Towards a sustainable event industry in Sørlandet

A study on minimizing plastic cup waste in the event industry in the context of circular economy

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Preface

The master's thesis was prepared in the spring of 2021 as a final part of the master's program for Industrial Economics and Technology Management at the University of Agder. The thesis corresponds to 30 credits and has been prepared in collaboration with the music festival Ravnedalen Live and Norwegian Research Centre NORCE. The objective of the thesis was to examine various measures in the aim to increase sustainability in the event industry in Agder. In this regard, the festival management encounters several challenges, including connecting with relevant actors in the public, private and voluntary sectors to develop and experiment new approaches. On the basis of great interest in the subjects Innovation Management and Contract Management in Industrial Value Chains, we chose to study circular economy, as well as how to utilize circular economy in the event industry, in order to maximize the value of resources. Through the assignment, we have been in contact with skilled people with great competence in their field, who have contributed valuable information and input. We view the master's thesis as a good learning experience and are grateful for the opportunity.

We want to thank our supervisor Naima Saeed for constructive feedback and admirable availability. Furthermore, we would like to thank our contact person in Arena For Bærekraft, Mira Svartnes Thorsen for valuable and productive conversations related to the task. Due to the Covid-19 pandemic, it has been difficult to conduct the scheduled interviews. The contribution of Hansa Borg was thus sincerely appreciated. Their information and knowledge have been crucial to the empirical part of the thesis. Moreover, it has been difficult to study in the pandemic, considering that all universities in Oslo prohibit entry to the premises if the students do not belong to the universities. We as UiA students experienced a number of problems as a result. Therefore, we would like to thank each other for keeping a robust collaboration through the spring of 2021. Lastly, we would like to thank the teachers and fellow students for two knowledgeable years at UiA.

Oslo, 14 May 2021

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Abstract

The master's thesis was based on the outcomes from a report compiled after a network gathering emphasizing on the increase of sustainability in the event industry in Agder. The network gathering was organized by the music festival Ravnedalen Live. By cooperating with their partners, including Norwegian Research Centre NORCE, the festival management identified the scope for improvement. In this regard, the thesis aims to examine measures to promote sustainability in the event industry in Sørlandet.

The theoretical background presents sustainability, circular economy, supply chain, and an introduction to the event industry in Sørlandet. Moreover, a brief review of plastic, as well as the alternative materials are introduced. In collaboration with Ravnedalen Live, the authors have conducted a deductive research design approach. In spite of the challenges due to the Covid-19 pandemic, a survey and an interview were accomplished. Empirical data collection focused on the priorly established theoretical perspective and both surveys and interviews were conducted in relation to the theoretical framework. The literature study and research have identified the following:

Emphasis on communication with the festival participants is pivotal, as it is beneficial to map the environmental awareness of the participants in advance, with the objective to identify which measures should be prioritized. Accordingly, it is plausible to highlight the measures that will be valuable for the sustainability efforts. The authors' impression is that relevant steps for increasing sustainability in the context of circular economy includes: Motivating festival goers, implementing incentive schemes, cooperating with like-minded vendors, and increasing inter-festival communication for the purpose of pushing suppliers to deliver more environmentally friendly festival cups. In addition to the measures related to reducing plastic waste, the conclusion contains three proposals for the implementation of the two recommended alternative materials. In context of circular economy, the conclusion presents two different approaches for implementing stainless steel, and one approach for implementing rPET. In all of these approaches, it is focal to emphasize on dissemination of knowledge, collaboration with like-minded vendors, and implementation of incentives.

The authors' impression is that the findings and suggested approaches from the thesis will offer great value to the event industry in Sørlandet if utilized by Ravnedalen Live.

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Abbreviation list

AI	- Artificial Intelligence
CE	- Circular Economy
CSCO	- Chief Supply Chain Officer
EC	- The European Commission
EMF	- Ellen MacArhut Foundation
HDT	- Heat deflection temperature
IoT	- Internet of Things
LCA	- Life Cycle Asessment
LDPE	- Low-density polyethylene
PET	- Polyethylene terephthalate
rPET	- recycled Polyethylene terephthalate
Sg	- Subgroup

1. Introduction

This chapter aims to provide the reader with an insight into the ecological and sustainable challenges the event industry encounters. The chapter briefly describes present-day concerns towards climate change, and finally defining the problem statement.

1.1 Background and issue

Present-day neoclassical economic theories and various management theories either disregard or underestimate major ecological concerns (Eccles, Ioannis & Serafeim, 2014). However, there is a growing concern regarding the rapidly increasing impact of climate change upon tourism patterns and practices (Becken & Hay, 2007), and the significance of sustainability (Font & Harris, 2004). Until recently, the main area of ecological concerns in the event industry has been correlated to how ecological strategies, green strategies and the agreement of environmental renewal are fundamental for the competitive bidding for huge events, such as music festivals. According to Kearins & Pavlovich (2002), these green strategies have been analyzed in case studies of the 2000 Sydney Olympics. Awareness of these strategies were further increased when negative publicity was being widespread due to the air pollution at the 2008 Beijing Olympics, since this mega event implemented a minimal amount of green policies. The event industry is thereby reliant on sustainable innovations to maintain competitiveness, where changes in the organization's philosophy, values, products, services or practices could create environmental and economic value (Laing & Frost, 2010).

There are extensive studies which describe how integrating environmental dimensions into manufacturing and business strategies can improve several aspects (e.g., increased sales, return on investment, efficient use of resources, competitive advantage) according to Dangelico, Pontrandolfo & Pujari (2013). Pujari (2006) specifies how a corporations' performance has been improved through sustainable innovation strategies. As it is a focal factor for enhancing differentiation-based competitive advantage, it may also be an essential element to revitalize mature industries in industrialized countries (Reinhardt, 1998).

Increasing concern regarding overconsumption of resources, environmental degradation and social inequity has resulted in a demand for a transition towards a more sustainable society and economy. This encourages the Norwegian event industry to innovate in a sustainable and responsible way of creating value. However, there is limited academic literature on what actually characterizes how this industry works, or should work, with the purpose to achieve this. Consequently, the thesis will aim to investigate, in cooperation with the music festival Ravnedalen Live and NORCE Samfunn, how the Norwegian event industry in Sørlandet should facilitate responsible and sustainable innovations.

1.2 Problem statement

As explained in the introduction, society has an enormous focus on sustainable innovation. Businesses are now innovating in parallel with societal changes and expectations. Circular economy (CE) in particular, is vital on the political agenda in Europe (European Commission, 2014a,b, 2015a). The estimated increase in net savings for EU businesses are up to EUR 600 billion, if certain eco-designs are implemented that encourages waste prevention and reduction of greenhouse gases. An action plan to promote CE was proposed by the European Commission in 2015 (EC, 2015b). The thesis aims to answer the following research question by conducting a detailed examination of the subject of circular economy:

How can we minimize the waste of the plastic cups in the event industry in the context of circular economy, and what alternative material can be used instead of plastic to increase sustainability?

It is relevant to account for theory on alternative materials and circular economy practices, particularly in the event industry in order to answer the aforementioned question. The differentiation between circular economy practices in the literature is somewhat unclear, as the CE field is occupied by diverging approaches. There is a restricted amount of analysis on the current CE implementation strategies, as well as empirical data. By exploring what circular economy means for the event industry, it is conceivable that the thesis may highlight the relevance of certain CE practices in the industry, and conclude with recommendations for future research.

2. Theoretical background

This chapter aims to provide the reader with an insight into the literature study related to sustainability, CE, supply chain and background details of the music festival Ravnedalen Live. Finally, literature review on plastic and alternative materials will be presented.

2.1 Sustainability

While the inspiration to live sustainably dates back to ancient times, its terminology is nevertheless three decades old. In this relatively short span of time, the notion and practice of sustainability has generated lifestyle changes for individuals, innovations within design, business, engineering, and agriculture, as well as laws at municipal and state levels (Thiele, 2016). Sustainability is now endorsed by a rapidly increasing number of citizens, organizations, political parties and governments. It is one of a very few ideals- approaching the ranks of democracy and human rights - that obtains near universal endorsement. In fact, sustainability has been labeled as a "megatrend", with an immense and enduring effect on culture, the economy, governmental issues, and innovation (Scoones, 2007). But what is sustainability?

One of the earliest and widely accepted definitions of sustainability was published by WCED (1987, p. 43), where the term was explained as "… development which meets the needs of current generations without compromising the ability of future generations to meet their own needs". Furthermore, Portney (2015) reinforces the statement by interpreting sustainability as having three co-equal parts: environment, economy, and society, as depicted in Figure 1. Sometimes described as three overlapping concentric circles, or as three pillars holding up the concept, these elements have established the basis for disaggregating and elaborating sustainability. The essential point, according to this broad concept, is that sustainability focuses on meeting the requirements of the present without compromising the ability of future generations to meet their needs. Thus, sustainability can be achieved only by simultaneously protecting the environment, preserving economic growth and development, and promoting equity.

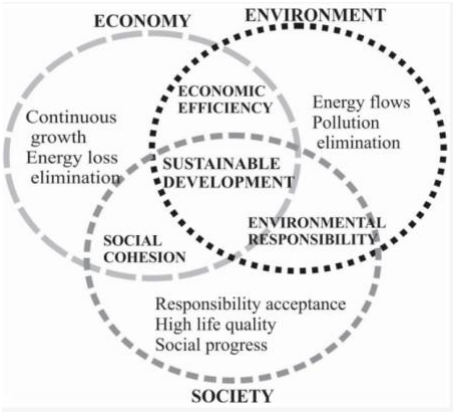


Figure 1 – Showcases the sustainable development: at the confluence of three constituent parts (Cafuta, 2015).

Although the importance and focus on sustainability has increased over the years, complications and barriers are still encountered during the process of realizing sustainable actions. According to Cohen (2006), one of the key challenges for sustainability is related to the increasing rate of population growth. The world's population has grown exponentially in the 20th century from approximately 1.6 billion in 1900 - to around 7 billion today, with each additional billion people being added more rapidly than the last (Haub, 2013). The speed and scale of increase in the world's population can create enormous stress on the immediate and surrounding environment and poses major challenges for sustainable development, as the increase of population is accompanied by the increase of waste (Brockerhoff & Brennan, 1998).

One of the global problems associated with sustainability is related to plastic waste. Plastic waste is 'the accumulation of plastic objects (e.g., plastic bottles, plastic cups etc.) in the Earth's environment that negatively impacts wildlife, nature and humans (Ritchie & Roser, 2018). Organisms can ingest the plastic or become entangled in it. Additionally, the plastic takes centuries to degrade (Stefatos, Charalampakis, Papatheodorou & Ferentinos, 1999). As a result, plastic contamination in the natural environment has attracted much attention from both researchers and the general public (Li, Tse & Fok, 2016). Waste related to plastic will be further elaborated in chapter 2.5.

Hamilton et al. (2019) indicates that strategies for reaching sustainability can mainly be divided into three categories. Most governments and international organizations that aim to achieve sustainability apply all three approaches, although they may differ on which deserves priority. The three suggested viewpoints can be summarized as follows:

- **Affluence:** Many reckon that the best path to sustainability is reducing consumption. This theory is represented distinctly in the idea of a steady-state economy, signifying an economy without growth. Procedures in this category involve, among others, the phase-out of lightweight plastic bags, promoting biking, and increasing energy efficiency. This statement can be reinforced by Yu, Geng, Dong, Ulgiati, Liu & Sun (2016) who determined that affluence is the biggest threat to sustainability.
- **Population:** Some believe that the most effective way of attaining sustainability is population control, for example by improving access to birth control and education.
- **Technology:** Others believe that the most auspicious path to sustainability is new technology. This theory may be seen as a form of technological optimism. One popular tactic in this category is transitioning to renewable energy, which is further supported by many researchers, including Owusu & Asumadu-Sarkodie (2016).

2.2 Circular economy

The European Commission (EC) recently proposed an Action Plan with the aim of promoting circular economy (EC, 2015b). The commission foresees the implementation of a CE to nurture economic growth by the creation of new businesses and job opportunities. In addition to reducing material costs, restricting price volatility, enhancing security of supply and parallelly reducing environmental- pressures and impacts (EC, 2014a,b, 2015a). Furthermore, auxiliary measures to improve resource productivity by 30% by 2030, is estimated to increase GDP by approximately 1% in addition to creating 2 million job opportunities (EC, 2014a,b). Netherlands is currently aspiring to become the "circular hotspot" and launched a project named "Realization of Acceleration of a Circular Economy (RACE)" in 2014 together with stakeholders. However, it is imperative to state that the dissemination of CE may be restricted or delayed as an outcome of the existing diverging approaches. Furthermore, there are currently no referenceable analysis of the convenient CE implementation strategies or empirical data on mentioned implementation strategies. Hence, precluding productive CE implementation and possibly jeopardizing planned CE investments.

As the importance and viability of CE has been presented, it is vital to understand the definition of the term and concept. Firstly, it should be stated that there are three different kinds of industrial economy: linear, circular and performance. Kalmykova, Sadagopan & Rosado (2018) describes linear economy as a river which utilizes value adding activities to sell its natural resources as base materials and products. The liability for risk and waste is transferred to the buyer at the point of sale. It is the owner's responsibility to reuse, recycle or dump the materials or products after usage. Make, use and dispose characterizes linear economy.

Circular economy is described as a lake by Kalmykova et al. (2018), where the materials are reprocessed instead of being disposed. The reprocessing generates job options while saving energy and reducing waste and resource depletion. For instance, waste managers can collect used bottles and initiate a recycling process. Contrarily, performance economy utilizes services as a form of selling goods. The goods are often "sold" through rent or lease, but the manufacturer still retains ownership and liability of its risk and waste. The focal point in the performance economy is to provide solutions or remedies such as waste prevention, instead of products (Geissdoerfer, Savaget, Bocken & Hultink, 2017).

As an explanation of the various kinds of industrial economy has been accounted for, it is essential for the thesis to elaborate on the similarities in the diverging definitions and concepts of CE. Figure 2 includes various CE definitions collected by Kalmykova et al. (2018).

1. Focuses on stock optimization. Has a structure of three loops: reuse and re-marketing for goods, product-line extensions for goods and a recycling loop for molecules (secondary resources) (Stahel, 2013)
2. An industrial system that is restorative by intention and design. The idea is that rather than discarding products before the value are fully utilized, we should use and re-use them (Wijkman and Skånberg, 2015).
3. In the circular economy the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimized (EC, 2015a,b)
4. An alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life (WRAP, 2016).
5. A regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling (Geissdoerfer, Savaget, Bocken and Hultink, 2017:759).
6. An industrial economy that is restorative or regenerative by intention and design (Ellen MacArthur Foundation, 2013b: 14).

Figure 2 - Presents an overview of various CE definitions by Kalmykova et al. (2018).

It is possible to identify a pattern of similarity from the presented definitions in addition to their readings. The EC among others emphasizes on maximizing the value of resources that directly correlates with Stahel's (2013) focus on stock optimization, which is a recurring matter of importance. Likewise, eco-efficiency has also been identified as a common principle. While Stahel (2013) and Wijkman & Skånsberg (2015) describe CE to be almost synonymous with eco-efficiency, EC (2015a,b) and Ellen MacArthur Foundation (EMF, 2013b) consider it to be one of the focal consequences of CE. EMF (2012) further discusses how eco-efficiency also is achievable through linear economy, by centralizing resource productivity and waste reduction. Additionally, EMF distinguishes between eco-efficiency and eco-effectiveness, where eco-efficiency revolves around minimization and dematerialization (Geissdoerfer et al., 2017).

Eco-effectiveness is described as "the transformation of products and their associated material flows such that they form a supportive relationship with ecological systems and future economic growth. The goal is not to minimize the cradle-to-grave flow of materials, but to generate cyclical, cradle-to-cradle 'metabolisms' that enable materials to maintain their status as resources" by EMF (2012, p.23). On the basis of eco-effectiveness promoting a synergistic relationship between ecological and economical systems, EMF (2012) suggests to rather focus

on eco-effectiveness than eco-efficiency. Furthermore, in accordance with Wijkman & Skånsberg (2015) and EC (2015a,b), EMF (2013) also presents waste prevention in their CE approaches, whilst WRAP (2016) identifies it as the main purpose of CE. Conclusively, the identified commonalities of various CE approaches are: stock optimization, eco-efficiency, eco-effectiveness and waste prevention.

Geissdoerfer et al. (2017) utilized bibliometric tools to conduct a meta-analysis in order to uncover conceptually related commonalities, contrasts and interrelations between CE and sustainability. The research interprets CE as a determinant for sustainability or as a beneficial correlation. However, certain costs of a circular system have to be analyzed and revised to avoid negative value (Andersen, 2007). Allwood et al. (2014) identified the technical impossibility with a closed circle in an industry with growing demands, and with a restriction of required energy to reprocess materials. The impact of this energy can have a greater impact than the environmental effect created for acquiring certain materials. Thus, CE can worsen emission of hazardous gasses and negatively influence global warming if a pragmatic approach is not established. Consequently, Geissdoerfer et al. (2017) states that factors such as material efficiency and reducing inputs should be prioritized over CE. Moreover, although CE complements various aspects of sustainability, the absence of certain dimensions such as the social one should be integrated to the CE concept (Murray, Skene & Haynes, 2015). Hence, EMF has redefined the modern understanding of CE cooperatively with the UN Environmental Programme and New Plastic Economy. Modeling it to not only limit negative effects from linear economy, but also focus on long-term resilience, societal benefits, environmental benefits, i.a. (EMF, 2020).

Geissdoerfer et al. (2017) states that their research is limited by the implemented methodologies in their literature review. Fetscherin & Usunier (2012) explains that a bibliometric analysis presumes researchers to publish the most significant findings and bases further research on previously published studies. This approach excludes contributions from unpublished documents and readings that are not published in academic journals. Moreover, by excluding randomized representatives the study is prone to selection bias. However, these limitations are manageable by implementing diverse methodological techniques and by elucidating contexts in which they are not applicable (Geissdoerfer et al., 2017).

2.3 Supply chain

The impact of the global pandemic has elucidated the fragility of complex globalized supply chains. Decreased raw material availability and increased uncertainty has encouraged chief supply chain officers (CSCOs) to consider a future-fit raw material approach (Gartner, 2020a). CSCOs are advised by Gartner (2020a) to abolish the traditional linear consumption-based model and transition towards a CE strategy. Genovese, Acquaye, Figueroa & Koh (2015) describes the transition as a complex long-term journey, requiring dynamic changes and acceptance of failures as part of the learning process. A controversial issue with CE is that it is contrary to numerous manufacturing and marketing principles, especially principles that assume planned obsolescence and independent ownership. Conversely, CE concepts are still progressively integrated into several manufacturing and distribution strategies. Majority of the advantages are derived from energy and resource efficiency, which are the subsequent results of reverse supply chain developments. It is therefore believed that firms facing market saturation are more inclined to implement CE supply chains, with the purpose of retaining or gaining market share.

Whereas conventional supply chains consist of a linear sequence (supplier - manufacturer - distributor - user), CE supply chains are distinguished by two fundamentals (Genovese et al., 2015). The first fundament is summarized by the socioeconomic and product design circumstances of material depletion. CE designs its products with focus on the life expectancy and viability of reprocessing. By sharing commodities such as capital goods the utilization scope is expanded. Consequently, the amount of necessary goods to provide the same extent of service is reduced. The second fundament exploits the assemblage of depleted or exhausted biological and technical goods, in relation to their several reprocessing alternatives. Technical goods require digital manifestation journals, as determining their recycle value requires precise information on resource composition in relation to the quality, quantity and type (Genovese et al., 2015). This converts the traditional supply chain to become a feedback loop.

The Gartner 2020 Opportunities After Crisis Survey showcases that a majority of 51% supply chain professionals expects an increased shift of focus towards circular economy strategies over the next two years. Gartner (2020c) advises CSCOs to utilize digital technology in the supply chain to enable CE. A combination of technologies is necessary as a “all-purpose technology” is yet to be developed. By integrating advanced analytics, internet of things (IoT), artificial

intelligence (AI) and 3D printing it is conceivable to achieve success (Kalmykova et al., 2018). Recent studies (Gartner, 2020b) accounts for employable strategies to promote the transition from linear economy to CE, in addition to the four reverse logistic layers (maintenance, reuse, remanufacture and recycle) from a circular perspective that are defined in previous studies (Rodrigue, 2020). However, these strategies require certain preconditions:

- Advisable to have executive management buy-in.
- Imperative to have collaborative partnerships with numerous suppliers.
- Prioritize product design that reinforces reprocessing and recycling.

Gartner's (2020b) first strategy supports development of a holistic and long-term vision. This includes a thorough analysis of products, in order to characterize their viability of various raw material refurbishments and recycling opportunities. The main aim of this strategy is to make a commitment towards CE. It is commendable to utilize pilot projects to gain support from either senior leadership or partners, to promote change in a circular path. Secondly, Gartner (2020b) suggests discovering overlooked opportunities to retain ownership of materials or products, by shifting towards a product as service arrangements. Leasing is a possible arrangement that can be made regarding certain products. The return process should be as customer friendly as possible, since customer goodwill is the sole reliance for product returns. The second strategy thereby focuses heavily on engagement with customers.

The third strategy involves constructing an ecosystem of partners and collaboratives to optimize the accessibility and end of life material management. It is advantageous to base partnerships on joint value creation and shared benefits. Gartner (2020b, pp. 1) defines the third strategy as "Scale through collaboration". The study advises close cooperation with waste contractors, reverse logistics providers and raw material suppliers. These coherent collaborations will provide access to end of life materials, ability to rationalize the materials, and establish the most viable reprocessing routes. Additionally, CSCOs are encouraged to "move beyond residual materials value" (Gartner, 2020b, pp. 1) as the fourth strategy. Consequent assessments of residual material value, price volatility of raw materials, customer sentiment, and global and local regulations should be made as the business environment is ever-changing.

Participation in the design process is encouraged as the fifth strategy. By utilizing early involvement in product design, a holistic understanding of material selection is gained. Supply chains have the opportunity to establish certain criteria which concerns the material's end of life. Collaborating with design teams can establish a set of circular design metrics, that consider factors such as; reprocessing and environmental impacts (Gartner, 2020b). Lastly, the sixth strategy involves conducting an assessment of the impacts related to the shift towards CE. In this regard, it is imperative to examine the balance sheet and consider whether the negative impacts on the company's metrics, compared to the benefits of raw material security are satisfactory.

2.4 Event industry in Sørlandet – Ravnedalen Live

Since the beginning of the industrial revolution in the 19th century, environmental pollution has grown into a global problem that impacts the whole world (Ritchie & Roser, 2018). In response to this issue, numerous industries try to reduce waste and emissions by mapping and highlighting existing opportunities. Event industry is one of these, which consists of various established industries that have in common to create events and happenings. According to ISO 20121, sustainable event management is the practice of incorporating environmental and social responsibility issues into event planning. Sustainable event management demands to contemplate the requirements and values of different stakeholders that are impacted by the event. Steps should be taken to reduce substantial negative impacts, such as solid waste. Moreover, it is essential to pursue opportunities for events that result in positive legacies which will benefit communities.

In the procedure of becoming a sustainable event, the festivals can benefit in two ways; by being economically more effective compared to their competition, and by being positively viewed by their audiences (Henderson, 2011). The economic feature of becoming sustainable might still be of interest to those festivals organizers who remain unconvinced. Henderson (2011) further implies that achieving a sustainable event is associated with the festival organizers motivation. In fact, becoming sustainable can be directly proportional to becoming cost efficient, since purchasing less decreases expenses. Thus, less waste is produced, resulting in less litter to clean up after the festival.

With an ever-increasing awareness of an ongoing ecological crisis, global warming and emissions-related consumption, Ravnedalen Live, a music festival in Kristiansand (6000-7000 attendance), wants to find a balance between economically, ecologically and socially sustainable operations. As there is minimal amount of academic literature and reliable framework related to implementation of sustainable management in the event industry, Ravnedalen Live has started a collaboration with numerous organizations that is conceived to be completed in the near future. With a relatively small staff, the festival management experienced that many existing solutions quickly became too expensive, and that alternative, innovative and new solutions could not be produced without good partners.

Some of the key challenges include; reducing the dependency on fossil fuel transportation, establishing societal cooperation, plastic waste management and the possibility to phase out plastic completely. However, due to Covid-19 numerous delays have been encountered. Regardless, findings will be collected in collaboration with several private and public organizations, including NORCE Samfunn.

2.5 Plastic

Plastic has been the subject of significant attention both in the media and among the society. From the first accounts of plastic in the environment, which were reported from the carcasses of seabirds gathered from shorelines in the early 1960s (Harper & Fowler, 1987), the magnitude of the problem soon became evident with plastic debris polluting oceans from the poles to the Equator and from shorelines to the deep sea. As depicted in figure 3, more than 300 million tons of plastic are produced yearly, of which it is estimated that about four- to twelve million tons end up in the sea (Geyer, Jambeck & Law, 2017). The use of plastic has increased nearly 200-fold in the last 50 years (World Economic Forum, 2016), and macroplastic (easily visible pieces of plastic that are over five millimeters in size) in particular has become a visual symbol of both consumption and society's inability to handle the created waste. The awareness regarding plastic and its long degradation time is not new, however, it has been widely disseminated for almost 40 years.

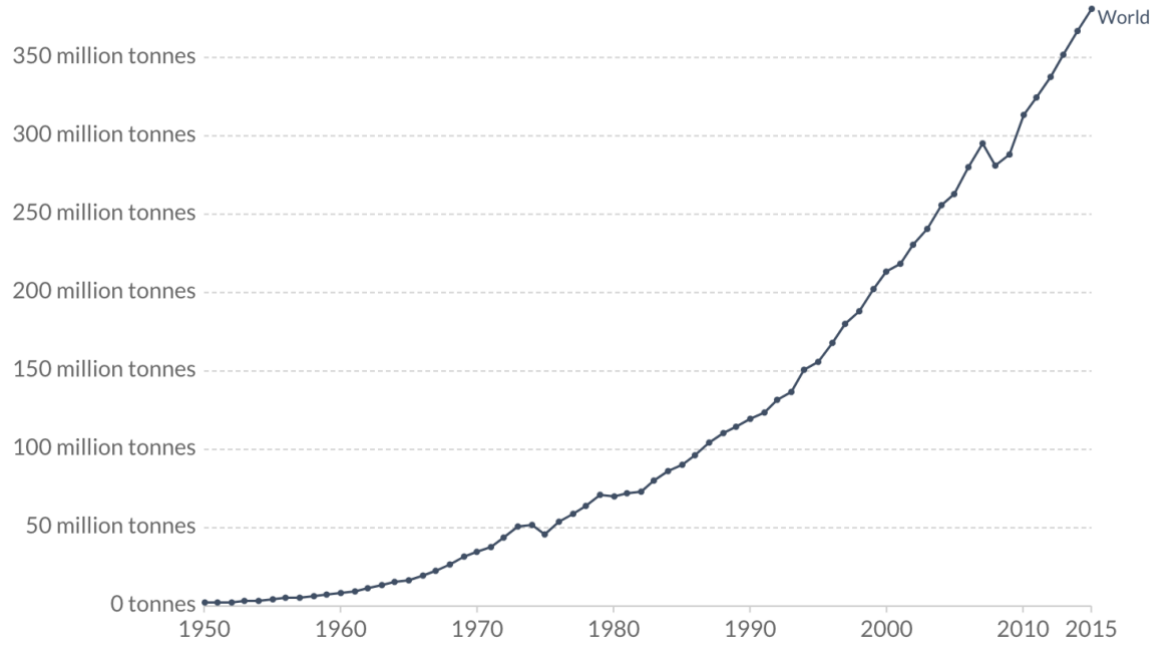


Figure 3 – Illustrates the annual global plastic production measured in metric tons per year (Greyer et al., 2017).

Until 2016, plastic was not considered as a impactful waste in nature, and treated occasionally, often based on the voluntary sector such as; environmental organizations or local charities (Kvanneid & Guribye, 2019). In Norway, the commitment to plastic as a special threat to the environment was first emphasized when the "plastic whale" was discovered outside Sotra in 2017. The six-meter-long starving whale had been stranded with over 30 plastic bags in the intestinal system that prevented food uptake. Thereby, the whale became an icon for the threat

plastic poses to aquatic and terrestrial animals (Haave, 2019). In addition to plastic waste being harmful to the environment, the production of plastic materials is also associated with environmental consequences. Plastic is produced from hydrocarbons, such as oil and gas, and carbon emissions from plastic production in 2015 were estimated to be around 1.8 billion tons of CO2 (Zheng & Suh, 2019). Table 1 showcases the decomposition rates of various marine debris items, including the typical items containing plastic, e.g. fishing line, plastic bags, plastic bottles and disposable diapers.

Table 1 – Describes the decomposition rates of various marine debris items (U.S. National Park Service; Mote Marine Lab, Sarasota, FL; National Oceanic and Atmospheric Administration Marie Debris Program).

Glass bottle	NA
Fishing line	600.00 years
Plastic bottle	450.00 years
Disposable diaper	450.00 years
Plastic beverage holder (six-rings)	400.00 years
Aluminimum can	200.00 years
Syrofoam cup	50.00 years
Foamed buoy	50.00 years
Tin can	50.00 years
Plastic bag	20.00 years
Cigarette butt	5.00 years
Photodegradable beverage holder	0.50 years
Waxed milk carton	0.25 years

2.5.1 Plastic cups

Plastics in general have become fundamental components of products and packaging due to the fact that they are durable, lightweight and cheap. Subsequently, plastic materials such as plastic cups are widely used, and often intended for single use followed by disposal or recycling. These types of cups were introduced in the last century to promote public health by substituting detrimental communal drinking cups near public water facilities (Foteinis, 2020). However, plastic materials have encountered numerous environmental issues in recent years related to the disposal and recycling (Glazner, 2015). Moreover, Glazner (2015) insinuates that plastic manufacturing in general is assessed to consume 8% of annual global oil production, which signifies the dependency plastic products have on nonrenewable sources.

Production and usage

The majority of disposable cups are produced from low-density polyethylene (LDPE) or polyethylene terephthalate (PET). However, there are limited recycling options for these polymers which has led to disposable cups becoming a problematic waste (Mitchell et al., 2014). Disposable plastics contribute in fact to 60-95% of global marine plastic pollution (Schnurr et al., 2018). Consequently, fish, seabirds, and marine mammals can become entangled in or ingest plastic debris, causing suffocation, starvation, and drowning, thereby damaging the marine ecosystem (Gall & Thompson, 2015). Contrarily to the several benefits such as being practical, lightweight, and ideal for transportation, plastic cups derive from fossil fuels and emit greenhouse gases through their lifecycle (Hamilton et al., 2019). According to Häkkinen & Vares (2010), roughly 77 MJ of nonrenewable energy is required to produce 1 kg of LDPE, while 83 MJ of nonrenewable energy is needed to produce 1 kg of PET. The CO_2 emissions generated in the production phase of LDPE and PET were suggested to be 1700 g/kg and 2900 g/kg, respectively. Table 2 depicts the environmental parameters of LDPE and PET. In addition, environmental parameters of Poly Lactic Acid (PLA) are showcased. However, this form of plastic will be further elaborated in section 2.6.2.

Table 2 - Showcases environmental parameters of LDPE, PLA and PET in the production phase (Häkkinen & Vares, 2010).

