4). However, according to their responses, this study shows that they still put effort and resources into meeting consumers, engaging in events and campaigns and creating and raising awareness and informing how consumers could become more sustainable. However, this study is also showing that the manufacturing organizations may not do enough, at least not according to Swedish consumers. Based on the survey results, less than 34 % of the respondents think that the organizations are doing enough to spread awareness about their work with sustainable manufacturing and sustainability. This means that over 66% of the Swedish consumers in this research answered that they either think or do not know if the organizations are doing enough.

The interviewees and their respective organizations do not focus a lot on targeting specific consumer groups. Some of them do some segmentation and are aware that they have various

types of consumers with different needs (P2; P3; P4). In connection to this topic, the respondents on the survey were asked about what type of consumer they were. Most of them are purpose-driven and value-driven came in second place. Although, the survey did receive votes on all of the options, which suggests that the fifth assumption is true. The descriptions for these two types differ. A purpose-driven consumer is willing to pay more for better products and willing to change their behavior in order to reduce the environmental impact. A value-driven consumer chooses brands based on convenience and price, wants good value for the money and does not change their behavior in order to reduce the environmental impact. They are opposites to each other but the survey shows that most of the Swedish consumers are either willing to change their behavior or not. How to reach out to these opposite types of consumers and how to engage the value-driven consumers to become more sustainable could be discussed in future research. Additionally, in comparison to the literature, the results of a report showed that 80% fall into the same categories as this study. However, these are not based on Swedish consumers (Haller, Lee & Cheung, 2020).

5.8 Challenges

Some of the literature found about the challenges is relatively old (Nambiar, 2010; Garetti & Taisch, 2011) and the interviewees mostly talked about the same challenges. The authors can therefore see that the challenges identified in older studies are still challenges that the Swedish organizations are facing today. Some of the struggles that the interviewees expressed, on an organizational level, were making sure that the organization and employees have enough competence for future challenges (P1), need for technical development (P1; P2) and complying to laws and regulations (P1; P2). P1, P3 and P4 highlighted the challenge of ensuring that there is an availability of renewable materials. From a consumer aspect, the respondents mentioned that communication with consumers, providing clear and true information, tougher demands and being ahead and foreseeing different aspects are challenging.

From the survey, when asked about whether awareness has changed the Swedish consumers' way of living, almost 43% answered "No" or "I do not know". This suggests that there is still an amount of individuals in Sweden that has not adopted a more sustainable lifestyle. This could be seen as a challenge for organizations, about how these types of consumers could be encouraged to become more sustainable.

When it comes to sustainability in general, all the different parties involved need to work together as suggested by P2. One party cannot work towards a more sustainable future alone. This can be linked to what P1 stated, that the organization is not able to control what happens with their products after they have been used. Organizations can only do their part of the sustainability work to a certain extent. Consumers have a responsibility as well.

6 Conclusion

In this section, the study is summarized by answering the research question. It also concludes how the question was answered and some key findings.

This research was aimed to understand how Swedish manufacturing organizations, in particular organizations that focus on packaging, work with sustainable manufacturing and their consumers, and how Swedish consumers perceive these efforts. This led to the following research question:

"How effective are sustainable manufacturing efforts for Swedish manufacturing organizations and how do Swedish consumers perceive it?"

In order to answer the question, firstly, collecting relevant literature on the topic of sustainable manufacturing was necessary and then collecting data from interviews about what organizations do regarding sustainable manufacturing, how they view it and how much effort they put into it and into consumers. Secondly, the authors wanted to study how aware Swedish consumers are, how they perceive this topic and those efforts made by Swedish manufacturing organizations. By answering the question, the authors believe that this research helps both organizations and consumers to better understand each other. Organizations gain some insights of what Swedish consumers think about them, sustainable manufacturing and sustainability in general. Consumers could improve their knowledge about what organizations do in terms of manufacturing sustainably and spreading knowledge and awareness.

6.1 Key Findings

In summary, some conclusions that can be drawn are that Swedish manufacturing organizations appear to care about sustainable manufacturing and put efforts and resources into. They also invest in consumers, even if most of them are business to business companies and do not have much direct communication with consumers. However, the results from the survey suggest that many Swedish individuals think that the organizations are not doing enough. The results are also showing that many individuals have yet to adapt to a more sustainable living.

Another key finding is that consumers can get a positive perception on organizations who are taking responsibility for the environment. This could be shown through work and programs that demonstrate a corporate social responsibility. This research is also showing that Swedish consumers see social media as the best way to get their attention and spread awareness. However, this was not a dominant medium among the interviewees when discussing communication with consumers.

One other finding is that despite all the sustainable manufacturing activities adopted by the Swedish organizations, a footprint is always present to some extent. However, whether a small footprint is sustainable or not is debatable.

Lastly, something important that was brought up in this study is that, eventually, it does not matter how much effort organizations put into creating and spreading awareness. What happens to a product once it has been used, is up to the user. Everyone in the supply chain, including consumers, have a responsibility and a choice.

Appendix 1 - Interview Guide

Contract
1. Asking for permission to record the interview and thereafter transcribe it
2. Informing the interviewee that the collected data will solely be used for research purposes and for publication of a Master's thesis
3. Asking if the interviewee wants to be anonymous or if we are allowed to mention their name and the name of the organization in our research.
4. Informing that the interviewee can withdraw and cancel the interview anytime.
5. Informing the interviewee that a copy of the final thesis will be sent to him/her if he/she wants - yes
6. Making sure the statements above are approved by the interviewee
7. Presenting the purpose of the thesis: a. Presentation of the authors b. Presentation of the thesis topic

Interview questions and topics

Introductory questions
1. Tell us a little bit about yourself and your role within the organization.
2. What main responsibilities do you have within the organization?
3. What does the organization do? a. What industry is the organization in? (Apart from packaging)

Definition (sustainability, sustainable manufacturing)
1. How would you define the term sustainability?
2. What do you think about sustainable manufacturing?

Sustainable manufacturing
1. How long has the organization been focusing on sustainable manufacturing?
2. What are the main drivers that push the organization to make manufacturing sustainable?

The effects of sustainable manufacturing
1. What changes has the organization noticed after applying sustainable manufacturing? a. Financially b. Brand image and customer perception
2. Has the increased awareness from stakeholders put some pressure on the organization? If so, how does the organization handle it?

What the organization does
1. Which practices has the organization adopted in order to have less negative impact on the environment? a. What approach and concept does the organization use in their product lifecycle? b. Are some popular approaches and concepts such as Triple Bottom Line (TBL), the 6R concept (“reduce”, “reuse”, “recycle”, “recover”, “redesign” and “remanufacture”) applied in the organization?
2. Does the organization focus on environmentally conscious manufacturing (ECM) or lean manufacturing?

Challenges regarding sustainable manufacturing
1. What challenges has the organization faced when changing their systems?
2. What are the current challenges that the organization is facing today?
3. Do the challenges that the organization had before implementing sustainable manufacturing differ from the current ones? If so, how?

Consumer perception
1. What does the organization do to create awareness around sustainability? a. What does the organization do to spread information about their work regarding sustainability and sustainable manufacturing?
2. How has the increased awareness from consumers affected the organization? Do you feel that consumers have a bigger impact and more power now?
3. Is the organization targeting any specific groups of consumers? (Eg. consumers who want to purchase green products, consumers who do not care, etc.)
4. Does the organization work with Corporate social responsibility (CSR)? If yes, how?

Challenges regarding the consumer perception
1. What challenges is the organization currently facing regarding their work with consumers? a. Any possible future challenges?

Conclusion
1. Are there any comments you would like to add?

Appendix 2 - Survey Guide

SURVEY - MASTER THESIS
Definitions: **Sustainable manufacturing** - manufacture products through environmentally friendly processes which have less negative impact on the environment

Sustainability - meeting people's current needs without ruining the future generations' capability of meeting their needs
Corporate social responsibility - an organization's work with sustainability matters, labor, etc. where they take responsibility for the environmental and social effect on society

1. **Gender**
   Male
   Female
   Other

2. **Age**
   16-25
   26-49
   50-65
   Over 65

3. **Occupation**
   Student
   Employed
   Unemployed
   Other

4. **Do you live in Sweden?**
   Yes
   No

5. **How aware are you about sustainability?**
   Very low
   Low
   Moderate
   High
   Very high

6. **How aware are you about sustainable manufacturing?**
   Very low
   Low
   Moderate
   High
   Very high

7. **Do you think manufacturing organizations are spreading enough awareness about their work with sustainable manufacturing and sustainability?**
   Yes
   No
   I do not know

8. **From which medium do you get awareness about sustainability and sustainable manufacturing? (Can select more than 1)**
   Tv
   Games
   Social media
   Articles
   Billboard/posters
   Labels on products
   Other

9. **From which medium do you think is the best way to get your attention and educate people and spread information about sustainability and sustainable manufacturing? (Choose max 2)**
   Tv
   Games
   Social media
   Articles
   Billboard/posters
   Labels on products
   Other

10. **Has the awareness changed your way of living?**
    Yes
    No
    I do not know

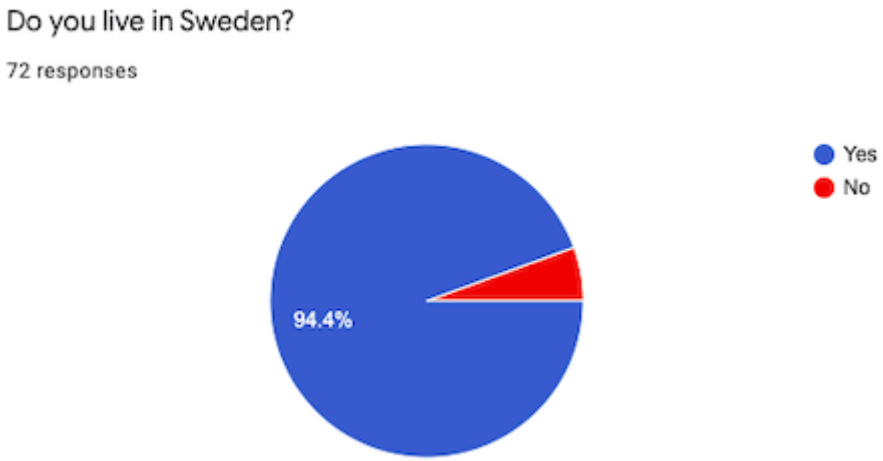
11. **Which of these following types of consumer are you?**
    Value-driven consumer - The person wants good value from their money and chooses brands based on convenience and price. He/She does not change the behavior in order to have less negative impact on the environment
    Purpose-driven consumer - The person is more willing to pay a higher price for products and services with better quality. He/She is willing to change his/her habit to reduce the environmental impact.
    Brand-driven consumer - The person is brand-driven and trusts the organization and its brand. He/She is willing to spend more for products and services that match his/her lifestyle.
    Product-driven consumer - The person is product-driven and cares about the authenticity of a product and would pay a higher price for the transparency.

