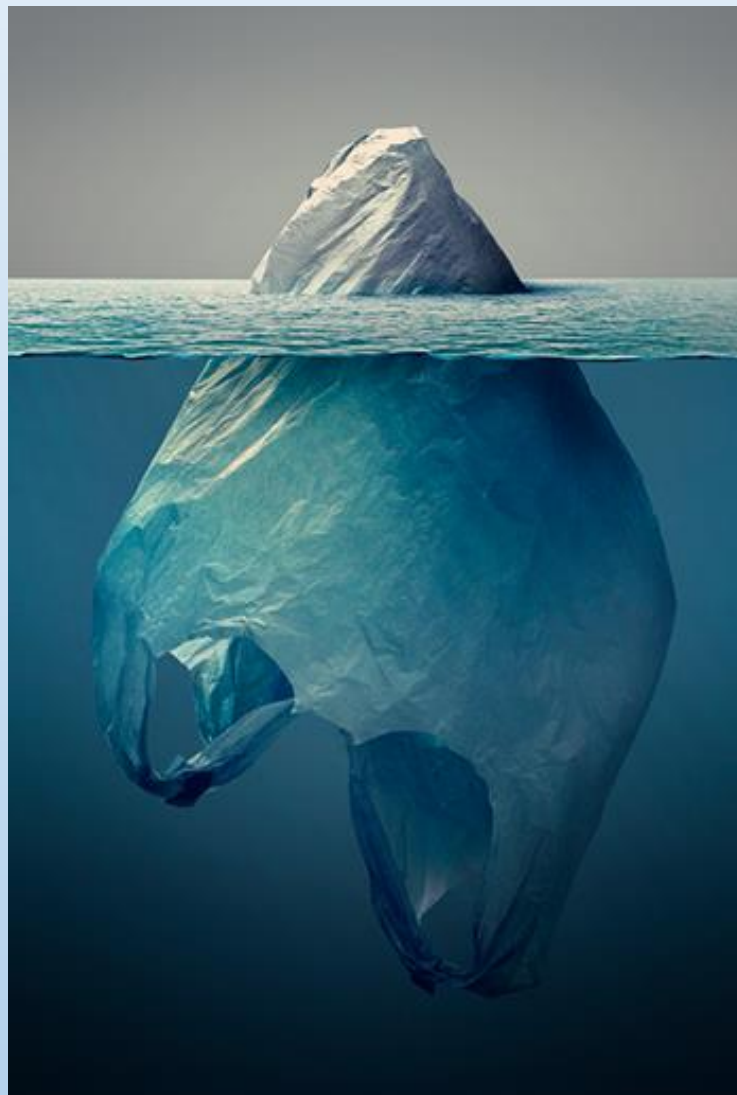# Can a Nudge Perform a Miracle?

A quasi-experimental field study on employees' stated and revealed preferences towards plastic recycling at Haukeland university hospital

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Abstract

Plastic pollution has become a major global problem and recycling is one step to take to solve the issue. A lot of research on nudge theory have focused on consumers, but very few have investigated the effect of nudges on employees' environmental behaviour. Organizations produce substantial amount of plastic wastes where the success of correct recycling depends mainly on employees. The aim of this thesis is therefore to motivate and encourage employees' plastic recycling behaviour by introducing simple nudges and investigate their stated and revealed preferences while taking the value-action gap into consideration.

Theory of planned behaviour and nudge theory were used as conceptual lenses to guide this research. A quasi-experimental field study with one control group and two experimental groups including a pre-post-test was conducted. Based on a review of the literature on nudge theory and theories on human behaviour, interventions were designed, an online survey was distributed, and waste audits were conducted. Nudge interventions were: 1) provision of information on the meaning and purpose behind recycling through a document sent by email, 2) recognition; a poster with a positive message, 3) Instructions; informative posters on how to dispose plastic waste and 4) a reminder to recycle. Results show that one experimental group improved recycling by 42%, the other experimental group decreased by 2 % and the control group experienced a 26% improvement. A combination of meaning and purpose to recycle and simple recognition nudge seemed to have the strongest effect. The intention to recycle had a significant positive effect on stated behaviour, moreover intention and behaviour were similar across groups. There was a slight contradiction in stated and revealed preferences for one experimental group however consistency in preferences for the other experimental group.

In conclusion, emphasizing meaning and purpose and recognizing recycling effort may improve environmentally friendly behaviour. Based on the results, it is recommended that environmental organizations use simple and cheap nudges to target their goal of more correct recycling and in turn gain financial and environmental benefits.