		LDPE	PLA	PET
Non-renewable energy (including feedstock)	MJ/kg	76.7	27.15	82.0
Renewable energy (including feedstock)	MJ/kg	1.12	31.3	0.450
CO_2	g/kg	1700	1783	2900

Recycling

Despite the facts that PET derives from nonrenewable resources and that the material is not environmentally friendly, PET comprises the ability to be fully recyclable if sorted properly (Komula, 2011). Thus, there will not be any amount of unprocessed PET in the recycling process if sorted sensibly. However, a higher percentage of recyclability will reduce the optical transparency of the material (Chacon, Brouwer & van Velzen, 2020). Moreover, Shen & Worrell (2014) implies that only 29% of the PET progresses to the recycling phase. In an attempt to measure emission rates from recycled polyethylene terephthalate (rPET), PET recycling team (2017) conducted a study where the emission from rPET was calculated to be 0,45 kg CO2 eq./kg rPET. As of the usage of nonrenewable energy correlated with rPET, Benavides et al. (2018) measured it to be 4,1 MJ/kg.

2.5.2 Minimizing waste related to plastic cups

The conscious approach towards environmentally friendly practices have been one of the key drivers of environmental protection in western societies. Despite this improvement, there are day-to-day unsustainable applications, which unperceived to most, tend to prompt large environmental impacts. One relevant example is the immense quantities of single-use plastic cups consumed and disposed on a daily basis (Foteinis, 2020). In spite of the benefits related to the disposable plastic cups, numerous environmental issues have been encountered. In an attempt to minimize the waste from plastic cups, various measures have been implemented in festivals around the world. These measures include emphasis on the communication with festival participants (Kennell & Sitz, 2010), partnering with like-minded vendors (Bermudez, 2015), motivating festival participants and collaborators to sort waste (Kvanneid & Guribye, 2019), introducing incentives for sorting (Martinho et al., 2018), employing a renovation team (Bermudez, 2015), implementing joint purchasing schemes, and the utilization of alternative materials (Changwichan & Gheewala, 2020).

A comprehensive study, concerning environmental awareness at music events in Norway conducted by Bermudez (2015), indicated that the partnership between Hove festival and Agder Renovasjon resulted in a significantly higher waste sorting success. Likewise, an increase in informed communication strategies was experienced. The partnership consisted of the renovation team being responsible for all renovation tasks, including waste management, transport, as well as establishing contact with external partners for practicalities. In addition, the festival had a cooperation with The Red Cross and The Salvation Army which arrived at the completion of the festival to accumulate materials left at the festival area. Thus, collaborating with environmentally conscious partners was deemed as a key catalyst for sustainability.

Bermudez (2015) further implies that another catalyst for the improvement of sustainability was related to inter-festival communication. The catalyst signifies the importance of communal information gatherings and publication of realized results, so that future events may achieve their sustainability targets. Both the Hove- and Øyafestival devote time to publish their strategies by cooperating with the Environmental Handbook, which displays the festivals concern in sharing information. Implementation of this approach corresponds with the findings from Bjørseth (2014), where shared information is observed as necessary to evaluate failures

and success, in an effort to help other festivals. Inter-festival communication thus disregards the competitiveness between festivals, and rather emphasizes on achieving a collective objective. Moreover, Bermudez (2015) states that by sharing information and joining forces, festivals may eventually have an opportunity to push their sponsors and vendors into delivering more environmentally friendly products, i.e., festival cups. The statement corresponds with Laing & Frost (2010), which highlights the significance of appropriately engaging event stakeholders in order for the event to prosper in its sustainable efforts.

Another measure to improve sustainability is related to the emphasis regarding communication with festival participants. Kennell & Sitz (2010) explored the greening policies of the Bonnaroo Festival, which is one of the largest music festivals in the US that actively supports recycling and sustainability. The study discovered that much of the success in relation to sustainability was achieved due to the immense effort to educate all parties involved in the festival. The management provided staff members and volunteers with a "greening handbook" issued by email, which contained festival purchasing policies and greening tips. The approach anticipated the participants to be inspired and partake in an environmentally friendly behavior at the actual site. Another factor for the attained success was the focus on improved compost collection by increasing the amount of manned recycling stations, in addition to engaging several volunteers to provide elaborated education to festival participants on the proper disposal of materials.

In regard to waste management, a case study (Martinho et al., 2018), was conducted at the Andanças Festival located in Portugal. The key catalyst for obtaining sustainability was the numerous incentives for sorting waste. Facilities at the site had to pay a deposit to the festival organizers of €300, which would be returned only if the area around the facility was cleaned by the end of the festival. The study insinuates that so far, the facilities have cleaned their surrounding areas, which reveals that the deposit payment is sufficient and effective.
In addition, the approved option for beverage container was to use a 200 ml mug, with a deposit-refund system. The deposit was refunded when the mug was returned at the end of the festival. The mug deposit was €1, and a carabiner (to hold the mug on a person's belt or pack) could be acquired for an additional €0.50. Martinho et al. (2018) further alludes that the deposit-refund system functioned in an effective manner and increased sustainability.

Nonetheless, the report from NORCE Norwegian Research Centre (2020) indicates that incentives such as mortgage schemes for increased waste sorting, can have a good effect, but

with the “wrong” audience it can also work against its purpose. For instance, the Shambala festival that has a strong sustainable and environmentally friendly profile and attracts audiences with similar attitudes, it has been plausible to demand a £10 deposit to get the audience to sort all the waste themselves, which has worked relatively well. Contrarily, at another festival with a different audience, the same approach resulted in the audience being under the impression that they had paid for someone else to sort the waste for them. The sorting rate thus decreased, since they now had less incentive than before to sort the waste (NORCE Norwegian Research Centre, 2020). Hence, it is essential to recognize the environmental awareness of the festival participants early, as suggested by Bermudez (2015).

Another approach to minimize waste related to plastic cups includes phasing out single-use cups completely. As these cups are one of the major waste streams at festivals, outdoor festivals apply alternative reusable cup systems and strategies in order to reduce single-use plastic waste production (Šuškevičė & Kruopienė, 2021). According to Changwichan & Gheewala’s (2020) study that compared life cycle assessment of conventional plastic, bioplastic and steel cups, it was presented that reusable steel cups had the best environmental performance in the case of prolonged use. Moreover, since bio-based plastics are fairly new, the production cost of PLA was estimated to be 2-3 times higher compared to traditional plastic. However, PLA cups displayed a better environmental performance than traditional plastic cups.

2.6 Alternative materials

Since the recyclability of plastics still needs plenty of time to achieve satisfactory levels, scientists venture into other alternatives that, contrarily to plastics, do not instigate adverse effects on the environment when degrading at product life-end (Sin, 2012). Thus, this chapter will address alternative materials with the aim of reducing and replacing plastic, specifically disposable plastic.

2.6.1 Cardboard cups

Paper is an alternative material for plastic and is used extensively on a global scale. The worldwide production of paper and cardboard is estimated to be around 420 million metric tons in 2018 (Tiseo, 2021), as depicted in figure 4. More than half of that production was attributable to packaging paper, while nearly one third was attributable to graphic paper (Tiseo, 2021). Evaluations from the paper and recycling sectors insinuate that in the U.S. and Canada alone, between 600,000 and 800,000 tons of postconsumer single-use cardboard cups are used annually (Cornish, 2018).

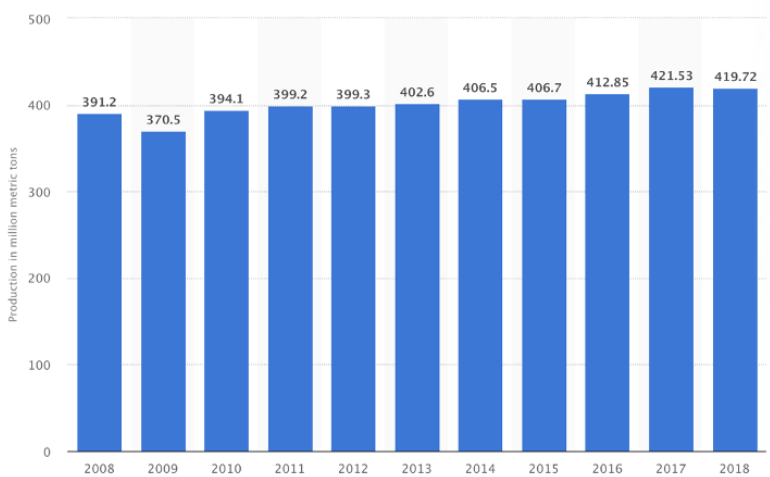


Figure 4 - Showcases production volume of paper and cardboard worldwide from 2008 to 2018 (Tiseo, 2021).

Production and usage

During the manufacturing process, cardboard cups are coated with either PET or PLA for the purpose of keeping the beverages warm and to prevent liquid from soaking through the paper. However, the plastic material prevents the cups from being fully recycled (Häkkinen & Vares, 2010). An additional obstacle concerning this alternate material is related to its sustainability. Arumugam et al. (2015) indicates that generally 6,5 million trees are cut down to create 16

billion paper cups. Although paper originates from trees which are a renewable resource, increased felling of trees counteracts the sustainable aspect of protecting the environment, as this environmental ally neutralizes billions of tons of CO_2 yearly (Rowntree & Nowak, 1991).

In an attempt to determine the CO_2 emission and nonrenewable energy usage in the production phase of cardboard cups coated with either PET or PLA, Häkkinen & Vares (2010) conducted a study where environmental impacts were calculated with regard to 100 000 pieces of cups. Table 3 depicts nonrenewable energy and CO_2 emission metrics of cardboard cups coated with PLA and PET.

Table 3 - Illustrates the environmental parameters of 100 000 cardboard cups coated with PE and PLA (Häkkinen & Vares, 2010).

		Carton + 2PE	Carton + 2PLA
CO_2 (bound to biomass)	kg	5038	4980
Non-renewable energy + feedstock energy	GJ	24	19
Renewable energy + feedstock energy	GJ	3.2	9.8

In correspondence with Häkkinen & Vares (2010) study, calculations have been conducted to find the MJ/kg non-renewable energy usage and kg CO_2/kg emissions of both cardboard cups. An detailed depiction of mentioned calculations are presented in Appendix C1.

Composting and recycling

Typically, once paper has been used it will either end up in a landfill, or be recycled. However, the plastic coating prevents cardboard cups from being fully recycled (Häkkinen & Vares, 2010) or completely degraded in the soil (Arumugam, Renganathan, Babalola & Muthunarayanan, 2018). In addition, Castro-Aguirre, Iniguez-Franco, Samsudin, Fang & Auras (2016) implies that cardboard cups coated with either PET or PLA can only be recycled in limited facilities, due to the difficulties related to the separation of the coating from the paper fiber. In the absence of such facilities, the cups are taken to landfill for composting. In an attempt to measure the carbon footprint of a disposed cardboard cup, Foteinis (2020) revealed the emission of a typical cardboard cup to be 11 g CO_2 (per cardboard cup) when disposed in a sanitary landfill.

2.6.2 PLA

Most plastics are derived from the distillation and polymerization of nonrenewable petroleum reserves (Glazner, 2015). Contrarily, plastics that originate from biomass are known as “bioplastics" and have the potential to displace fossil fuels in the production of disposable plastics. PLA is one form of bioplastics that have experienced extensive usage globally (Groot & Borén, 2010), especially in packaging and service ware (Castro-Aguirre et al., 2016).

Production and usage

In contrast to conventional plastics, PLA originates from renewable resources like corn starch, potato or sugar cane and is currently the largest industrial scale production of biodegradable polymer. Consequently, allowing the cost of PLA material to be reduced immensely to a level sufficient for fabrication of domestic containers, plastic bags, plastic cups etc. (Sin, 2012). However, as PLA is derived from organic plants, there is a potential risk of the organic plants to have been sprayed with pesticides, which contain chemicals that can contaminate the crops and be transferred into the finished product (Castro-Aguirre et al., 2016).

PLA is in addition used to manufacture bottles for water and juices. However, this market is not extensive as application for PLA bottles is restricted solely to non-carbonated beverages due to the insufficient creep behavior of PLA and low barrier regarding CO_2, resulting in products with lack of carbonation. Despite several efforts by manufacturers in introducing PLA-based bottles into the market, further development is required to obtain PLA bottles with the necessary commercial properties to compete with the established fossil-based polymers. Production of PLA regarding service ware, such as single-use disposable drinking cups, is challenging since PLA is vulnerable to heat deformation (Castro-Aguirre et al., 2016). To utilize PLA for single-use disposable drinking cups, a higher heat deflection temperature (HDT) is preferred. Lim, Auras & Rubino (2008) states that HDT of PLA is measured to be between 55°C and 65°C, which is too low for producing thermally stable PLA containers for a non-refrigerated product such as; disposable coffee cups. Moreover, Tsuji & Sumida (2001) implies that in PLA containers used for alcoholic products, ethanol will swell the PLA matrix, and increase the chain mobility. Consequently, the PLA will be subjected to solvent induced crystallization and eventually leading to leakage.

Composting and recycling

One of the main value propositions for PLA is its intrinsic degradation, which can be triggered when PLA is exposed to different environments. Thus, degradation of PLA acknowledged as an advantage or disadvantage depending on the application. De Andrade, Souza, Cavalett & Morales (2016) conducted a study where the life cycle assessment (LCA) was compared to three end-of-life scenarios for PLA, including process of chemical recycling, mechanical recycling and composting. Figure 5 depicts the three end-of-life scenarios for PLA, and the recycling yield of each scenario.

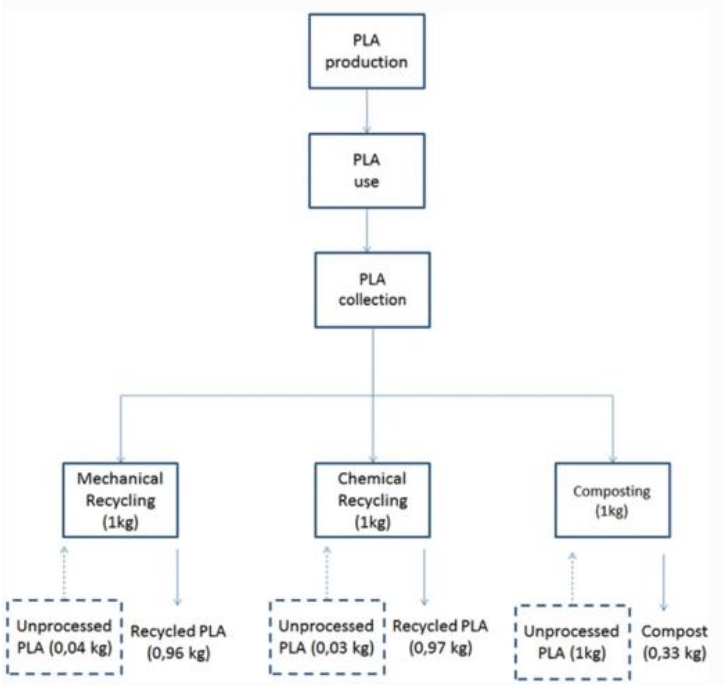


Figure 5 - Showcases the end-of-life scenarios for PLA and correlated yield efficiency (De Andrade et al., 2016).

De Andrade et al. (2016) implies that the mechanical recycling yields 0,96 kg of recycled PLA per kg PLA, chemical recycling yields 0,97 kg of recycled PLA per kg, while composting does not recycle polymer, which generates the highest environmental impact. Thus, chemical recycling was considered to be slightly more efficient than the mechanical approach. However, Piemonte, Sabatini & Gironi (2013) denotes that mechanical recycling is the most promising as it causes less environmental impact compared to chemical recycling, since mechanically recycled polymer is generated using lower energy.

As indicated by Sin (2012), the large-scale production of PLA allows the cost of material to be reduced immensely, to a level sufficient for fabrication of PLA cups. Although, Castro-Aguirre et al. (2016) implies that there are limitations to the implementation of PLA due to the deficiency of sustainable infrastructure for sorting, recycling, and composting PLA products.

Hence, it is challenging to select a particular approach for recycling due to the deficiency of sustainable infrastructure. Furthermore, Castro-Aguirre et al. (2016) suggests that the infrastructure for recycling and composting PLA must be more extensive to be affordable.

2.6.3 Reusable

Although substituting to compostable or recycled cups is an alternative for the reduction of waste at festivals, another alternative would be to rid concessions of any disposable cups. The majority of single-use cups never get composted or recycled at their end-of life (Häkkinen & Vares, 2010), while a considerate amount of the disposable cups that are disposed, they cannot be fully recycled due to the difficulties related to the separation of various materials in the single-use cups (Castro-Aguirre et al., 2016). A new alternative trend perceives consumers purchasing reusable cups instead of disposable cups as a more sustainable approach, where the alternate material may include bamboo cups, clay cups, porcelain cups, as well as stainless steel cups (Glassett, 2014). However, this section will be based on stainless steel cups as the other alternatives turn out to be less viable, more fragile and more costly regarding the transportation (Changwichan & Gheewala, 2020).

Production and usage

There are several methods to produce stainless steel. The electricity required to produce stainless steel can be generated from a variation of sources. The source of electricity can be hydraulic, nuclear, combined cycle, natural gas, fuel oil or coal. Thereby, the amount of CO_2 emitted in the production of stainless steel depends on the type of electricity source utilized.
Table 4 showcases the measurements from the study conducted by Chang et al. (2011), where the amount of CO_2 emission by each type of electricity plant per MJ of electricity generated is revealed.

Table 4 - Describes the CO2 emissions by various types of electricity generation plants (Chang et al., 2011)

Source of Electricity	Grams of CO2 per MJ
Hydraulic	1.11
Nuclear	1.67
Combined Cycle	118.61
Natural Gas	245.28
Fuel Oil	247.50
Coal	271.67

The global production of stainless steel has slightly increased from around 20 million tons to approximately 25 million tons in a span of eight years. The ability to be 100% recyclable may elucidate this limited growth of the material. Typically 3700 MJ of electricity is needed to generate one ton of stainless steel. Moreover, the total amount of CO_2 emissions is discovered to be 3,81 tons CO_2/ton stainless steel (Chang et al., 2011) as depicted in Table 5.

Table 5 – Showcases CO2 emissions in the various phases of producing stainless steel (Chang et al, 2011).

Emissions from raw materials (ton CO2/ton stainless steel)	2.8
Emissions from electricity and steam (ton CO2/ton stainless steel)	0.65
Direct emissions (ton CO2/ton stainless steel)	0.36
Total Emissions	3.81

A comprehensive study, concerning sustainability in music events, conducted by Glassett (2014) indicated that stainless steel cups produced the least amount of waste and were most durable. Despite these attributes, it was detected that both the vendors and participants had complaints with this alternative material. The cups were costly, obliging festival participants to purchase an expensive cup in addition to the cost of their beer. Moreover, the stainless-steel cups were apparently not conducive to how the beer was dispensed, conclusively being more inclined to heat up in the sun. However, Changwichan & Gheewala (2020) proposes a solution for this complication encountered in music festivals, where it is suggested to utilize stainless steel cups that are double walled with vacuum insulation, so that the cups can keep the liquid hot or cold for a longer time. As the steel cups are reusable, they require lower inputs with

multiple uses as compared to single-use cups which need to be manufactured for every use. Stainless steel cups have a long-term durability and do not pose any potential health hazards (Chang, Craig, Leclerc, Tianyu & Nikaein, 2011), although the environmental impacts from the production of these cups are relatively high (Changwichan & Gheewala, 2020).

Stainless steel cups require to be thoroughly rinsed and cleaned each time after use which is correlated with additional impacts from water, detergent, and electricity use. Two approaches for cleaning the cups include utilizing a dishwasher or washing the cups by hand. According to Changwichan & Gheewala (2020), the dishwashing approach exhibits higher environmental impact due to the usage of electricity to run the dishwashing machine, while the handwashing approach displays lower environmental impact even though the approach requires a higher amount of water and detergent. Changwichan & Gheewala (2020) further implies that the stainless steel cups can usually be used for a minimum of 3 years, depending on how careful the users and the maintenance team are, before a recycling process is required.

Recycling

Stainless steel is fully recyclable (Changwichan & Gheewala, 2020) and has one of the highest recycling rates of any material (Chang et al., 2011). It turns out that the amount of energy and resources required for reuse applications can be considerably lower than producing a new application from raw materials. For example, steel plates used to manufacture ships can be re-rolled and used in the construction of new vessels. The only input is the energy needed to reheat, re-roll and transport the steel (World Steel Association, 2015). Hasanbeigi (2013) reveals that the energy to reheat and re-roll stainless steel would be approximately 6000 MJ/t of material.

3. Methodology

This chapter elucidates methodological commitments made for procedure selection and data collection in the thesis. Lastly, the analysis process will be examined.

3.1 Research method

According to Holme and Solvang (1996) an method is chosen dependent on its capacity to shed light on the given problem, as it is deemed to be of the utmost importance to solve the problem optimally. There are primarily two methods of data collection; qualitative and quantitative (Johannessen, Christoffersen & Tufte, 2016). Where qualitative data emphasizes on interviews, observations and text data, quantitative data is based on quantity terms (Grønmo, 2016). Certain problems and cases require data collection from a multitude of sources in order to evaluate a problem (Simpson et al., 2017). Qualitative analysis is centered around empirical data (e.g. insights, reflections, theories and concepts). This data is often an outcome of observations, interviews or documented studies according to Tjora (2018). In the forefront of this approach lies the researchers own understanding and interpretation of the information at hand (Holme & Solvang, 1996). Both methods can be combined with the crucial benefit of gaining supportive data in relation to cause and effect. The thesis seeks to account for implementational characteristics of CE in Ravnedalen Live by analyzing previous case studies, conducting surveys and interviews, and will thereby have a mixed research approach. The chosen method encourages a holistic understanding of the problem and emphasizes on the analysis of the topic.

3.2 Research Design

Johannesen, Tufte & Christoffersen (2016) defines research design as the identification of what and who is going to be examined, in order to acquire key information for the case. As a research plan, it is required to account for the expectations and the context (Thomas, 2017). A priorly established scientific theoretical perspective is imperative before considering a research design. The methodological aspects elucidate where, why, when and how the data is accumulated and managed (Tjora, 2018). Consequently, to the aspects and concepts of method and methodology, there are three key research designs: deductive, inductive and abductive. A deductive advance focuses on empirical data and validates theories and literature through empirical information (Busch, 2019). The aim of a deductive advance is to verify theories and hypotheses based on empirical data (Johannessen et al., 2019). Contrary, inductive research design utilizes theories and concepts to reinforce the empirical data, as a theoretical framework has not been established (Johannessen et al., 2019). An abductive approach is a combination of them both. Thus, it exchanges between theory and empiricism (Busch, 2019). An abductive advance has the advantage of being able to elaborate, change or further develop the theoretical framework consequently.

With regard to the presented perspectives and concepts, a deductive research design approach was conversed to be most sufficient in this case. Empirical data collection focused on the priorly established theoretical perspective and both surveys and interviews were conducted in relation to the theoretical framework.

3.3 Data collection

Three different data collection methods were derived, in order to illuminate and achieve a comprehensive understanding of the problem statement; literature search, qualitative interview and quantitative survey. The choice of data collection was made on the basis of associating theoretical framework with relevant empirical data. Literature distinguishes between two types of data sources, primary data and secondary data (Befring, 2002). Dalland (2017) describes the primary source to be data the researchers has obtained by themselves. The approach is further elaborated to be advantageous as the collected data is specifically for the issue at hand. Qualitative interviews and quantitative surveys are defined as the primary data in the thesis. The primary data in the thesis was collected to specify the scope of the theoretical perspective, and to identify relevant themes in relation to the problem statement. Dalland (2017) defines secondary sources as data that can often be accessed through direct search and are based on a critical review and assessment of the primary source. The secondary data were utilized to establish the problem statement and to illuminate relevant cases, studies and aspects. Literature search laid the foundation for the formulation of the problem statement, and was incorporated in the preparation of qualitative interviews and quantitative surveys. This specific method was selected, because it is best suited for gathering information revolving the research object.

3.4 Literature search

Relevant literature that is compelling for the topic of the thesis have been read and collected. To be able to deduce how CE is experienced by the CSCOs, it was important to have a holistic understanding of the method in its entirety. Among other things, a systematic search was made on existing literature, research and scientific articles on CE in the event industry, CE in the supply chain and usage of alternate materials for plastic. Ideally, allowing discovery of a specific overview relevant to existing research on these topics. Google scholar and IEEE Xplore were the main search engines used in literature search. This ensured that the collected articles and studies provided good quality and reliable information. The thesis were also supplemented with relevant literature from both the supervisor and Ravnedalen Live. To limit the search volume and delegate time appropriately in order to make the process more efficient, the citation chaining method by Ellis (1993) was utilized. The method is applied by examining the reference lists for relevant research study, and chaining sources from one study to another. Table 6 showcases a list of keyword examples and number of search hits.

Table 6 - Showcases a search matrix consisting of keywords, search engines and the approximate number of hits.

Keywords	IEEE	Google Scholar
Circular economy	406	1 870 000
Circular economy event industry	2	229 000
Plastic circular economy	11	115 000
Circular economy sustainability	48	196 000
Green events	1 062	5 230 00
Circular economy supply chain	39	156 000

An appropriate amount of time has been invested in the literature search to obtain and secure a holistic understanding of CE and its various implementation methods. This actively demonstrates a thorough overview of how CE has been implemented in the past, and how it has affected the projects or companies. Acquired studies have also been assessed regarding their quality, reliability and relevance to the thesis. A significant emphasis has been placed on acquiring recent research literature as CE implementations are relatively modern.

3.5 Quantitative survey

The purpose of a quantitative method, such as a survey is to delegate the accumulated data to predefined categories (Jacobsen, 2015). To ensure operationalization of the questions, it is imperative to formulate and phrase the questions in a particular manner that reduces the possibility of misinterpretation and misunderstanding by the respondents (Jacobsen, 2015). Saris & Gallhofer (2014) differentiates between the three distinct ways to address a question; nominal, ordinal and metric. To categorize respondents, it is common to use nominal questions that aim at a yes or no answer. However, they restrict the respondent's response-ability by limiting the answer to two contrasting choices. For a more reflective response, ordinal questions can be implemented. They may be used to collect measurable data along the lines of frequency, priority, and likelihood. Figure 6 provides an example of both types of aforementioned questions.

Figure 6 - Illustrates an example of quantitative survey questions

It is vital to include relevant alternatives when asking a nominal or ordinal question. For instance, the ordinal question in Figure 6 does not include a viable alternative for respondents that may indulge in the described activity less than once a month. Another factor that must be accounted for is that the answer alternatives should not overlap. Consequently, the frequency should not be labeled as:

- 1-3 times a month
- 3-6 times a month
- 6-9 times a month

The third and last type of question Jacobsen (2015) describes is the metric question. An interval scale is often used in this context, where the respondents may grade the likelihood of them

recommending a product or service to a friend, by selecting a number from 1 (not likely) to 10 (very likely). Certain metric questions allow the respondent to write the specific number themselves. Saris & Gallhofer (2014) states that quantitative surveys may also include qualitative questions. These questions are often described as open answer questions. Depending on the answer, open answer questions can extract qualitative data which may be supplementary for the quantitative data accumulated, or illuminate unforeseen opinions. Otherwise, open answer alternatives can act as a fail-safe in an ordinal question (Saris & Gallhofer, 2014). By implementing an open answer alternative in Figure 6, it is possible to include respondents who do not fit in the presented alternatives.

3.5.1 Survey guide

A survey guide was constructed as a manual, including criteria, requirements and formulations that are favorable in a survey. It was an important tool when phrasing questions, and enabled the thesis to implement all of the aforementioned means to address a question. Conclusively, allowing extraction of adequate data. Literature search and the research question were the basis of the questions and topics that were presented in the survey. The respondents of the survey were both previous- and possibly new participants of Ravnedalen Live, and other events in Sørlandet. As per the survey guide, the survey consisted of three kinds of questions; introductory/general questions, main questions and reflective questions.

3.5.2 Conducting the survey

The survey was conducted as a web-based survey through SurveyMonkey. As a digital survey, it enabled certain analytical data to be gathered easier using the built-in functions of SurveyMonkey. Additionally, respondents might feel anonymous which consequently may lead to more honest answers. With a respectable network of survey distributors in place, it is conceivable that the survey reached out to a sufficient number of respondents to perform a thorough quantitative analysis (Jacobsen, 2015). However, a weakness with web-based surveys is the disconnect between researcher and respondent which makes it difficult to resolve misunderstandings. To reduce the occurrence of misunderstanding, questions were formulated to target specific topics.

3.6 Qualitative interview

Dalland (2017) describes the accumulation of personal experiences and perspectives of the interviewee as the purpose of qualitative interviews. Interviews in the thesis were constructed with the aim of grasping insight from the relevant informants on various challenges towards CE and plastic cups in the event industry. A satisfactory interview provides the study with valuable information that may shed light on the problem statement (Dalland, 2017). An interview guide was made before conducting interviews to ensure the quality of the process. A semi-structured interview was implemented in the guide to gather the required information. Semi-structured interviews have predetermined questions and themes, but are still open to either exclude or include certain themes or questions depending on the flow of the interviews (Saunders, Lewis & Thornhill, 2009). This form of interview was deemed to be more beneficial than structured or unstructured interviews, since it allows the interviewee to speak openly and freely, while staying on the topic of the problem statement.

Furthermore, according to Kvale & Brinkmann (2008) a qualitative interview should last between approximately 60 to 90 minutes. It is stated that an interview shorter than 60 minutes is not adequate to extract the necessary information. These interviews potentially suffer being overly focused on an objective perspective and may omit personal thoughts and opinions. Opposingly, if the interview lasts more than 90 minutes it has the possibility of straining both the interviewer and the interviewee. Thereby, the thesis aimed to conduct interviews based on Kvale & Brinkmanns statement regarding the duration of interviews. Jacobsen (2015) differentiates between two types of interviewees; informants and respondents. Respondents are defined as people who have direct relation and access to information regarding the topic. Contrary, informants have indirect accessibility to the topic, for instance by being within a close proximity of the respondents. Thus, the thesis attempted to focus on a interviewee from a different part of the value chain to obtain key information and opinions from a different perspective. Consequently, project partners, managers and suppliers were determined as interview objects in the thesis. Table 7 showcases technical information of the interview, including interviewee, date and duration.

Table 7 - Presents overall information of the interview.

Interviewee	Role/Position	Date	Duration
Hansa Borg	Representative	14.04.2021	60 minutes

3.6.1 Interview guide

The interview was conducted in accordance with the established interview guide, which focused on relevant topics for the specific respondent. The interview guide was used both prior to- and during the interview to promote a structured implementation. Questions were defined with respect to the specific interviewee in regards to the desired topics. Furthermore, the questions were formulated based on literature study and the research question, while the thesis was open for follow-up questions and unexpected topics relevant to the issue. The interview guide consisted of introductory questions, main questions and lastly, reflective questions. Detailed interview guide is presented in appendix A3.

3.6.2 Conducting the interviews

The qualitative interview was conducted with a single interviewee at a time, to avoid influenced opinions and encourage honest answers. As De Ruyter (1996) states, group interviews may hinder the exchange of opinions and lead to the loss of opposing views. Dalland (2017) expresses that the context around interviews impact the quality of the conversation. Thus, personal meeting to conduct the interview was preferred to reduce misunderstandings and streamline the process. However, because of the pandemic it was deemed overly complicated to conduct them as desired, and video conference was held instead. As illustrated in Table 7, the interview lasted approximately 1 hour. A precise transcription was conducted during the digital interview and to secure a common understanding the transcribed data was sent to the interviewee as soon as possible. The purpose of this was to enable clarifications and corrections of possible misinterpretations to ensure the quality of the transcript.

3.7 Analysis of quantitative data

First and foremost, a sample size calculator was employed to ensure that the results were statistically significant. Figure 7 showcases SurveyMonkey's sample size formula, which calculates the "z-score" to identify the desired confidence level. Before elaborating on the desired confidence level, it is vital to understand the importance of a statistically significant sample size in various contexts.