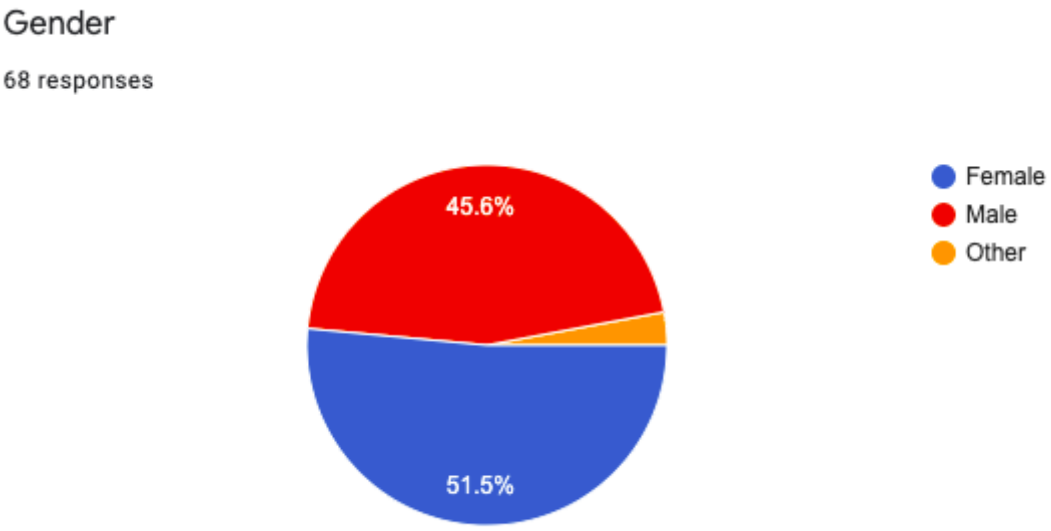
12. **Do you think an organization who does sustainable manufacturing and works with Corporate social responsibility (CSR) gives you a positive image of them?**
    Yes

No I do not care

Appendix 3 - Survey Results

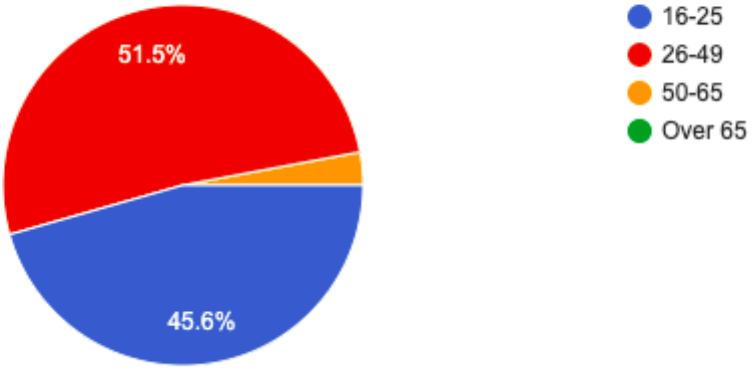
The four responses that answered “No” on the question below were removed.





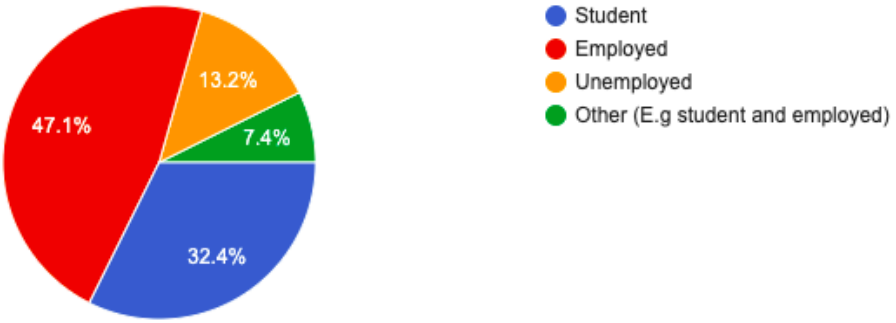
Age

68 responses



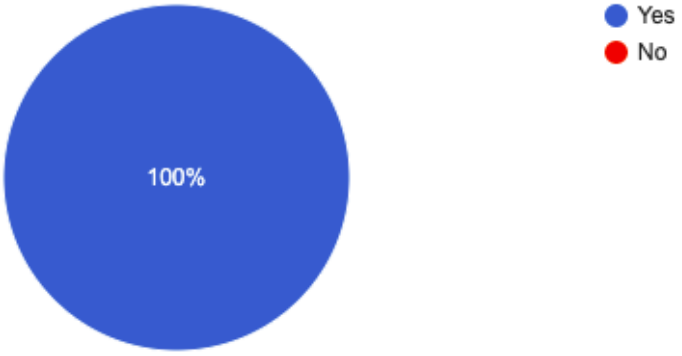
Occupation

68 responses



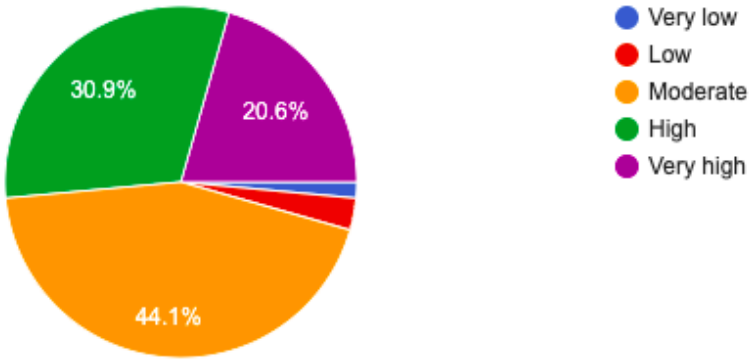
Do you live in Sweden?

68 responses



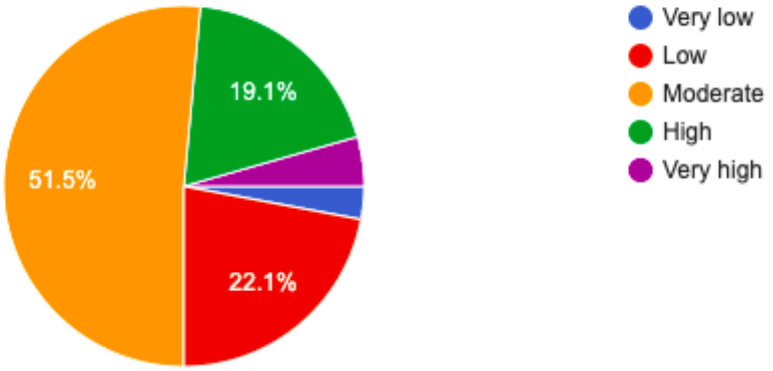
How aware are you about sustainability?

68 responses



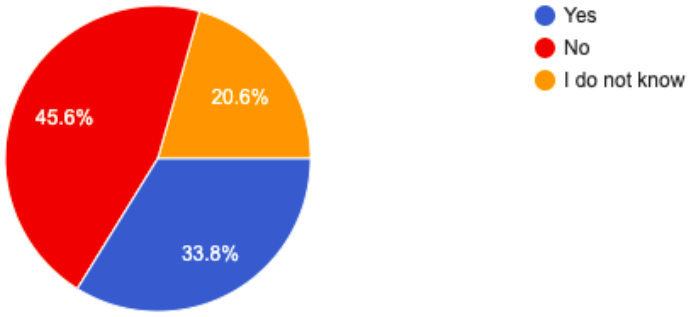
How aware are you about sustainable manufacturing?

68 responses



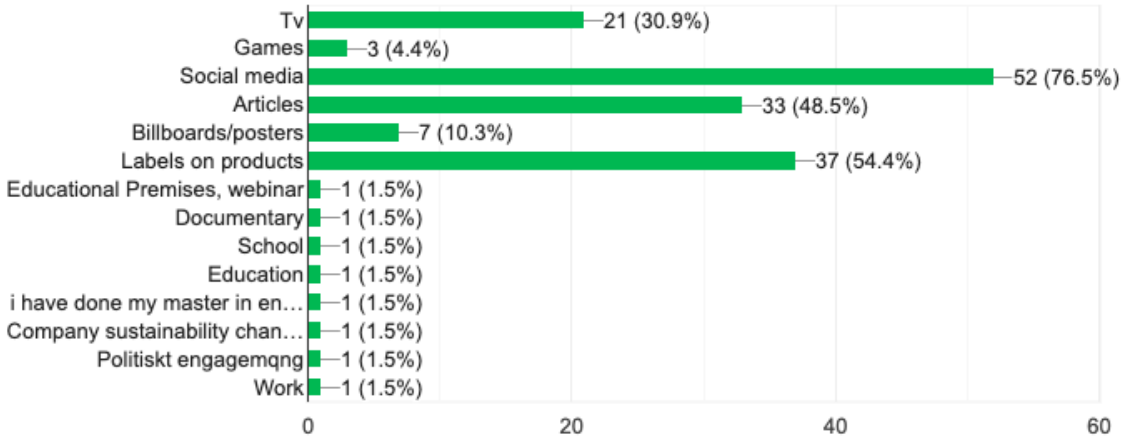
Do you think manufacturing organizations are spreading enough awareness about their work with sustainable manufacturing and sustainability?

68 responses



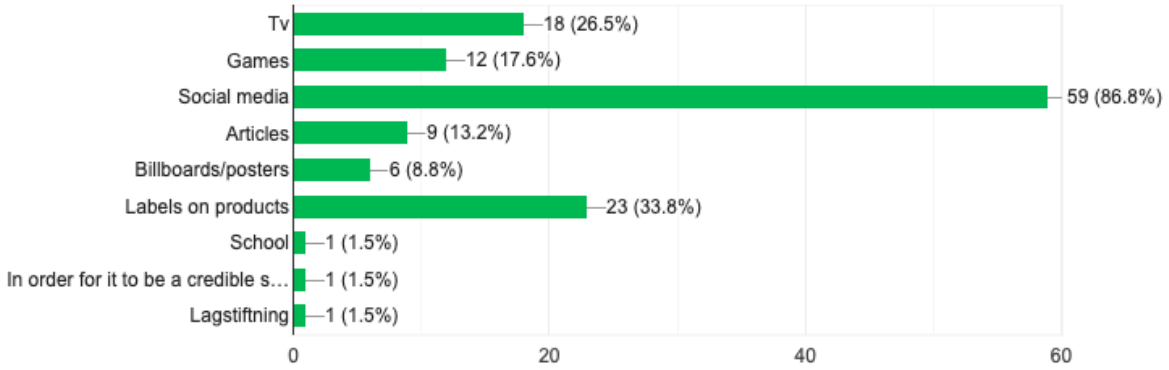
From which medium do you get awareness about sustainability and sustainable manufacturing? (Can select more than 1)

68 responses



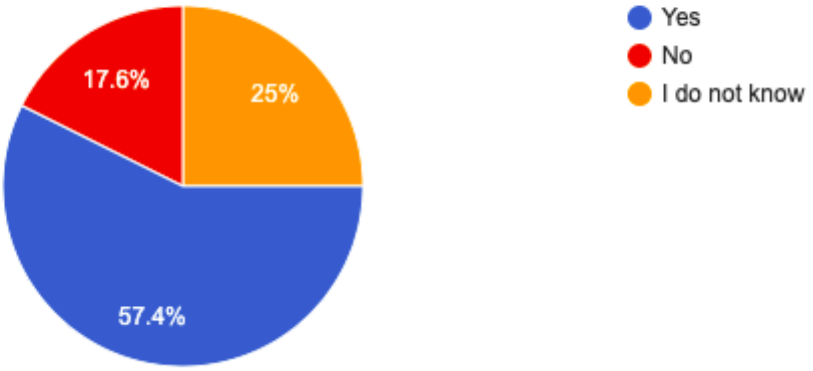
From which medium do you think is the best way to get your attention and educate people and spread information about sustainability and sustainable manufacturing? (Choose max 2)

68 responses



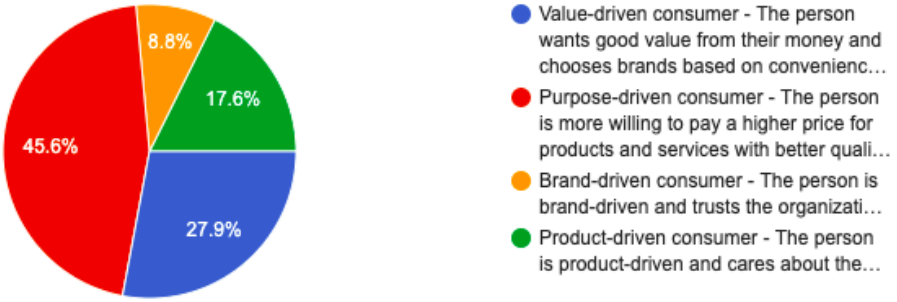
Has the awareness changed your way of living?