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List of Abbreviations:

A= attitude

CA= cognitive attitude

AA= affective attitude

SN= subjective norm

PBC= perceived behavioural control

COA= control on availability

PE= perceived effectiveness

MN= moral norm

SI= self-identity

IN= intention

B= behaviour

1. Introduction

Plastic is a material of infinite use which on one hand has many benefits and has been a crucial part in modern life, but on the other hand it is polluting and poisoning the planet, harming animals and ultimately human health. Despite the increasing concerns about this global issue in recent years there is still a long way to go to reach a more sustainable relationship with plastic material (Jortveit, 2018). Scientists have recently come up with a plastic material that can be recycled infinite amount of times (Zhu, Watson, Tang and Chen, 2018). In order to take advantage of the scientific findings and have plastic become a more sustainable material, it needs to be properly disposed and recycled after use. This will prevent plastic from ending up in the ocean, put a stop to the use of virgin plastic and ultimately reduces air pollution (Jortveit, 2018). Correct recycling can be the first of many steps towards solving the plastic issue and it can produce a positive and strong ripple effect.

This study will test out simple nudge interventions to see if it can help promote pro-environmental behaviour. The behaviour studied is recycling which is defined as "the action or process of converting waste into reusable material" (Oxford Dictionary, 2019). Recycling involves the collection, sorting and treatment procedure of the used materials so it can become a new product (Wilmet, n.d.). A nudge is a source of encouragement or guidance without mandates and preferably without the need for high financial incentives (Halpern, 2015). The thesis is linked to previous studies that use nudges as a policy tool to study people's behaviour towards plastic bags (Gupta, 2011), willingness to pay (WTP) for different types of plastics and the WTP for the protection of the marine environment (Latinopoulos, Mentis and Bithas, 2018; Yue et al., 2010; Orset, Barret and Lemaire, 2017), food and water waste (Linder, Lindahl & Borgström, 2018; Szabó & Ujhelyi, 2015), parents knowledge on children's reading skills (Jakobsen & Serritzlew, 2016), retirement savings program (Clark, Maki & Morrill, 2014) and environment friendly choices in the supermarkets (de Wijk et al., 2016; Kalnikaitė et al., 2011; Vlaeminck, Jiang & Vranken, 2014).

There is a lot of research on nudge theory with focus on the consumer- and household-level (Gupta, 2011; Linder, Lindahl & Borgström, 2018; Ohtomo & Ohnuma, 2014). However, as far as we know nudging general behaviour of employees towards correct sorting of plastic waste specifically has not yet been addressed in the literature. The thesis aims to add to the literature by studying employees' in the healthcare sector which produces large amounts of plastic waste daily. It is to the best of our knowledge the first study that looks at employees stated and

revealed preferences towards recycling of plastic in a Nordic hospital. Having data on stated-revealed preferences will give a more authentic picture of environment friendly behaviour that might not be attained in a merely stated preference study. We want to examine the relationship between employees' self-reported recycling intention and the ward-unit outcome of employees actual recycling behaviour when nudging is introduced. Simple nudge interventions such as the provision of information, posters and signs will be applied to see if employees experience positive behavioural change.

Studying employees' recycling behaviour is important for organizations, policymakers and analysts concerned with plastic pollution. They often need to develop policies or make decisions about actions that affect the environment and ecosystem. More policymakers are starting to recognize the importance of human behaviour and motivation on the long term global environmental problems such as climate change (Kunreuther & Weber, 2014; Van der Linden et al., 2015). Sorting waste correctly and knowing what type of plastic to recycle will lessen contaminated waste and ensure that recycled waste is accepted by end-point recycler. If we can understand what affects recycling behaviour, we can come up with effective solutions to solve the issue of contaminated recycling bins. If those who are concerned about the climate can work together with public officials, adding nudges to other policy mixes, it is possible to get more effective results compared to relying completely on traditional regulatory tools (Thaler & Sunstein, 2009, Ch.12).

This study is a cooperation with Haukeland university hospital who are currently working on a two-year national plastic project lead by environmental leader Linda K. Eide. They aim to make the whole waste sorting system more efficient starting with plastic material. For a hospital to function efficiently and uphold safety it is necessary and critical to use plastic products. The hospital's goal is to decrease plastic consumption and increase proper recycling (Pedersen, 2019). Working in a hectic and fast paced environment makes it difficult for employees to correctly recycle plastic waste. Proper recycling practices in hospitals are important to prevent wasting valuable resources, increasing cost savings on waste removal and protecting the environment (Helse i Vest, 2009).

The authors of this study will conduct an originally designed quasi-experimental field study on employees recycling behaviour in Haukeland university hospital. The focus of this thesis is to study what effects simple nudges can have on employees' segregation of plastic waste and

addresses the following main research question: **Do nudge interventions have the potential to encourage employees working in a hospital to correctly dispose plastic recyclables?**

The sub-research questions addressed are:

- Which nudge interventions have the strongest effect on employees' plastic recycling behaviour?
- Which variables within the framework of the extended theory of planned behaviour model has the strongest effect on recycling intention and in turn recycling behaviour?
- Is there a gap between employees stated and revealed preferences?