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

N = population size • e = Margin of error (percentage in decimal form) • z = z-score

Figure 7 - Illustrates the equation utilized by SurveyMonkey to calculate the sample size.

The survey can be characterized as a customer satisfaction survey and market research. According to SurveyMonkey (2021), it is not necessary for customer satisfaction surveys to have a statistically significant sample size. The focal point of analysis in this prospect is the individual feedback, whether positive or negative. While customer satisfaction surveys analyze how customers feel, market research surveys uncovers information about customers and the target market. A statistically significant sample size assures accurate information and provides insights on the overall market. SurveyMonkey (2021) thereby recommends a statistically significant sample size in market research, as it can make a big difference. Consequently, the statistical significant sample size had to be calculated to display the accuracy of the survey.

The sample size calculator evaluates the desired confidence level by utilizing measures such as; population size, sample size and margin of error. Population size is defined as the total amount of people in the group the survey aims at. In the thesis' case, it can be argued to be the participants of the previous Ravnedalen Live and other events in Sørlandet. Sample size is simply the amount of people who have conducted the survey. Margin of error is calculated as a percentage and compares the sample size with the population size. The smaller the margin of error, the more accurately does the survey represent the views of the overall population. Furthermore, a low margin of error combined with a given confidence level amplifies the

accuracy of the survey. At last, sample confidence level describes how confident the survey is regarding the possibility of the remaining population choosing an answer within the parameters, or metric alternatives presented in the survey.

Statistical analysis was utilized to expose trends and patterns after collecting and interpreting the accumulated data. Additionally, it was conducted to deem whether the survey data was statistically significant. It is commonly implemented in a circumstance of statistical modeling, data collection, research interpretation and survey design (Liu, 2014). Moreover, statistical analysis is applied in various businesses to identify and gauge customer experiences, in order to facilitate a efficacious customer experience (SurveyMonkey, 2021). In addition to the customer friendly narrative, the survey also focused on certain sustainable and environmental refinements. The statistical analysis was supplemented with a descriptive statistical analysis to illuminate the various participants' views, and categorize the participants according to the defined parameters. SurveyMonkey's software allowed for a more holistic understanding by contributing with additional metric tools, graphs, data preparation and data management. The survey software supported data modeling, by enabling "filtering" as an operational tool. It was deemed conceivable to identify trends and patterns in a particular subgroup by utilizing this tool. Identifying trends and patterns in various subgroups, facilitated a comparative analysis that identified further distinctions and similarities.

Lastly, a longitudinal analysis was deemed vital for the prosperity and longevity of the event. Athreya et al., (2016) explains it as the comparison of previous and future survey analytics to track the changes in trends and satisfaction rates. However, the thesis did not have comparable survey data, but this year's survey data may act as a basis for future surveys. By collecting feedback now, it is desirable to establish benchmarks for the coming years. Benchmarks can be implemented in the subgroups as well, to gain a holistic understanding of the changes. For instance, in a fictive example an overall increase in satisfaction has been gained in a year. A thorough analysis illuminates that the satisfaction rate has increased for females, but not for males. This finding encourages the researchers to review the males' responses in order to gain insight on why they are less satisfied. Furthermore, longitudinal analysis is not limited to tracking the satisfaction rate, but can be implemented in additional questions as well.

3.8 Analysis of qualitative interview

It is imperative to analyze and interpret the obtained empirical data in order to present the content in a factual manner (Dalland, 2017). Holme & Solvang (1996) defines analysis of qualitative data as a time consuming process with undeveloped formalized techniques. The analysis procedure may vary from case to case and can be performed in several ways. Dalland (2017) describes the basis for the analysis to already be existing in the interview guide. The interview guide was constructed with the aim of illuminating the problem statement, and consisted of clarified topics. Consequently, after collecting the qualitative data, certain topics from the interview was selected and emphasized (Holme & Solvang, 1996). A systematic analysis of data was utilized based on the interview guide and problem statement. Thus, the data was categorized according to the thesis' research question. The correspondence between the interview topics and empirical data was the focal point of the analysis. Furthermore, by utilizing content analysis as a method it was possible to derive relations and connections within the data (Jacobsen, 2015). Additionally, an interviewee may subconsciously talk about a certain topic in a distinct way, and it is conceivable that content analysis may uncover the underlying causes by comparing the gathered data.

When analyzing the transcription, it was favorable to underline certain quotes and statements that depicts the interviewee's views. Dalland (2017) states that different answers have separate weight and denominations, and repeated answers are of greater weight and should be prioritized. The combination of both similar and dissimilar answers, led to a deeper understanding of the problem statement. Jacobsen (2015) explains that some interview objects may be opposed to change or become overly defensive to their point of view. However, this phenomenon is relevant for both the interviewees and the researchers conducting the interview. Conclusively, analysis of qualitative data requires both self-criticism and self-insight. Appendix A1 showcases the analysis procedure of the interview.

3.9 Reliability, validity and generalizability

Reliability, validity and generalizability are among the criteria that indicate the quality of the research. Tjora (2018) explains reliability to be the general consistency of an evaluation or measure. Moreover, a reliable measure should present corresponding results when the conditions are matching, and is thereby often referred to as reproducibility or repeatability. Analysis of quantitative survey data utilizes confidence level to estimate the degree of reliability. A qualitative interview was conducted with one individual at a time to ensure high reliability. As previously stated, group interviews may lead the individuals to influence each other's' opinions and thoughts. Griffin (2006) defines this phenomenon as groupthink. Additionally, groupthink can be related to Colleoni, Rozza & Arvidssons' (2014) theory of the echo chamber effect. An echo chamber can be explained as a subconscious agreement within a group, where the individuals primarily communicate with other individuals with similar understanding and opinion of a phenomenon. Another aspect that impacts the reliability is whether the interview is structured or not. Structured interviews are preferred to ensure high reliability, since they can easily be quantified. Hence, the thesis avoided implementing unstructured interviews and chose semi-structured interviews instead, to secure reliability and to gather sufficient data.

Validity concerns whether the accumulated data from a survey or interview is relevant to the problem statement (Tjora, 2018). It evaluates if the collected data represents the purpose of the study or measurement. Both the interview guide and survey guide were reviewed within the validity perspective before they were conducted. It was possible to steer the interview in a preferred manner, and avoid the content to focus on irrelevant topics. A semi-structured approach supplemented the validity of interviews and aided to prevent possible derailing from the problem statement. Adapting the formulation and phrasing of questions in the survey according to its respondents, further improved the validity of the measurement. In order to secure and collect relevant and valid information, emphasis was placed on good sources of information. The theoretical framework presented in the thesis is extracted from textbooks and, both old and new scientific articles. It is important to be critical of the validity of the author and publisher. Hence, scientifically approved journals and articles were sought after and used in the literature search.

The extent of findings that are applicable to other contexts is defined as generalizability (Tjora, 2018). Tjora (2018) claims discussion of generalization as a focal subject of the research, and states that omitting this matter will reduce the credibility of the research. Generalization of the findings made in this thesis is desirable as the current society has a major focus on sustainability and reduction of emission gasses. An elaboration on the generalization of the findings is presented and discussed in section 6.1.

4. Data analysis

This chapter presents findings of material research, interview data and survey data. Furthermore, mentioned data and findings are analyzed in regard to focal topics of the thesis.

4.1 Material analysis

By comparing and analyzing academic literature, an attempt has been made to explore which alternative materials are preferred when phasing out plastic cups to promote sustainable development. In order to get a broad overview of which materials may be favored over conventional plastic; benefits, limitations, recycling possibilities, and the percentage of the various materials that end up in the recycling plant has been brought up in section 2.6. Moreover, two essential factors have been examined in the aim of evaluating the sustainability of the alternative materials, showcased in appendix C2, which includes:

- The amount of non-renewable energy used in both the production phase and composting/recycling phase for per kg of the alternative materials.
- CO_2 emissions per kg in production phase and composting/recycling phase for the alternative materials.

A generic version of the appendix, displayed in table 8, presents the benefits and inconveniences of the most preferred materials, by taking the literature study into account. An elaborated comparison between all materials investigated is displayed in appendix C2, whereas table 8 emphasizes on the favored materials.

Table 8 – Describes the pros and cons of the materials examined.

Material used in beverage cups	Benefits	Inconveniences	Sources
PET	- Lightweight and cost-effective. - High temperature resistance, as well as moisture resistant. - Transparent, may be visually satisfying for users. - Ability to be fully recyclable if sorted properly.	- Relatively high non-renewable energy usage. - Vastly harmful to marine life in case of failed waste sorting. - High degradation time.	Häkkinen & Vares (2010) Glazner (2015)
rPET	- Lightweight and cost-effective. - Exceptionally low emissions and energy usage compared to examined alternatives. - Transparent, may be visually satisfying for users. - Extensive recycling facilities.	- The initial material is produced from oil. - 100% recyclability is not recommended, as at least 10-20% new material should be added to ensure the viability. - Vastly harmful to marine life in case of failed waste sorting.	Benavides et al. (2018)
PLA	- Derived from renewable resources, such as organic plants. - Biodegradable (does not leave behind any toxic residues) and high recycling rate.	- Costly and limited recycling facilities. - Risk of the organic plants to have been sprayed with pesticides that may be transferred into the finished product. - Vulnerable to heat deformation. - Restricted to non-carbonated beverages, due to low barriers regarding CO2. - Alcoholic products swell the PLA-matrix, eventually leading to leakage.	Häkkinen & Vares (2010) Castro-Aguirre et al. (2016) Tsuji & Sumida (2001)
Cardboard cups - Coated with PLA	- Originates mainly from renewable resources. - PLA coated cups are the only cardboard cups which can be composted fully.	- PLA coating prevents the cups from being fully recycled. - Comparatively high CO2 emissions generated.	Häkkinen & Vares (2010) Foteinis (2020) Castro-Aguirre et al. (2016)
Reusable -Stainless Steel	-Comparably low non-renewable energy usage and CO2 emissions. -Long-term durability, fully recyclable and high recycling rates. -Can usually be used for a minimum 3 years before a recycling process is required. -Considerably lower energy and resources used when recycling. Only input is the energy needed to reheat and re-roll the steel.	-Costly and weighty regarding the transportation. -Costly, obliging festival participants to purchase a cup in addition to the cost of their beer. -Rigid material that can be used to inflict damage.	Chang et al. (2011) Changwichan & Gheewala (2020) World Steel Association (2015)

4.2 Qualitative interview

An interview guide was prepared prior to the interview, which addressed the most important and relevant questions in a systematic way. Supplementary questions were also prepared based on possible outcomes from the interviewee's responses. As part of the transcription method, attempts were made to transcribe the interview verbatim to ensure the quality of the work. The transcribed interview was forwarded to the interviewee with the purpose of ensuring the quality of the interview, and clarifying the transcript in case of any errors. Due to the minor technical glitches from insufficient internet bandwidth in the digital meetings, this approach was perceived as beneficial, given that the interviewee had an opportunity to correct the gathered data in case of misconceptions. After performing a holistic analysis of the interview, relevant topics, in regard to the two research questions, were highlighted and a systematic analysis was performed. A comprehensive systematic analysis of the transcribed data was conducted with the aim to get acquainted with the relevant material. The interview revolved around applicable topics such as;

- Optimal solution for beer cups.
- Cooperation with Infinitum.
- Possibility of using stainless steel, cardboard, or PLA based festival cups.
- Measures to minimize festival waste.

In order to find an optimal solution for beer cups with the aim of achieving a higher degree of sustainability, the respondent has previously examined various festivals, including Øyafestivalen, and their washable plastic cups that were initiated by Ringnes. There has also been contact with Heineken, however, a satisfactory solution was not developed. After cooperating with Infinitum, a possible solution was presented, where the emphasis was on a material that was easily accessible. In collaboration with Infinitum, the carbon footprint of washable plastic cups were compared to disposable rPET cups. By recycling rPET instead of using washable plastic cups, 1 kg of plastic and 16 kg of oil are saved according to Infinitum. Thus, the respondent considered rPET festival cups with a deposit-legislation scheme to be a better solution compared to the reusable plastic cups from Øyafestivalen. In addition to being a better solution from an environmentally friendly perspective, Infinitum has also established a logistic arrangement where plastic cups are collected from not only Hansa Borg, but also external partners, in an attempt to recycle as much of the distributed rPET cups as possible. The approach ensures that the recycling process is conducted in the most optimal manner.

Nonetheless, this approach has not been put into practice yet, due to COVID-19. The pandemic has delayed much of the work, however, Hansa Borg is still in talks with Infinitum, and is monitoring new and better solutions.

Hansa Borg receives their plastic cups from an external supplier, while Infinitum approves the cups. Infinitum is also responsible for collecting the cups at the various events, and recycling the plastic in their new plant outside Oslo. The raw material is thereafter sold, with the aim to be redistributed to Hansa Borg's producer that can make new cups and maintain the circular economy. To further ensure a circular economy, Hansa Borg encourages their suppliers to deliver recycled plastic products. The interviewee expressed that this seemed impossible two years ago, but is now feasible. It is essential to put pressure on suppliers in the industry to promote sustainability. To further explain the cooperation between Hansa Borg and Infinitum, the amount of cups delivered to a festival are registered. Unopened and unused cups are returned to Hansa Borg and the quantity (delivered cups minus cups received) is reported to Infinitum. Thereafter, Infinitum collects the used cups from the festival and invoices Hansa for the corresponding amount.

The interviewee further explained that there is not a big price difference between conventional plastic cups and rPET cups. In fact, Hansa Borg pays an "environmental fee" of only 8 cents per cup to Infinitum. However, the respondent revealed that there are some experienced complications with 100% rPET cups. Infinitum disclosed that 100% rPET is not always the most sustainable. Moreover, with 100% recyclable plastic, the quality of the cups are weakened, and the material becomes less transparent. This is not acceptable to Hansa Borg as the brewery has a strong desire for the consumers to be able to see the beer in the festival cups. Hence, Infinitum's recommendation of utilizing 80% recyclable plastic was considered beneficial.

When asked about the viability of implementing PLA cups, the respondent stated that it is possible to compost PLA cups, but not reuse them, which counteracts the circular economy. Furthermore, it is derived from the interview that there are poor opportunities for composting and recycling PLA, as adequate arrangements and facilities are not priorly established. However, various coast festivals have demanded PLA cups, but their understanding of the material's bio-process and recycling has been insufficient. An example of such an occurrence is provided by the respondent. One particular festival representative asked "Can we get these PLA glasses, because if they fall into the sea, it is not so dangerous as they dissolve.".

Consequently, the interviewee stated that the majority of consumers obviously do not know enough about the material, as they think it dissolves completely; hence the exclusion of further research on PLA cups as an alternative material.

Hansa has also explored the possibilities of stainless steel cups, through a collaboration with BALL, who tested the possibility in a festival in America. The complications Hansa identified with steel and aluminum cups, were the challenges related to marketing and the visual aspect. They believe that the consumers want to see the beverage while drinking it, thus a transparent material is preferred. Safety, hygiene and costs are also vital factors. Steel or aluminum cups can be used for violence, and reusable cups need special washing machines, which impacts the implementation costs of these materials. Conclusively, there are several perspectives in addition to the environmental perspective that should be examined when considering alternative materials.

Moreover, the possibility of cardboard cups have also been discarded in their research due to the lack of transparency and the material's discrepancy in various weathers. Cardboard cups are very soft and the weather in Western Norway demands the cups to withstand a lot of water. At last the respondent states that while cardboard is a good material, it is only sufficient under the right circumstances.

At last, the incentive perspective was elaborated. Hansa Borg utilizes incentive strategies such as sponsoring, to expand the society's knowledge scope of sustainability. For instance, Hansa provides financial support to certain students if they are conducting sustainable studies or projects. Furthermore, they are currently establishing a new sponsorship strategy to contribute to six of UN's sustainability goals. There are, however, various other incentives that can be implemented to encourage and motivate the consumers, excluding awards and monetary recognition. In regard to waste management in festivals, the respondent suggests an environmental fee as an incentive, which festivals have to pay if the waste is not collected, sorted and delivered to the right place. As of today, there are no sustainable requirements for festivals, but as part of the global sustainable development, it is conceivable that it will be implemented in the near future. Conclusively, the respondent states that it is vital to emphasize on educating the consumers as it is perhaps one of the most important measures towards a sustainable society.

4.3 Quantitative survey

The web-based survey was able to gather approximately 275 responses resulting in a confidence level of roughly 90%. Consequently, ensuring a high probability of the survey results to reflect the attitude of the general population. It was also profitable to formulate the questions in an appropriate manner, as the survey achieved a completion rate of 100%. Furthermore, the sample size calculator enabled the calculation of the margin of error, which was estimated to be just about 5%. The combination of the relatively low margin of error and high confidence level assures the accuracy of the survey, and permits the thesis to conduct a survey analysis. Moreover, identifying the error of margin enabled a statistical analysis to determine whether the collected data was statistically significant or not. Consequently, allowing examination of statistical significant differences through ANOVA tests, T-tests and Chi-squared tests (see appendix B4).

4.3.1 Survey analysis

It is possible to determine the general trend by reviewing the responses on various questions. A overall analysis without "filtering" allows for an understanding of the general sentiment towards the proposed measures, and contributes to establish several common factors. Consequently, an analysis of responses to each individual question was conducted, prior to identifying trends in subcategories.

Q2 - Select your age group (percent values have been rounded to the nearest whole number)

18 - 24 years	**25 - 34 years**	**35 - 44 years**	**44 - 54 years**	**55 years or more**
13 %	27%	22%	20%	18%

It is important to point out that even though the majority of the survey respondents are over 25 years old, it does not mean an equal amount of festival participants fall into the same age groups. This may be due to the fact that the survey had not reached all age groups equally, and should be taken into account when distributing future surveys. Sharing the survey on websites and platforms that are more attractive to the other age groups is a possible solution.

Q3 - Select your gender

Male	Female	Others
63%	37%	0%

As mentioned earlier, the percentage of respondents does not necessarily reflect the percentage of festival participants. To confirm whether the percentages correspond with the actual participants, an analysis or survey must be conducted at the festivals.

Q4 - How often do you attend events or festivals?

1-3 times a year	4-6 times a year	7-10 times a year	More than 10 times a year	Less than once a year	Never attended
30%	31%	19%	11%	9%	0%

Responses gathered from question 4 indicate that the majority of respondents are regular festival goers. With only 9% of the respondents stating that they participate in events or festivals less than once a year. These figures indicate that the survey has been distributed evenly to its target group.

Q5 - Have you participated in Ravnedalen Live before?

Yes	No
60%	40%

Question 5 was targeted primarily at the collaborative event Ravnedalen Lives participants. The data showcases that most of the respondents have attended the festival before. As the majority of respondents have participated in Ravnedalen Live, the results and findings of the survey is directly of great value for the festival.

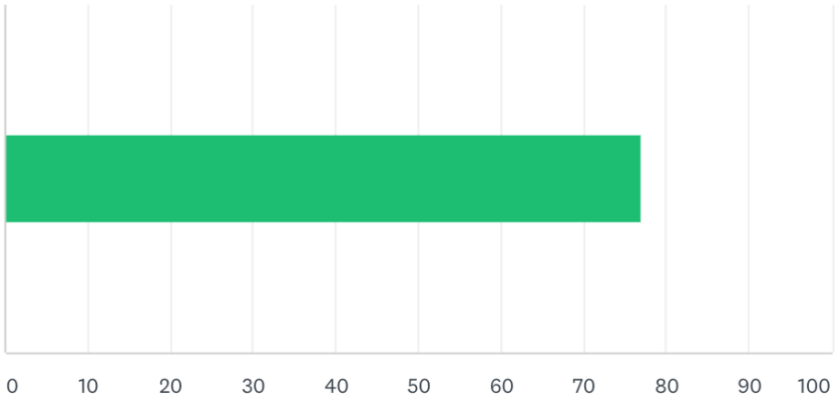
Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
27%	3%	70%

2% (six individuals) of the respondents answered “No”, where four of the six elaborated on why they would not participate. Three respondents stated that they are too old to participate in festivals and events, while the fourth respondent answered that they do not know about the festival. The consensus was that the respondents do not yet know whether they will participate

or not. This may be due to the uncertainty revolving the Covid-19 pandemic, or that the majority of the survey participants have not planned so far ahead.

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



The gathered data showcases that the general public have a great focus on the environmental friendly aspect of the industry in Sørlandet, with the average number from this question being 77. Further elaboration on this question in the respect of the various subgroups is presented in section 4.3.2.

Q8 - Select your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
1%	11%	59%	29%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	10%	51%	39%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
1%	13%	54%	32%

Most of the respondents have a good understanding of the various sustainability topics that the thesis focuses on. However, there is room for improvement and a greater knowledge level may be achieved by educating the participants through various means.

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below…

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
68%	27%	5%

While the majority of survey participants agree with the deposit scheme, some of the participants have illuminated certain unforeseen aspects of this proposed measure. The thesis has been informed through the survey that free distribution of beer is not allowed based on the Alcohol Act. The thesis had interpreted that the Alcohol Act only took aim at free beer distribution with the purpose of marketing alcohol. It was conceivable that this measure would be legal, as the purpose was to reduce plastic waste. After communicating with the Norwegian Directorate of Health it was deemed as impracticable. However, the scheme itself is possible to implement by altering the "award". Respondents have referred to Øya Festivalen which utilized the same scheme with money as an award for the exchange. In this specific case 10 kr was given for each plastic cup. Others support this measure, but only if it does not inflate the current beer prices at the festivals. Contrarily, some respondents suggested that instead of giving money to the festival participants for each deposit, the money should rather be given to a charity with an environmental profile.

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are <u>not</u> included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
39%	55%	6%

The survey has gathered comments regarding this measure that sheds light on the percentages presented above. Several festival participants have commented that they travel by foot or cycle to festivals and will not be affected by this arrangement. These comments could explain why the respondents have mostly selected "Neutral". Others who do not live a short walk from the festivals agree with this proposal and would prefer such an arrangement. One particular respondent states "I do not disagree that you should use electric transport for the festival, but I think transport should not be included. I think more people will get there by their own machine (not environmentally friendly) to avoid extra expenses".

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
27%	28%	45%

As presented in the comments in the previous proposal, a large proportion of the respondents prefer to travel by foot or cycle. These respondents have commented that it should not be demanded of them to pay for other participants' transport. However, as more than a fourth of the respondents agrees to this proposal, it is conceivable that an altered proposal is preferred. Electric transport to the festival may not be necessary for everyone, hence, it should rather be optional for each participant to pay for this option when purchasing the festival ticket.

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug…

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
60%	33%	7%

Even though a vast majority agreed to this proposal, a lot of questions regarding the ease of use, environmental benefits, hygiene, increased queues and the possibility of it being used as a weapon were raised. The common feeling among the respondents towards this proposed measure was optimistic curiosity. There were also some divided comments revolving the taste of beer in a stainless steel cup and a plastic cup, where some preferred stainless steel and others plastic. A few of those who were in favor of the measure, did not appreciate the design and asked for a more elegant cup. Given that only 7% disagreed with this measure, it is favorable for the thesis to elaborate on the viability of this mug and its material related to questions that have been raised, in the context of circular economy.

Lottery, where you get the opportunity to participate in a competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
59%	34%	7%

Respondents raised questions on the probability of this measure to succeed if the first proposed measure (deposit scheme) is implemented, as both measures require the festival participants to deliver their used cups to a sorting station. A simultaneous implementation of both measures would require the festival to staff both stations and may be expensive for the resource management. Some respondents have commented in favor of this measure as it was conceived as fun and engaging. Other respondents have suggested a cash prize instead of items that they "do not need".

Q10 - If you have suggestions for other measures to reduce plastic waste or promote sustainability and environmental protection, you can provide feedback here.

The survey acquired responses both related to the thesis and other aspects of sustainability, that may be of value for the event industry in Sørlandet. All comments are presented in Appendix B2 according to their subgroup. However, the thesis is determined to only focus on proposed sustainable measures in relation to the research question. Recycled plastic cups, reusable plastic cups and biodegradable cups were some of the suggested measures that are directly related to the thesis. Some potential alternate materials for festival cups have already been presented and analyzed, further elaboration and discussion is presented in section 5.1 of the thesis. One particular respondent commented on the waste sorting aspect in various festivals: "I have worked as a volunteer and as a cleaning assistant at many festivals. There should be waste sorting and different containers to throw the waste in. I have often experienced that the volunteers sort and collect plastic and cardboard separately, but the event organizer has only ordered containers for residual waste.". Another respondent touched on this topic and agreed with the aforementioned participant by stating that there should be deployed more waste sorting stations, for both the festival participants and waste management volunteers.

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
54%	45%	1%

Six respondents answered "No", whilst three of those provided the thesis with comments to why they would not recommend the festival. Each had a different reason. Respondent #90 stated that they are too old, while respondent #154 was not familiar with the festival. Respondent #148 did not enjoy the music genres presented at the festival. Conclusively, it is positive for the festival that there are only a few respondents who would not recommend them. Measures to further reduce this number may involve marketing and conducting a survey to identify desired artists, but it is not a relevant aspect for the thesis. Hence, further investigation and elaboration on this topic will be excluded.

4.3.2 Comparative analysis of subgroups

Statistical analysis and the descriptive statistical analysis were supplemented by the operational tool "filtering", which allowed for a swift detailed analysis of subgroups and enabled the analyses to identify patterns and trends. The latter analysis is provided in appendix B2 and was utilized in larger parts of the survey, as it included qualitative data (comments) as well. Contrarily, the statistical analysis primarily focused on question nine, as it touched on various incentives for waste reduction, and a possibility for an alternate material (see appendix B4). Thus, illuminating precious data relative to the research question and determining the collected data's statistical significance. Key findings from the both analyses will be presented and compared in this section to identify further distinctions and similarities.

Twelve subgroups (Sg) have been established based on the respondents age, gender and the frequency of their festival participation. Key figures are identified and presented in table 9. The presented values showcase the various aspects of the subgroups and allows for identification of trends and a comparative analysis. By comparison, the subgroups that have scored high on question 7 (grading the importance of an environmentally friendly event industry in Sørlandet), have also claimed to have more knowledge in the sustainable topics presented in question 8. Table 10 and table 11 depicts the statistical ANOVA tests conducted for some of the subgroups

in relation to question 8. The combination of table 10 and table 9, confirms a high degree of knowledge in the gender groups, with an average of 3+ (some knowledge) depicted in table 10.

Table 9 - Presents the key figures of each subgroup.

SUBGROUP #	SG 1	SG 2	SG 3	SG 4	SG 5	SG 6	SG 7	SG 8	SG 9	SG 10	SG 11	SG 12
SG Description	18-24	25-34	35-44	44-54	55+	Male	Female	1-3 times/year	4-6 times/year	7-10 times/year	10+ times/year	Less than 1/year
Participates less than once a year	5 %	12 %	3 %	11 %	10 %	12 %	3 %	-	-	-	-	-
Environment friendly event industry	85	75	76	72	83	76	80	72	78	83	84	71
No knowledge - climate changes	0 %	1 %	0 %	2 %	0 %	0 %	2 %	3 %	0 %	0 %	0 %	0 %
No knowledge - recycling	0 %	0 %	0 %	2 %	0 %	1 %	0 %	0 %	0 %	0 %	0 %	4 %
No knowledge - transport	0 %	0 %	0 %	0 %	4 %	0 %	2 %	2 %	0 %	0 %	0 %	0 %
Little knowledge - climate changes	3 %	19 %	2 %	16 %	10 %	9 %	15 %	18 %	8 %	8 %	3 %	12 %
Little knowledge - recycling	6 %	16 %	12 %	7 %	4 %	11 %	8 %	13 %	6 %	8 %	3 %	25 %
Little knowledge - transport	8 %	17 %	12 %	18 %	6 %	14 %	12 %	17 %	7 %	13 %	10 %	25 %
Deposit 10 cups for free beer (agree)	56 %	58 %	73 %	71 %	84 %	63 %	76 %	67 %	70 %	72 %	73 %	50 %
Transport not included in ticket (agree)	28 %	31 %	29 %	44 %	48 %	39 %	41 %	35 %	45 %	40 %	47 %	29 %
Transport included in ticket (agree)	11 %	17 %	46 %	40 %	38 %	26 %	30 %	31 %	22 %	24 %	37 %	29 %
Stainless steel cups (agree)	56 %	61 %	54 %	57 %	69 %	58 %	63 %	62 %	64 %	44 %	74 %	50 %
Lottery scheme (agree)	59 %	65 %	59 %	47 %	58 %	56 %	62 %	54 %	62 %	58 %	63 %	54 %

Table 10 - Depicts ANOVA test for both genders in relation to question 8.

Variansanalyse: en-faktor

SAMMENDRAG

Grupper	*Antall*	*Sum*	*Gjennomsnitt*	*Varians*
FEMALE				
Climate	101	309	3,059405941	0,456435644
Recycling	101	343	3,396039604	0,401584158
Transport	101	314	3,108910891	0,458019802
MALE				
Climate	172	556	3,23255814	0,35495716
Recycling	172	548	3,186046512	0,444716442
Transport	172	552	3,209302326	0,447164423

Variansanalyse

Variasjonskilde	*SK*	*fg*	*GK*	*F*	*P-verdi*	*F-krit*
Mellom grupper	6,94497904	5	1,388995807	3,274971451	0,006186134	2,22511697
Innenfor grupper	344,813263	813	0,424124554			
Totalt	351,758242	818				
Totalt	351,758242	818				

Moreover, Sg 1 for instance, has achieved the highest score on question 7 and has a corresponding level of knowledge on the sustainable topics. Sg 12 is an example of the opposite case, the group has achieved the lowest score on question 7 and has the lowest degree of knowledge compared to the other subgroups. Hence, it is conceivable to determine that a higher degree of knowledge affects the respondents attitude towards the importance of environmentally friendly initiatives.

Table 11 - ANOVA tests on SG8-SG12.

Event participants

Variansanalyse: en-faktor

SAMMENDRAG

Grupper	*Antall*	*Sum*	*Gjennomsnitt*	*Varians*
1-3 times yearly				
Climate	82	242	2,951219512	0,466726889
Recycling	82	257	3,134146341	0,389190003
Transport	82	245	2,987804878	0,481330924
4-6 times yearly				
Climate	85	274	3,223529412	0,342296919
Recycling	85	289	3,4	0,361904762
Transport	85	283	3,329411765	0,366386555
7-10 times yearly				
Climate	52	174	3,346153846	0,387631976
Recycling	52	174	3,346153846	0,387631976
Transport	52	167	3,211538462	0,444570136
10+ times yearly				
Climate	30	100	3,333333333	0,298850575
Recycling	30	104	3,466666667	0,326436782
Transport	30	99	3,3	0,424137931
Less than once yearly				
Climate	24	74	3,083333333	0,34057971
Recycling	24	70	2,916666667	0,688405797
Transport	24	73	3,041666667	0,563405797

Variansanalyse

Variasjonskilde	*SK*	*fg*	*GK*	*F*	*P-verdi*	*F-krit*
Mellom grupper	22,0221048	14	1,573007486	3,861480482	2,13243E-06	1,7040834
Innenfor grupper	327,516357	804	0,407358653			
Totalt	349,538462	818				

Table 11 elaborates on Sg 8 – Sg 12, reinforcing the connection between festival participance, degree of knowledge and attitude towards a sustainable event industry. There is a clear pattern in the frequency respondents participate in events and their attitude towards the importance of environmental friendly events in Sørlandet. From a rating of 71 on question 7 by Sg 12 (table 9), it steadily increases throughout Sg 8-11 to a rating of 84, correspondingly to their average yearly participation in events.