68 responses



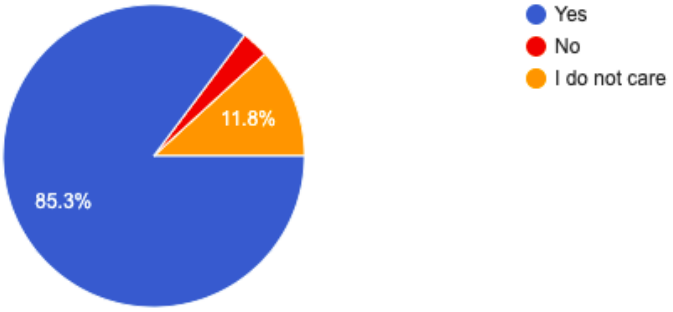
Which of these following types of consumers are you?

68 responses



Do you think an organization who does sustainable manufacturing and work with Corporate social responsibility (CSR) gives you a positive image of them?

68 responses



Appendix 4 - Transcript of Interview 1

Interviewee: P1

Interviewers: Emelie Huang and Sana Zaheer (Int)

Date of the interview: April 28th 2021

Type of interview: Video call on Zoom

Category	Code	Color
Sustainability	O-S	Orange
Sustainable Manufacturing	O-SM	Yellow
Effects of Sustainable Manufacturing	O-ESM	Green
Practices	O-P	Cyan
Corporate Social Responsibility	O-CSR	Brown
Increased Awareness	O-IA	Pink
Create Awareness	O-CA	Beige
Challenges	O-Ch	Purple

Line	Person	Transcription	Code
1.		(Going through the first three points of the contract)	
2.	Int	You have the right to withdraw and cancel the interview anytime you want. If you want to, we could send a copy of the final thesis, when it's done.	
3.	P1	Yeah, or at least if you quote me, it would be good if you could share that.	

4.	Int	Yup. Ok, so I'm Emelie and	
5.	P1	Hi Emelie.	
6.	Int	And I'm Sana.	
7.	P1	Hi Sana.	
8.	Int	So, we are writing a thesis about sustainable manufacturing in Swedish manufacturing companies that focus on packaging. And see their work around it and their work around customer perception.	
9.	Int	So now we could start with the introductory questions.	
10.	P1	Mhm.	
11.	Int	Tell us a little bit about yourself and your role within the organization.	
12.	P1	Yeah, so I'm responsible for sustainability at Duni Group. It's a Swedish, international company. I used to work with Tetra Pak but I moved three months ago to Duni. And yeah, so I'm responsible for the overall sustainability work for the company. Duni is an international company with manufacturing in Sweden, Germany, Thailand, Australia, New Zealand and so on. And we buy a lot of things from China as well, especially packaging.	
13.	Int	So it's a quite big company right?	
14.	P1	Depends. No, not really, I mean we're 2500 people so it's a medium-sized international company I would say.	
15.	Int	Ok, so what are your main responsibilities within the organization?	
16.	P1	To make sure that we have a sustainable offering and response with sustainability throughout the whole value chain so from supplier, material selection, production, logistics, sales and End-Of-Life solutions.	O-SM
17.	Int	What does the organization do? Apart from packaging	
18.	P1	We are mostly known in Sweden for napkins, paper napkins for restaurants and food service outlets. And also tablecloths so single-use tablecloths, paper tablecloths that we sell. But then, recently we have a growing business in packaging and packaging for the food service industry so take-away bowls and boxes and paper cups for coffee and things like this.	

19.	Int	Ok, so if we move on to the definition part. How would you define the term sustainability?	
20.	P1	Yeah, there are many different definitions of course. But I tend to go back to John Elkington's definition with the Triple Bottom Line. So financial, environmental and social sustainability.	O-S
21.	Int	What do you think about sustainable manufacturing?	
22.	P1	Sustainable manufacturing is to make sure that the materials used and energy used are as environmentally smart as possible and that you drive a socially acceptable and positive work environment for the people working in the production environment as well. And of course, that the manufacturing is adding value to the company overall. So you could take the Triple Bottom Line reasoning there as well.	O-SM
23.	Int	So how long has the organization been focusing on sustainable manufacturing?	
24.	P1	I'm just three months into the job so a little bit difficult to say. But I would say since the past four or five years at least, that the focus on going towards renewable energy has been around. So four or five years you could say.	O-P
25.	Int	What are the main drivers that push the organization to make manufacturing sustainable?	
26.	P1	I think in the end it's to provide customers with sustainable solutions so when they select a product from Duni, they should feel good that it's a good choice, that it's been manufactured in the right way and material choices have been done the right way.	O-SM
27.	Int	Ok, so after applying sustainable manufacturing, maybe it's hard for you to say since you haven't been working there for that long but what changes has the organization noticed from a financial aspect?	
28.	P1	Financially, I'm not sure that it's such a big difference. I mean the electricity is a little bit more expensive but you know, from the cost side, I mean it's common sense. Sustainable manufacturing is also about reducing waste and in all sense, material waste but also energy waste or waste of time and so on. So from that perspective, I think financial and sustainability go hand in hand.	O-ESM, O-SM
29.	Int	So from a more brand image and customer perception	

		aspect?	
30.	P1	Yeah, I mean manufacturing as such sets the base line you could say. But it's not really just the customers, it's more the products themselves. So I think it has a bigger impact on, I mean employee satisfaction and people working in the company, that they feel that they are working for a company who has a strong agenda when it comes to sustainability. So there's more things there. Manufacturing as such, that it has more internal focus than external. External is what comes out of manufacturing, and that's the products and they need to be sustainable in terms of material choice, on pack labeling and what not.	O-SM, O-ESM
31.	Int	Do you feel that customers are more interested nowadays in like greener products?	
32.	P1	Absolutely, yes. Definitely so.	O-IA
33.	Int	Has the organization felt any pressure from stakeholders?	
34.	P1	Yes, there's a lot of pressure from regulators and legislators. So in the packaging sector, I mean I'm sure you are aware of this Single-Use Plastics Directive that is now being planned for implementation mid this year. So that has a huge impact on the whole industry. So that's probably the biggest legislative package that has come through the past 15-20 years. So it's a big, big impact. So regulators, legislators have a huge impact. NGOs are also quite impactful but maybe not so directly but more indirectly since they affect the legislators a lot, they are lobbying a lot and when it comes to politicians and so on. Consumers are important because they are the ones who want to have good solutions as the primal user. So they are big. And I would say that investors are increasingly picking up on the sustainability train as well of course.	O-IA
35.	Int	So how does the organization handle all this pressure?	
36.	P1	Yeah, I think that is a big challenge because it means that you need to learn new things, you need to have new competences that have not been so important in history. So that is the big challenge for most companies. That you need to adapt to this new future and you need to have competent colleagues who can take on all these new challenges from a sustainability perspective. So I would say that's one of the bigger discussions that we have, how do we ensure that our colleagues are competent in the area of sustainability. And in there, of course there is a big competence lift needed. For example for our front lines,	O-Ch, O-P

		marketing people but equally important for purchasing and the supplier management, for them to know how to evaluate suppliers. And it cuts across, really, all the way from the bottom to the top. I mean we need to make sure that our CEO is strong when it comes to sustainability because he has a lot of external speaking engagement and things like that. So, yeah it cuts across. It's a big challenge.	
37.	Int	Which practices has the organization adopted in order to have less negative impact on the environment? Like approaches, concepts?	
38.	P1	Yeah, so we focus on key actions that we can drive and take decisions on and that is raw material choice. We're going more and more with renewable so avoiding fossil plastics, going to renewable sources. We are actually reducing plastics overall and going more for paper based products, wood based products. We are switching to renewable energy, electricity, but also renewable gas. We have used quite a lot of gas in some of the manufacturing so that's something. And then when it comes to end-of-life, recycling, collection, end-of-life treatment, that's a big area where we are running a lot of projects to see how our products can turn into new valuable raw materials for new products. So I think it follows the value chain and we need to find the most important actions and not just stop at one stop. So you cannot only work at end-of-life and recycling but you need to work with start-of-life, the design of the products and so on. So it's quite a wide reach.	O-P
39.	Int	Yeah, so does the organization focus on environmentally conscious manufacturing or lean manufacturing?	
40.	P1	You mean if we are focusing on lean manufacturing as well?	
41.	Int	Yeah.	
42.	P1	A little bit, but not so much. I think that is something that we will need to look at in the future because we have a very flexible setup when it comes to production because we have a lot of products, so that means that we need a lot of lines and I think we need to look at the width of the portfolio because it's probably too wide today. We need to be a bit more focused on some main products rather than have a wide range of products but that's just a feeling I have. I've just been here for three months but that's sort of	O-P

		my impression.	
43.	Int	What are the challenges that the organization is facing right now? Or maybe we should take the question before this. What challenges has the organization faced when changing their systems? Maybe that's hard for you to say.	
44.	P1	Yeah, I think it gets, over time, similar because right now, I mean the big challenge is to be in line with the Single-Use Plastics Directive. So regulations are the biggest challenge and I think that's what I did the survey with all of our sales people, 150 people in Europe and asked them about what are the big pressures from customers and where do they need to see innovation. And the biggest area is absolutely end-of-life solutions so recycling, composting, reusable solutions, things like that. That is what's coming back, so end-of-life is absolutely the biggest challenge right now. And the main reason is that regulators and legislators, politicians, they are engaging a lot in sustainability questions and they quickly end up in end-of-life regulations because that's something which is easy to understand and easy to regulate for them but it's not necessarily the best area to engage in to be honest. So that's why it's a huge challenge. We have bigger positive impact that we can do in the material selection and upstream value chain but politicians, they force us to look downstream on the end-of-life *only*. That's also important but it's not the only question. So I would say this is a big challenge. The other one, I think most companies are facing is that we all realize that we need to switch from fossil material to renewable materials. But in many cases, the availability of renewable materials is not where it needs to be, for that massive change to happen, especially when it comes to plastics. So we need to see technological development, industry capacity, to deliver the volumes of plastics needed. And that is a challenge today and will be an increasing challenge in the future as well. So yeah, both end-of-life and start-of-life, I think that's where the big challenges are.	O-Ch, O-IA
45.	Int	And are these challenges the same as before implementing sustainable manufacturing? I know this could be a hard question for you.	
46.	P1	Yeah, they remain the same. They are irrespective of the manufacturing system or solution that we select. I mean it is about the materials we choose and what happens to the products once they have been used so it's outside our own	O-Ch