Smaller subgroups can be omitted if only a general point of view is utilized. Analyzing the proposed measure in the perspective of the various subgroups enables a holistic understanding of the collective sentiment of the subgroups. This approach was implemented when analyzing feedback on the proposed measures. The most preferred measures are highlighted with the color green in table 9, whilst the least preferred measures are highlighted in red. Deposit scheme of 10 plastic cups is preferred by the majority, with 8 of the 12 subgroups agreeing to this form of collaboration. Contrarily, “Transport costs included in ticket” is least preferred by 11 of the 12 subgroups. An further elaboration and statistical analyses including ANOVA tests, T-tests and Chi-squared tests regarding the proposed measures are provided in appendix B4.1 – B4.6.

Consequently, all proposed measures will be revised according to the analyses, comments and feedbacks from the survey, independent of whether they were preferred or not. In an attempt to allow the consumers (festival participants and survey respondents) to engage in customizing appropriate and optimal measures.

4.3.3 Longitudinal analysis

To enable a longitudinal analysis in the future, benchmarks were defined. These benchmarks revolved around the level of knowledge and the importance of an environmentally friendly event industry. A benchmark on customer satisfaction rate for the various subgroups is preferred, but was discussed to be excluded from this specific survey. The reasoning behind this decision was that the customer satisfaction rate should be measured right after the festivals to collect accurate data. Due to the Covid-19 pandemic the event industry in Sørlandet has postponed their festivals, and conducting a customer satisfaction measurement now would result in the collection of inaccurate data. Hence, the customer satisfaction rate aspect should be implemented in a survey distributed after the next event, and benchmarks should be set accordingly.

As described in 4.3.2 Comparative analysis of subgroups, there is a clear indication of the knowledge level of respondents being directly related to their attitude towards the importance of an environmentally friendly event industry in Sørlandet. Increasing the knowledge level of festival participants will thereby cause a ripple effect and may cause participants to be more inclined to contribute to sustainable and environmentally friendly initiatives. Benchmarks have been set for each subgroup and for the respondents as a collective, in order to promote a holistic understanding of the participants. Table 12 describes the defined benchmarks. By adding the colon "Accumulated percentages", it is possible to identify the aspect that the respondents have the least knowledge about.

Table 12 - Showcases the defined benchmark for each subgroup and the collective.

	Benchmarks													
SUBGROUP #	-	SG 1	SG 2	SG 3	SG 4	SG 5	SG 6	SG 7	SG 8	SG 9	SG 10	SG 11	SG 12	Accumulated
SG Description	All respondents	18-24	25-34	35-44	44-54	55+	Male	Female	1-3 times/year	4-6 times/year	7-10 times/year	10+ times/year	Less than 1/year	percentages
Environment friendly event industry	77	85	75	76	72	83	76	80	72	78	83	84	71	
No knowledge - climate changes	1 %	0 %	1 %	0 %	2 %	0 %	0 %	2 %	3 %	0 %	0 %	0 %	0 %	8 %
No knowledge - recycling	0 %	0 %	0 %	0 %	2 %	0 %	1 %	0 %	0 %	0 %	0 %	0 %	4 %	7 %
No knowledge - transport	1 %	0 %	0 %	0 %	0 %	4 %	0 %	2 %	2 %	0 %	0 %	0 %	0 %	8 %
Little knowledge - climate changes	11 %	3 %	19 %	2 %	16 %	10 %	9 %	15 %	18 %	8 %	8 %	3 %	12 %	123 %
Little knowledge - recycling	10 %	6 %	16 %	12 %	7 %	4 %	11 %	8 %	13 %	6 %	8 %	3 %	25 %	119 %
Little knowledge - transport	13 %	8 %	17 %	12 %	18 %	6 %	14 %	12 %	17 %	7 %	13 %	10 %	25 %	159 %

5. Discussion

This chapter discusses the findings in the context of the presented theory. Potential solutions that generate value to the event industry in Sørlandet will be elaborated.

5.1 Viable materials

As shown in appendix C2 and table 8, a comparison and analysis based on literature review were made of the different materials that have the potential to replace the use of conventional plastic cups in festivals. This section aims to compare and evaluate these findings with the revelations from the survey and interview. By supplementing findings from the academic literature, the survey, and the interview, it will be attempted to select a competitive and sustainable material.

The thesis intends to reduce plastic waste related to festival cups and evaluate different alternatives for plastic. Hence, self-evidently, typical materials for plastic such as PET and LDPE have been disregarded. However, the benefits and inconveniences of these materials have been examined to get a holistic overview of properties that are expected from the alternative materials. Currently, the majority of disposable cups are produced from LDPE or PET (Mitchell et al., 2014). Due to the limited recycling options for these polymers, disposable cups have become an expansive problematic waste. In fact, Schnurr et al. (2018) states that disposable plastics contribute to 60-95% of global marine plastic pollution. Moreover, plastic cups derive from fossil fuels and emit greenhouse gases through their lifecycle (Hamilton et al., 2019). Hamilton et al. (2019) further elucidates that contrary to the drawbacks related to the environment, PET and LDPE possess several use case benefits such as being practical, lightweight, and ideal for transportation. Thus, the environmental footprint and the use case benefits of the alternative materials have been examined and compared to PET and LDPE, in the aim to select the most sustainable and competitive solution.

5.1.1 Cardboard cups

The survey revealed that a sizable proportion of the respondents had the impression that cardboard cups were a superior alternative for plastic cups. Unlike PET and LDPE, cardboard cups consists mainly of renewable resources. However, cardboard cups are lined with either PET or PLA for the purpose of keeping the beverages warm and to prevent liquid from soaking through the paper (Häkkinen & Vares, 2010). As mentioned in Häkkinen & Vares (2010), the combination of different materials in cardboard cups leads to difficulties related to the separation of materials in the recycling process. In addition to this complication, Castro-Aguirre et al. (2016) implies that the cups can only be recycled in limited facilities, and in the absence of such facilities, the cups are taken to landfill for composting. In this regard, Foteinis (2020) revealed the emission of a typical cardboard cup to be 11 g CO_2 when disposed of in a sanitary landfill, which is comparatively high.

Moreover, PLA based cardboard cups decompose to a certain degree in a landfill due to their biodegradable property, but the coating of PET based cardboard cups prevent the cups from decomposing properly (Arumugam et al., 2018). The interviewee indicated that cardboard cups have been discarded in their research as these cups are very soft and the weather in Norway demands the cups to withstand a lot of water. Additionally, the cups lack the transparency, resulting in not being suitable from a visual perspective. The interviewee further elucidated that cardboard is a good material, but is only sufficient under the right circumstances.

5.1.2 PLA cups

Some of the respondents in the survey suggested using PLA based cups instead of traditional plastic cups. Apparently, these respondents had the impression that PLA is completely degradable, even in the case of mismanaged waste sorting, which is incorrect. The interviewee had also experienced something similar where various festivals had demanded PLA cups, however, their understanding of the material's bio-process and recycling had been insufficient. In fact, PLA will only be decomposed optimally in the case of specific and controlled composting conditions (Arumugam et al., 2018). Accordingly, Castro-Aguirre et al. (2016) implies that there are limitations to the implementation of PLA due to the deficiency of sustainable infrastructure for sorting, recycling, and composting PLA products. This corresponds to the statements of the interviewee, as it derived from the interview that there are

limited opportunities for composting and recycling PLA, as adequate arrangements and facilities are currently not established. In addition, when asked about the viability of implementing PLA cups, the interviewee stated that it is possible to compost PLA cups, but not reuse them, which counteracts the CE.

Although mechanical recycling can be utilized to minimize the carbon footprint of PLA (Piemonte et al., 2013), the polymer's lacking quality to be used in a circular economy leads to its dismissal. Other potential disadvantages related to the discharge of PLA includes; the risk of pesticides to be transferred into the final product (Castro-Aguirre et al., 2016), PLA being vulnerable to heat deformation (Lim et al., 2008), PLA being poorly suited for the use of carbonated liquids (Castro-Aguirre et al., 2016), as well as being unsuited to contain alcoholic products as ethanol swells the PLA matrix, eventually leading to leakage (Tsuji & Sumida, 2001).

5.1.3 Reusable stainless steel cups

Reusable cups were another option suggested by the festival goers in the survey. By collecting data from academic literature, it was chosen to explore stainless steel cups, as these were already diligently used in various festivals worldwide (Šuškevičė & Kruopienė, 2021). In fact, according to Changwichan & Gheewala (2020), a study that compared life cycle assessment of conventional plastic, bioplastic and steel cups, it was revealed that reusable steel cups showed the best environmental performance of prolonged use. The impacts from the production of the stainless steel cup were reported to be high at the beginning. However, after about 20 and 70 uses, the global warming impact starts to be lower than PET cups and PLA cups, respectively.

In addition, a key advantage of using this material proved to be its strong ability to maintain the CE. Furthermore, Changwichan & Gheewala (2020) praised the long-term durability of the material when using it in festivals, whereas Chang et al. (2011) commended its potential to be fully recyclable. Changwichan & Gheewala (2020) further implies that stainless steel cups can usually be used almost daily for a minimum of 3 years in festivals, before a recycling process is required. Another advantage associated with the material includes its effective recycling rate, as it turns out that considerably lower energy resources are required when recycling, as the only input is the energy needed to reheat and re-roll the steel (World Steel Association, 2015).

In contrast, the interviewee mentioned some disadvantages, revealing that stainless steel as an alternative to festival cups had been omitted for the main reason being its lack of transparency, resulting in not being appropriate to be an alcoholic container. Other weaknesses related to the selection of stainless steel cups, also highlighted by Changwichan & Gheewala (2020), involve them being costly and weighty in the transportation process, as well as potentially dangerous, since the rigid structure of the cups can be used to inflict damage. However, it is important to specify that also glass, which can be utilized to inflict damage, is used extensively worldwide as an alcohol container in an acceptable manner.

Changwichan & Gheewala (2020) further underlines the high cost of stainless steel cups at the expense of the festival participants. The festivals goers are obliged to purchase a cup in addition to the cost of their beer. However, the survey revealed that the weakness experienced by Changwichan & Gheewala (2020) at festivals in Thailand, where not reflective with the festival goers in Sørlandet, as 60% of the survey respondents supported the use of reusable steel cups, whereas 33% were neutral. The interviewee also mentioned complications with stainless steel cups regarding hygiene and waiting time, as the cups have to be washed properly each time after use, which can be time consuming, leading to long queues in front of the bar. Nevertheless, in accordance with Changwichan & Gheewala (2020), renting some fast industrial washing machines, or better yet, hiring enough personnel responsible for washing the cups continuously, the complication related to hygiene and waiting time can be eliminated.

5.1.4 rPET cups

Feedback from the survey indicated that recyclable plastic cups were perceived as an interesting alternative. A few of the respondents expressed that the recycling rate of these cups should be examined prior to the implementation of this alternative. In this regard, Komula (2011) specified that PET has the ability to be 100% recyclable, hence, there will not be any amount of unprocessed PET in the recycling process if sorted sensibly. Coincidentally, the representative from Hansa Borg explained how the brewery had already examined recyclable plastic cups, in addition to washable plastic cups. The carbon footprint of the two cups were compared, and it was discovered that by recycling rPET instead of using washable plastic cups, 1 kg of plastic and 16 kg of oil will be saved. The interviewee further elucidated the importance of the cups to be transparent, where the alcoholic liquid can be seen. However, the findings from Infinitum indicated that 100% rPET eventually leads to decrease in quality, as well as the

material becoming less transparent. These findings from Infinitum are thereby consistent with Chacon et al. (2020), where the decrease of optical transparency in high percentage of rPET was mentioned. Thus, 80% rPET was decided to be an optimal solution that would still maintain the circular economy to a high degree.

5.1.5 Ideal materials

As the focus of the thesis is on sustainability and CE, the materials LDPE, PET, and cardboard were disregarded, due to the disadvantages outweighing the benefits in regards of the environmental footprint. Therefore, stainless steel cups and rPET cups were selected as alternatives to plastic cups. These materials have a higher degree of reuse and recycling compared to the disregarded materials, as well as greater recycling possibilities. Comparatively, stainless steel and rPET have a lower non-renewable energy usage. However, stainless steel exhibits a higher amount of CO_2 relative to some of the examined materials, but has the quality to be reused several times before being defective. In addition, it is much easier to recycle steel and less energy and material is required to produce new steel products. Stainless steel and rPET also excelled when it came to potential user experience, which can be seen from table 8, such as resistance to leakage, heat and alcoholic liquids. Thus, the disregarded materials will be excluded, and the implementation of the two selected materials, stainless steel and rPET, will be further examined.

5.2 Implementation of rPET cups

Arrangements for the implementation of rPET in a CE context are already in place, but measures to reduce the waste of rPET cups are yet to be established. The material itself is sustainable, but littering will presumably still occur. This section describes the implementation process of rPET and the preferred measures to reduce waste.

5.2.1 Circular economy

Hansa has achieved the preconditions of CE implementation, as described by Rodrigue (2020). The executives support the initiative and the company has established collaborative partnerships with suppliers of raw material and the final product. Data collection has indicated that the primary focus has been on product design that reinforces reprocessing and recycling. It is also imperative to account for employable strategies to promote CE when considering alternative material in a CE context. Gartners' (2020b) first strategy involves the development of a holistic and long-term vision. This strategy has been applied by Hansa, as they have conducted studies to characterize the viability of various raw material refurbishments and recycling opportunities. Hence, it is favorable for the event industry in Sørlandet to cooperate with Hansa when implementing rPET as material for their event cups.

Additionally, Hansa actively engages in sustainable development and has studied viable CE possibilities. They have conclusively arrived at a collaboration with Infinitum and an extern supplier. The established arrangement conceivably covers the three co-equal parts of sustainability described by Portney (2015). Figure 8, describes the circular economy established by Hansa. However, it is vital to specify that this system is yet to be tested and it lacks empirical data, due to the Covid-19 pandemic.

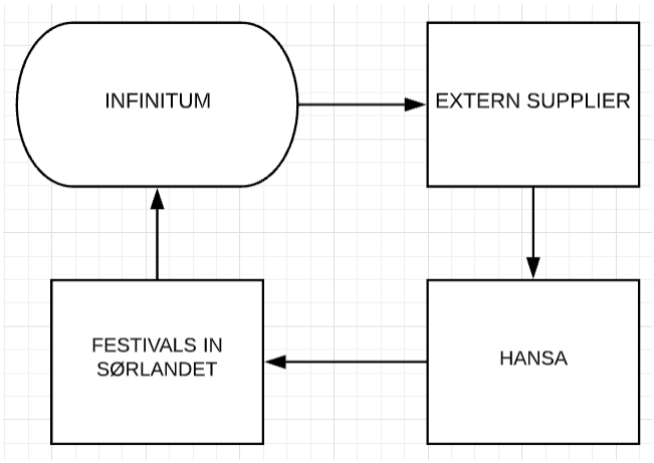


Figure 8 - Illustrates Hansa's rPET event cup CE.

According to the theoretical framework established by Hansa and their collaborators, the extern supplier is responsible for the purchase of recycled raw material from Infinitum, and production of the event cups. Infinitum will then conduct quality control to ensure that the produced cups satisfy the requirements set by Hansa (80% rPET), before they are delivered to the company. The rPET cups will then be distributed to events or festivals as agreed. Unused cups are delivered back to Hansa, while Infinitum collects the used cups. This directly correlates with Gartners' (2020b) second strategy of discovering opportunities to retain ownership of materials or products, and ensuring that the return process is as customer friendly as possible.

Furthermore, Hansa receives an invoice from Infinitum according to the amount of cups collected from the festival, which works as a deposit-refund system. At last, the collected cups are recycled to raw material and sold to suppliers, such as the external supplier of Hansa. It is thereby convenient to assume that an ecosystem of partners and collaborators have been constructed according to Gartners' (2020b) recommendations and strategies. However, as the arrangement focuses on CE, empirical data is necessary to define specific measures for stock optimization (Stahel, 2013). There is currently no data on how often, or how many event cups should be produced. Nevertheless, Hansa states that the cups will stay in a circular loop even if they are only used once a year.

Hansa has engaged in a cradle-to-cradle metabolism by enabling materials to maintain their position as resources. Thus, displaying a focus on eco-effectiveness (EMF, 2012). Empirical data from the qualitative interview showcases that there is a constant focus on resource productivity and waste reduction throughout the production and recycling of the rPET cups.

The combined focus on these topics directly corresponds with EMF's (2012) description of eco-efficiency. For instance, in order to promote these factors further, an investigation on the viability of 100% rPET cups was conducted by Infinitum, but it was soon deemed to be insufficient for repeated recycling. As eco-efficiency is a prioritized aspect throughout this arrangement, it is imperative for the events to correspondingly prioritize waste reduction to promote the eco-efficiency further (EMF, 2012).

5.2.2 Minimizing waste of plastic cups

Events should prioritize the waste management of the rPET cups and aim to collect and return all used festival cups to Infinitum. The assembled data suggests implementing various incentives and strategies in order to facilitate waste reduction. Bermudez (2015) recommends engaging in partnerships with like-minded vendors and renovation teams. Organizing waste management in collaboration with a renovation team such as; Agder Renovasjon, is ought to increase waste sorting success and be efficacious in most cases. The collaboration should specifically account for the necessary amount of waste sorting stations and their accessibility, as survey data suggests that a multitude of events does not install an adequate amount of these stations. Moreover, some respondents have stated that waste sorting stations should have more containers for the various materials. Thus, a container for festival cups should be deployed at each station to streamline the collection and sorting of rPET cup waste.

In order to maximize the use of waste sorting stations, it is necessary to disseminate knowledge regarding sustainability and recycling to the event participants. The dissemination of knowledge aspect demands for an elaborate and thorough examination, as the aspect is of utmost importance regardless of the material utilized. Hence, it will be presented in its own section; 5.4.

However, Martinho et als.' (2018) study suggests that in addition to centralizing communication, numerous incentives can be implemented to promote waste management. The study on the Adanças Festival describes the viability of demanding a deposit payment by the facilities at the festival, which will be returned if the area around the facility is cleaned by the end of the festival. Be that as it may, this option is only implementable if the events in Sørlandet utilizes facilities for their beer sales. If the events take ownership and responsibility of the beer sales, Hansa's representative recommends an environmental fee set by the municipality, with

the aim being that the events clear the waste on their premises. This specific incentive emphasizes Bermudez (2015) recommendation of collaboration and partnership. Furthermore, it can also be related to Hansa's effort on pressurizing their suppliers to deliver sustainable products and solutions. Their representative states that some potential options and solutions are only explored and uncovered if an adequate pressure is set on the collaborators. Hence, establishing environmental fees will conceivably encourage the event organizers to discover various sustainable solutions and incentives.

Mapping the participants and survey respondents environmental awareness was one of the central goals, as Bermudez (2015) states that it is essential before implementing incentives. According to the report from NORCE (2020), the success rate of an incentive heavily depends on the event's audience. A successful incentive in one festival can be a direful failure in another. It is plausible that the web-based quantitative survey was able to collect necessary data to measure the event participants' environmental awareness. The acquired survey data showcases that the event participants in Sørlandet have a positive attitude toward sustainability and an environmentally friendly profile. Thus, it is comprehensible that the event participants are inclined to cooperate with various sustainable incentives. Survey data on proposed sustainable measures and incentives support this claim, as the majority of respondents agreed with the proposed incentives.

The specific incentives that can be introduced together with rPET that have received the most support from the survey respondents, are as follows:

- Deposit-refund scheme of 10 plastic cups.
- Lottery scheme of plastic cups.

Before elaborating on the incentives with regards to the accumulated data, it is vital to clarify that both schemes require festival participants to hand in used rPET cups. A combination of both is desirable as it gives participants more opportunities to gain rewards, whilst increasing the waste sorting options. Both incentives can be implemented in a combined system/station, with the option of selecting whether the cups will be used for entering the lottery, or be delivered as a mortgage. However, simultaneous implementation of both incentives requires an increased use of resources, thus also increasing the costs.

The introduced mortgage scheme of 10 plastic cups had a fatal flaw, as the intention was to give a free beer in exchange for 10 plastic cups. It was brought to the thesis' attention that distributing free alcohol is against the Alcohol Act by both the survey participants and the interviewee. The Norwegian Directorate of Health was contacted to confirm these statements. Survey respondents were fond of the idea and suggested to utilize this concept as a deposit legislation, where the event participants exchange used cups for money.

According to the respondents and the interviewee, the Norwegian Øyafestivalen had a similar scheme and were successful with their implementation of it. It is claimed by Øyefestivalen (2017) that the audience deposited 180 000 cups that year. Furthermore, the interviewee also supports the deposit-refund scheme and states that through the adjustment of the monetary prize, it will still be possible to get a "free" beer after a certain amount of deposits. Depending on the event's environmental profile and their audiences' attitude towards sustainability, it is possible to give the money to a charity with an environmental profile instead. Some support for this specific measure has been acknowledged through the web-based survey, but further research is recommended to assess whether this affects the majority of participants' motivation within a cynical aspect.

Lottery scheme was the second proposed incentive in the quantitative survey. It gained a lot of support, but also more fraction than the priorly introduced incentive. Survey respondents expressed some uncertainty related to this incentive, due to both incentives requiring deposit of event cups. Since a combined arrangement with both incentives is implementable as a system, the greatest uncertainty revolves around the lottery prize. The interviewee and the majority of respondents perceived the lottery scheme as fun and engaging. However, a few respondents suggested a cash prize instead, since they would not participate in a lottery for items that they might not need. Thus, it is vital to explore various possibilities for prizes. Cash prizes might be the most attractive, but several other prizes such as a service or event tickets might be valid options.

5.3 Implementation of stainless steel

By analyzing different materials, it emerges that steel is the most optimal material if one aims to have a high degree of CE. Regardless, arrangements for the implementation of stainless steel cups in a CE context are yet to be established. This section describes the implementation process of stainless steel cups, as well as the preferred measures to counteract associated complications.

5.3.1 Circular economy

Compared to the other evaluated material alternatives, stainless steel cups have a great advantage in the context of CE. As reported by World Steel Association (2015), the material is 100% recyclable, and the energy needed in the recycling process is comparatively low. The only input is the energy required to reheat and re-roll the new material, leading to a focus on eco-effectiveness and eco-efficiency (EMF, 2012) in the context of CE. However, the arrangements to promote the transition from linear economy to CE, as proposed by Gartner (2020b), are yet to be established. The four reverse logistic layers introduced by Rodrigue (2020) are also not initiated as of yet. Therefore, to benefit from this approach in an effective manner, it is crucial that executives support the initiative and that the company, which intends to use this material, establish collaborative partnerships with suppliers of the raw material.

Likewise, it is recommended to develop a holistic and long-term vision. Furthermore, as indicated by Stahel (2013), empirical data is required to define specific measures for stock optimization. Unfortunately, there is not extensive empirical evidence to compare when it comes to the use of stainless steel cups in festivals. Nevertheless, Changwichan & Gheewala (2020) reports that with the CE point of view, the use of reusable stainless steel cups is strongly recommended. The study further elucidates that these cups are superior to the alternative materials if the cups are used for a minimum of 3 years, assuming it will be used 260 times annually. In relation to the presented theory and data, the thesis suggests two possible approaches for the implementation of stainless steel cups.

By taking the aforementioned theories into consideration, i.e. Gartner (2020b) and Rodrigue (2020), the first approach suggests forging an agreement with various festivals or events in Sørlandet. The agreement is based on the premise that a joint purchasing scheme is prepared. The intention with this type of cooperation is to create possibilities to interchange the cups

between festivals, resulting in increased inter-festival communication, as proposed in Bjørseth (2014). The process is visualized in figure 9, and illustrates the potential process. The proposal is based on festivals managing most areas of responsibility, including quality control after production, storage management, and distribution of cups. In the case of the cups being defective, which typically occurs after a minimum of 3 years if used almost on a daily basis (Changwichan & Gheewala, 2020), an external partner is responsible for recycling the cups. The same, or even a different partner can manufacture new stainless steel cups from the raw material. Lastly, the manufactured cups are brought in by the festivals and placed in a common storage facility, ready to be utilized when required.

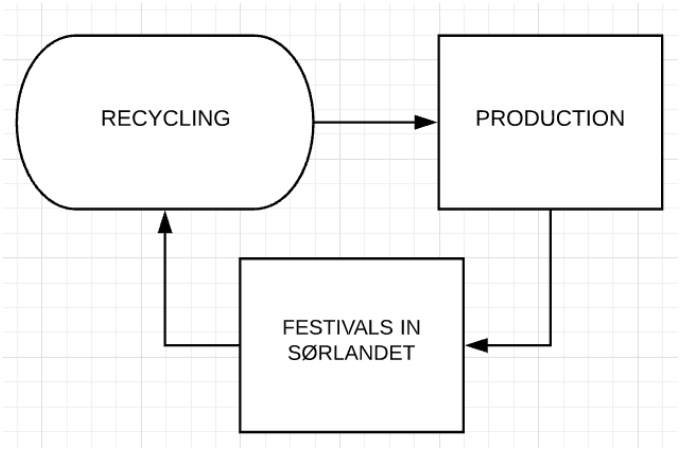


Figure 9 - Depicts approach 1: implementation of stainless steel cups.

The second approach requires the event collaboration in Sørlandet to establish partnership with three additional collaborators. As the previous proposition, a partner responsible for recycling process and a partner responsible for the production process is necessary. Additionally, an agreement with a distributor/stock manager is proposed, with the distributor/stock manager being responsible for the purchase, transportation, storage, quality control and distribution of the recycled stainless steel cups. The distributor would also be responsible for the deliverance and recollection of cups from the various festivals. Used cups should be washed appropriately before being stockpiled in the distributor's storage. Before being stockpiled, a quality control should be conducted, consisting of criteria set by the events in Sørlandet. Cups that fail the quality control after being collected from the production, or are determined as being defect after consecutive usage, should be transported for recycling before new cups are produced and delivered to the distributor. Thus, the distributor will act as an intermediary between the festivals and the recycling and production processes.

Figure 10 showcases the CE of the second proposition. A successful implementation of this approach in combination with the presented measures in section **5.3.2,** will theoretically lead to zero waste of festival cups, while maintaining the CE. A point to be noted is that the common link (distributor) does not necessarily have to be an external partner. Nevertheless, if an external partner is utilized, it is recommended to implement the "leasing" aspect from performance economy (Geissdoerfer et al., 2017), in order to retain ownership of materials (Gartner, 2020b). Contrary, leasing payments of the cups will not be required, if a collaborative department is established through inter-festival communication.

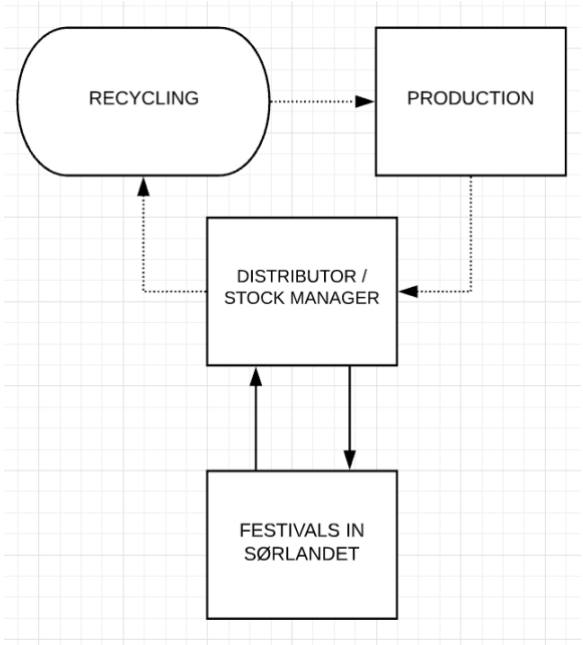


Figure 10 - Depicts approach 2: implementation of stainless steel cups.

5.3.2 Counteract the challenges

This subsection aims to elaborate on the challenges and complications regarding the implementation of stainless steel cups that are identified through the data collection.

Risk of inflicting damage and optical transparency

In both the survey and the interview, it has been mentioned that stainless steel cups can be used to inflict damage. This particular issue can, as of yet, not be solved. However, regular glass, which also can be used to inflict damage, is extensively practiced in bars globally, for the purpose of serving alcoholic beverages. Therefore, credibility to the audience has to be formed, in the case of utilizing stainless steel cups. In regards to the optical transparency issue, it is

fundamental to decide what is of most importance, sustainability or marketing. These festival cups have proved to be a sufficient alternative for maintaining CE in an efficient manner (Changwichan & Gheewala, 2020). It will therefore seem wrong to omit this option completely. A proposed solution is thus to engrave the stainless steel cups with the logo or name of each partner, feasibly solving the marketing issue.

Product design

The stainless steel cup illustrated in the survey did not have an elegant and attractive design according to some particular survey respondents. It is vital to emphasize that the provided illustration was just a supplementary demonstration of the cup's functions. The final design should be based on Rodrigue's (2020) precondition of CE, where it reinforces the reprocessing and recycling procedures. Furthermore, Gartner's (2020b, pp. 2) fifth strategy suggests the collaboration to actively participate in the product design process. By utilizing early involvement, it is conceivable to gain a holistic understanding of the material selection and acquire sufficient knowledge to establish criteria which impacts the material's end of life. Hence, it is imperative for the event industry in Sørlandet to cooperate closely with the assigned design team (Gartner 2020b).

Figure 11 - Depicts the illustration provided in the survey.

Taste, functionality and hygiene

Some of the respondents opposed the implementation of stainless steel cups, with the main reason emerging to be the possibility of these cups to spoil the taste of the alcohol. Nevertheless, this particular matter has not been experienced in festivals that have used these types of cups repeatedly (Changwichan & Gheewala, 2020). However, Changwichan & Gheewala (2020)

mentioned a lacking quality of stainless steel cups, being the material's inadequate ability to be more inclined to heat up in the sun, leading the liquid to become hot. In accordance with the aforementioned study, a solution is proposed regarding the functionality of the cup where a double walled vacuum insulation can be utilized. This arrangement has proved to retain the liquid's temperature for a longer duration. To further increase the functionality, Martinho et al. (2018) proposes attaching a carabiner hook (to hold the mug on a person's belt or pack) with the aim to improve the ease of use.

Moreover, issues revolving the hygiene of the reusable cups were raised by the interviewee, as well as some of the survey respondents. Self-evidently, the cups require to be properly rinsed and cleaned each time after use. As recommended by Kennell & Sitz (2010), increasing the amount of staff in the handwashing stations can be environmentally beneficial. The increase in workforce may also decrease the potential long queues that will be waiting for the cups to be washed. Changwichan & Gheewala (2020) elucidates that washing the cups by hand can be replaced with fast industrial dishwashing machines. It is essential to specify that this approach exhibits higher environmental impact due to the usage of electricity. Hence, the handwashing proposition is identified as the most sustainable approach.

Identifying partners

When identifying potential partners for the recycling, production, and distribution of stainless steel cups, it is imperative to focus on like-minded vendors (Bermudez, 2015). The collaborative event partners should be the custodians of this arrangement as they are the initiators. Hence, specific requirements and specifications for the recycling and production of the cups should be defined collaboratively. The material's wide availability fosters a dynamic that is supplementary to a multitude of diverse opportunities. A thorough analysis on the recycling and production possibilities should be conducted, with the aim of extracting compelling data. Ideally, the analysis should include a myriad of external partners, lest the research risk becoming analogous. The gathered information should then be utilized to elude certain vendors, before a comparison of viable external partners is coordinated. It is desirable that the analysis largely include possible partners who utilizes hydraulic or nuclear means in their production and recycling process, as these emit the least CO_2 emissions according to Chang et al.'s (2011) study.

Comparably, a similar approach is beneficial when identifying the distributor/stock manager. Regardless of whether the event industry in Sørlandet engages this role or assigns it to an external partner, certain preconditions should be defined and maintained. An arrangement centralized on the minimization of greenhouse gas emissions from distribution and transport is beneficial for the environmental profile of the collective. Thus, electric transport, train or an arrangement corresponding to Hansa's partnership with Tine should be utilized. In that vein, it is conceivable to increase sustainability, as Hansa saves 187 000 km and 155 tons of CO_2 annually, through their collaboration with Tine.

Incentives

Implementation of stainless steel cups as festival cups will exterminate all plastic cup waste, but requires some particular incentives to prevent litter of the new cups as described by Martinho et al. (2018). A specific incentive that supplements both Bermudez's (2015) and Martinho et al.'s (2018) studies is the deposit scheme proposed in the survey. Survey data indicates that the respondents have a high environmental awareness, whilst the aforementioned proposition has obtained considerable support. The proposed measure illuminated the possibility of establishing a deposit-refund system that can be compared to "leasing" from a performance economy (Geissdoerfer et al., 2017). Beer consumers at the festival have to pay a deposit to obtain the new event cup, which will be the only accepted cup for beer distribution. To establish a systematic arrangement, only one cup should be assigned to each participant.

Additionally, this measure does not cause inflation of existing beer prices, which some of the incentives for rPET may lead to. Furthermore, the deposit will only be refunded to participants that return the cup. Comparably to Øyafestivalen, where a considerable amount of participants did not return the event cups, this measure reduces the possibility of this occurrence, while ensuring that the events are compensated if this occurs. Moreover, the particular measure corresponds with Gartner's (2020b) sixth strategy of considering whether CE may have negative impacts in the company's metrics. However, it is conceivable that certain negatively impacting factors are yet to be uncovered. Consequently, a thorough and holistic study on this matter is encouraged before the implementation of stainless steel cups.

5.4 Knowledge dissemination

Information- and knowledge sharing should be centralized regardless of the utilized material, in order to reduce waste, prevent complications and promote sustainability. Certain aspects of communication have already been elaborated, thus this section deals with communication related to knowledge dissemination with festival participants and other festival organizers.

5.4.1 Disseminate knowledge to festival participants

The value of proper knowledge dissemination to festival participants is elucidated by Kennel & Sitz (2010), who studied the greening policies of the Bonnaroo Festival. The festival was able to succeed in relation to sustainability, through prioritizing education of all involved parties. Staff members, volunteers and festival participants were emailed a "greening handbook". Said action solidified the festival's environmental profile and their conviction towards sustainability. Conclusively, it influenced the involved parties to act appropriately. The correspondence between the degree of knowledge, and sense of environmental and sustainable responsibility is showcased through the thesis' quantitative survey. Festival participants with a higher degree of knowledge in the highlighted themes, were more environmentally conscious and more motivated to promote a sustainable event industry in Sørlandet.

Kennel & Sitz (2010) study correlates to NORCE's (2020) comparison of the Shambala festival and another festival with the same incentives. The festival participants attitude towards sustainability and the event's lack of communication with the participants resulted in two contrasting outcomes. Thus, it is advisable for the events to engage in marketing and information sharing practices with the aim of promoting responsible environmental and sustainable behavior. For instance, distributing e-handbooks is a measure that literature studies support. Since the knowledge can be linked parallelly to the responsibility, it is conceivable that well informed event participants will be inclined to engage in sustainable and environmentally friendly measures.

5.4.2 Inter-festival knowledge exchange

Through the qualitative interview, the thesis was given the impression of Hansa being aware of the knowledge dissemination aspect. Their representative stated that they actively employ resources to promote sustainable purposes to share information about sustainability, both within the organization and to their audience. They regularly share a sustainability report and have currently completed a press release, which soon will be distributed to the society. Dissemination of knowledge and experience with the society is fruitful for both the industry and the company's audience. Comparably, it is beneficial for the events in Sørlandet to share their knowledge, to discern favorable measures and strategies.

Bjørseth (2014) describes shared information as a necessity to evaluate failure and success. It does however, require the events to disregard the competitiveness in some degree. A common goal may motivate the collaborators to overlook rivalry in search of the collective objective and joint value creation (Gartner, 2020b). Furthermore, the collaboration may be able to push their sponsors and vendors into delivering more sustainable and environmentally friendly products and measures (Bermudez, 2015).

As elucidated, inter-festival knowledge exchange is a focal catalyst for improved sustainability (Bermudez, 2015). Communal information gatherings and publications enables events to realize their sustainability targets. Ravnedalen Live and NORCE engage in said gatherings to promote sustainable development in Sørlandet. However, the industry can also obtain valuable data from events in other countries. For instance, Hansa Borg has engaged in communication with overseas organizations to gain knowledge on alternative materials for the event cup. Consequently, further research on sustainable measures and alternative materials should be executed in collaboration with a wide range of events, vendors and external partners. Uploading a report on the internet, equivalent to Hove- and Øyafestivalen, is conceivably favorable. Distributing event data and strategies on the events website improves accessibility of data, thus streamlines international communication and collaboration.

6. Conclusion

The problem statement is divided into two questions and each question will be answered correspondingly, leading to a conclusion on the research question. Finally, the prospects of generalization will be elucidated to conclude the thesis.

- How can we minimize the waste of plastic cups in the event industry in the context of circular economy?

Based on data collected from the literature studies and the conducted research, it is conceived that emphasis on the communication with festival participants is pivotal. It is beneficial to map the environmental awareness of the participants in advance, with the objective to identify which measures should be prioritized. In accordance with these findings, emphasis on motivating the participants, by providing them the festival policies and greening tips, should be arranged beforehand (i.e. by email). Moreover, the importance of an adequate quantity of sorting stations is essential. Likewise, it should be considered to hire a sufficient amount of staff, with the responsibility to monitor the waste sorting. The staff should also be obliged to provide elaborated education to festival participants on the proper disposal of materials.

Implementing incentive schemes is also a valid measure to minimize waste of plastic cups. Facilities at the site may pay a deposit to the festival organizers, which will be returned only if the surrounding area of the facility is cleaned at the festival's completion. In relation to the festival goers, an approved option for drinks with a deposit-refund system can be utilized, where deposit is returned after the delivery of the mug. Another possible incentive scheme, for the purpose of waste sorting, involves three different options associated with a monetary reward system. The approach requires a machine (can be done physically) for container deposit legislation, which pawns plastic cups. The festival goers may have the opportunity to select between three options. The first option includes the festival participants receiving money for their deposit. The second option is to deposit the plastic cup and participate in a lottery, where one can potentially win more money. The final option is that the money from the deposit is contributed to a charity with an environmental profile.

Concurrently, the cooperation with like-minded vendors is mandatory as these suppliers have the opportunity to deliver more environmentally friendly products, i.e., festival cups. To be able

to push the suppliers into delivering more environmentally friendly products, it is detrimental to acknowledge the significance of inter-festival communication. In this regard, urgency of communal information, as well as publication of realized results are essential, so that future events may evaluate failures and successes in their process to achieve sustainability targets. Inter-festival communication thus disregards the competitiveness between festivals, and rather emphasizes on achieving a collective objective. Indeed, this collective objective, where various festivals join forces (i.e. joint purchasing schemes), contributes to push their sponsors and vendors into delivering more environmentally-safe products. Hence, increasing the probability for the events to prosper in their sustainable efforts.

- What alternative material can be used instead of plastic to increase sustainability?

On basis of the presented data, it is conceivable to define stainless steel as a feasible alternate material that positively impacts the sustainability. The thesis indicate that stainless steel has already been established as an exceedingly sustainable material if prolongedly used. A multitude of the challenges regarding the material are manageable, but the primary concern is the lack of transparency which disables marketing possibilities to a certain degree. However, if perceived through an ethical perspective, the sustainable aspect of the material should not be disregarded solely due to marketing challenges. The material's wide accessibility in combination with its interminable viability fosters a plethora of opportunities. Hence, the implementation of stainless steel cups demands a holistic study of vendors to evaluate its applicability in the event industry in Sørlandet, within a CE context. In that vein, an optimal solution is achievable by eluding conjectures. In the same light, as the custodians, the event industry in Sørlandet will be charged with establishing and maintaining sustainable integrity throughout the initiated CE.

Another feasible material instead of conventional plastic is rPET. Implementing this material might be favorable as arrangements for its CE are already established by Hansa. These cups consists of 80% rPET and 20% PET, since 100% rPET was deemed insufficient by Hansa and their collaborators. Moreover, Hansa accounted for the involvement of the event industry in Sørlandet when defining the solution. Consequently, the collaborative events will have a much minor task comparably to the implementation of stainless steel cups. The sole responsibility of the events is to reduce the waste of rPET cups considerably. Ideally, returning all cups that have

been delivered by Hansa's collaborator (Infinitum). It is worth mentioning that due to the pandemic, no empirical data has been gathered regarding this solution. Hence, changes might occur as auxiliary means may be implemented to preclude or diminish unanticipated challenges.

6.1 Generalizability

With CE and sustainability being in the forefront of technological and societal development, it is conceivable that the presented data might be generalizable. As the thesis aims at the event industry in Sørlandet, its relevancy to event industries is globalized. Furthermore, industries that utilize single use products may find the thesis valuable. It is also relatable to companies and industries that utilize PET as packaging material, as the thesis encourages implementation of rPET instead. Conclusively, the findings are applicable to decision making processes for vendors, producers and policy makers in a global context.

6.2 Further research and limitations

Viable materials have been examined and a compelling approach have been introduced. However, due to the encountered complications regarding the Covid-19 pandemic, it has been difficult to conduct several of the scheduled interviews. Thus, it was not possible to conduct an extensive data collection from various interviewees, resulting in limitations related to the collected data. A broader range of interview subjects is recommended for future research to increase validity and promote the dissemination of knowledge. In addition to the proposed alternative materials, it is reasonable to examine the LCA of bamboo, palm leaves, clay, porcelain, and Norwegian wood, as these materials were disregarded due to limitations regarding time.

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Appendix A - Interview

A1 – Analysis procedure

Analysis methods	Description
Transcription	Transcribe the interview as verbatim as possible, to identify things in retrospect that may have been overlooked during the interviews.
Clarification	Transcribed interviews must be forwarded to interviewee, so that they can clarify the transcript if there is something wrong.
Holistic analysis	Helhetsanalyse
Systematic analysis	A systematic analysis of data should be utilized based on the interview guide and problem statement. Data should then be categorized according to the thesis' research question, with the correspondence between the interview topics and empirical data as the focal point of the analysis.
Content analysis	By utilizing content analysis as a method it is possible to derive relations and connections within the data (Jacobsen, 2015). Additionally, an interviewee may subconsciously talk about a certain topic in a distinct way, and it is conceivable that content analysis may uncover the underlying causes by comparing the gathered data.
Comparative interpretation analysis	Compared individual interpretation of interview and analysis so far, to promote self-criticism and self-insight.

A2 - Data collection for interview 1

Introductory

- Short introduction of the authors, their education and the master thesis. Explain that the interview is anonymous and what the focal themes (sustainability, circular economy, reduce the use of plastic, reduce plastic waste, replace plastic with another material) of the interview are. First question asks for an introduction of the interviewee and her work areas (arbeidsområder).

Main themes

- **Sustainability**
    - Hansa Borg has set itself six priority sustainability goals, based on the UN's 17 sustainable goals:
        - 3. Good health / God helse
        - 5. Gender equality / Likestilling
        - 7. Clean energy for all / Ren energi for alle
        - 12. Responsible consumption and production / Ansvarlig forbruk og prod.
        - 13. Stop climate change / Stoppe klimaendringene
        - 17. Collaborate to achieve goals / Samarbeid for å nå målene

- Intervjuet er et eksempel på FNs mål 17, som viser at de Hansa er åpne til å dele kunnskap og erfaringer. Mål 7, 12 og 13 er veldig relevant for dette intervjuet. Ettersom Hansa sikter til å være et klimanøytralt bryggerikonsern innen 2030, ved å investere i teknologi, kunnskap og en mer energieffektiv drift. Kan være relevant å spørre om teknologiske investeringer for å fremme en energieffektiv drift.
- Mål 12 innebærer å redusere ressursbruk, miljø-ødeleggelse og klimagassutslipp ved produksjon og distribusjon av en vare.
    - Spørsmål til tiltak og endringer som har gjort for å redusere ressursbruk.
    - Spørsmål til tiltak og endringer som har gjort for å redusere miljø-ødeleggelse.

    - Spørsmål til tiltak og endringer som har gjort for å redusere klimagassutslipp ved produksjon og distribusjon av en vare.

- Mål 13 kan kobles med å styrke kunnskapen og bevisstgjøre eventdeltakere til å bidra til å motvirke, tilpasse og redusere konsekvensene av klimaendringer. Lurt å spørre hvordan Hansa formidler denne kunnskapen til samfunnet. Benytter de seg av insentiver innad i organisasjonen eller i samfunnet for å fremme dette?

- **Sirkulær økonomi**
    - Relevant å spørre om deres supply chain, produktsyklus fra råvare til resirkulering rettet mot plastikk emballasjen.
    - Mål 12 er direkte relevant med konseptet sirkulær økonomi. Spørre om hvordan de implementerer dette konseptet ved produksjon og distribusjon av varer. *"Vi tar ansvar for dette i Norge gjennom organisasjonen Grønt Punkt hvor vi bidrar økonomisk til å samle inn all emballasje som blir brukt i Norge for å kunne resirkulere emballasjen. Vi har i tillegg inngått Plastløftet, et løfte som skal bidra til en mer sirkulær plastøkonomi. Målet er å øke bruken av resirkulert plast, unngå unødvendig bruk av plast og designe for gjenvinning."* Fortelle litt om Plastløftet og hvordan den sirkulære plastøkonomien øker bruken av resirkulert plast, unngår unødvendig bruk av plast og eksempel på designe for gjenvinning.

- **Redusere plastavfall**
    - Har Hansa Borg opplevd noen utfordringer ved å ta i bruk 100 prosent resirkulerbare plastbeger i festivaler? Isåfall hvilke?
    - Mange festivaler har vanskeligheter med å kildesortere avfallet. Hva gjør Hansa Borg for å forsikre seg at mest mulig av festival koppene dere distribuerer blir resirkulert slik at dere kan fortsette å ha 100 prosent resirkulert plast? Altså har dere et krav om at det skal bli utplassert spesifikke containere som forbedrer kildesorteringen, eller har dere ansatt en form for ryddehjelp som kildesorterer plastkoppene? **MÅL 17**
    - Etter å ha distribuert koppene til en festival, hvem er det som har ansvaret for å transportere de brukte festival koppene til gjenvinningsstasjonen? Er det festivalledelsen eller er det noen fra Hansa som har det ansvaret?
- **Redusere bruken av plast/Erstatte plast med alternative materialer**
    - Er det noen fordeler/ulemper for Hansa dersom man utfaser plastkopper med andre materialer som for eksempel, PLA-kopper, Papp-kopper, Stål-kopper
    - Ved å gå gjennom flere akademiske papers retter mot festivaler, har vi fått inntrykk av at stål-kopper har lavest "carbon footprint" og er mest miljøvennlig i lengden. Utfra deres livssyklusanalyse som har blitt gjort på ulike materialer, hva slags materiale er mest miljøvennlig
    - Etter å ha utført en spørreundersøkelse rettet mot festivaldeltakere på Sørlandet, så kom det frem at bio-nedbrytbare kopper er foretrukket, altså PLA-kopper er foretrukket av publikum. Har dere vurdert PLA-kopper? Isåfall hvorfor gikk dere ikke videre med dette alternativet?

- Musikkfestivalen Ravnedalen Live har tidligere vurdert å bruke PLA-kopper (bio-nedbrytbar plast) i stedet for vanlige plastkopper, men har erfart at det er få avfallsanlegg som kan kompostere PLA i Norge. Med tanke på at Hansa Borg, i samarbeid med Infinitum, benytter resirkulert plast (RPET) til deres festivalglass, hvilke utfordringer møter dere på når det kommer til resirkulering av så store mengder med plastkopper? Vanskeligheter med å finne et avfallsanlegg som samarbeider? Vanskeligheter med å transportere avfall til anlegget, med tanke på distanse?
- Et av de seks bærekraftsmålene som Hansa Borg prioriterer er jo bærekraftsmål nummer 7 som handler om Ren energi. Vi prøver jo også å se på rene energiløsninger for festivalene på Sørlandet. Vi lurte derfor på noe relatert til energien som blir brukt i gjenvinningsanlegget Hansa Borg tar i bruk. Vet du om energien for å resirkulere festival begerene til Hansa Borg kommer fra fornybare eller fossile ressurser?
- Utifra en spørreundersøkelse vi laget rettet mot festivaldeltakere på Sørlandet, så virket det som mange var FOR å ta i bruk resirkulerbare plastkopper. Men det var også noen spørsmål angående levedyktigheten til resirkulerbar plast, hvor flere kommenterte at plast svekkes i kvalitet når det resirkuleres. Har Hansa Borg møtt på noen komplikasjoner når det kommer til levedyktigheten av resirkulert plast? Og hvor mange ganger vil du si at festivalkopper kan bli resirkulert før koppene må kvittes med?
- Når det kommer til festivalkopper, hva tenker du er fordelen med å ha 100% resirkulert plast (RPET), fremfor stålkopper.

Hansa's Miljøpolicy

- "Før ny emballasje implementeres, skal det utføres en LPA (livsykslusanalyse) for å vurdere emballasjens påvirkning på miljøet."
- "Fossilfri drift innen 2030"
- "Resirkulering av avfall og biprodukter skal ligge over 99 prosent"
- "Bruke 50 prosent resirkulert PET-materiale, eller mer enn 50 prosent når praktisk mulig, i all plastemballasje"

- Hansa Borg tok i 2019 initiativ til et samarbeidsprosjekt med bryggeri- og drikkevarebransjen for å se på mer miljøvennlige løsninger til drikkebeger på festival. Vi har kommet frem til en løsning sammen med Infinitum, som driver panteordningen for resirkulerbare plastflasker i Norge. Fremover vil plastbegrene samles inn og resirkuleres, og bli råstoff til produksjon av nye krus eller flasker. Sirkulærøkonomi i praksis!
- Fra 2020 har Hansa Borg 100 prosent resirkulert plast (RPET) i våre festivalglass.

Reflective questions / Avslutningsvis

- Enten være basert på tidligere erfaringer (refleksjon), eller være oppsummerende for intervjuet. Kanskje spørsmål rundt deres samarbeid med Infinitum og potensielle materialer de så på for drikkebeger på festival.
- Resirkulering av RPET, mister man noe av materialet gjennom resirkuleringsprosessen? Hvis ja, ca hvor mye?
- Er det noen andre eventer Hansa samarbeider med (Palmesus)? Hvordan er kildesorterings- og innsamlingsprosessen av plastbeger avfall i disse eventene?
- 100% RPET i festival glass, men 50% RPET i flasker, hvorfor ikke 100% i flasker også?

- Dersom materialet for gjenbrukbare “festival glass” blir identifisert. Vil Hansa Borg investere i disse glassene eller fortsatt benytte seg av 100% RPET festivalglass?

A3 - Interview guide

Spørsmål til intervju med Hansa

- Kort introduksjon om oss
    - Navn, studieretning, master oppgaven og research question på master oppgaven. *Hvordan kan vi minimere "waste" av plastbeger i event industrien i kontekst av sirkulær økonomi, og hvilke alternative materialer kan bli brukt i stedet for plastikk for å fremme bærekraft?*
- Før vi går videre vil vi påpeke at intervjuet er anonymt og vil fokusere på relevante temaer for masteravhandlingen, deriblant bærekraft, sirkulær økonomi, redusere bruken av plast og plastavfall, resirkulering av plast og alternative materialer for plast.
- Vi kan jo starte med en kort introduksjon av deg selv og dine ansvarsområder, så kan vi skrive noen notater underveis.

Bærekraft

- Vi ser at Hansa jobber aktivt med 6 av FNs bærekrafts mål. God helse(3), Likestilling(5), Ren energi for alle(7), Ansvarlig forbruk og produksjon(12), Stoppe klimaendringene(13) og Samarbeid for å nå målene(17). Det at dere stiller opp til intervju er jo et eksempel på sistnevnte bærekraftsmål og viser at dere er åpne til å dele kunnskap og erfaringer. Det er spesielt Ren energi (7), Ansvarlig forbruk og produksjon (12), Stoppe klimaendringene (13) og Samarbeid for å nå målene (17) som er direkte relevant for dette intervjuet. Vi kan jo starte med mål 7 ren energi for alle. Hvilke teknologiske investeringer har blitt gjort for å fremme en energieffektiv drift?
- Vi har noen spørsmål rundt Mål 12 Stoppe klimaendringer, som innebærer å redusere ressursbruk, miljø-ødeleggelse og klimagass ved produksjon og distribusjon av en vare. Hvilke endringer og tiltak har blitt gjort for å redusere ressursbruken ved produksjon og distribusjon av en vare?
- Har det blitt gjort noen ytterligere tiltak for å redusere miljø-ødeleggelse og klimagassutslipp ved produksjon og distribusjon?
- Mål 13 om å stoppe klimaendringer kan i eventindustriens tilfelle kobles med å styrke kunnskapen og bevisstgjøre eventdeltakere til å bidra til å motvirke, tilpasse og redusere konsekvensene av klimaendringer. Musikkfestivalen Ravnedalen Live har faktisk opplevd at ryddemannskapet og festivaldeltagere har lite kjennskap til materialenes oppbygning og klassifisering, noe som kompliserer etterarbeidet. Hvordan formidler Hansa denne kunnskapen til samfunnet for å motvirke og redusere klimaendringer? Benytter dere feks. insentiver innad i organisasjonen eller i samfunnet for å fremme dette?

Sirkulær økonomi

- Kan du fortelle litt om hvordan dere gjennom Plastløftet implementerer sirkulær plastøkonomi for å øke bruken av resirkulert plast, og unngår unødvendig bruk av plast, samt optimerer gjenvinningen?
- Vi ser at dere har kommet frem til en løsning sammen med Infinitum, som driver panteordning for resirkulerbare plastflasker i Norge. Fremover, vil jo plastbegere samles inn og bli resirkulert, og bli råstoff til produksjon av nye krus eller flasker. Har

vi fortstått korrekt med at råvare til festivalbeger kommer fra Infinitum og dere for står for produksjon av festivalkopper og diverse?
- Blir den råvaren kun benyttet ved produksjon av festivalbeger, eller blir den også brukt ved produksjon av all plastemballasje.
- Sånn ca hva er kostnadene for kjøp av deres festivalbeger? Pakkepris med alkholen? (pris for ca 500-1000 kopper?
- Med tanke på gjenvinningsgrad til RPET, er det store tap av RPET ved gjenvinning? Altså resulterer resirkulering av feks 100kg RPET, til at man får gjenvunnet 100kg RPET? Mister man store eller små mengder?
- Har Hansa Borg opplevd noen utfordringer ved å ta i bruk 100 prosent resirkulerbare festival beger? Isåfall hvilke?

Redusere plastavfall

- Hva gjør Hansa Borg for å forsikre seg at mest mulig av festival koppene dere distribuerer blir resirkulert slik at dere kan fortsette å ha 100 prosent resirkulert plast?
- Vi har gjennomført en spørreundersøkelse i samarbeid med eventindustrien på Sørlandet. Noen av respondentene mente at mange festivaler sliter med å kildesortere avfallet på en optimal måte. Det er feks. kun kontainer for restavfall, i enkelte tilfeller. Med tanke på bærekraftsmål 17 om samarbeid for å nå målene, kan det være mulig for dere å stille et krav om at det skal bli utplassert et spesifikt antall med containere som forbedrer kildesorteringen?
- Hva med å ansatte en form for ryddehjelp som kildesorterer plastkoppene gjennom Infinitum?
- Etter å ha distribuert koppene til en festival, hvem er det som har ansvaret for å transportere de brukte festival koppene til gjenvinningsstasjonen? Er det festivalledelsen eller er det noen fra Hansa som har det ansvaret?

Redusere bruken av plast/Erstatte plast med alternative materialer

- Ved å gå gjennom flere akademiske papers retter mot festivaler, har vi fått inntrykk av at stål-kopper har lavest "carbon footprint" og er mest miljøvennlig i lengden. Utfra deres livssyklusanalyse som har blitt gjort på ulike materialer, hva slags materiale er mest miljøvennlig?
- Når det kommer til festivalkopper, hva tenker du er fordelen med å ha 100% resirkulert plast (RPET), fremfor stålkopper?
- Etter å ha utført en spørreundersøkelse rettet mot festivaldeltakere på Sørlandet, så kom det frem at bio-nedbrytbare kopper er foretrukket, altså PLA-kopper er foretrukket av publikum. Har dere vurdert PLA-kopper? Isåfall hvorfor gikk dere ikke videre med dette alternativet? Hva med pappkopper?
- Musikkfestivalen Ravnedalen Live har jo tidligere vurdert å bruke PLA-kopper (bio-nedbrytbar plast) i stedet for vanlige plastkopper, men har erfart at det er få avfallsanlegg som kan kompostere PLA i Norge. Med tanke på at Hansa Borg, i samarbeid med Infinitum, benytter resirkulert plast (RPET) til deres festival begeret, hvilke utfordringer møter dere på når det kommer til resirkulering av så store mengder med plastkopper? Vanskeligheter med å finne et avfallsanlegg som samarbeider? Vanskeligheter med å transportere avfall til anlegget, med tanke på distanse?
- Et av de seks bærekraftsmålene som Hansa Borg prioriterer er jo bærekraftsmål nummer 7 som handler om Ren energi. Vi prøver jo også å se på rene energiløsninger for festivalene på Sørlandet. Vi lurte derfor på noe relatert til energien som blir brukt i gjenvinningsanlegget Hansa Borg tar i bruk. Vet du om energien for å resirkulere festival begerene til Hansa Borg kommer fra fornybare eller fossile ressurser?

- Utifra spørreundersøkelsen vår, så virket det som mange var FOR å ta i bruk resirkulerbare plastbeger. Men det var også noen spørsmål angående levedyktigheten til resirkulerbar plast, hvor flere kommenterte at plast svekkes i kvalitet når det resirkuleres. Har Hansa Borg møtt på noen komplikasjoner når det kommer til levedyktigheten av resirkulert plast? Og hvor mange ganger vil du si at festivalbegerene kan bli resirkulert før koppene må kvittes med?
- Det dukket også opp et spørsmål fra spørreundersøkelsen hvor en respondent lurte på om de resirkulerbare festivalbegerene kunne vaskes for gjenbruk for å øke gjenbrukbarheten ytterligere. Altså er begerene begrenset til engangsbruk?

Avslutningsvis

- Er det noen andre eventer Hansa samarbeider med (Palmesus)? Vet du noe om hvordan kildesorterings- og innsamlingsprosessen av plastbeger avfall er i disse eventene?
- 100% RPET i festival glass, men 50% RPET i flasker, hvorfor ikke 100% i flasker også?
- Dersom materialet for gjenbrukbare "festival glass" blir identifisert. Vil Hansa Borg investere i disse glassene eller fortsatt benytte seg av 100% RPET festivalglass?
- Helt til slutt, har du noen flere innspill til hvordan man kan minimere "waste" av plastbeger spesifikt i event industrien?

A4 - Transcription of interview 1 - Hansa Borg

Intervju 1 - Hansa Borg
14.04.2021

Harpartap: **Hp**
Harkirat: **Ht**
Representant for Hansa Borg: **R**

Ht: Kort introduksjon om oss, oppgaven og presentering av problemstillingen til oppgaven. Forteller videre at intervjuet er anonymt og vil fokusere på relevante temaer for masteravhandlingen (bærekraft, sirkulær økonomi, redusere bruken av plast, redusere plastavfall, resirkulering av plast og alternative materialer for plast.
Hp: Vi kan jo starte med en kort introduksjon av deg selv.

R: Jobber med bærekraft i Hansa Borg, og har sett på det med grønnere festivaler deriblant Øyafestivalen og deres vaskbare plast glass som Ringnes igangsatte. Tatt kontakt med flere festivaler og Heineken for å finne en god løsning for ølglass. Ingen «eureka!» løsning på dette per dags dato. Ønsket å finne noe alle kan bruke og som er lett tilgjengelig. Kom i kontakt med Infinitum gjennom BROD. I samarbeid med Infinitum sammenlignet vaskbare plastglass med engangsglass (CO2 avtrykk). Sett på det reelle forbruket sammenlignet rPET festivalglass. Ifølge Infinitum sparer man 1 kg plast og 16 kg olje med ved resirkulering av rPET. Sammenlignet med gjenbrukbare glass fra Øyafestivalen opplever vi rPET festivalglass med panteordning som den bedre løsningen. Vi har sett bortifra bioglass, ettersom det er dårlig muligheter for kompostering og resirkulering. Fordelaktig for løsningen som har blitt valgt har Infinitum en logistikk ordning som er på plass allerede. Alle steder der de allerede henter pant, kan de også hente disse plastglassene og ta de med inn til resirkulering.
Hp: Vi har sett Hansa jobber aktivt med 6 av FNs bærekraftsmål og har noen spørsmål relatert til dem. Vi kan starte med Bærekraftsmål 7 som er "Ren energi for alle". Hvilke teknologiske investeringer har blitt gjort for å fremme en energieffektiv drift hos dere?

R: ISO 14001 sertifisering i miljøledelse jobbes med nå. Kartlegging sammen med Entro, måling av forskjellige verdier (vannforbruk, energiforbruk og avløp/avfall) på samtlige anlegg. Mål om å iverksette tiltak. Har benyttet biofyring i Sarpsborg. Vurdert solceller men er ikke en effektiv investering. Sett på strøm muligheter fra ren Energi Norge.
Hp: Angående mål 12 om å stoppe klimaendringer, lurer vi på hvilke endringer og tiltak som har blitt gjort for å redusere ressursbruk, miljø-ødeleggelse og klimagass ved produksjon og distribusjon av en vare.

R: Rettelse, Mål 13 er «stoppe klimaendringer». Mål 12 er «ansvarlig forbruk og produksjon» - dette er vårt hovedmål der vi kan spille en størst mulig rolle, vi ser nå på vår supply chain. Mål 12 og 13 går litt i hverandre, man må ha en bærekraftig drift. Samarbeid med Tine for distribusjon til uteliv og benytter oss av Tines lastebiler. Sparer 187 000 km årlig, samt 155 tonn CO2. Har også tall på nitrogenoksid og vurderer å benytte oss av tog for å redusere tallene ytterligere.
Hp: Mål 13 om å stoppe klimaendringer kan i eventindustriens tilfelle kobles med å styrke kunnskapen og bevisstgjøre eventdeltakere til å bidra til å motvirke, tilpasse og redusere konsekvensene av klimaendringer. Musikkfestivalen Ravnedalen Live har faktisk opplevd at ryddemannskapet og festivaldeltagere har lite kjennskap til materialenes oppbygning og klassifisering, noe som kompliserer etterarbeidet. Hvordan formidler Hansa denne kunnskapen til samfunnet for å motvirke og redusere klimaendringer? Benytter dere feks. insentiver innad i organisasjonen eller i samfunnet for å fremme dette?

R: Ny sponsorstrategi i gang for å bidra til bærekraftsmålene. Sponse bærekraftige formål for å informere mer om bærekraft. Kan feks. gi pengestøtte til studenter dersom de har noen bærekraftige prosjekter eller fokus på bærekraft. Jobber også med en bærekraftsrapport som skal deles bredt. Mye av det som blir gjort nå er for å redusere klimaavtrykk. Stort fokus internt for å få med hele organisasjonen. I tillegg til plastglassene jobber vi også med disse «fatene» vi levere øl på, for å finne muligheter å få resirkulert de (dette også i samarbeid med Infinitum).

Hp: Ettersom Hansa har tatt Plastløftet, lurer vi på om hvordan dere implementerer den sirkulære plastøkonomien til å øke bruken av resirkulert plast, siden dere har begynt å produsere 100% rPET festivalglass og 50% rPET i flasker.