		scope, in that perspective. So it doesn't change.	
47.	Int	If we go back to approaches and concepts, do you apply the Triple Bottom Line or the 6R concept?	
48.	P1	Triple Bottom Line, yes, I mean that's the way we structure our annual reports so there is information content in each of the areas there. And it's also a key concept in the report that is being used. So yes, I would say so. 6R, I mean is that the reuse, is that the waste hierarchy?	O-P
49.	Int	Yeah.	
50.	P1 & Int	Reduce, reuse, recycle, and so on.	
51.	P1	And that we do, absolutely. We try to move as far up the waste hierarchy as possible. So with recycling being sort of the bottom level where we want to see our products end up. We don't want them to go to incineration or landfill. So we start from recycling, composting and biogas generation as the sort of bottom line and then see how we can also reduce the amount of material. Especially when it comes to plastics, we try to reduce as much as possible. And then we are also exploring opportunities in reusable solutions, or instead of paper cups, to have refillable coffee mugs and salad bowls and stuff like that. So I think we work up and down that hierarchy but the further up you go, the more difficult it becomes.	O-P
52.	Int	And now we move on to consumer perception. What does the organization do to create awareness about sustainability? To create awareness among people	
53.	P1	I think there, it is important with certifications of labeling. So that we can put it on the final products. Most of our products are FSC certified, so Forest Stewardship Council, responsible forestry certified. We also have the Nordic swan for the napkins and tablecloths. And we have OK Compost for some of our products when it comes to packaging. So labeling is important to enable consumers to understand why it's a good choice, so that we do. We are a little bit of an FMCG company in some markets in Sweden for example. So there, we have a presence in food stores with a limited range but we don't do so much direct communication to be honest so it's more in the product design and what is written on labels and on the products themselves. So that's the main channel for us.	O-CA
54.	Int	Yeah so labeling. I read articles about using games as a	

		way of creating awareness. So it could be for example putting a game on a package to get kids more interested and create an awareness. Do you think that's like a good way of creating and spreading awareness?	
55.	P1	It can be, yes. And we have a really good example at my previous job when I worked at Tetra Pak, where we created a school competition, actually the biggest school competition ever in Sweden where we engaged from preschool up to year 6, classes in learning more about recycling. We worked together with WWF in a competition called the carton match. So we asked teachers to sign up in classes and then they got access to training materials, lesson materials around recycling and why it's good. And then there were some competitions in there to document how you did the recycling, to come up with campaign ideas on what we could print on the package and things like that. Before I left, I think we had almost 300 000 kids that participated in this competition. So I mean yeah, if you can find a good match then I think it absolutely works. But it's difficult to, I mean it's easy to run a competition but it's difficult to get participation. You need to get all the details right. But yes, I think it can be. In isolated thoughts.	O-CA
56.	Int	How has the increased awareness from consumers affected the organization? Do you feel that consumers have a bigger impact and more power now than before? Now that they are more aware.	
57.	P1	I think so but I think it's actually due to social media where all of us as individuals are more visible and approachable as companies and also accountable. So you will get uncomfortable questions if you do something stupid. You will get uncomfortable questions in your Facebook or Instagram account or on LinkedIn of disgruntled and angry consumers. So I think from that perspective, I think the consumer angle is becoming more important. But maybe not as consumers but more as citizens I would say. So yes, I think all companies feel that, even business to business companies feel more accountable now, when it can be a situation of hanging out to dry if you do something stupid.	O-IA
58.	Int	Yeah, and now with social media, everything spreads so much easier as well. So the reputation of a company, yeah.	
59.	P1	Mm, yeah.	

60.	Int	Is the organization targeting any specific consumers?	
61.	P1	No, I wouldn't say so. Not at this stage at least.	O-CA
62.	Int	And does the organization work with Corporate social responsibility?	
63.	P1	What do you mean? Do you mean social programs or welfare or philanthropy, things like this?	
64.	Int	Yes.	
65.	P1	Yeah, we have some examples. We have some cities in Australia that are quite active, who work with charity projects as well. So some cities in Australia are quite engaged in that because that's a fairly common way of doing things there. But not so much in Europe I think. We do have some partnerships with organizations so "Keeping the oceans clean" is a Swedish organization, "Mitt liv", "My life" in English, it's a diversity organization for newly arrived immigrants to get jobs for example, we're engaged there. Actually my boss has a presentation for one of their lunch seminars right now. So yeah, we do have some examples.	O-CSR
66.	Int	Do you think that showing that you have a social responsibility gives a positive view for consumers?	
67.	P1	Sure, I mean of course that's a value for the brand. The question is, does it add enough value? And what's difficult in doing social projects is that it's something you do to be a good citizen and something that makes you feel good. But it's difficult to capture as a value in a sales situation. When it comes to environmental sustainability, it's easier because then you do the characterization for life cycle assessment or switching away from plastics. It's much easier to explain whereas a social project is more complex for many reasons.	O-CSR
68.	Int	What challenges is the organization currently facing regarding their work with consumers?	
69.	P1	Regarding the? I'm sorry, could you repeat?	
70.	Int	Regarding their work with consumers?	
71.	P1	I think the main challenge, working towards consumers is always a matter of scale and money. It's expensive. If you want to talk to many consumers, it's expensive. If you want to do advertising, consumer advertising, it's very	O-Ch

		expensive. So I think to get a reasonable reach towards your consumers, it's always going to cost a lot of money. So B2C communication is typically very, very expensive. And it's also a very crowded space where a lot of other advertisers and companies want to get attention. So I think that's the main challenge there.	
72.	Int	And any possible future challenges?	
73.	P1	Future challenges?	
74.	Int	Yup.	
75.	P1	I mean there's always a challenge to get consumers to have the right facts. I mean we know that today, it's a lot of emotional communication and our decisions are not always or rarely based on facts but more on emotions. So that is going to be an increasing challenge for all companies, to get people to make decisions based on more factual information whereas we are emotional animals.	O-Ch
76.	Int	We actually don't have any more questions from the interview guide.	
77.	P1	Yup, there were a lot of questions.	
78.	Int	Do you have any comments you would like to add?	
79.	P1	I think it's an important question that you are working on and it's an important area. And I think when it comes to sustainable manufacturing as a subject, that's always good to be very factual. You're going to talk to engineers who take pride in not being emotional and not taking decisions based on what they think right now. But really what they built up, a logical structure. So I think it will be interesting to see what you arrive at there, how do you convince engineers to go sustainable as well because they are humans as well.	

Appendix 5 - Transcript of Interview 2

Interviewee: P2

Interviewers: Emelie Huang and Sana Zaheer (Int)

Date of the interview: May 5th 2021

Type of interview: Video call on Microsoft Teams

Category	Code	Color
Sustainability	O-S	Orange
Sustainable Manufacturing	O-SM	Yellow
Effects of Sustainable Manufacturing	O-ESM	Green
Practices	O-P	Cyan
Corporate Social Responsibility	O-CSR	Brown
Increased Awareness	O-IA	Pink
Create Awareness	O-CA	Beige
Challenges	O-Ch	Purple

Line	Person	Transcription	Code
1.	P2	It says it's recording.	
2.	Int	Yeah ok.	
3.	P2	Do you see a red dot on the top of the screen?	
4.	Int	Yes.	
5.	P2	Excellent.	
6.	Int	Ok perfect. We have to inform you that the collected data will be used for research purposes and for the publication of the master thesis. Do you want to be anonymous or are we allowed to mention your name and the name of the organisation?	
7.	P2	You could mention my name and the organisation.	

8.	Int	Ok, perfect and you can withdraw and cancel the interview any time you want and if you want, we can send the copy of the final thesis, when we are done with it.	
9.	P2	And if you want me to look over your transcript as well.	
10.	Int	Yeah.	
11.	P2	Because it's just possible that I may forget myself and use some acronyms. Or something like that	
12.	Int	Yeah it’s fine we can send it to you.	
13.	P2	Yeah, so I am happy to help you clear up any of those mysteries.	
14.	Int	Ok perfect. Ok and then we’re just shortly gonna present. So I am Emelie	
15.	P2	Hi Emelie.	
16.	Int	And I am Sana	
17.	P2	Nice to meet you guys. Sana, you are quite quiet. I don't know if you need to be a bit nearer the microphone.	
18.	Int	Yeah I think so.	
19.	P2	That’s a lot better.	
20.	Int	Yes. Now shall we start with the questions?	
21.	P2	Let's do that.	
22.	Int	Ok. Can you please tell us a little bit about yourself and role within the organization?	
23.	P2	Sure. What should I say about myself? I am a Brit that started work as an engineer which I did for 9 years then I taught at university for 5 years on product design and I was a management consultant for 9 years and I have been working with my last management consulting client which is Tetra Pak for about 16 years now.	
24.	Int	Ok. That’s a long time.	
25.	P2	Yeah, I’m at the far end of my work life now. And now I work in our central sustainability team with responsibility for sustainable sourcing and operations which is about	

		environmentally impact reduction with our suppliers, main categories are environmental materials which we buy about 3 million tons of materials every year and you can find a breakdown of that on our external website in the sustainability tab, in the data section. You'll see we disclose that. For operations, it's about managing our environmental impact, so energy, waste, water, carbon footprint, that sort of thing.	
26.	Int	Ok. And what does the organization do? Apart from packaging.	
27.	P2	Ok that, again you can find more information on our external website. We make food processing equipment, for example when you get raw milk from cows you have to take delivery of it, store it in tanks and then you have to filter it, you have to heat treat it to remove bugs and so on. And we make that sort of processing equipment for a number of different types of food. I mean if you can think of a liquid food, we work with it and we also make cheese processing systems. Anything from soft cheeses to 20 tons batches of hard cheese and even ice cream manufacturing, so that is the largest part of our business. We probably have around 80,000 processing lines in operations across the world on our customer sites. Then packaging, which is probably what you know about Tetra Pak because you see it in the supermarket everywhere. We have about 8,700 lines in operation around the world.	
28.	Int	Yeah, that's huge.	
29.	P2	Yeah and we are a business to business company. We don't sell directly to consumers. We sell to organizations like CompanyName, CompanyName, CompanyName and so on.	
30.	Int	Ok. If we move on to the definition part, how would you define the term sustainability?	
31.	P2	Yeah sustainability for us has three parts: Triple Bottom Line, environmental, social and economic. This is in contrast to the Friedmanite's definition which just focused on economic sustainability. You know, bringing results for shareholders. And sustainable means that you can go on doing it for the long term and not exhausting resources and then moving on somewhere else.	O-S
32.	Int	Ok. What do you think about sustainable manufacturing?	
33.	P2	Yeah. How would you define manufacturing as opposed to	