R: Fokus på plast i produksjon, ser på muligheter for å bruke 100% rPET i emballasje rundt six-packs. Dette testes nå i maskinparken for å sikre at de krymper korrekt mm.. Infinitum har sagt til oss at de ønsker ikke 100% rPET, men heller 80%, som fører til endringer av merking plastglass. 100% rPET er ikke alltid det som er mest bærekraftig.

Hp: Angående samarbeidet deres med Infinitum, har vi forstått korrekt med at Infinitum gir dere råvarer og dere står for selve produksjon og om at det skal være 100% rPET eller mindre.

R: Nei, plastglass får vi fra en ekstern leverandør og Infinitum godkjenner glassene. Infinitum samler inn og med sitt nye anlegg utenfor Oslo, resirkulerer plasten og selger råvaren. Med mål om at råvarer går tilbake til vår produsent, som da lager nye glass (sirkulær økonomi).

Hp: Blir råvarer fra ekstern leverandør kun benyttet til festivalglass, eller også andre produkter og plastemballasjer?

R: Vi får ikke råvarer sendt til oss, vi får kun ferdig produkter. Vi utfordrer våre leverandører til å levere produkter av resirkulert plast til oss. For to år siden virket dette umulig, men vi ser nå at det er gjennomførbart. Det handler om å legge press på leverandørene i næringen og industrien for å fremme bærekraft.

Hp: Hvordan er kostnadene på innkjøp av rPET festivaglassene til Hansa, kontra vanlig plastikk glass?

R: Ikke stor prisforskjell, vi må betale en «miljøavgift» på ca 8 øre per glass ekstra til Infinitum for å muliggjøre denne panteordningen. Det er verdt investeringen.

Hp: Når det gjelder samarbeid med festivaler, er det pakkepris på festivalglassene sammen med alkoholen, eller er det en ekstra kostnad for glassene?

R: Det er stort sett slik at om vi har avtale med en festival så får de glassene våre. Vi jobber med løsningen på de pantbare glassene. Det kan komme en liten miljøavgift, men dette er ikke konkludert enda.

Hp: Med tanke på gjenvinningsgraden til rPET, om man har 100% rPET og det skal resirkuleres igjen, mister man store mengder eller små mengder av materialet under denne prosessen?

R: Kan dele en slide med dette regnestykke. Dersom man antar at gjenbrukskrus blir brukt åtte ganger, vil fortsatt resirkulert krus være bedre. Infinitum sammenligner ombrukskrus og det kruset vi har, og da ser de på 90% rPET vs ombruksglass.

Ht: Vi utførte en spørreundersøkelse rettet mot festivaldeltakerne og der ble levedyktigheten til festival glass tatt opp. Mange av respondentene var for, men stilte spørsmål til resirkuleringen av festivalglassene.

R: Det som blir sagt i forhold til regnestykket er at glassene skal bli brukt igjen og igjen og igjen. Men hvis de bare brukes på en festival i året, og så skal det være på lager og transporteres og vaskes. Mye som ligger i det, men plasten er i loopen frem til vi trenger den igjen. Mange faktorer i forhold til regnestykket som har resultert med det vi har valgt. Har noen tall på dette som jeg kan sende.

Hp: Det hadde vi satt pris på. Har dere noen krav på hvor disse festivalglassene skal bli

returnert når dere distribuere dem til festivaler?

R: Vi registrerer antall glass levert til en festival. Uåpnet og ubrukte glass returneres til oss. Dette tallet (leverte glass minus glass fått tilbake) blir rapportert til Infinitum. Infinitum henter brukte festivalglass fra festivalen og Hansa blir fakturert for glassene Infinitum tar inn. Blir nesten som pant med plastflasker.

Hp: Vi har fått med oss at samarbeidet med Infinitum startet i 2019, og i 2020 ble dere enige om å benytte dere av 100% rPET festivalglass. Med tanke på Covid situasjonen, har dere hatt noen anledning til å bruke disse festivalglassene hittil?

R: Nei, vi har lyst å teste dette før vi går bredt ut. En pressemelding har stått ferdigstilt siden 2020, men vi vil teste ut om dette faktisk fungerer først. Pandemien har stoppet mye, men vi er fortsatt i samtaler og møter med Infinitum. Vi følger samtidig med om det kommer noen nye og bedre løsninger.

Ht: Utifra noen blant annet akademiske papers og litteratur studier ser vi at det blir diskutert at stålkopper har, eller kan ha lavest "carbon footprint" og er mest miljøvennlig i lengden. Har dere sett på stålkopper som en mulighet?

R: Ja, gjennom samtaler med «BALL» (leverer halvliter boksene) som testet dette i Amerika. Utfordringen med aluminiumskopper er at ikke bare går på miljø, men vi får heller ikke muligheten til å markedsføre oss. Man vil SE ølen, mens man drikker den. Med en aluminiumskopp ser man ikke produktet. Sikkerhet og pris er også en faktor i forhold til skader i festivalen. Koppen kan bli kastet og brukt for vold. Flere perspektiver som må bli sett på i tillegg til miljø, deriblant brukervennighet og feks det med vasking av koppen.

Ht: Når det kommer til vasking, er det mulig å vaske festivalglassene deres, eller er det engangsglass?

R: Det er engangsglass. Nødvendig med spesielle vaskemaskiner for vasking for vaskbare glass som vi så på. Med gjenbrukbare glass kommer også det med matsikkerhet og hygiene.

Ht: Fra den samme spørreundersøkelsen fikk vi også noen kommentarer relatert til PLA kopper. Har dere sett på PLA eller har kanskje kompostering mulighetene fått dere til å vike fra det?

R: PLA kan komposteres men ikke gjenbrukes, blir ikke sirkulær økonomi. Blitt kontaktet av enkelte festivaler langs kysten som har sagt "Kan vi få disse PLA glassene, fordi om de faller i sjøen så er det ikke så farlig ettersom de løser seg opp." Forbrukeren kan tydeligvis ikke nok om det og tror at det løser seg helt opp. Det gjør de ikke om må komposteres i spesielle anlegg. Derfor ble det ikke noe av dette og vi ønsker gjerne et materiale som vi kan bruke om og om igjen.

Ht: Litt tilbake til bærekraftsmålene. Mål nr 7 "Ren energi", vi prøver å se på rene energiløsninger for festivalene på Sørlandet. Vi lurte derfor på noe relatert til energien som blir brukt på gjenvinningsanlegget for festivalglassene. Vet du om denne energien per dags dato kommer fra fornybare eller fossile kilder?

R: Det vet jeg dessverre ikke. Det må dere nesten høre med Infinitum eller Veolia. Veolia har bygget et helt nytt anlegg oppe på Heia. Jeg vil tro at når man lager et nytt anlegg så vil man ha fokus på ting som ren energi.

Ht: Har dere sett på mulighetene med "cardboard cups" eller kopper laget av papp?

R: Samme som stål når det kommer til gjennomsiktighet. I tillegg er de veldig myke og på festivaler i Vestlandet må koppene tåle mye vann. Papp er et bra materiale, men da må det være til riktig bruk.

Ht: Ifølge litteraturen vil rPET kopper miste farge og bli mindre gjennomsiktig ved resirkulering. Har dere opplevd dette?

R: Ja det er helt riktig og var en av de tingene vi måtte se litt på med de koppene som var 100% resirkulert. De var litt gråere og mindre gjennomsiktige, men ble enige om at dette

takler vi.

Hp: Noen av spørreundersøkelsens respondenter har ment at enkelte festivaler har dårlige ordninger for ryddehjelpen. De har begrenset med kilde stasjoner og har feks bare containere for restavfall og ikke for plast eller papp. Som du sa tidligere så vil det nå bli krevd at festivalglassene skal bli hentet fra festivalen. Har dere hatt noen krav eller betingelser før dere begynte med disse festivalglassene?

R: Det er festivalens ansvar og ikke noen krav vi kan sette. Vi ser at mange festivaler har fokus på bærekraft, mens andre ikke har. Vil tro at som en del av utviklingen videre, vil det nesten bli stilt krav til festivaler.

Ht: Til slutt så lurer vi på om du kanskje har noen innspill relatert til oppgaven vår om å redusere plast "waste" på festivaler?

R: Redusere svinn ved å kjøpe to øl isteden for fire. Festivaler er i lukkede områder, og viktig å ha tilstrekkelig med ressurser for å rydde, som mange sliter med. Et miljøgebyr som festivaler må betale kan virke som et insentiv og sørge for at de passer på at avfallet blir samlet, kildesortert og levert til rett sted.

Hp: Ja, angående insentiver så har vi gjennom spørreundersøkelsen kommet med noen forslag til potensielle ordninger for å motivere festivaldeltakerne til å rydde etter seg. Det ene forslaget var å lage en panteordning, hvor deltakere får en gratis øl om de panter 10 festivalglass. Vi fikk et spørsmål fra en av respondentene om dette var lov i henhold til alkoholloven.

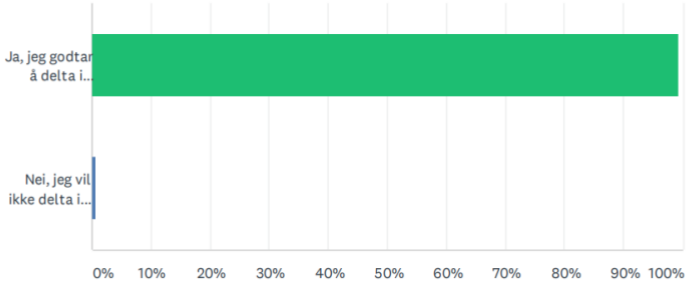
R: Ikke lov med gratis øl. Mener at det var 10 kr pant per glass på Øya festivalen, og om du da panter 10 glass så får du en ny øl i verdi da. Men festivalen må da ha en ordning for betaling og retur av penger, ikke alle som har økonomi til det. Det er en god løsning, men det ble noe svinn på Øya, fordi folk synes glassene var kule og tok de med seg hjem. Mener at man må ha stort fokus på å lære opp forbrukerne – det er kanskje noe av det viktigste man gjør.

Appendix B - Survey

B1 - The survey

Q1 Ved å delta i denne undersøkelsen gir du oss samtykke til å få tilgang til svarene dine, for å fremme bærekraft i eventindustrien i Sørlandet. Svarene kan også bli brukt til forskning og publisering. Deltagere av undersøkelsen forblir anonyme.

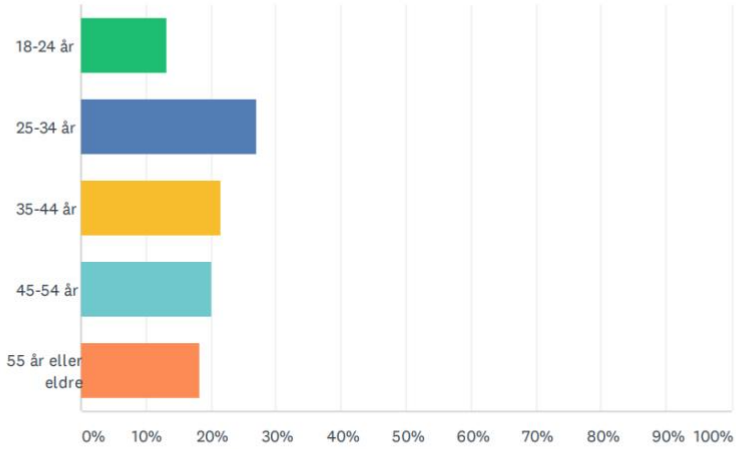
Answered: 275 Skipped: 0



ANSWER CHOICES	RESPONSES	
Ja, jeg godtar å delta i undersøkelsen, vel vitende om at svarene vil bli brukt som beskrevet ovenfor.	99.27%	273
Nei, jeg vil ikke delta i undersøkelsen. (Vennligst ikke fortsett med undersøkelsen, dersom du velger dette alternativet.)	0.73%	2
Total Respondents: 275		

Q2 Vennligst velg din aldersgruppe.

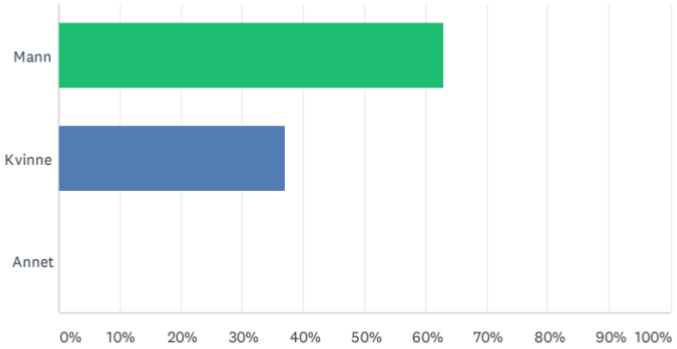
Answered: 274 Skipped: 1



ANSWER CHOICES	RESPONSES	
18-24 år	13.14%	36
25-34 år	27.01%	74
35-44 år	21.53%	59
45-54 år	20.07%	55
55 år eller eldre	18.25%	50
Total Respondents: 274		

Q3 Vennligst velg ditt kjønn

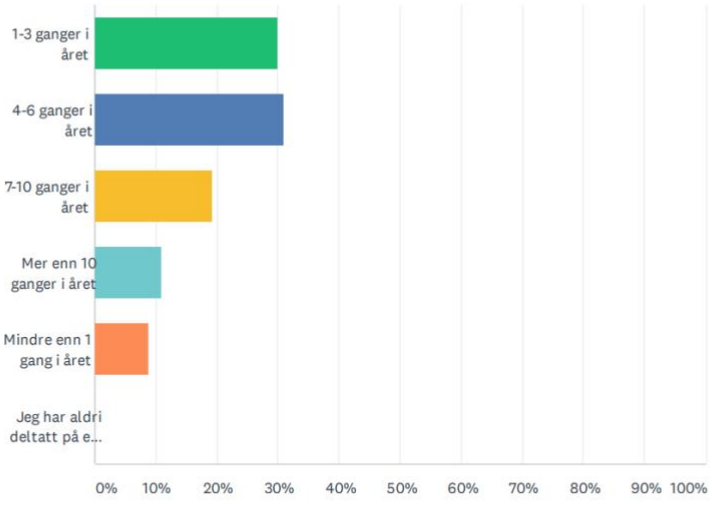
Answered: 273 Skipped: 2



ANSWER CHOICES	RESPONSES	
Mann	63.00%	172
Kvinne	37.00%	101
Annet	0.00%	0
TOTAL		273

Q4 Hvor ofte deltar du på arrangementer eller festivaler?

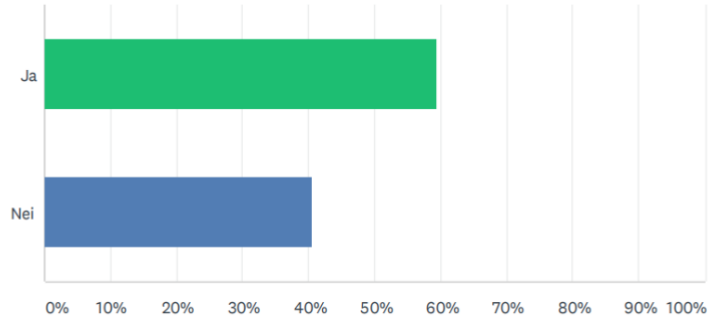
Answered: 274 Skipped: 1



ANSWER CHOICES	RESPONSES	
1-3 ganger i året	29.93%	82
4-6 ganger i året	31.02%	85
7-10 ganger i året	19.34%	53
Mer enn 10 ganger i året	10.95%	30
Mindre enn 1 gang i året	8.76%	24
Jeg har aldri deltatt på et arrangement eller en festival	0.00%	0
TOTAL		274

Q5 Har du deltatt på Ravnedalen Live før?

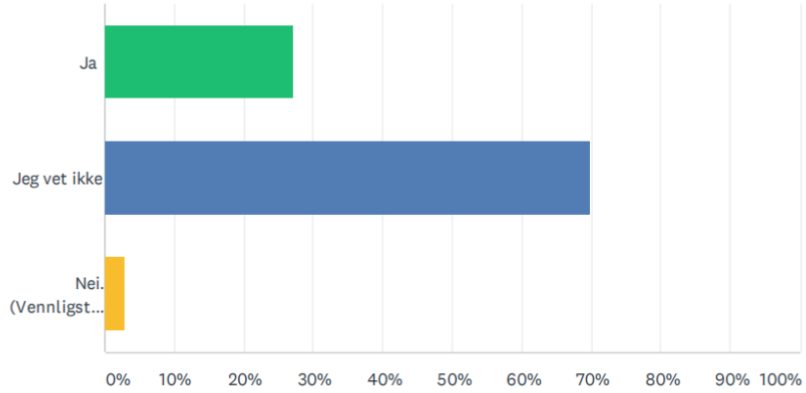
Answered: 274 Skipped: 1



ANSWER CHOICES	RESPONSES	
Ja	59.49%	163
Nei	40.51%	111
TOTAL		274

Q6 Kommer du til å delta på neste Ravnedalen Live?

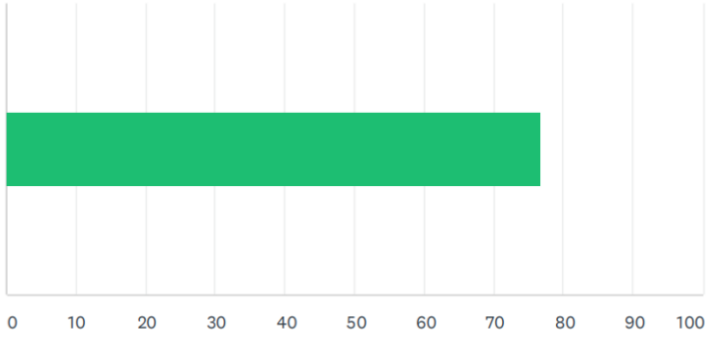
Answered: 273 Skipped: 2



ANSWER CHOICES	RESPONSES	
Ja	27.11%	74
Jeg vet ikke	69.96%	191
Nei. (Vennligst forklar hvorfor du ikke vil delta på neste Ravnedalen Live.)	2.93%	8
TOTAL		273

Q7 Hvor viktig er det for deg å ha en miljøvennlig eventindustri på Sørlandet? (Rangeres fra 0 til 100).

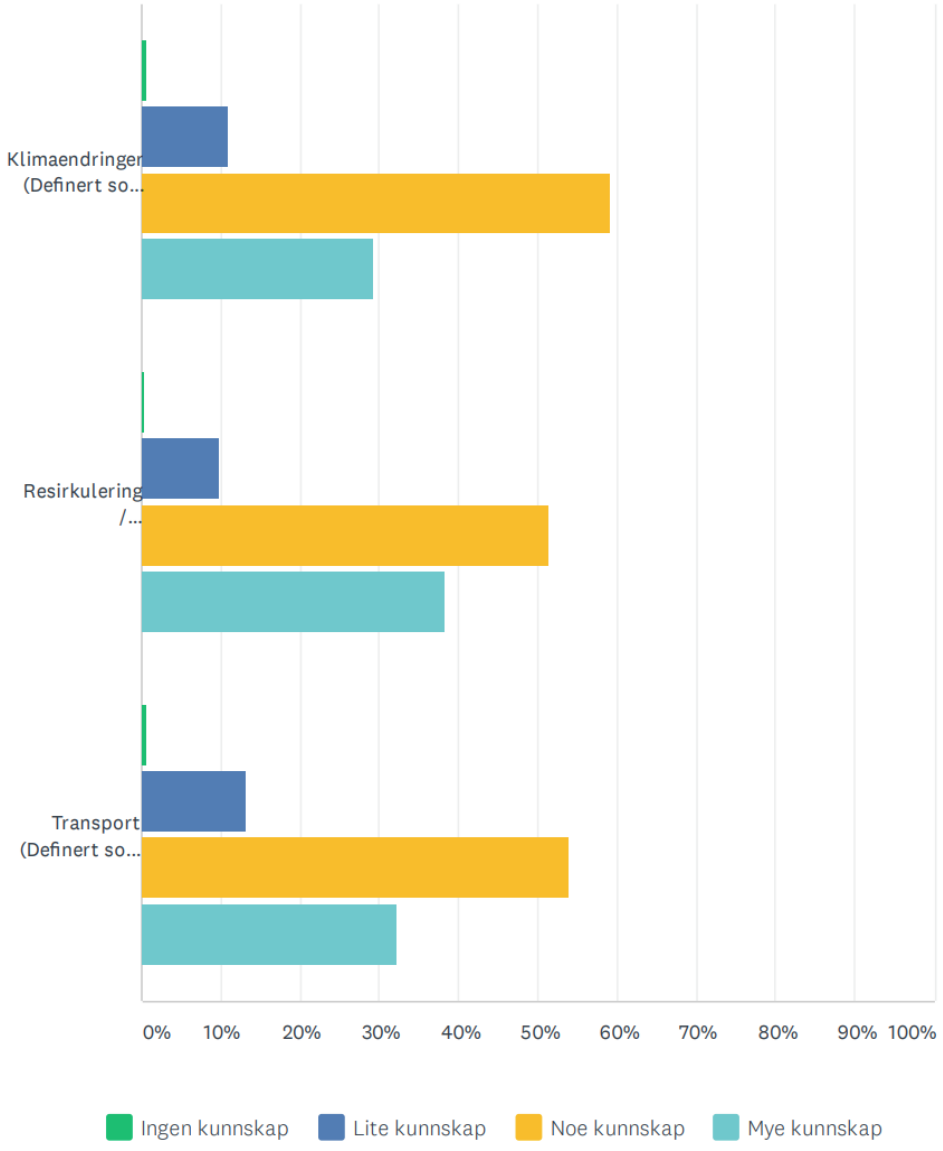
Answered: 275 Skipped: 0



ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	77	21,138	275
Total Respondents: 275			

Q8 Velg ditt nåværende kunnskapsnivå relatert til følgende temaer.

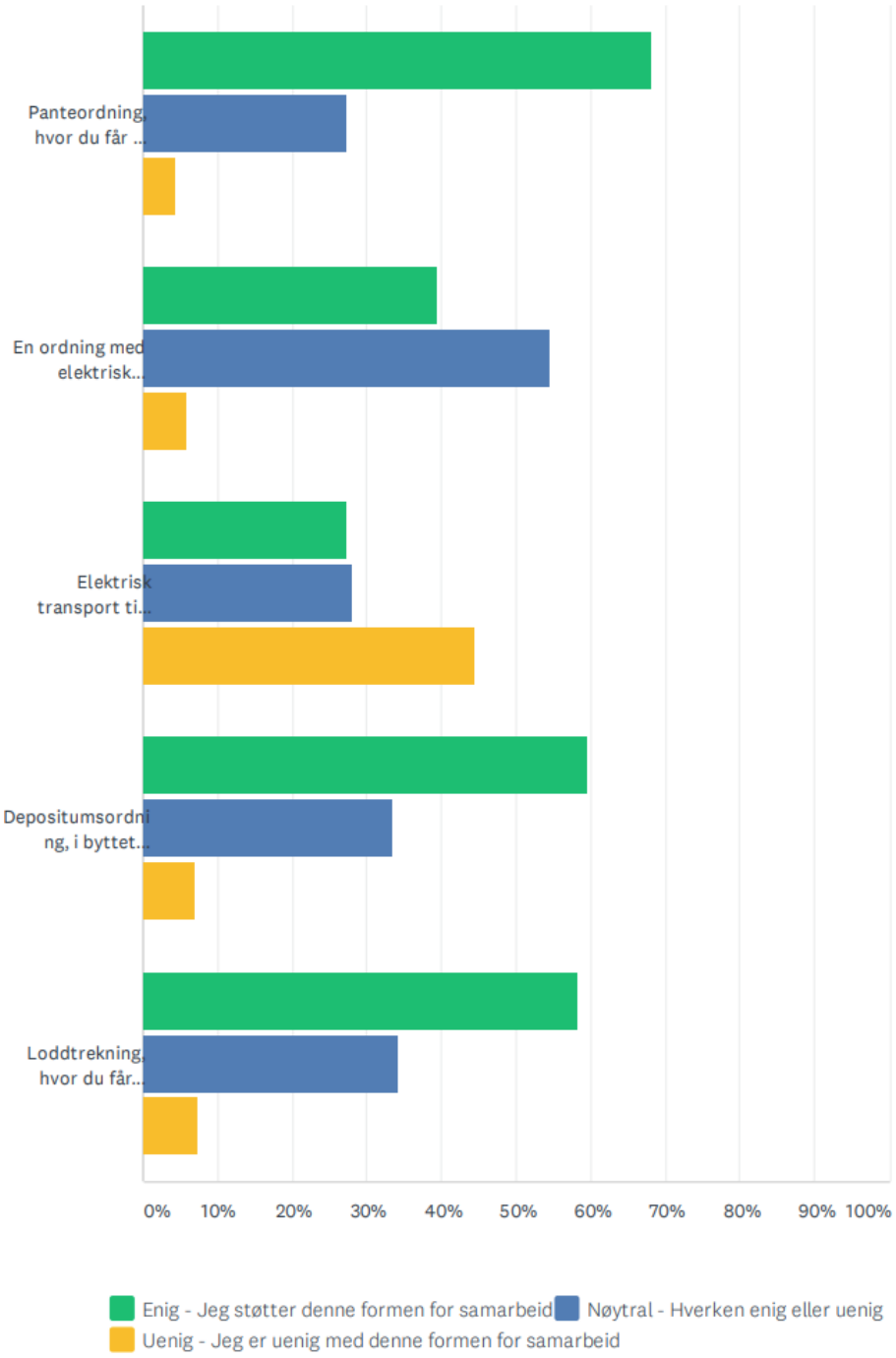
Answered: 274 Skipped: 1



	INGEN KUNNSKAP	LITE KUNNSKAP	NOE KUNNSKAP	MYE KUNNSKAP	TOTAL	WEIGHTED AVERAGE
Klimaendringer (Definert som en endring i gjennomsnittsforholdene, for eksempel temperatur og nedbør i en region over lengre tid).	0.73% 2	10.95% 30	59.12% 162	29.20% 80	274	3.17
Resirkulering / Avfallshåndtering (Definert som generell resirkuleringspraksis og hvordan du kan resirkulere på en effektiv måte).	0.36% 1	9.85% 27	51.46% 141	38.32% 105	274	3.28
Transport (Definert som bevissthet av forskjellige transportformer, dvs. fossilt brenstoff, elektrisk og biogass, samt deres ulemper/fordeler).	0.73% 2	13.14% 36	54.01% 148	32.12% 88	274	3.18

Q9 En rekke foreslåtte tiltak for å fremme bærekraft og miljøvern er listet under. Disse tiltakene krever samarbeid fra deg som deltaker av eventer på Sørlandet. Vennligst velg alternativet som passer dine meninger relatert til disse tilakene best.

Answered: 274 Skipped: 1



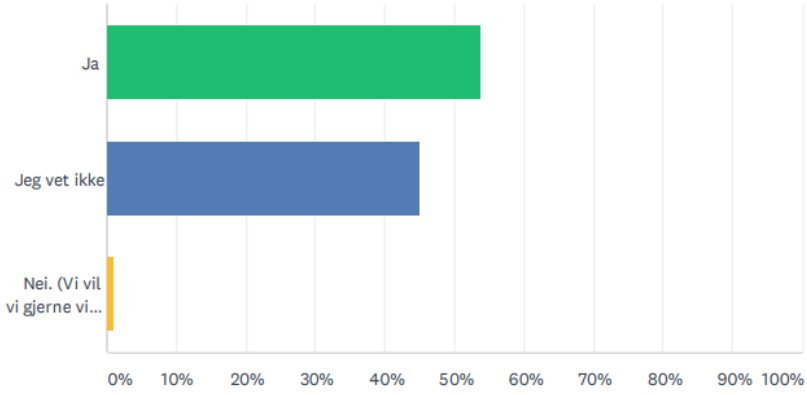
	ENIG - JEG STØTTER DENNE FORMEN FOR SAMARBEID	NØYTRAL - HVERKEN ENIG ELLER UENIG	UENIG - JEG ER UENIG MED DENNE FORMEN FOR SAMARBEID	TOTAL	WEIGHTED AVERAGE
Panteordning, hvor du får en gratis øl dersom du panter 10 plastkopper.	68.25% 187	27.37% 75	4.38% 12	274	1.36
En ordning med elektrisk transport til festivalen, i stedet for drivstoffdrevet. Hvor transportkostnadene ikke er inkludert i festivalbilletten.	39.48% 107	54.61% 148	5.90% 16	271	1.66
Elektrisk transport til festivalen, hvor transportkostnadene er inkludert i festivalbilletten.	27.37% 75	28.10% 77	44.53% 122	274	2.17
 Depositumsordning, i byttet mot en depositumsbetaling får du et gjenbrukbart stål-krus. Med sikte på å redusere plastavfall, vil påfyll av drikke bare godtas med dette kruset. Kruset vil ha en karabinkrok som kan feste kruset til bukser, beltet eller ryggsekken. Kruset vil også bli vasket før hver påfyll.	59.56% 162	33.46% 91	6.99% 19	272	1.47
Loddtrekning, hvor du får muligheten til å delta i en loddtrekningskonkuranse og får et lodd for hver plastkopp som du leverer til sorteringsstasjonen.	58.39% 160	34.31% 94	7.30% 20	274	1.49

Q10 Hvis du har forslag til andre tiltak for å redusere plastavfall eller fremme bærekraft og miljøvern, kan du gi tilbakemelding her.

Answered: 31 Skipped: 244

Q11 Vil du anbefale venner / familie / bekjente til å delta på musikkfestivalen Ravnedalen Live?

Answered: 273 Skipped: 2



ANSWER CHOICES	RESPONSES	
Ja	53.85%	147
Jeg vet ikke	45.05%	123
Nei. (Vi vil vi gjerne vite hvorfor du ikke vil anbefale Ravnedalen Live. Vennligst forklar, slik at vi kan bedre din opplevelse hos oss.)	1.10%	3
TOTAL		273

B2 – Descriptive statistical analysis of subgroups

B2.1 Subgroup 1 - Age group 18-24

Q3 - Select your gender

Male	Female	Others
72%	28%	0%

Q4 - How often do you attend events or festivals?

1-3 times a year	4-6 times a year	7-10 times a year	More than 10 times a year	Less than once a year	Never attended
11%	50%	28%	6%	5%	0%

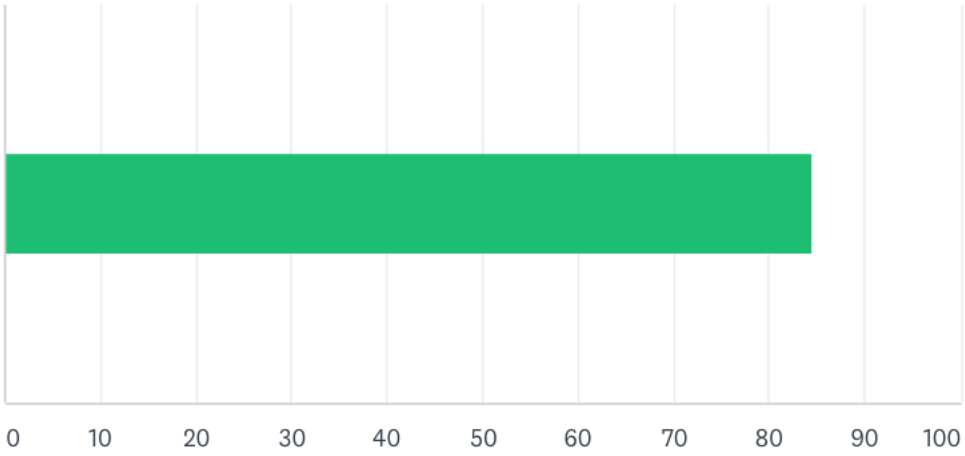
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
31%	69%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
12%	5%	83%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 85.

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	3%	33%	64%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	6%	50%	44%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	8%	31%	61%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
56%	39%	5%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
28%	69%	3%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
11%	19%	70%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug. With an aim to reduce plastic waste, refills of beverages will only be accepted with this mug. The mug will have a carabiner hook that can attach the mug to pants, belt or backpack. The mug will also be washed before each refill.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
56%	44%	0%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
59%	34%	7%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
61%	33%	1%

Summary subgroup 1:
Active festival goers, only **5%** participate less than once a year. Very attentive and focused on the environment with a score of **85** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics **(little knowledge 3% - 6% - 8%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(28% agrees)** and transport costs being included in the festival ticket **(11% agrees)**. No one disagrees with stainless steel cups. Lottery is prefered (**59%)**, whilst steel cups and deposit of 10 cups are equally on **56%**.

Main comments:

- Alcohol Act.
- Transport fee should be optional.
- Steel cups should hold the same amount of liquid as previous cups.
- Reusable plastic cups.

B2.2 Subgroup 2 - Age group 24-34

Q3 - Select your gender

Male	Female	Others
64%	36%	0%

Q4 - How often do you attend events or festivals?

1-3 times a year	4-6 times a year	7-10 times a year	More than 10 times a year	Less than once a year	Never attended
28%	30%	21%	9%	12%	0%

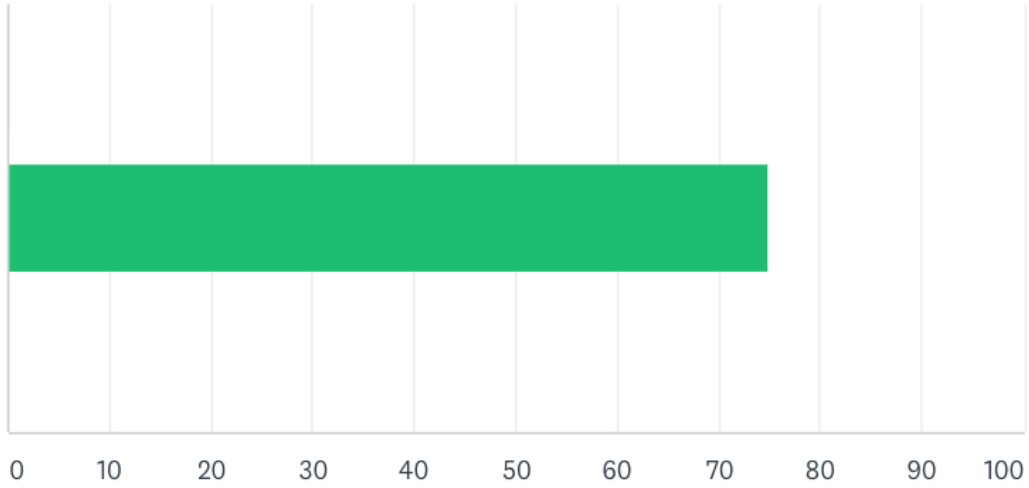
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
30%	70%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
12%	4%	84%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 75.

Q8 - Choose your current level of knowledge related to the following topics.
Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
1%	19%	49%	31%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	16%	51%	33%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	17%	49%	34%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
58%	34%	8%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
31%	60%	9%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
17%	15%	68%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug…

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
61%	34%	5%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
65%	30%	5%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
24%	73%	3%

Summary subgroup 2:
Active festival goers, **12%** participate less than once a year. Attentive and focused on the environment with a score of **75** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics (**no knowledge 1% - 0% - 0% and little knowledge 19% - 16% - 17%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(31% agrees)** and transport costs being included in the festival ticket **(17% agrees)**. Lottery scheme(**65% agrees)** and deposit scheme**(61% agrees)** with steel cups is prefered.

Main comments:

- Do not know about the festival.
- Deposit of each cup should award money instead of a free beer after 10 cups.
- Transport fee should be optional.
- Steel cups should hold the same amount of liquid as previous cups.
- Steel cups should have a more elegant design.
- Steel cups can be used as a weapon by troublemakers.
- Lottery is fun, but should have a money prize.
- Secure bicycle parking to reduce theft and vandalism.
- "Opportunity to buy vegan tasty food. Avoid using all types of plastic products. Serve food that does not need plastic packaging, possibly have unbreakable plates that can be washed and cutlery that can be washed, against deposit upon purchase."

B2.3 Subgroup 3 - Age group 35-44

Q3 - Select your gender

Male	Female	Others
58%	42%	0%

Q4 - How often do you attend events or festivals?

1-3 times a year	4-6 times a year	7-10 times a year	More than 10 times a year	Less than once a year	Never attended
32%	31%	17%	17%	3%	0%

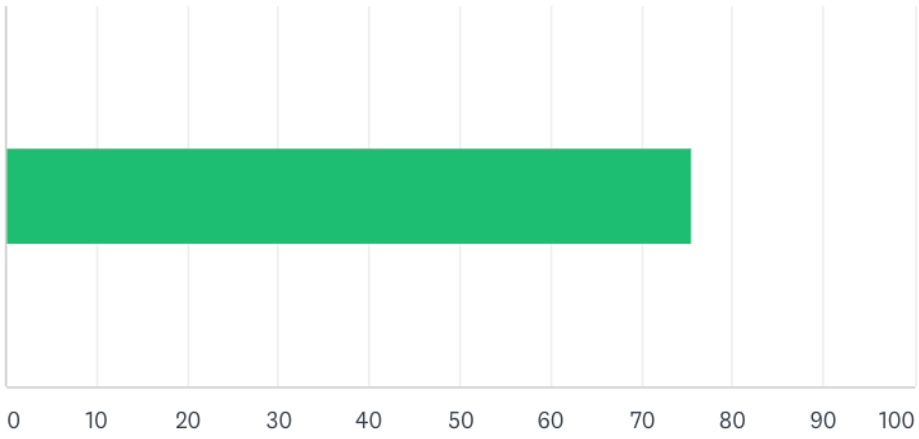
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
68%	32%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
27%	0%	73%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 76.

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	2%	78%	20%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	12%	61%	27%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	12%	64%	24%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
73%	25%	2%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
46%	53%	2%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
29%	29%	42%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
54%	42%	3%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
59%	34%	7%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
59%	41%	0%

Summary subgroup 3:
Active festival goers, only **3%** participate less than once a year. Attentive and focused on the environment with a score of **76** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics **(little knowledge 2%-12%-12%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(29% agrees)** and transport being included in the festival ticket **(46% agrees)**. Deposit scheme with a mortgage of 10 plastic cups **(73% agrees)** is prefered.

Main comments:

- Transport fee should be optional.
- Do not prefer a cup for beer, would much rather like to drink from a glass.
- Lottery is fun, would much rather have a lottery scheme than the deposit scheme of plastic cups that is proposed.
- Plantbased festival food.
- Is it possible to bring your own cup to get a reduced cost on the purchase of a beverage?
- Important to research whether the subcontractors also focus on sustainable and eco-friendly products and deliveries.

B2.4 Subgroup 4 - Age group 45-54

Q3 - Select your gender

Male	Female	Others
65%	35%	0%

Q4 - How often do you attend events or festivals?

1-3 times a year	4-6 times a year	7-10 times a year	More than 10 times a year	Less than once a year	Never attended
36%	25%	15%	13%	11%	0%

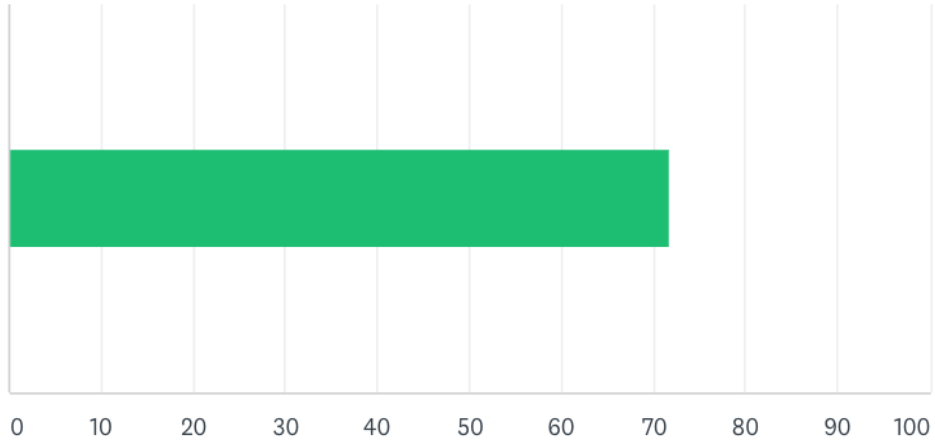
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
84%	16%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
38%	2%	60%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 72.

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
2%	16%	60%	22%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
2%	7%	51%	40%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	18%	53%	29%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
71%	25%	4%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
44%	46%	10%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
40%	40%	20%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
57%	28%	15%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
47%	40%	13%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
73%	27%	0%

Summary subgroup 4:

Active festival goers, **11%** participate less than once a year. Attentive and focused on the environment with a score of **72** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics **(no knowledge 2% - 2% - 0% and little knowledge 16% - 7% - 18%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(44% agrees)**, transport being included in the festival ticket **(40% agrees)** and lottery scheme **(47% agrees)**. Deposit scheme with a mortgage of 10 plastic cups **(71% agrees)** is prefered.

Main comments:

- Do not think it is legal to give free alcohol, should give money instead like Øya festivalen.
- Use a reusable cup.
- Transport fee should be optional.
- Hygiene and environmental challenges related to steel cups.
- Steel cups can be used as a weapon by troublemakers.
- I prefer steel cups over plastic based cups.
- Maybe some other material than steel, it affects the taste.
- Better design on the steel cup, I like the concept however.
- Washing of the steel cup will produce large queues.
- The problem with the lottery is that you may win products you do not need.
- Beer in a can?
- Use 100% biodegradable.
- More waste sorting stations.
- "Autonomous electric minibus that picks up participants from the city, participants book a seat on the bus and pay with an app"

B2.5 Subgroup 5 - Age group 55+

Q3 - Select your gender

Male	Female	Others
59%	41%	0%

Q4 - How often do you attend events or festivals?

1-3 times a year	4-6 times a year	7-10 times a year	More than 10 times a year	Less than once a year	Never attended
36%	26%	20%	8%	10%	0%

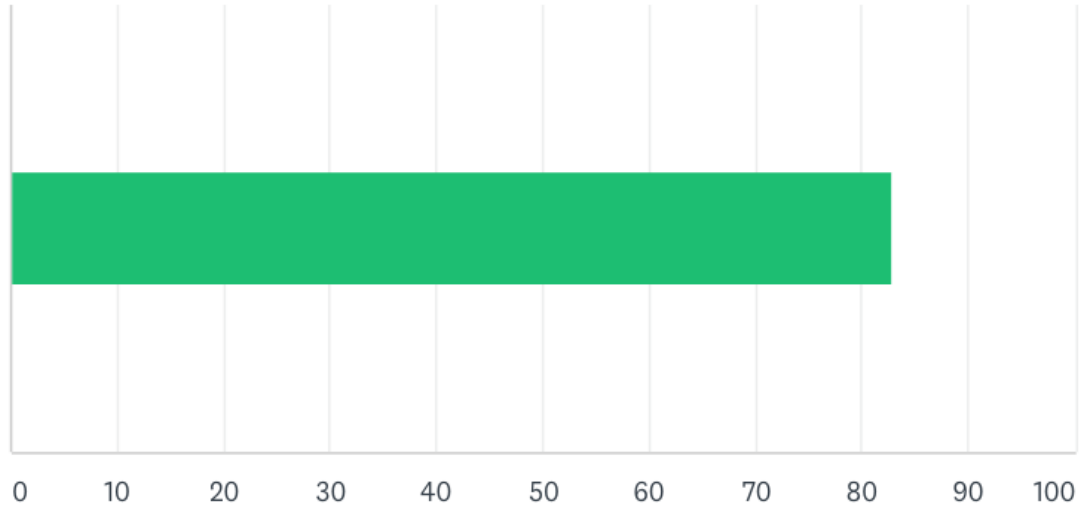
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
88%	12%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
48%	4%	48%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 83.

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	10%	70%	20%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	4%	42%	54%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
4%	6%	68%	22%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
84%	14%	2%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
48%	48%	4%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
38%	40%	22%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
69%	21%	10%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
58%	32%	10%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
88%	10%	2%

Summary subgroup 5:
Active festival goers, **10%** participate less than once a year. Attentive and focused on the environment with a score of **83** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics **(no knowledge 0% - 0% - 4% and little knowledge 10% - 4% - 6%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(48% agrees)**, transport being included in the festival ticket **(38% agrees)**. Deposit scheme with a mortgage of 10 plastic cups **(84% agrees)** is prefered.

Main comments:

- Instead of a free beer in exchange for 10 cups, the value of the cup should go to charity.
- Transport fee should be optional.
- How about giving some kind of discount to those who can somehow prove that they have walked from the city center?
- Electric transportation scheme is a very demanding scheme. Irrational use of resources.
- Not all beverages taste good in a steel cup.
- Hygienic challenges related to the steel cup.
- How would you wash the steel cups? Warm water? Chemicals?
- Lottery is fun!
- Plastic cups can be refilled several times, right? Cardboard holders for 4 plastic cups are widely used. Maybe they could have been made as a simple "wire basket"?
- Biodegradable products.
- Less disposable cutlery.
- Can beer.

B2.6 Subgroup 6 - Gender: Male

Q4 - How often do you attend events or festivals?

1-3 times a year	4-6 times a year	7-10 times a year	More than 10 times a year	Less than once a year	Never attended
26%	32%	19%	11%	12%	0%

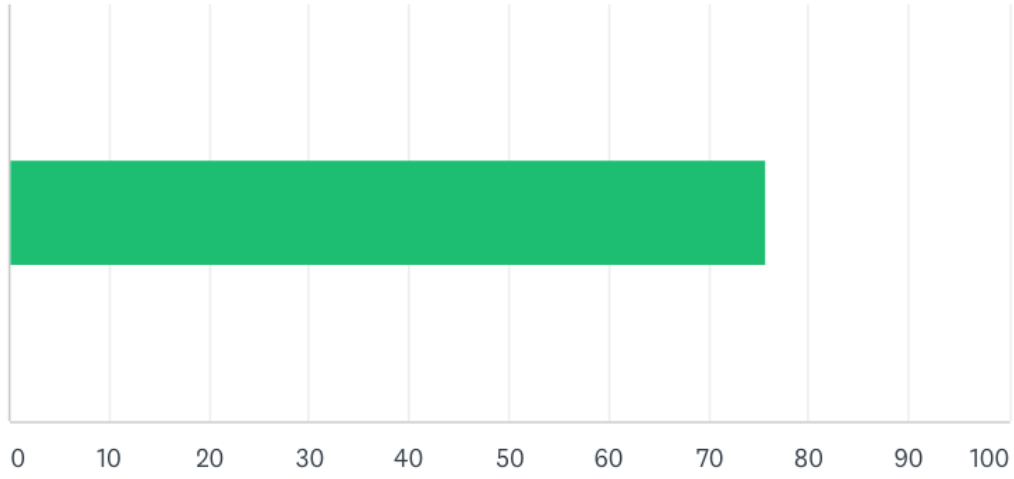
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
56%	44%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
26%	3%	71%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 76.

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	9%	59%	32%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
1%	11%	56%	32%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	14%	51%	35%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
63%	31%	6%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
39%	56%	5%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
26%	30%	44%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
58%	34%	8%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
56%	37%	7%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
50%	49%	1%

Summary subgroup 6:
Active festival goers, **12%** participate less than once a year. Attentive and focused on the environment with a score of **76** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics **(no knowledge 0% - 1% - 0% and little knowledge 9% - 11% - 14%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(39% agrees)**, transport being included in the festival ticket **(26% agrees)**. Deposit scheme with a mortgage of 10 plastic cups **(63% agrees)** is prefered.

Main comments:

- 31 comments on Q9
- 23 comments on Q10

B2.7 Subgroup 7 - Gender: Female

Q4 - How often do you attend events or festivals?

1-3 times a year	4-6 times a year	7-10 times a year	More than 10 times a year	Less than once a year	Never attended
37%	28%	21%	11%	3%	0%

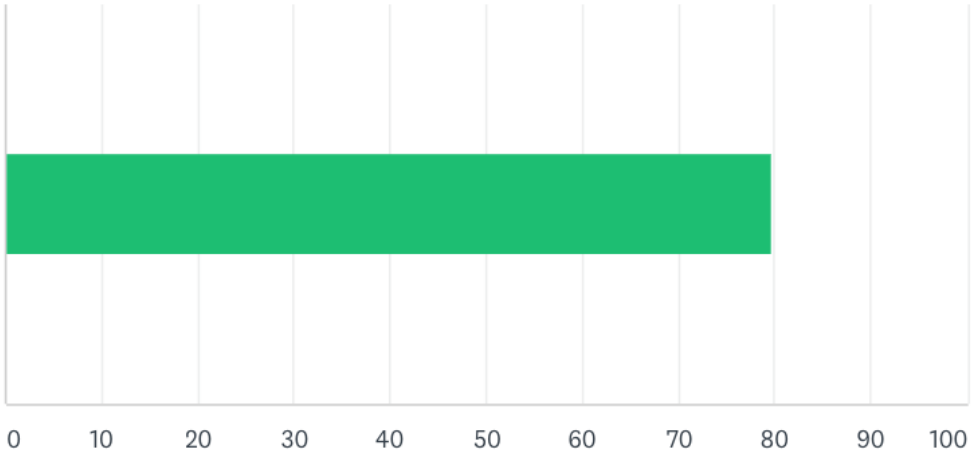
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
65%	35%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
30%	2%	68%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 80.

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
2%	14%	60%	24%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	8%	45%	47%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
2%	12%	59%	27%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
76%	22%	2%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
41%	52%	7%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
30%	26%	44%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
63%	33%	4%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
62%	31%	7%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
60%	39%	1%

Summary subgroup 7:
Active festival goers, only **3%** participate less than once a year. Attentive and focused on the environment with a score of **80** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics **(no knowledge 2% - 0% - 2% and little knowledge 15% - 8% - 12%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(41% agrees)**, transport being included in the festival ticket **(30% agrees)**. Deposit scheme with a mortgage of 10 plastic cups **(76% agrees)** is prefered.

Main comments:

- 19 comments on Q9
- 8 comments on Q10

B2.8 Subgroup 8 - Event participants: 1-3 times a year

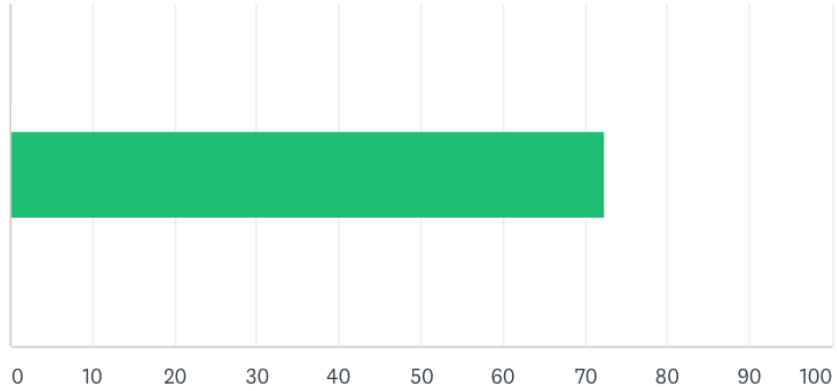
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
60%	40%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
22%	2%	76%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 72.

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
3%	18%	61%	18%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	13%	60%	27%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
2%	17%	60%	21%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
67%	29%	4%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
35%	54%	11%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
31%	35%	34%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
62%	31%	7%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
54%	39%	7%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
53%	46%	1%

Summary subgroup 8:
Attentive and focused on the environment with a score of **72** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics **(no knowledge 3% - 0% - 2% and little knowledge 18% - 13% - 17%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(35% agrees)**, transport being included in the festival ticket **(31% agrees)**. Deposit scheme with a mortgage of 10 plastic cups **(67% agrees)** is prefered.

Main comments:

- 17 comments on Q9
- 13 comments on Q10

B2.9 Subgroup 9 - Event participants: 4-6 times a year

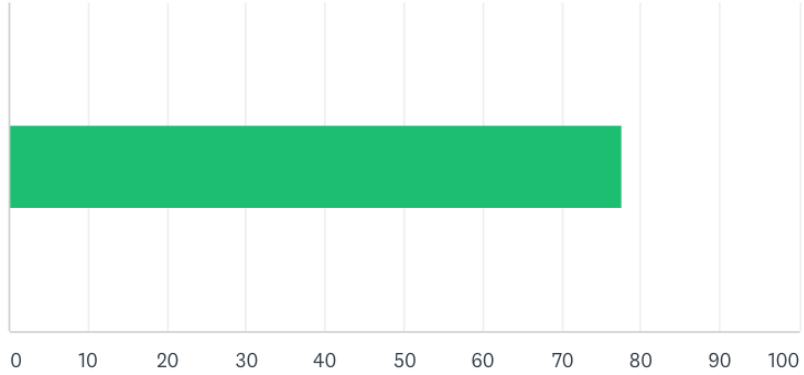
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
65%	35%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
28%	4%	68%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 78.

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	8%	61%	31%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	6%	48%	46%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	7%	53%	40%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
70%	25%	5%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
45%	55%	0%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
22%	30%	48%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
64%	30%	6%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
62%	31%	7%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
54%	46%	0%

Summary subgroup 9:
Attentive and focused on the environment with a score of **78** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics **(little knowledge 8% - 6% - 7%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(45% agrees)**, transport being included in the festival ticket **(22% agrees)**. Deposit scheme with a mortgage of 10 plastic cups **(70% agrees)** is prefered. Point to be noted, no one disagrees with transport costs **not** being included in the festival ticket.

Main comments:

- 21 comments on Q9
- 7 comments on Q10

B2.10 Subgroup 10 - Event participants: 7-10 times a year

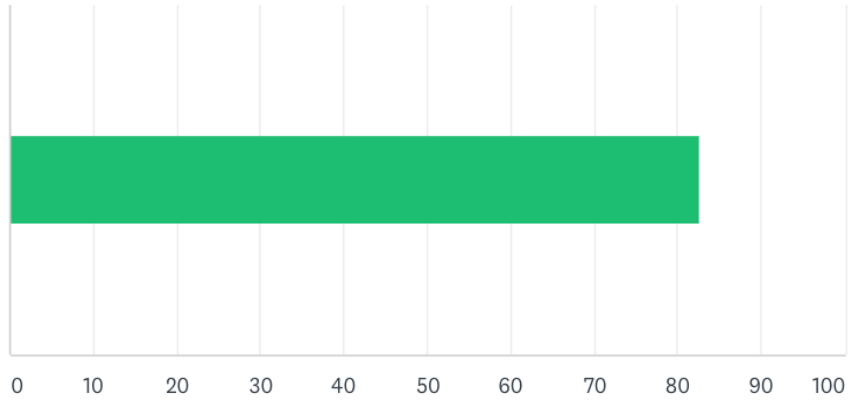
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
62%	38%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
38%	0%	62%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 83.

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	8%	49%	43%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	8%	49%	43%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	13%	53%	34%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
72%	25%	3%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
40%	58%	2%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
24%	21%	55%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
44%	44%	12%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
58%	36%	6%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
58%	40%	2%

Summary subgroup 10:
Attentive and focused on the environment with a score of **83** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics **(little knowledge 8% - 8% - 13%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(40% agrees)**, transport being included in the festival ticket **(24% agrees)** and deposit scheme with steel cups **(44%)**. Deposit scheme with a mortgage of 10 plastic cups **(72% agrees)** is prefered.

Main comments:

- 8 comments on Q9
- 4 comments on Q10

B2.11 Subgroup 11 - Event participants: 10+ times a year

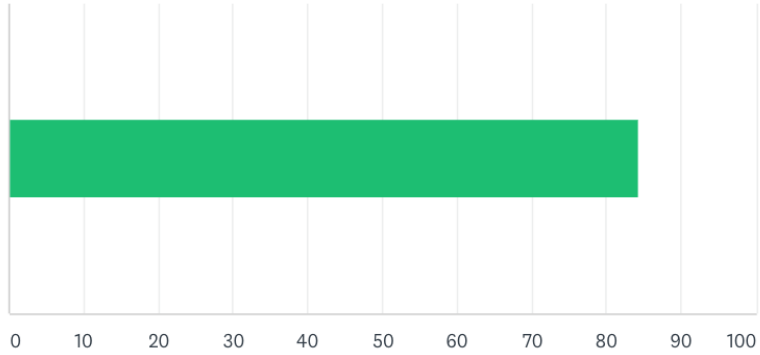
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
70%	30%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
40%	0%	60%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 84.

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	3%	60%	37%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	3%	47%	50%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	10%	50%	40%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
73%	26%	0%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
47%	47%	6%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
37%	33%	30%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
74%	23%	3%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
63%	27%	10%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
67%	30%	3%

Summary subgroup 11:
Attentive and focused on the environment with a score of **84** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics **(little knowledge 3% - 3% - 10%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(47% agrees)**, transport being included in the festival ticket **(37% agrees)**. Deposit scheme steel cups (**74% agrees)** and deposit scheme 10 plastic cups **(73%)** are prefered.

Main comments:

- 7 comments on Q9
- 3 comments on Q10

B2.12 Subgroup 12 - Event participants: Less than once a year

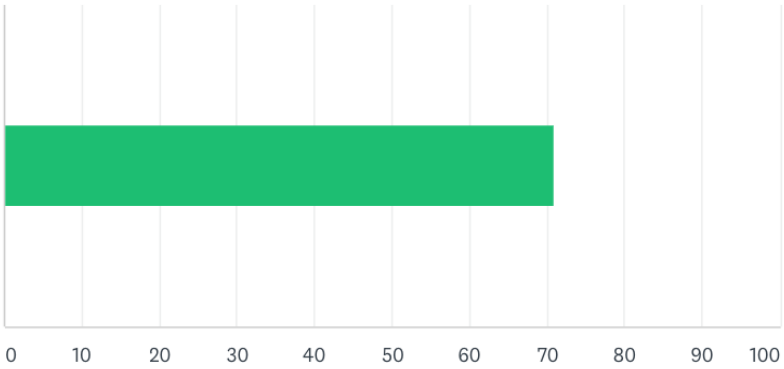
Q5 - Have you participated in Ravnedalen Live before?

Yes	No
21%	79%

Q6 - Are you going to participate in the next Ravnedalen Live?

Yes	No	I do not know
0%	13%	87%

Q7 - How important is it for you to have an environmentally friendly event industry in Sørlandet? (Rated from 0 to 100)



Average 71.

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	12%	67%	21%

Recycling/waste management

No knowledge	Little knowledge	Some knowledge	Knowledgeable
4%	25%	46%	25%

Transportation

No knowledge	Little knowledge	Some knowledge	Knowledgeable
0%	25%	46%	29%

Q9 - A number of proposed measures to promote sustainability and environmental protection are listed below. These measures require cooperation from you as a participant in events in Sørlandet. Please choose the option that best suits your opinions related to these proposed measures.

Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
50%	38%	12%

An arrangement with electric transport to the festival, instead of fuel-powered. Where transport costs are not included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
29%	54%	17%

Electric transport to the festival, where transport costs are included in the festival ticket.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
29%	8%	63%

Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
50%	46%	4%

Lottery, where you get the opportunity to participate in a lottery competition and get a ticket for each plastic cup that you deliver to the sorting station.

Agree - I support this form of collaboration	Neutral - Neither agree nor disagree	Disagree - I disagree with this form of collaboration
54%	38%	8%

Q11 - Would you recommend friends / family / acquaintances to participate in the music festival Ravnedalen Live?

Yes	I do not know	No
29%	71%	1%

Summary subgroup 12:
Attentive and focused on the environment with a score of **71** on the importance of environmentally friendly event industry in Sørlandet. High knowledge on presented sustainable topics **(no knowledge 0% - 4% - 0% and little knowledge 12% - 25% - 25%)**. Open to change, as the majority agrees to the proposed measure, with the exception of transport costs **not** being included in the festival ticket **(29% agrees)**, transport being included in the festival ticket **(29% agrees)**. Lottery scheme **(54% agrees)** is prefered, while deposit scheme plastic cups **(50% agrees)** and deposit scheme steel cups **(50% agrees)** are on a close second.

Main comments:

- 4 comments on Q10

B3 - Comparative analysis of subgroups and benchmarks

SUBGROUP #	SG 1	SG 2	SG 3	SG 4	SG 5	SG 6	SG 7	SG 8	SG 9	SG 10	SG 11	SG 12
SG Description	18-24	25-34	35-44	44-54	55+	Male	Female	1-3 times/year	4-6 times/year	7-10 times/year	10+ times/year	Less than 1/year
Participates less than once a year	5 %	12 %	3 %	11 %	10 %	12 %	3 %	-	-	-	-	-
Environment friendly event industry	85	75	76	72	83	76	80	72	78	83	84	71
No knowledge - climate changes	0 %	1 %	0 %	2 %	0 %	0 %	2 %	3 %	0 %	0 %	0 %	0 %
No knowledge - recycling	0 %	0 %	0 %	2 %	0 %	1 %	0 %	0 %	0 %	0 %	0 %	4 %
No knowledge - transport	0 %	0 %	0 %	0 %	4 %	0 %	2 %	2 %	0 %	0 %	0 %	0 %
Little knowledge - climate changes	3 %	19 %	2 %	16 %	9 %	9 %	15 %	18 %	8 %	8 %	3 %	12 %
Little knowledge - recycling	6 %	16 %	12 %	7 %	11 %	8 %	13 %	6 %	8 %	3 %	25 %	
Little knowledge - transport	8 %	17 %	12 %	18 %	14 %	12 %	17 %	7 %	13 %	10 %	25 %	
Deposit 10 cups for free beer (agree)	56 %	58 %	73 %	71 %	63 %	76 %	67 %	70 %	72 %	73 %	50 %	
Transport not included in ticket (agree	28 %	31 %	29 %	44 %	39 %	41 %	35 %	45 %	40 %	47 %	29 %	
Transport included in ticket (agree)	11 %	17 %	46 %	40 %	26 %	30 %	31 %	22 %	24 %	37 %	29 %	
Stainless steel cups (agree)	56 %	61 %	54 %	57 %	58 %	63 %	62 %	64 %	44 %	74 %	50 %	
Lottery scheme (agree)	59 %	65 %	59 %	47 %	56 %	62 %	54 %	62 %	58 %	63 %	54 %	

Benchmarks													
SUBGROUP #	-	SG 1	SG 2	SG 3	SG 4	SG 5	SG 6	SG 7	SG 8	SG 9	SG 10	SG 11	SG 12	Accumulated
SG Description	All respondents	18-24	25-34	35-44	44-54	55+	Male	Female	1-3 times/year	4-6 times/year	7-10 times/year	10+ times/year	Less than 1/year	percentages
Environment friendly event industry	77	85	75	76	72	83	76	80	72	78	83	84	71	
No knowledge - climate changes	1 %	0 %	1 %	0 %	2 %	0 %	0 %	2 %	3 %	0 %	0 %	0 %	0 %	8 %
No knowledge - recycling	0 %	0 %	0 %	0 %	2 %	0 %	1 %	0 %	0 %	0 %	0 %	0 %	4 %	7 %
No knowledge - transport	1 %	0 %	0 %	0 %	0 %	4 %	0 %	2 %	2 %	0 %	0 %	0 %	0 %	8 %
Little knowledge - climate changes	11 %	3 %	19 %	2 %	16 %	10 %	9 %	15 %	18 %	8 %	8 %	3 %	12 %	123 %
Little knowledge - recycling	10 %	6 %	16 %	12 %	7 %	4 %	11 %	8 %	13 %	6 %	8 %	3 %	25 %	119 %
Little knowledge - transport	13 %	8 %	17 %	12 %	18 %	6 %	14 %	12 %	17 %	7 %	13 %	10 %	25 %	159 %

B4 – Statistical analysis

B4.1 Q9 - Overview of data collection

ANOVA - Question 9: We will use alpha = 0,05 for the test
The one-way ANOVA will answer the following questions.
Does the gender of the respondentens have a statistically significant difference impact on their attitude towards the proposed measures?
Does the age of the respondentens have a statistically significant impact on their attitude towards the proposed measures?