		business? What are you focusing on there?	
34.	Int	We are focusing on manufacturing different products that are environmentally friendly and that consumers want to buy.	
35.	P2	Ok. I guess you could say then maybe we are talking about different stains of products, environmental footprint and organizational environmental footprint. So then you might think about the life cycle assessment and environmental impact categories. So we do have, in our central sustainability team, a group that does that sort of life cycle assessment. We also require our suppliers to supply us with materials that are certified to sustainability standards. So the paper board is certified to FSC standard. The renewable polymer that we buy is certified by Bonsucro standard, that's sustainable sugarcane which is where the ethanol comes from, it's turned into polymer. And ASI Aluminum Stewardship Initiative for our aluminium foil. And those standards are framed around the Triple Bottom Line so productivity, environmental impact and social impact.	O-SM, O-P, O-S
36.	Int	Ok. How long has the organization been focusing on sustainable manufacturing?	
37.	P2	Yeah. I would say it's been in Tetra Pak's DNA from the beginning because the whole idea that the founder Robin Rousing articulated, at the beginning, was that the package should save more than it costs. And rather than just looking at the package in its used phase, that means looking at the package all the way from the materials it's made from, the manufacturing, the filling and transporting distribution. So for example the dominant package types in the 50s, when the company was started, were typically round and heavy, made of glass or metal. That means that when you put them into pallet loads, you've got lots of air space included. It's the same thing on the distribution stores and on the shop shelf. You can pack more square packages together so there are lots of efficiencies, plus the packages weigh a lot less. I would say it's been from the beginning and obviously there was not any real recognition of sustainability in the beginning and now we grew sorts of contexts under the heading of sustainability.	O-SM, O-S
38.	Int	What do you think are the main drivers that push the organization to make manufacturing sustainable?	
39.	P2	Yeah, good question. One reason is that it's the right thing to do. Our brand promise says that we will protect what's	O-SM

		good and that we say, has three aspects: protecting people, protecting food and protecting the planet.	
40.	Int	So it may be difficult to answer this question since sustainable manufacturing has been part of Tetra Pak for so long but what changes has the organization noticed after applying sustainable manufacturing, like financially.	
41.	P2	Yeah so you can say that one of the roots toward sustainability is to reduce waste. And since 1999, our largest part of our industrial base has been adopting a continuous improvement work culture called world class manufacturing. You can say this is either lean manufacturing or similar to the Toyota production system. The headline is zero waste and 100% involvement. We've made significant reductions in waste, of our production and we continue to go on reducing waste. So when you do that, you save materials, you save energy and save time, all of which are very closely aligned with sustainability objectives about reducing environmental impact.	O-S, O-ESM
42.	Int	Ok. As you know many people are more aware about sustainability. Has this increased awareness from stakeholders put some pressure on the organization?	
43.	P2	Yeah. When I talked about why we are motivated to do sustainable manufacturing, I talked about the right thing to do. We do have some other stakeholders who are very interested that we do that and that's our customers. Our sustainability actions are very important for our customers' sustainability brands.	O-SM, O-ESM
44.	Int	Ok. So which practices has the organization adopted in order to have less negative impact on the environment? So like what approaches and concepts do you use in product life cycles?	
45.	P2	We talk about life cycle analysis or life cycle assessment so that's been one of the basics and that covers the range of environmentally impact categories. From a product perspective, that's what we do. We know that the climate is very important to many of our stakeholders. If you go to our external website in the sustainability tab, you will be able to find our carbon calculator and there you can select packages from our range of packages and see what the carbon footprint is of each package. That's for the product perspective and from an organization perspective we have the normal sorts of carbon footprint, energy, energy efficiency, water consumption, waste. These are the	O-P,

		categories. In the methodology, what we do is, we measure what our status is to create a baseline and then we set targets for improvement. I am sure you are very familiar with that sort of methodology.	
46.	Int	So what about the 6R concept? Is the organization following that?	
47.	P2	Yeah. For each of these areas, we have a policy. So we have a waste policy and that means the policy is implemented by procedure and the procedure embodies the principles that you mentioned. This is for our operations. So we categorized all the different ways of streams. We have basically production waste and non production waste. We don't yet have a zero waste to landfill target but that is one of the areas that we have progressively been reducing. So when it comes to recycling, we send pretty much of our waste to recycling particularly the production waste because these are valuable materials.	O-P.
48.	Int	And I guess you use Triple Bottom Line as well right? Because you mentioned that	
49.	P2	Yes, we do, yeah.	
50.	Int	Does the organization focus on environmentally conscious manufacturing or lean manufacturing? Which manufacturing do you focus more on?	
51.	P2	That's an interesting question. I would say we do both and they are not exclusive in world class manufacturing. It is supported by a number of, what we call pillars and the pillars are particular contexts that are not functionally found. So for example we have the focused improvement pillar which looks at increasing value added time in the journey from door to door and if you like, truck to truck. From the materials that come in, to when they leave as products. And we need to take away all the non value added time and that's something that unites the different functions within the factory. Everyone has to work together. That's the whole context of WCM, world class manufacturing. And one of the pillars is environment and again, the type of environmental impact categories I talked about. Each factory has its own performance and targets for those, so that is part of our lean manufacturing approach.	O-P
52.	Int	Ok if we move on to challenges regarding sustainable manufacturing. So what challenges did the organization face when changing the systems to be more sustainable. Maybe difficult to answer.	

53.	P2	Yeah. I think it's always a matter of collecting data. And when you have to collect data about waste, if you are producing something at 600 meters a minute, if you're using people to identify waste and defects, it's not going to go very well because people are not so good at scanning at 600 meters a minute. So then, how do you actually develop technologies that will allow you to scan your production so that you can capture defects or at least that you can see the start of defects before actually producing materials that's after specification. That's been one of the big challenges, to enable that and of course Internet of things, industry 4.0 and so, with developing that.	O-Ch
54.	Int	So these are the current challenges that the organization faces?	
55.	P2	Yeah. I mean there are defect types that are difficult. If you take the human out of the loop. You know, first of all you have to detect a defect, then you have to identify it and then you have to position it on the production, the manufacturing execution system. A lot of our production is where we unwind the roll of paper board, process it and then wind it back up. So each defect then has to be located on a map of the roll that's produced. And at the end of the production stage, we have to remove the defect. Otherwise it goes to the customer who then isn't pleased. That's not what we want to do. That's a continuing challenge and it is, the heart of it, a technology challenge.	O-Ch, O-P
56.	Int	Do the challenges that the organization had before implementing sustainable manufacturing differ from the current ones?	
57.	P2	I think part of sustainable manufacturing, to make sustainable products is that they are designed to be sustainable, in other words, to use less material or the material to be easier to recycle. It's a whole life cycle thing, I don't think I can focus just on the manufacturing part of a life cycle.	O-SM
58.	Int	Ok, so let's talk about the customer perception. The first question related to that. What does the organization do to create awareness around sustainability?	
59.	P2	We communicate with our customers to understand what their sustainability requests are and then we communicate on our product sustainability for example on product carbon footprint. We are also asked about manufacturing sustainability so customers may ask us for Sedex audits.	O-CA, O-S

		Sedex is about supplier ethical data exchange and it's a system that companies can belong to, where they have four pillar audits that focus on environment, human rights, business ethics and so on. So our customers ask us to be audited according to the Sedex principles. We actually ask our suppliers to be audited as well. So you can say that's one of the basics for sustainability.	
60.	Int	So what does the organization do to spread information about your work regarding sustainability and sustainable manufacturing. Because I guess on your website, you can find quite a lot about your work around sustainability. Are there any other ways, like putting it on packages and stuff like that?	
61.	P2	So when it comes to environmental claims on packaging, we have FSC labels and we have placed more than half a trillion FSC labeled products on the markets since 2007, when we had our first FSC labeled package. We're able to do the same thing for Bonsucro that we started last year. Because it took time for our supplier to ask all of their suppliers, the sugar cane plantations and the mills to become certified to the Bonsucro certification. So that is one way that we talk about our sustainability on product advertising board, that is a customer decision to whether they want to do that by the way. Another thing we do is marketing campaigns and last year I think in September, we released our Go Nature Go Carton campaign where we talk about our sustainability journey and our sustainability ambitions for our product range.	O-CA
62.	Int	And the next question is related to how has the increased awareness from consumers affected the organization?	
63.	P2	Again, on our sustainability part of our website you can find something called the Tetra Pak index report. Every couple of years we go out to consumers in 14 markets around the world and we survey them on key sustainability topics, what their behavior is and so on. We also have that sort of dialogue with our customers. But this is one part where we actually do contact consumers in order to understand how we can help our customers make their packages more attractive to consumers.	O-CA
64.	Int	Doing analysis and assessment on that, do you feel that consumers have a bigger impact and more power now?	
65.	P2	I think if we look at the topics for sustainability. Let's talk about marine pollution. People have been making a noise	O-IA, O-P

		about marine pollution and particularly about plastic marine pollution since the 80's. And it wasn't really until the Attenborough films, I think Blue Planet showing the impact of marine pollution on marine life that the consumers around the world, civil society, really started to request that more is done about marine pollution. And then we saw that the European legislators created the Single-Use Plastics Directive and that they then focused on things that end up in the ocean for example plastic straws. I know actually that's probably the smallest of the top 10 categories but at least it's a start and as a result of that we've had a big program for sustainable openings. One aspect of which is to switch our straws from being plastic to being paper, not just any paper but FSC certified paper. And we wouldn't have done that without that pressure and it also stimulated innovation. I don't know if you use these plastic straws but you know the most common one is a U-straw so it's bent, so that you can have, within the package format, a straw that's actually long enough not to disappear into the package when you put it in. It's actually possible to make a paper straw that is a U-straw which is something I wouldn't have believed if I'd been told. And these straws are not just straws, they are straws that could be applied, I don't know, let's say 25,000 an hour in a packaging line. So yeah, it's a real challenge.	
66.	Int	Yeah I guess it could be a good way to use someone like David Attenborough as a way to spread awareness.	
67.	P2	Yeah, it is, it is.	
68.	Int	Ok. Has the organization targeted any specific groups of consumers? Do you put them into categories when you do analysis?	
69.	P2	We do some segmentation. We know that when we look at our consumer surface and from working with our customers, that consumers have different behaviors in different parts of the world. For example, in parts of the world where sustainability is a big issue because of pollution and air emissions and things like that, typically these are the places where consumers are very concerned about sustainability. So therefore we can help our customers highlight the sustainability of the packaging they are selling their products in. We do make a lot of effort to understand our consumers as well as our customers.	O-CA, O-S, O-IA
70.	Int	An additional question, have you noticed changes among Swedish consumers? If they are more aware and they want	

		to purchase more green products or sustainable products.	
71.	P2	We can talk about the fact that some of the countries are indeed more conscious of sustainability topics and Germany has been one of them and Sweden is another. So yes, Swedish consumers are very focused on this and particularly now with the focus, recently, on plastics in packaging. They are asking for the food manufacturers to use packages without closures. So instead of having a milk carton with screw cap, they want to have just the original gable top where you have to unfold it. And of course sometimes that means you increase food waste because opening packages like that often means that you spill the contents. Food waste itself is a big problem that isn't globally recognized. Global agriculture is probably responsible for about a third of climate emissions and I think it's, I'm just trying to remember the figures here but you probably know better. But you could look it up. I think it's 70% of water use in the world is agriculture. So if you waste food that has a very big impact and looking at food waste, about a third of all food that's produced is wasted, in its journey from the fields to the consumer. So one of the jobs our packaging has to do is to preserve that food, like keep it safe for the time it'll be in the package and during that time consumers are using it. So that it doesn't spoil. But it's complex.	O-IA O-Ch
72.	Int	Does the organization work with corporate social responsibility?	
73.	P2	Yeah. I think it's difficult to differentiate between CSR and sustainability. I think they have the same purpose. If you look again on our sustainability part on our website, you will see initiatives like Food for Development where we do school feeding programs. We also have a loose milk, a dairy hub initiative where we work with smallholder farmers in parts of the world where there's a lot of loose milk which spoils quickly and after it's not safe. We help smallholders form corporatives and put proper food processing in place and at the same time be effective and not increase the price. It's about our promise to make food safe and available everywhere.	O-CSR
74.	Int	Ok. So when it comes to challenges regarding customer perception. What challenges is the organization currently facing regarding the work with consumers? When you do analysis on consumers, are there any challenges that you have identified?	

75.	P2	I think it's difficult to generalize because our customers are so diverse. We work with some customers for example CompanyName or CompanyName and they sell to consumers in many, many different countries. So they have to have products that address the different needs of the consumers in those countries. Then of course we may work with customers that are very local so just to make another example, CompanyName. They produce juice and I don't think they have a greater market outside of Sweden so it's very difficult addressing them as a customer than it is, one of our big customers.	O-Ch
76.	Int	And any possible future challenges that the organization will face?	
77.	P2	In sustainability challenges, one of the ones that is occupying our minds is the European Union Green Deal and they are going to make a deforestation law so that companies will be able to show that there is a very low risk, that there is any deforestation in the supply chains. And that's not just European companies, it's companies placing products on the European market and being able to trace their supply chains back to the land use. So it's not just like the European Union Timber Regulation, which was about forests and there, not being illegal timber. This is about any consumer, any commodity that has a land footprint that is associated with deforestation. I won't cover them all but I will say that beef and soy and palm oil are very connected to deforestation. If you look at palm oil, palm oil is in almost everything. I'm exaggerating a little bit, but everything from Nutella to shampoos. It's huge. So the reach of the legislation is huge. We've already focused on deforestation for the supply chain for some time but being able to prove to a degree, because they haven't released the legislation yet, which is due at the end of this year. We and our suppliers don't know what we'll have to do in order to satisfy that legislation. So that's something that's on top of mind and we know that there are many other similar challenges coming our way and this is really what sustainability is all about, we can't do this on our own. We have to work with our suppliers. We have to work with organizations like Preferred by Nature, Rainforest Alliance, Proforest. We have to work with the legislators in order to create a more sustainable future.	O-Ch
78.	Int	So when it comes to challenges regarding consumers. Do you think there are any future challenges since I guess consumers' behavior for example could change?	

79.	P2	Yeah, a good thing that's happening is environmental sustainability has started to appear in school curriculum so we are getting more educated consumers, which is great. The other thing is that we have environmental NGOs, like WWF or Greenpeace or Mighty Earth, just to mention some of the more recognized ones, who are raising the consciousness of consumers about the issues and they are also lobbying the regulators to go better into the legislation. So I mean there are challenges ahead as well. Everyone needs to be more educated about these topics. I include myself in that.	O-CA, O-Ch
80.	Int	And another question, I read about using games as a way to create awareness. Do you think that is a good way to do it? Like letting kids play games to be more aware.	
81.	P2	Anything that engages people is likely to be successful in helping them to learn more. So games, humor, making it connect with people on an emotional basis. All of these things are successful education strategies. We've come to an end. I have another meeting that's starting right now.	O-CA
82.	Int	Yeah it's fine. Thank you so much.	

Appendix 6 - Transcript of Interview 3

Interviewee: P3

Interviewers: Emelie Huang and Sana Zaheer (Int)

Date of the interview: May 6th 2021.

Type of interview: Video call on Microsoft Teams

Category	**Code**	**Color**
Sustainability	O-S	Orange
Sustainable Manufacturing	O-SM	Yellow
Effects of Sustainable	O-ESM	Green

Manufacturing		
Practices	O-P	Cyan
Corporate Social Responsibility	O-CSR	Brown
Increased Awareness	O-IA	Pink
Create Awareness	O-CA	Beige
Challenges	O-Ch	Purple

Line	Person	Transcription	Code
1.	Int	Ok so we're also just gonna inform you that the collected data will be used for research purposes and the publication of the master thesis. Do you want to be anonymous or are we allowed to mention your name and the name of the organization?	
2.	P3	Well, it really depends on how the other interviews are managed. Is it a mix or is everyone else anonymous?	
3.	Int	We have done two so far. Both of them are not anonymous for now. But you can be anonymous if you want to. It's fine.	
4.	P3	Yeah. Well, let's start like that. Maybe later we can change that.	
5.	Int	Ok perfect. You can withdraw or cancel the interview anytime you want. And we can send you a copy of the final thesis if you want to.	
6.	P3	Yeah, please.	
7.	Int	Just to present ourselves. I am Emelie and Sana is here as well. We are doing a master thesis on sustainable manufacturing. We are mostly focusing on Swedish manufacturing companies, their work and around customer perception. Shall we start? So tell us a little bit about yourself and your role within the organization.	
8.	P3	My name is XXX. I work as director of sustainability within CompanyName and at the unit called GBIS standing for global branding innovation on sustainability and my main responsibility area is the climate actions that we have within the company. Since we do have science based targets, I'm coordinating these activities that we have set out to meet	

		these targets and it involves basically the complete value chain of our products.	
9.	Int	Ok. What does the organization do? What industry is the organization in apart from packaging?	
10.	P3	The company is a health and hygiene company providing soft tissue products and personal care products and also medical products. Yeah, that's basically it.	
11.	Int	So if we move on to definitions. How would you define the term sustainability?	
12.	P3	Sustainability is a vast area. We have defined sustainability in three different activity platforms and for us it's well-being, covering the social aspects of sustainability. We also have more from less and circularity which is more towards the environmental aspects of sustainability. But then of course, as always we also do have the economic aspect of sustainability in our overall definition.	O-S
13.	Int	Ok. What do you think about sustainable manufacturing?	
14.	P3	Sustainable manufacturing is a big thing. To start, we always talk about more sustainable or less sustainable because we do think that none of the activities are sustainable to the fullest extent. There is always a footprint involved somehow. You can argue whether or not a small footprint is sustainable. But as long as you have the directions, and then you could set target levels for yourself to be happy or satisfied where you are at the moment or have as a future ambition to work with. But for us, sustainable manufacturing or rather sustainable supply chain, meaning that whatever we do up until the products we sell reach our customers is basically involved in that. Then you can look at it in many different aspects. So you do have the upstream effects from us, meaning our supply chain where we source our raw materials from. Then we have our own manufacturing sites and then we have the distribution channels to take into consideration and then you can narrow it down to maybe only look at your own in-house manufacturing parts as the scope.	O-SM
15.	Int	Ok. Yeah so if we move on to, how long has the organization been focusing on sustainable manufacturing?	
16.	P3	I mean sustainable manufacturing, it's many different aspects included in that. One would be the efficiency part, meaning that we use material and energy in the best possible way. That is something that has been ongoing since we started and	O-SM

		that is many, many years ago. So depending on what you count, the company is a fairly young company. We started off in 2017 where we were split from a Swedish company. But before that, we have been ongoing since the 1800's, more or less in various sites. So it's a long going effort for this and over the last year we have increased, significantly our efforts into the sustainability area and also for the manufacturing area.	
17.	Int	Is it a larger company or small?	
18.	P3	I would say that the turnover of two companies, the former one and CompanyName is more or less equally big. Could be that I'm misinformed here.	
19.	Int	Ok. What are the main drivers that push the organization to make manufacturing sustainable?	
20.	P3	Yeah. What we do with our products is that we do the full life cycle assessments on them so we understand from which part of the value chain we have the biggest contributing impact to the overall footprints. And for instance when you look at the tissue products we see that roughly 50% of the overall footprints come from our own manufacturing operations. So improving the overall product footprint that would be immediately looking at our own manufacturing operations. The overall driver for that is to maintain or increase our market shares since we do see and feel the pressure from our customers and users to provide them with more and more sustainable products.	O-SM
21.	Int	Ok. So what changes has the organization noticed after applying or becoming more sustainable and applying sustainable manufacturing like financially?	
22.	P3	Yeah from a financial point of view, if you increase your efficiency for material and the energy then you reduce your invoice. So there will be an immediate link in between these two areas. But then again, as I mentioned, for some tenders that we've responded to from big customers, then maybe sustainable performance upto a certain level is really a ticket to play. If you don't comply with their requests, then you are not interesting from their point of view and then you will not get their order. So there is additional financial impact regarding that.	O-ESM
23.	Int	And when it comes to brand image and customer perception?	
24.	P3	Yeah, that is definitely something we build on. We believe that our brands are strongly linked to a sustainable	O-ESM

		performance upto a certain level. And as I mentioned, at least our bigger customers are really progressive and requesting us to deliver more and more sustainable products all the time.	
25.	Int	As you've mentioned, the increased awareness among stakeholders has put pressure on the organization. So how does the organization handle that?	
26.	P3	Yeah. One of the most important stakeholders externally is our investors. They are more and more knowledgeable about how companies are doing when it comes to sustainability. And they request from us, to report in a transparent way on how we actually make progress towards our sustainability targets. So we set out, in many different ways, to actually meet these requests from all the different external stakeholders that we see. Of course, we need to make prioritization because we cannot do all of it but we need to do what is most important at least, to provide what they request.	O-ESM, O-P
27.	Int	Which practices has the organization adopted in order to have less negative impact on the environment? Which concept and approaches does the company use?	
28.	P3	What we do to start with, when we look at the value chain we actually look at the type of material that we use in our products, understand the opportunities to change to other materials. We also look at evaluating our suppliers in terms of their footprint and then it's mostly as an intensity footprint. So we understand if we buy a ton of products from them, what type of environmental footprints will that bring to us. We also look at our own operations and look at, for instance the energy we use in our sites, shifting more and more into renewable electricity. We also utilize different approaches to decouple our other energy sources from CO2 footprint, for instance using bio based energy in many different sites.	O-P
29.	Int	Does the organization use the Triple Bottom Line or 6R concept?	
30.	P3	I'd say that we work with both of them but perhaps don't express as explicitly that we actually do work with the Triple Bottom Line or 6R concept. But all these words are in our vocabulary, maybe with the exception of "remanufacture" and to some extent also "reuse", although that is a strong coming trend now, within our products. So you find more and more reusable products, whereas the majority still are	O-P