GENDER: MALE = 1 FEMALE = 2

MEASURE 1
Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Levels	Agree	Neutral	Disagree
1	63 %	31 %	6 %
2	76 %	22 %	2 %

MEASURE 2
An arrangement with electric transport to the festival, instead of fuel-powered.
Where transport costs are not included in the festival ticket.

Levels	Agree	Neutral	Disagree
1	39 %	56 %	5 %
2	41 %	52 %	7 %

MEASURE 3
Electric transport to the festival, where transport costs are included in the festival ticket.

Levels	Agree	Neutral	Disagree
1	26 %	30 %	44 %
2	30 %	26 %	44 %

MEASURE 4
Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Levels	Agree	Neutral	Disagree
1	58 %	34 %	8 %
2	63 %	33 %	4 %

MEASURE 5
Lottery scheme..

Levels	Agree	Neutral	Disagree
1	56 %	37 %	7 %
2	62 %	31 %	7 %

Gender		
Females	101	37 %
Males	172	63 %
Total	273	

Female			
	Agree	Neutral	Disagree
Measure 1	77	22	2
Measure 2	41	53	7
Measure 3	30	26	45
Measure 4	64	33	4
Measure 5	63	31	7

Male			
	Agree	Neutral	Disagree
Measure 1	109	53	10
Measure 2	67	96	9
Measure 3	45	51	76
Measure 4	100	58	14
Measure 5	96	64	12

AGE GROUP:

MEASURE 1
Deposit scheme, where you get a free beer if you deposit 10 plastic cups.

Levels	Agree	Neutral	Disagree
18-24	56 %	39 %	5 %
25-34	58 %	34 %	8 %
35-44	73 %	25 %	2 %
44-54	71 %	25 %	4 %
55+	84 %	14 %	2 %

MEASURE 2
An arrangement with electric transport to the festival, instead of fuel-powered.
Where transport costs are not included in the festival ticket.

Levels	Agree	Neutral	Disagree
18-24	28 %	69 %	3 %
25-34	31 %	60 %	9 %
35-44	46 %	53 %	2 %
44-54	44 %	46 %	10 %
55+	48 %	48 %	4 %

MEASURE 3
Electric transport to the festival, where transport costs are included in the festival ticket.

Levels	Agree	Neutral	Disagree
18-24	11 %	19 %	70 %
25-34	17 %	15 %	68 %
35-44	29 %	29 %	42 %
44-54	40 %	40 %	20 %
55+	38 %	40 %	22 %

MEASURE 4
Deposit scheme, in exchange for a deposit payment you get a reusable steel mug….

Levels	Agree	Neutral	Disagree
18-24	56 %	44 %	0 %
25-34	61 %	34 %	5 %
35-44	54 %	42 %	3 %
44-54	57 %	28 %	15 %
55+	69 %	21 %	10 %

Age	
18-24	35
25-34	74
35-44	60
44-54	55
55+	49
Total	273

18-24			
	Agree	Neutral	Disagree
Measure 1	19	14	2
Measure 2	10	24	1
Measure 3	4	7	24
Measure 4	20	15	0
Measure 5	21	12	2

25-34			
	Agree	Neutral	Disagree
Measure 1	43	25	6
Measure 2	23	44	7
Measure 3	13	11	50
Measure 4	45	25	4
Measure 5	48	22	4

35-44			
	Agree	Neutral	Disagree
Measure 1	44	15	1
Measure 2	28	31	1
Measure 3	17	18	25
Measure 4	32	26	2
Measure 5	35	21	4

44-54			
	Agree	Neutral	Disagree
Measure 1	39	14	2
Measure 2	24	25	6
Measure 3	22	22	11
Measure 4	32	15	8
Measure 5	26	22	7

MEASURE 5
Lottery scheme..

Levels	Agree	Neutral	Disagree
18-24	59 %	34 %	7 %
25-34	65 %	30 %	5 %
35-44	59 %	34 %	7 %
44-54	47 %	40 %	13 %
55+	58 %	32 %	10 %

55+			
	Agree	Neutral	Disagree
Measure 1	41	7	1
Measure 2	24	24	1
Measure 3	19	20	10
Measure 4	34	10	5
Measure 5	28	16	5

B4.2 Q9 - Age measures

AGREE = 1, NEUTRAL = 2, DISAGREE = 3

18-24					25-34					35-44					45-54					55+				
MEASURE 1	MEASURE 2	MEASURE 3	MEASURE 4	MEASURE 5	MEASURE 1	MEASURE 2	MEASURE 3	MEASURE 4	MEASURE 5	MEASURE 1	MEASURE 2	MEASURE 3	MEASURE 4	MEASURE 5	MEASURE 1	MEASURE 2	MEASURE 3	MEASURE 4	MEASURE 5	MEASURE 1	MEASURE 2	MEASURE 3	MEASURE 4	MEASURE 5
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					3	3	3	3	3															
					3	3	3	3	3															
					3	3	3	3	3															

B4.3 Q9 - Gender measures

AGREE = 1, NEUTRAL = 2, DISAGREE = 3

FEMALE = F - MEASURE X **MALE = M - MEASURE X**

F - MEASURE 1	F - MEASURE 2	F - MEASURE 3	F - MEASURE 4	F - MEASURE 5	M - MEASURE 1	M - MEASURE 2	M - MEASURE 3	M - MEASURE 4	M - MEASURE 5
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1	1	1	1	1	1	1	1	1	1
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1	1	1	1	1	1	1	1	1	1
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1	1	2	1	1	1	1	1	1	1
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2	2	3	2	2	1	2	2	1	1
2	2	3	2	2	1	2	2	1	1
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					3	3	3	3	3
					3	3	3	3	3
					3	3	3	3	3

B4.4 Q9 - ANOVA test

Variansanalyse: en-faktor
SAMMENDRAG

Grupper	*Antall*	*Sum*	*Gjennomsnitt*	*Varians*
FEMALE				
MEASURE 1	101	128	1,254901961	0,231411376
MEASURE 2	101	169	1,656862745	0,366239565
MEASURE 3	101	218	2,137254902	0,733449816
MEASURE 4	101	143	1,401960784	0,321976315
MEASURE 5	101	147	1,441176471	0,387594642
MALE				
MEASURE 1	172	246	1,421965318	0,361607743
MEASURE 2	172	287	1,658959538	0,330689609
MEASURE 3	172	376	2,173410405	0,679056325
MEASURE 4	172	259	1,497109827	0,414235784
MEASURE 5	172	261	1,50867052	0,390912757

Variansanalyse

Variasjonskilde	*SK*	*fg*	*GK*	*F*	*P-verdi*	*F-krit*
Mellom grupper	113,893048	9	12,65478312	29,75845661	1,04433E-47	1,88672562
Innenfor grupper	580,466225	1365	0,425249981			
Totalt	694,359273	1374				

CONLUSION

Measure 1 was the most preferred measure in both gender groups.
Measure 3 was the least preferred measure in both gender groups.
If the ANOVA statistic is significant, the P-verdi will be less than 0.05.
As the P-verdi is less than 0.05, this test indicates that there is a statistically significant difference in attitude towards the various measures.
On the basis of the biggest "varians" and "sum" being on measure 3 in both subgroups, it is presumably measure 3 that creates the statistically significant difference.
This will be further analyzed through Chi-square test and T-test.

Variansanalyse: en-faktor
SAMMENDRAG

Grupper	*Antall*	*Sum*	*Gjennomsnitt*	*Varians*
18-24				
MEASURE 1	35	53	1,514285714	0,374789916
MEASURE 2	35	61	1,742857143	0,255462185
MEASURE 3	35	90	2,571428571	0,487394958
MEASURE 4	35	50	1,428571429	0,25210084
MEASURE 5	35	51	1,457142857	0,373109244
25-34				
MEASURE 1	74	111	1,5	0,417808219
MEASURE 2	74	132	1,783783784	0,363569049
MEASURE 3	74	185	2,5	0,609589041
MEASURE 4	74	107	1,445945946	0,360051833
MEASURE 5	74	104	1,405405405	0,353942984
35-44				
MEASURE 1	60	77	1,283333333	0,24039548
MEASURE 2	60	93	1,55	0,28559322
MEASURE 3	60	128	2,133333333	0,693785311
MEASURE 4	60	90	1,5	0,322033898
MEASURE 5	60	89	1,483333333	0,389548023
45-54				
MEASURE 1	55	73	1,327272727	0,298316498
MEASURE 2	55	92	1,672727273	0,446464646
MEASURE 3	55	99	1,8	0,57037037
MEASURE 4	55	86	1,563636364	0,546801347
MEASURE 5	55	91	1,654545455	0,48956229
55+				
MEASURE 1	49	58	1,183673469	0,194727891
MEASURE 2	49	75	1,530612245	0,295918367
MEASURE 3	49	89	1,816326531	0,569727891
MEASURE 4	49	69	1,408163265	0,454931973
MEASURE 5	49	75	1,530612245	0,462585034

Variansanalyse

Variasjonskilde	*SK*	*fg*	*GK*	*F*	*P-verdi*	*F-krit*
Mellom grupper	146,591786	24	6,107991095	14,91410116	1,70141E-53	1,52545297
Innenfor grupper	548,789899	1340	0,409544701			
Totalt	695,381685	1364				

CONCLUSION

Measure 1 was the most preferred measure in three groups (34-55, 45-54 & 55+), while Measure 4 was preferred by 18-24 and Measure 5 preferred by 25-34.
Measure 3 was the least preferred measure in all age groups.
If the ANOVA statistic is significant, the P-verdi will be less than 0.05.
As the P-verdi is less than 0.05, this test indicates that there is a statistically significant difference in attitude towards the various measures.
On the basis of the biggest "varians" and "sum" being on measure 3 in both subgroups, it is presumably measure 3 that creates the statistically significant difference.

B4.5 Q9 - Gender Chi-squared test

H0 describes the numbers the thesis expects; if the null hypothesis (H0) were true - that there is no difference based on gender.

*H0 = Actual total * % of total respondents*

	MEASURE 1			MEASURE 2			MEASURE 3			MEASURE 4			MEASURE 5			Amount of respondents	% of Total respondents
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree	Agree	Neutral	Disagree		
Female	77	22	2	41	53	7	30	26	45	64	33	4	63	31	7	101	37 %
H_0 Female	69	28	4	40	55	6	28	28	45	61	34	7	59	35	7		
Chi-squared statistic calculation	67	33	6	40	55	6	28	28	45	61	34	7	59	35	7		
	0,07	1,19	1,34	0,03	0,00	0,28	0,18	0,22	0,00	0,18	0,01	1,05	0,30	0,48	0,00		
Male	109	53	10	67	96	9	45	51	76	100	58	14	96	64	12	172	63 %
H_0 Male	117	47	8	68	94	10	47	49	76	103	57	11	100	60	12		
Chi-squared statistic calculation	67	33	6	1	5	1	5	6	0	11	0	7	17	17	0		
	0,57	0,70	0,79	0,02	0,05	0,12	0,11	0,13	0,00	0,11	0,01	0,62	0,17	0,29	0,00		
Actual Total	186	75	12	108	149	16	75	77	121	164	91	18	159	95	19		

	MEASURE 1	MEASURE 2	MEASURE 3	MEASURE 4	MEASURE 5
Chi-squared	5,56	0,49	0,64	2,00	1,25
df	2	2	2	2	2
Degree of freedom	0,062	0,784	0,727	0,369	0,536
Probability value					
APA formt	$\chi^2(2, N = 273) = 5.563, p = 0.062$	$\chi2(2, N = 273) = 0.486, p = 0.784$	$\chi2(2, N = 273) = 0.637, p = 0.727$	$\chi2(2, N = 273) = 1.996, p = 0.369$	$\chi2(2, N = 273) = 1.247, p = 0.536$

Conlusion

As all p values are higher than 0.01, it is safe to retain H0; there is no significant difference based on gender.

$$\sum \frac{(O-E)^2}{E}$$

Chi-squared is the sum of the green numbers, respective to their measures.

O = observed value

E = exoected value for each cell

If p is small, e.g. less than 0.01, or 0.001, you can assume the result is statistically significant; that is, there is a difference between groups.

B4.6 Q9 - Gender T-test

TYPE 1 ERROR: Finding a significant difference when there was none. Incorrectly rejecting the null hypothesis.
T-tests are conudcted to determine if there is a significant difference.
If P(T<=t)tosidig is less than the alpha, then there is a significant difference between the two groups.
Alpha was determined to be 0.01, as the calculated alpha is 0.05 and had to be divided on the amount of tests the thesis is going to run.

MEASURE 1 COMPARISON

t-Test: To utvalg med antatt like varianser

	Female	Male
	F - MEASURE 1	*M - MEASURE 1*
Gjennomsnitt	1,254901961	1,421965318
Varians	0,231411376	0,361607743
Observasjoner	102	173
Gruppevarians	0,313439856	
Antatt avvik mellom gjennomsnittene	0	
fg	273	
t-Stat	-2,390346637	
P(T<=t) ensidig	0,008755324	
T-kritisk, ensidig	2,340084563	
P(T<=t) tosidig	0,017510648	
T-kritisk, tosidig	2,593957776	

0,017 is not less than 0,01, therefore there is no difference in means between F - measure 1 and M - measure 1.

MEASURE 2 COMPARISON

t-Test: To utvalg med antatt like varianser

	F - MEASURE 2	*M - MEASURE 2*
Gjennomsnitt	1,656862745	1,658959538
Varians	0,366239565	0,330689609
Observasjoner	102	173
Gruppevarians	0,34384179	
Antatt avvik mellom gjennomsnittene	0	
fg	273	
t-Stat	-0,02864395	
P(T<=t) ensidig	0,488584744	
T-kritisk, ensidig	2,340084563	
P(T<=t) tosidig	0,977169487	
T-kritisk, tosidig	2,593957776	

0,97 is not less than 0,01, therefore there is no difference in means between F - measure 2 and M - measure 2.

MEASURE 3 COMPARISON

t-Test: To utvalg med antatt like varianser

	F - MEASURE 3	*M - MEASURE 3*
Gjennomsnitt	2,137254902	2,173410405
Varians	0,733449816	0,679056325
Observasjoner	102	173
Gruppevarians	0,699179924	
Antatt avvik mellom gjennomsnittene	0	
fg	273	
t-Stat	-0,346367169	
P(T<=t) ensidig	0,364666799	
T-kritisk, ensidig	2,340084563	
P(T<=t) tosidig	0,729333598	
T-kritisk, tosidig	2,593957776	

0.72 is not less than 0.01, therefore there is no difference in means between F - measure 3 and M - measure 3.

MEASURE 4 COMPARISON

t-Test: To utvalg med antatt like varianser

	F - MEASURE 4	*M - MEASURE 4*
Gjennomsnitt	1,401960784	1,497109827
Varians	0,321976315	0,414235784
Observasjoner	102	173
Gruppevarians	0,38010316	
Antatt avvik mellom gjennomsnittene	0	
fg	273	
t-Stat	-1,236261862	
P(T<=t) ensidig	0,108711911	
T-kritisk, ensidig	2,340084563	
P(T<=t) tosidig	0,217423821	
T-kritisk, tosidig	2,593957776	

0.21 is not less than 0.01, therefore there is no difference in means between F - measure 4 and M - measure 4.

MEASURE 5 COMPARISON

t-Test: To utvalg med antatt like varianser

	F - MEASURE 5	*M - MEASURE 5*
Gjennomsnitt	1,441176471	1,50867052
Varians	0,387594642	0,390912757
Observasjoner	102	173
Gruppevarians	0,389685176	
Antatt avvik mellom gjennomsnittene	0	
fg	273	
t-Stat	-0,866094607	
P(T<=t) ensidig	0,193599398	
T-kritisk, ensidig	2,340084563	
P(T<=t) tosidig	0,387198795	
T-kritisk, tosidig	2,593957776	

0.38 is not less than 0.01, therefore there is no difference in means between F - measure 5 and M - measure 5.

B4.7 Q8 - Overview of data collection

ANOVA - Question 8: We will use alpha = 0,05 for the test
The one-way ANOVA will answer the following questions.
Does the gender of the respondentens have a statistically significant difference impact on their attitude towards the proposed measures?
Does the age of the respondentens have a statistically significant impact on their attitude towards the proposed measures?

GENDER: MALE = 1 FEMALE = 2

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

Levels	No knowledge	little knowledge	some knowledge	knowledgeable
1	0 %	9 %	59 %	32 %
2	2 %	14 %	60 %	24 %

Recycling/waste management

Levels	No knowledge	little knowledge	some knowledge	knowledgeable
1	1 %	11 %	56 %	32 %
2	0 %	8 %	45 %	47 %

Transportation

Levels	No knowledge	little knowledge	some knowledge	knowledgeable
1	0 %	14 %	51 %	35 %
2	2 %	12 %	59 %	27 %

Gender		
Females	101	37 %
Males	172	63 %
Total	273	

Female				
	NK	LK	SK	Ka
Climate	2	14	61	24
Recycling	0	8	45	47
Transport	2	12	60	27

Male				
	NK	LK	SK	Ka
Climate	0	15	102	55
Recycling	2	19	96	55
Transport	0	24	88	60

AGE GROUP:

Age	
18-24	35
25-34	74
35-44	60
44-54	55
55+	49
Total	273

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

Levels	No knowledge	little knowledge	some knowledge	knowledgeable
1	0 %	3 %	33 %	64 %
2	1 %	19 %	49 %	31 %
3	0 %	2 %	78 %	20 %
4	2 %	16 %	60 %	22 %
5	0 %	10 %	70 %	20 %

Recycling/waste management

Levels	No knowledge	little knowledge	some knowledge	knowledgeable
1	0 %	6 %	50 %	44 %
2	0 %	16 %	51 %	33 %
3	0 %	12 %	61 %	27 %
4	2 %	7 %	51 %	40 %
5	0 %	4 %	42 %	54 %

Transportation

Levels	No knowledge	little knowledge	some knowledge	knowledgeable
1	0 %	8 %	31 %	61 %
2	0 %	17 %	49 %	34 %
3	0 %	12 %	64 %	24 %
4	0 %	18 %	53 %	29 %
5	4 %	6 %	68 %	22 %

18-24				
	NK	LK	SK	Ka
Climate	0	1	12	22
Recycling	0	2	18	15
Transport	0	3	11	21

25-34				
	NK	LK	SK	Ka
Climate	1	14	36	23
Recycling	0	12	38	24
Transport	0	13	36	25

35-44				
	NK	LK	SK	Ka
Climate	0	1	47	12
Recycling	0	7	37	16
Transport	0	7	38	15

45-54				
	NK	LK	SK	Ka
Climate	1	9	33	12
Recycling	1	4	28	22
Transport	0	10	29	16

55+				
	NK	LK	SK	Ka
Climate	0	5	34	10
Recycling	0	2	21	26
Transport	2	3	33	11

EVENT PARTICIPANTS

Event participation	
1-3 yearly	82
4-6 yearly	85
7-10 yearly	52
10+ yearly	30
Less than 1	24
Total	273

Q8 - Choose your current level of knowledge related to the following topics.

Climate change

Levels	No knowledge	little knowledge	some knowledge	knowledgeable
1	3 %	18 %	61 %	18 %
2	0 %	8 %	61 %	31 %
3	0 %	8 %	49 %	43 %
4	0 %	3 %	60 %	37 %
5	0 %	12 %	67 %	21 %

Recycling/waste management

Levels	No knowledge	little knowledge	some knowledge	knowledgeable
1	0 %	13 %	60 %	27 %
2	0 %	6 %	48 %	46 %
3	0 %	8 %	49 %	43 %
4	0 %	3 %	47 %	50 %
5	4 %	25 %	46 %	25 %

Transportation

Levels	No knowledge	little knowledge	some knowledge	knowledgeable
1	2 %	17 %	60 %	21 %
2	0 %	7 %	53 %	40 %
3	0 %	13 %	53 %	34 %
4	0 %	10 %	50 %	40 %
5	0 %	25 %	46 %	29 %

1-3 yearly				
	NK	LK	SK	Ka
Climate	2	15	50	15
Recycling	0	11	49	22
Transport	2	14	49	17

4-6 yearly				
	NK	LK	SK	Ka
Climate	0	7	52	26
Recycling	0	5	41	39
Transport	0	6	45	34

7-10 yearly				
	NK	LK	SK	Ka
Climate	0	4	26	22
Recycling	0	4	26	22
Transport	0	7	27	18

10+ yearly				
	NK	LK	SK	Ka
Climate	0	1	18	11
Recycling	0	1	14	15
Transport	0	3	15	12

Less than 1				
	NK	LK	SK	Ka
Climate	0	3	16	5
Recycling	1	6	11	6
Transport	0	6	11	7

B4.8 Q8 - Age measures

18-24			25-34			35-44			45-54			55+		
Climate	Recycling	Transport	Climate	Recycling	Transport	Climate	Recycling	Transport	Climate	Recycling	Transport	Climate	Recycling	Transport
2	2	2	1	2	2	2	2	2	1	1	2	2	2	1
3	2	2	2	2	2	3	2	2	2	2	2	2	2	1
3	3	2	2	2	2	3	2	2	2	2	2	2	3	2
3	3	3	2	2	2	3	2	2	2	2	2	2	3	2
3	3	3	2	2	2	3	2	2	2	2	2	2	3	2
3	3	3	2	2	2	3	2	2	2	3	2	3	3	3
3	3	3	2	2	2	3	2	2	2	3	2	3	3	3
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B4.9 Q8 - Gender measures

NK= 1, LK= 2, SK = 3, Ka = 4

Female			Male		
Climate	Recycling	Transport	Climate	Recycling	Transport
1	2	1	2	1	2
1	2	1	2	1	2
2	2	2	2	2	2
2	2	2	2	2	2
2	2	2	2	2	2
2	2	2	2	2	2
2	2	2	2	2	2
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B4.10 Q8 – Participation measures

1-3 yearly			4-6 yearly			7-10 yearly			10+ yearly			Less than once		
Climate	Recycling	Transport	Climate	Recycling	Transport	Climate	Recycling	Transport	Climate	Recycling	Transport	Climate	Recycling	Transport
1	2	1	2	2	2	2	2	2	2	2	2	2	1	2
1	2	1	2	2	2	2	2	2	3	3	2	2	2	2
2	2	2	2	2	2	2	2	2	3	3	2	2	2	2
2	2	2	2	2	2	2	2	2	3	3	3	3	2	2
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2	2	2	2	3	3	3	3	2	3	3	3	3	2	3
2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
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3	3	3	3	3	3	3	3	3	3	4	3	3	3	4
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B4.11 Q8 – ANOVA test

GENDER

Variansanalyse: en-faktor

SAMMENDRAG

Grupper	*Antall*	*Sum*	*Gjennomsnitt*	*Varians*
FEMALE				
Climate	101	309	3,059405941	0,456435644
Recycling	101	343	3,396039604	0,401584158
Transport	101	314	3,108910891	0,458019802
MALE				
Climate	172	556	3,23255814	0,35495716
Recycling	172	548	3,186046512	0,444716442
Transport	172	552	3,209302326	0,447164423

Variansanalyse

Variasjonskilde	*SK*	*fg*	*GK*	*F*	*P-verdi*	*F-krit*
Mellom grupper	6,94497904	5	1,388995807	3,274971451	0,006186134	2,22511697
Innenfor grupper	344,813263	813	0,424124554			
Totalt	351,758242	818				
Totalt	351,758242	818				

If the ANOVA statistic is significant, the P-verdi will be less than 0.05.
As the P-verdi is less than 0.05, this test indicates that there is a statistically significant difference in attitude towards the various measures.

AGE GROUPS

Variansanalyse: en-faktor

SAMMENDRAG

Grupper	*Antall*	*Sum*	*Gjennomsnitt*	*Varians*
18-24				
Climate	35	126	3,6	0,305882353
Recycling	35	118	3,371428571	0,357983193
Transport	35	123	3,514285714	0,433613445
25-34				
Climate	74	229	3,094594595	0,552573121
Recycling	74	234	3,162162162	0,466493891
Transport	74	234	3,162162162	0,493891151
35-44				
Climate	60	191	3,183333333	0,186158192
Recycling	60	189	3,15	0,366949153
Transport	60	188	3,133333333	0,35480226
45-54				
Climate	55	166	3,018181818	0,462626263
Recycling	55	181	3,290909091	0,469360269
Transport	55	171	3,109090909	0,469360269
55+				
Climate	49	152	3,102040816	0,301870748
Recycling	49	171	3,489795918	0,338435374
Transport	49	151	3,081632653	0,451530612

Variansanalyse

Variasjonskilde	*SK*	*fg*	*GK*	*F*	*P-verdi*	*F-krit*
Mellom grupper	19,5397081	14	1,395693434	3,406530019	2,17444E-05	1,7040834
Innenfor grupper	329,407789	804	0,40971118			
Totalt	348,947497	818				

If the ANOVA statistic is significant, the P-verdi will be less than 0.05.
As the P-verdi is less than 0.05, this test indicates that there is a statistically significant difference in attitude towards the various measures.

Event participants

Variansanalyse: en-faktor

SAMMENDRAG

Grupper	*Antall*	*Sum*	*Gjennomsnitt*	*Varians*
1-3 times yearly				
Climate	82	242	2,951219512	0,466726889
Recycling	82	257	3,134146341	0,389190003
Transport	82	245	2,987804878	0,481330924
4-6 times yearly				
Climate	85	274	3,223529412	0,342296919
Recycling	85	289	3,4	0,361904762
Transport	85	283	3,329411765	0,366386555
7-10 times yearly				
Climate	52	174	3,346153846	0,387631976
Recycling	52	174	3,346153846	0,387631976
Transport	52	167	3,211538462	0,444570136
10+ times yearly				
Climate	30	100	3,333333333	0,298850575
Recycling	30	104	3,466666667	0,326436782
Transport	30	99	3,3	0,424137931
Less than once yearly				
Climate	24	74	3,083333333	0,34057971
Recycling	24	70	2,916666667	0,688405797
Transport	24	73	3,041666667	0,563405797

Variansanalyse

Variasjonskilde	*SK*	*fg*	*GK*	*F*	*P-verdi*	*F-krit*
Mellom grupper	22,0221048	14	1,573007486	3,861480482	2,13243E-06	1,7040834
Innenfor grupper	327,516357	804	0,407358653			
Totalt	349,538462	818				

If the ANOVA statistic is significant, the P-verdi will be less than 0.05.
As the P-verdi is less than 0.05, this test indicates that there is a statistically significant difference in attitude towards the various measures.

Appendix C - Material

C1 – Calculations for cardboard cups

In order to disclose the non-renewable energy usage per kg material and the CO_2 emissions per kg in production phase, findings from Häkkinen & Vares (2010) can be supplemented with the research of Foteinis (2020). According to Foteinis (2020), cardboard cups coated with PET or PLA weigh on average 12 g when the serving volume is 340 ml. Hence, it can be assumed that the non-renewable energy consumption for cardboard cups combined with PE and cardboard cups lined with PLA is 20 MJ/kg and 16 MJ/kg, respectively. The CO_2 emissions in the production of these beverage cups are thereby 4,2 kg CO_2 / kg for cups coated with PE and 4,15 kg CO_2 / kg for cups coated with PLA.

Non-renewable energy usage
Thus, it can be assumed that 1 kg of cardboard cups coated with either PET or PLA includes 83 cups (1 kg/0,012 kg per cup = 83,3 cups per kg).
100 000 cups/83,3 cups per kg=1200
24 GJ/1200 = 0,02 GJ
0,02 GJ = 20 MJ/kg for cardboard cups coated with PET
19 GJ/1200 = 0,016 GJ
0,016 GJ = 16 MJ/kg for cardboard cups coated with PLA

Furthermore, the CO_2 emissions generated in the production phase of PET based cups were measured to be 5038 kg, whereas CO2 emissions caused by PLA based cups were estimated to be 4980 kg.

5038 kg/1200 = 4,2 kg CO_2 / kg cardboard cups coated with PET
4980 kg/1200 = 4,15 CO_2 / kg cardboard cups coated with PLA

C2 – Material analysis

Pros and cons of the materials examined

Material used in beverage cups	Non-renewable energy used in production (MJ/kg material)	CO_2 emissions generated in the production phase (kg CO_2/kg material)	Benefits	Inconveniences	Sources
LDPE	77	1,7	Lightweight and cost-effective Moisture resistant High temperature resistance Transparent, which may be visually satisfying for users	Relatively high non-renewable energy usage Vastly harmful to marine life in case of failed waste management High degradation time	Häkkinen & Vares (2010) Glazner (2015)
PET	83	2,9	Lightweight and cost-effective Moisture resistant High temperature resistance Transparent, may be visually satisfying for users Ability to be fully recyclable if sorted properly	Relatively high non-renewable energy usage Vastly harmful to marine life in case of failed waste sorting High degradation time	Häkkinen & Vares (2010) Glazner (2015)
rPET	4,1	0,5	Lightweight and cost-effective Exceptionally low emissions and energy usage Transparent, may be visually satisfying for users Can be recycled up to eight times	The initial material is produced from oil 100% recyclability is not recommended, as at least 10-20% new material should be added to ensure the viability Vastly harmful to marine life in case	Benavides et al. (2018)

			before total disposal	of failed waste sorting	
PLA	27	1,8	Derived from renewable resources, such as organic plants Biodegradable (does not leave behind any toxic residues) and high recycling rate	Limited recycling facilities Risk of the organic plants to have been sprayed with pesticides that may be transferred into the finished product Vulnerable to heat deformation Restricted to non-carbonated beverages, due to low barrier regarding CO2 Alcoholic products swell the PLA-matrix, eventually leading to leakage	Häkkinen & Vares (2010) Castro-Aguirre et al. (2016) Tsuji & Sumida (2001)
Cardboard cups • **Coated with PE**	20	4,2	Originates mainly from renewable resources	PE coating prevents the cups from being fully recycled PE coating can slow down the process of biodegradation Comparatively high CO2 emissions generated	Häkkinen & Vares (2010) Foteinis (2020) Castro-Aguirre et al. (2016)
Cardboard cups • **Coated with PLA**	16	4,15	Originates mainly from renewable resource PLA coated cups are the only cardboard cups which can be composted fully	PLA coating prevents the cups from being fully recycled Comparatively high CO2 emissions generated	Häkkinen & Vares (2010) Foteinis (2020) Castro-Aguirre et al. (2016)
Reusable	3,7	3,8	Comparably low non-renewable	Costly and weighty regarding the transportation	Chang et al. (2011)

• **Stainless Steel**			energy usage and CO_2 emissions Long-term durability, fully recyclable and high recycling rates Can be used usually for minimum 3 years before a recycling process is required Considerable lower energy and resources used when recycling. Only input is the energy needed to reheat and re-roll the steel	Costly, obliging festival participants to purchase an cup in addition to the cost of their beer Rigid material that can be used to inflict damage	Changwichan & Gheewala (2020) World Steel Association (2015)