		single use. Some might be hard, for instance toilet paper, that is a difficult product in terms of reuse of course.	
31.	Int	Yeah, exactly. Does the organization focus on environmentally conscious manufacturing or lean manufacturing?	
32.	P3	I'd say that we are not necessarily stock building but to some extent we do. The paper production that we have in our operations is big machines producing big rolls of tissue paper and then that semi-finished product is stored and may be shipped to other different sites of ours, to be converted into the products that we actually sell. So lean manufacturing is probably not what we are dealing with today. So it's more environmentally conscious manufacturing I would say.	O-P
33.	Int	So if we move on to the challenges regarding sustainable manufacturing. What challenges has the organization faced when changing the systems to more sustainable ones?	
34.	P3	I would say, if you look at for instance decoupling energy from carbon footprint, then you need to make investments and to find the earning margin for these day-to-day use, fast consumer goods products that we sell. It's kind of difficult. So finding a financial buyable situation for these investments is one of the biggest challenges.	O-Ch
35.	Int	And these are today's challenges as well?	
36.	P3	Yeah, that is a constant ongoing struggle to find these opportunities, to find investments and sometimes we actually do get support from various governments with subsidies of some kind to actually finance at least parts of the investment.	O-Ch
37.	Int	Any other current challenges that the organization is facing today?	
38.	P3	I mean, if you for instance look at our raw materials that we source and seek to find more sustainable alternatives to them then perhaps you run into availability issues because bio based materials at least if you start talking about for instance plastic packaging and so on, there are a limited number of suppliers on the global scale and of course these are very much subject to the balance between supply and demand. So price increases occur often, if the material is available at all, to the extent we would like to have.	O-Ch
39.	Int	Do the challenges that the organization had before implementing sustainable manufacturing differ from the current ones?	

40.	P3	I would say that without focusing that much on sustainability, then of course you get a lower pressure on what you are striving for and then it's more of going back to the efficiency aspects overall. Can you find something that you can actually increase your efficiency then you will have more focus on these areas rather than being more sustainable.	
41.	Int	Ok. So moving on to consumer perception. What does the organization do to create awareness around sustainability in general?	
42.	P3	We do quite a lot of communication, both in relation to our products but also in social media for instance. We also reach out to engage in different campaigns. For instance, the UN campaign on health and hygiene, where we participate and also present in the last 2 or 3 occasions as the opening speaker. So there are examples where we actually try to do this. We also engage in education and in various taboo areas, especially outside the industrialized world, to reach out and actually start talking about health and hygiene issues.	O-CA
43.	Int	Has increased awareness from the consumer side affected the organization or not?	
44.	P3	Yeah, I mean the consumers are extremely important because, as I mentioned one of the platforms that we strive to improve ourselves within, is the well-being aspects of what we actually provide and then of course it's well-being for the consumers and the users of our products that we are focusing on.	
45.	Int	So you do feel that the consumers have a bigger impact and are more powerful today?	
46.	P3	Yeah absolutely and I mean understanding the trends among consumers is basically building your ability for the future, to be successful as a company.	O-IA
47.	Int	Is the organization targeting any specific consumers, like consumers who want to buy green products and the consumers who do not care about that, etc.	
48.	P3	Of course we are reaching out to the big audience. But you can also find our consumers in a specific population group, for instance people with incontinence problems. So of course there's a bit of a difference in context to how we engage with these different groups.	O-CA
49.	Int	So how does your organization work with corporate social	

		responsibility?	
50.	P3	There are examples where we actually engage more on a local basis, where we are situated to help out and provide products to people in need. We also engage in various community activities around the world. We are present in many countries and in many markets.	O-CSR
51.	Int	And regarding the customer perception, what challenges does the organization face?	
52.	P3	I mean there is always a difficulty to reach out and communicate around sustainability. I mean keeping it straightforward and being clear on what you mean and so on. It's not always that easy and I mean people of today, we understand their behavior, when they actually go to retailers and shop for products, what they actually look for and how much they spend reading on different packages and so on and it's not that much. You know the competition in any media, it's fierce. So, directing communication materials more and more, in a simplified way to have clear but still true information to communicate to your consumers and customers, that's really important. But it's a struggle and doing so, we actually follow the various standards on how you should actually communicate around sustainability with your consumers. There is for instance an ISO standard, guiding you on what to do and what not to do.	O-Ch
53.	Int	You mentioned people reading the products like the labels. Do you think that's a good way to promote and spread awareness and in games for example. We read articles that talked about using games to spread awareness and create an engagement for consumers.	
54.	P3	Yeah, I think there are various ways of going about but turning back to these labels. That is an extra important area because that is someone else telling the consumer that this product is up to a certain standard. It's not necessarily us who have created which thresholds to pass, to be able to put that logo on your package, that is building the credibility of the communication as such.	O-CA
55.	Int	And another question about the Swedish consumers. Do you think that the awareness around sustainability is higher among Swedish consumers compared to other countries?	
56.	P3	I would say that you need to compare with comparable countries and prerequisites need to be fairly on term to say that the humans living in certain countries are more or less interested in this. But in general, we see a big trend moving	O-IA, O-P

		sustainability higher and higher on the agenda. We are also aware that it is one thing what people actually say in questionnaires and how they respond to questions but it's another thing what they actually do on the other end. But even in the do-area, for instance we have our system to investigate the use of bathroom toilets, public bathrooms. During the pandemic for instance, we see that one out of three visits to such rooms actually only involves cleaning your hands, which we did not see at all before. So there are shifts in this behavior and that is something that we see in many different countries, not necessarily only in Sweden.	
57.	Int	Are there any possible future challenges regarding consumers, when their behavior changes and trends?	
58.	P3	Yeah, following what will be acceptable from a consumer point of view is extremely important in order to understand the future prerequisites of the overall business situation. I mean who knows how long single use products will be acceptable at all in the future. And then again, understanding the alternatives and their footprint is also important to remember because if you do have a full understanding of that then you'll know for sure that you could provide the best possible alternative. In the long run, that will probably be the most successful way of moving forward.	O-SM
59.	Int	Lastly, is there any comment you would like to add?	
60.	P3	No. Not really. You could always find more information about the company on our website and you have a special section for sustainability which contains quite a lot. If you're more into understanding what type of company we are.	O-CA

Appendix 7 - Transcript of Interview 4

Interviewee: P4

Interviewers: Emelie Huang and Sana Zaheer (Int)

Date of the interview: May 10th 2021

Type of interview: Video call on Zoom

Category	Code	Color
Sustainability	O-S	Orange
Sustainable Manufacturing	O-SM	Yellow
Effects of Sustainable Manufacturing	O-ESM	Green
Practices	O-P	Cyan
Corporate Social Responsibility	O-CSR	Brown
Increased Awareness	O-IA	Pink
Create Awareness	O-CA	Beige
Challenges	O-Ch	Purple

Line	Person	Transcription	Code
1.	Int	It will be used for research purposes and the publication of this master thesis. Do you want to be anonymous or are we allowed to mention your name and the name of the company?	
2.	P4	I would like to see the results of it first, if it is ok.	
3.	Int	Do you mean the transcript or?	
4.	P4	I don't know, how will you use it? Will it be direct quotes or how will the output look like?	
5.	Int	Yeah we will probably include some quotes. We can do anonymous if you want to. That’s totally fine.	
6.	P4	I would like to see the quotes and how you will use them. And most probably, I can put my name there but I would like to see the results first.	
7.	Int	Ok. And you can withdraw and cancel the interview anytime you want to. And we can send a copy of the final thesis when it’s done, if you want that.	

8.	P4	That could be really nice.	
9.	Int	Ok, good. So I'm Emelie and	
10.	Int	I am Sana.	
11.	P4	Nice to meet you.	
12.	Int	It's nice to meet you too. Yes so our thesis is mostly about sustainable manufacturing, especially within manufacturing organizations that are focusing on packaging in Sweden. And their work around sustainable manufacturing, sustainability and consumers. So yeah, we can just start. Tell us a little bit about yourself and your role within the organization.	
13.	P4	XXX is my name and I work as a market sustainability expert for CompanyName, based in Lund. And I have a research background at Lund University, with a PhD in packaging logistics and I've also worked as a consultant for Afry, before I started at CompanyName about 5 years ago. And my responsibility is the Nordic countries, Sweden, Finland, Iceland and Denmark where I'm responsible for the sustainability questions concerning circular economy and recycling and so forth.	
14.	Int	And what does the organization do? Apart from packaging	
15.	P4	So CompanyName produces both dairy equipment, like separators and also whole processing lines for dairies. And we also have services that are more or less like consultancy where we can go in and have a look at a complete dairy and highlight potential savings from water efficiency, energy efficiency and so forth. But also services of the equipment. And we produce packaging lines and packaging machines. And also the packaging material that you see in our packages.	O-P
16.	Int	If we move on to definitions, how would you define the term sustainability?	
17.	P4	Can we put a hold on that one for a few seconds? And take another one and I will think a little on how to define it.	

18.	Int	Yeah, no problem. We could move on to the next, what do you think about sustainable manufacturing?	
19.	P4	Could you explain a little more about what you mean?	
20.	Int	Is the organization for example doing sustainable manufacturing to make environmentally friendly products and get economic benefits?	
21.	P4	Yeah, I mean we aim to do the process and the products as sustainable as possible. And the packages usually have a quite low impact from an environmental perspective in comparison to the impact that the food has, that it contains. So by prolonging the shelf life and making it available, it certainly impacts sustainability in all its dimensions I would say.	O-P
22.	Int	Do you know how long the organization has been focusing on sustainable manufacturing?	
23.	P4	Since the start I would say. Our founder said that a package should save more than it costs and that has been really the foundation of the company all the way. And just by making food safe and available everywhere. I would say it's really inherited into whatever we do, the whole purpose. I mean when CompanyName started out, there were no refrigerators and the distribution was in big, I don't know the English terminology, but big canteens kind of. And if you didn't consume the milk the same day, it was spoiled. So by protecting the food and also possible to distribute and store it over longer periods of time without the need of refrigeration, it's certainly making an impact I would say.	O-P, O-SM
24.	Int	And what do you think are the main drivers that push the organization to make manufacturing sustainable?	
25.	P4	Today, I would say sustainability is a must-have, at least here I would say.	O-S
26.	Int	Ok, so maybe it's a little bit difficult to answer this since you guys have had it from the beginning but what changes has the organization noticed after applying sustainable manufacturing from a financial point of view?	

27.	P4	As you said, it's hard to answer that question so maybe that's not possible to answer but we can see certainly that the shift in society, to more sustainability-focus has impacted us. We see that our customers have more demands when it comes to sustainability and more sustainable products and processes than before.	O-IA
28.	Int	And what about the brand image and customer perception?	
29.	P4	Well, since it's really important from the perspective of our customers and consumers, NGOs and also authorities, it's of course really important to us, for the perception of our brand and for the reputation of CompanyName in the long run.	O-ESM
30.	Int	So has the increased awareness from stakeholders put some pressure on the organization to be even more sustainable?	
31.	P4	Please repeat the question, sorry.	
32.	Int	Has the increased awareness from stakeholders put more pressure on the organization to be even more sustainable?	
33.	P4	Yes, yes definitely.	
34.	Int	And how does the organization handle that?	
35.	P4	I mean the goals are becoming even tougher and before, we used to be a sustainability department only and then we would assist the marketing department for instance but now, sustainability has really been implemented in the entire organization. So for instance the market department has received a lot of training when it comes to sustainability. So it's part of their kind of core business as well now. And not just a separate sustainability department in the company.	O-Ch, O-P
36.	Int	Which practices has the organization adopted in order to have less negative impact on the environment? What approach and concept does the organization use in their product lifecycle?	

37.	P4	We have a design for environment procedure but I'm not a product developer so I'm not all into the details there. But there are certain steps that they have to pass in the product development lifecycle kind of.	O-P
38.	Int	Ok, do you know if the organization uses approaches and concepts such as the Triple Bottom Line and the 6Rs?	
39.	P4	I mean reduce, reuse, recycle, they are kind of always present. And over time, the most hyped approaches or concepts, they change names. I mean those come and go but I would say that the most important is that you really work with it. What you call it is more a flavor of the month and not really what does the most impact I would say.	O-SM, O-P
40.	Int	Does the organization focus on environmentally conscious manufacturing (ECM) or lean manufacturing?	
41.	P4	I don't really know how you define those two concepts and the difference between. What's the distinction?	
42.	Int	So environmentally conscious manufacturing is more about satisfying environmental standards and requirements through the handling of standards regarding developing methods. Lean manufacturing, they aim to use less of everything, like fewer materials, less investments in machines and tools and stuff like that. So they are more about using less of everything, while environmentally conscious manufacturing is satisfying standards and requirements in manufacturing.	
43.	P4	I would say we kind of go beyond both of them. In the production, we work, of course to reduce the impact that we make by choosing sustainable sources, sustainable raw materials, and of course optimizing the amount of materials that we use. And also make the materials that we use to be a part of the circular flow. And we don't only see to our operations but to the whole value chain when we look at the impact that we have on the environment. I mean you can always optimize on one parameter if you don't look outside your own factory gate you will never optimize the whole system in an environmentally sound way. And by only looking at one parameter, you will	O-P

		never get as good as it can get, as if you look at all the parameters or selection of different environmental and social parameters. So I would say we go beyond the two concepts that you mentioned.	
44.	Int	Ok, so what are the challenges that the organization has faced when changing systems to maybe even more sustainable systems?	
45.	P4	I don't really know what to take as the starting point in changing systems since we have worked with sustainability all along but of course, focusing on different aspects of sustainability and to different extent, to some point. The challenges today are, I would say, in some parts it's the availability of raw materials, when it comes to sustainable and plant based raw materials. As we are a really large company, it requires large volumes and that is hard to reach from day one. So things have to evolve gradually and sometimes legislators and also society want, you know, a shift overnight but that is not really possible for an industry to change overnight, as it grows over time.	O-P, O-Ch
46.	Int	And the challenges you have mentioned, are those current challenges that the organization is facing?	
47.	P4	Yeah, I would say, I mean we are continuously looking at more sustainable sources of supply and we are shifting our fossil-based polyethylene in our packages, if we talk about our packages, to plant-based polyethylene. And the supply there is growing but we can't shift the whole stock overnight.	O-Ch
48.	Int	Maybe this next one is difficult to answer, so we can probably skip it but do the challenges that the organization had before implementing sustainable manufacturing differ from the current ones?	
49.	P4	I think we skip that.	
50.	Int	Yeah, so if we move on to customer perception. What does the organization do to create awareness around sustainability and how do you spread information about your work regarding sustainability and sustainable manufacturing?	

51.	P4	We have ongoing dialogue with our customers of course. And we support them on how they can communicate around our packages from a sustainability point of view. We share knowledge in terms of lifecycle analysis and different data that they need. And we also have, even though we are a business to business company, we have also communication with consumers, of course to a lesser extent than a regular consumer-facing company. But we have campaigns and we are out, not with the current situation so much, but in normal times we are out meeting both consumers and customers at different events and trade fairs and different conferences. But we are also just really out meeting and talking to regular consumers at for instance car releases. And in Kivik, we have a consumer event, having an Apple day where we're talking to consumers about recycling and the importance of recycling. And we also, in Sweden and Finland, have a school competition called "Kartong matchen", the carton match, where we have reached over a quarter million children to teach them how to recycle and the importance of recycling, and also what is a beverage carton and what's the package made of and why is it important to protect the food. So I guess we have a lot of different ways on how to reach out with our sustainability information. And, of course also our homepage and our sustainability report.	O-CA
52.	Int	How has the increased awareness from consumers affected the organization?	
53.	P4	I guess the most important and largest change would be that the responsibility for sustainability and communicating around sustainability are no longer just separated with us strictly working with sustainability but more spread in the organization. That's responsibility that we all have and share. And also the knowledge sharing with our colleagues, also outside the sustainability organization.	O-IA
54.	Int	Do you feel that consumers have a bigger impact now and more power?	
55.	P4	Compared to over which time period?	

56.	Int	Well, awareness around sustainability wasn't as big before but it has grown over the years. So if you compare to before, when the awareness wasn't as big and the knowledge around sustainability wasn't that large.	
57.	P4	I mean, yeah, both yes and no. As a consumer, if you're not owning your own land and harvest your own products, I mean you are somewhat limited to the products that are out on the market. But I would say that to some extent, the consumer power has increased over time and the focus, I would say has maybe shifted a bit over time as well. I mean it takes time but I believe that the aware consumers are getting more knowledge and deeper knowledge over time and can make more informed choices over time. I mean in Sweden, we have an example of double packing of toothpaste for instance. It's outside food packaging of course but today we don't see that many toothpastes in outer paper packaging and that's a consumer-driven change in Sweden. And I think that consumers are more aware when it comes to, I mean you buy some products and half of the package is empty, I think that annoys people. And to some extent it might drive changes but when you don't have any different products in different packages to choose among, it's also hard as consumers to really use the power. But in cases where you have different options, it can certainly be a power.	O-IA
58.	Int	Is the organization targeting any specific groups of consumers? For example consumers who want to purchase green products or consumers who do not care.	
59.	P4	We don't target any specific consumers since we are a business to business company but I mean we usually draw a triangle with the brand name and the product and the package in the three corners. And those three have to have a matching message to convey to the consumers. And for our customers, like the dairist for instance, they usually have at least a range of products that are marketed with particular concern to the environment and to environmentally concerned consumers. And in those cases, we of course highlight our packages that also match in communication, that have lower impact on the environment. And we have a portfolio of packages that	O-CA, O-P, O-IA

		can match different needs and different profiles of our customers and also consumers. And we have, I would say really, really sustainable alternatives where we have been front tiers in the market and that, of course, we highlight especially for the customers with the sustainability approach and that in turn, communicate that to the sustainable consumers. And we really try to lead the sustainability transformation and address the needs of our customers that are facing a lot of demands from consumers and legislators.	
60.	Int	Does the organization work with corporate social responsibility?	
61.	P4	Yes, we do.	
62.	Int	Do you have any examples?	
63.	P4	Yeah, I mean safety first is a really important principle. And we have the same high standards all around the globe and of course the difference between, I mean in safety level, between working for CompanyName and other companies varies, depending on where in the world you live. But we aim to have really high standards everywhere. And a recent example I would say is now, during the covid situation, we have had higher, if I only look here in Sweden, we have higher demands on the safety and in our work environment than what the society has demanded. We have face masks and temperature scanning when you enter the facility. And working from home for most of us and only having the staff that really needs to be on site. Shifting on to digital meetings, even in really important customer meetings and really trying to find good solutions and also supporting our employees with money and equipment to make the home office also a sound workplace.	O-CSR
64.	Int	What challenges is the organization currently facing regarding their work with consumers?	
65.	P4	I mean meeting tougher consumer demands is always a challenge and also reaching out with communication is another challenge.	O-Ch

66.	Int	And any possible future challenges?	
67.	P4	One challenge, of course, is the complexity of it. We have a number of aspects that we look at today, that are in focus today but what's in focus tomorrow. I mean before the microplastics and plastics in ocean debate, people didn't really think about it but it was there all along. What's the next plastic-in-ocean thing that we kind of become aware of? And foreseeing those things and really taking a sound, holistic perspective in producing products before they emerge as a global crisis, I would say is really the challenge.	O-Ch
68.	Int	Ok, I have one additional question because you talked about the "Kartong matchen" for kids. Do you think that type of events, and games and labels on packaging and so on, are good ways to kind of inform people about sustainability and create awareness around it? Just to create an engagement for consumers.	
69.	P4	Yes, I believe so and most of all, I believe that planting good behavior and knowledge among children is really important because they are easily adapting to new information and they can bring along sound habits throughout their lives. I mean, really changing the behavior of someone who is older, that is important as well but maybe spreading knowledge among kids, that's really the future. And the kids do also have really good impact on their parents and other adults in their closeness. So I believe that is key to change and also change that will remain for a long period of time. And when it comes to the second half of your question, please remind me. What was the other half of the question, could you please help me?	O-CA
70.		*Pause in the interview due to internet problems*	
71.	P4	Do you hear us?	
72.	Int	Yes, so sorry. The internet disappeared.	
73.	P4	Yeah, so I don't know how much you heard but basically addressing and devoting communication to children, I believe is really key to changing behavior in the long	O-CA

		term. But you kind of had two questions in the same question and I couldn't really remember the second one.	
74.	Int	It was more of a question about if it is a good way to kind of create consumer engagement and spread awareness.	
75.	P4	Yeah, and I really believe that it is. And to spread knowledge to the kids. And also, yeah you said labeling on packages, that was the second one. And that one I believe is also really important and one of the parts in the competition is that the children get to design a recycling message or recycling campaign for a milk panel, on one of the sides of a milf package. And that I believe is also an important way to convey messages to everybody. And our customers select the best panels and actually run them on real packages. And that is reaching millions of people in Sweden so it's really cool.	O-CA
76.	Int	Yeah, and I think also, for a lot of consumers, that is the first thing they do, like read the packages. It's the first contact that they have with products. And creating awareness through games and stuff, I think that is a fun way for kids especially, to learn stuff.	
77.	P4	And that's also one thing that we have been really eager to communicate that recycling is not a burden, it's not something boring but it can actually be fun. You can have fun with your friends, going and recycling. And it's a positive thing and it's easy and you do a good deed because it's a valuable resource for new products. And I believe that is really important. And you asked me before, in the beginning, what sustainability is.	O-CA
78.	Int	Yes.	
79.	P4	If we bring it down to packaging, I would say that sustainability is when you select materials and amount for your package, so that the package can protect and facilitate the handling and also communicate. I mean you have to have enough material and proper material for the package to do its services to us, to protect the products and meet the needs that the package faces during its journey through the supply chain. And of course, you should not use too much material or too much energy.	O-S

		Inaudible (but talks about using sources from renewable resources and also recycling it several times).	
80.	Int	I think that was all of the questions. We just have one last and that is just, are there any comments you would like to add?	
81.	P4	No, good luck to your work and please just email me when you have it and I would like to look at the quotes.	

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