The research questions will be investigated by 1) designing and implementing nudge interventions, 2) constructing, distributing and analysing an online questionnaire (stated preference) and 3) conducting and analysing waste audits (revealed preference).

The paper is organized as follows. Section 2 include in-depth background information about plastic which is followed by section 3 that presents a literature review aiming to broaden our knowledge of nudge theory and see how it is used in different contexts. Following is section 4 which describes different theories that aims to give a better understanding of individual's pro-environmental behaviour. This is followed by section 5 that gives a detailed description on the originally designed experiment, data collection process and methodological choices. Section 6 analyses the results using econometric methods. Discussion and the conclusion are reported in section 7 and 8 respectively.

2. Background

The life cycle of plastic is described in this chapter, including the plastic market, the international goal of sustainable development and the problem of plastic pollution. The recycling system in Norway and Haukeland university hospital are also described. The chapter emphasizes the relevance and importance of this thesis.

2.1 Plastic

Plastic is very versatile, strong, weightless and suitable for packaging material because of its extremely good moisture barrier properties (Andrady, 2011). Since its invention in 1907 it has made many aspects of our lives a lot easier. We find plastic in electronics, cars, furniture, construction materials and appliances among other things (Merino & Ayer, 2018, p. 3&4).

Natural resources such as coal, natural gas, salt and specifically crude oil are the origins of primary chemicals for manufacturing plastic materials. Crude oil is a complex of many different compounds. Oil refinery distillates the heavy crude oil into lighter components and separates them into different mixture of hydrocarbon chains which is a chemical compound made up of carbon and hydrogen. Among them, naphtha is one of the hydrocarbon chains mixture which is vital for making plastic. After the distillation process, polymers are made by forming different compounds into a chain, and different types of plastics are produced by creating different polymers and polymer chains (Rodriguez, 2018).

There are different ways to categorize the various types of plastics. According to chemical composition, plastics can be categorized into carbon-chain polymers and heterochain polymers (Rodriguez, 2018). Based on the quality of resins used for making the plastic, the plastics can be divided into specialty- or commodity resins plastics. Specialty resins plastics for special application are formed by heterochain polymers composed of atoms like oxygen, nitrogen, or sulphur besides carbon and is produced with low volume and high cost. Most of the commodity resins plastics are formed by carbon-chain polymers which have a "backbone" of linear carbon atoms and are produced at high volume and low cost. Based on their characteristics, plastics can also be distinguished between thermoplastics and thermosets. According to (American Chemistry Council, a), 92% of plastics are thermoplastics that can be soften when heated, harden when cooled and mounded into any shape. The melting and cooling process can be done many times without making any change in the thermoplastics' chemistry and characteristics. In contrary, thermosets can never be softened once they have been moulded into shapes. Therefore, recycling and re-usage of the plastics becomes a significant way for sustainable utilization. Hence, correct recycling of different types of plastics is crucial for the re-utilization process (American Chemistry Council, a). There are mainly seven types of plastics which are presented in table 2-1:

Table 2-1. Plastic types (Source: (Mertes, n.d.)

TYPE OF PLASTICS:	EXAMPLES:
1. Polyethylene Terephthalate (PETE or PET)	Soft drink bottles and medicine jars
2. High-Density Polyethylene (HDPE)	Milk jugs and grocery bags
3. Polyvinyl Chloride (PVC)	Shoes, window frames and sewage pipes
4. Low-density Polyethylene (LDPE)	Sandwich bags and cling wrap
5. Polypropylene (PP)	Plastic diapers and yogurt containers
6. Polystyrene or Styrofoam (PS)	Disposable coffee cups and plastic food boxes
7. Other plastics	Nylon and styrene i.e. plastic CDs and eyeglasses

The first six types of plastics are recyclable, the other plastics like nylon and styrene are non-recyclable. The Society of the Plastics Industry (SPI) identifies these plastic types with seven different codes known as resin identification number (Mertes, n.d.).

Rapid growth in plastic production began since the 1950s due to plastics' inexpensive and useful qualities (Ritchie & Roser, 2018), and large amounts of plastics are continuously being produced every year from different parts of the world. According to the Association of Plastics Manufacturers (PlasticsEurope, 2018, p. 18 &19), the world's plastic production was 335 million tonnes in 2016 which increased to 348 million tonnes in only a year. The annually world plastic production has increased by nearly 7 times compare to 50 million tonnes of production in 1970 (Ritchie & Roser, 2018). In 2017, half of the world's plastic production came from Asia, where China was the largest producer with 29.4% of distribution. Europe was the second largest producer responsible for 18.5%. When considering the total amount of plastic production during the last 68 years, the cumulative global plastics production is nearly 8 billion tonnes (Ritchie & Roser, 2018), which is more than the world population today. Even though 30% of the cumulative global plastic was still in use, only 6% of it was recycled and 8% was incinerated (Ritchie & Roser, 2018). This means that in the past large amounts of accumulated plastic wastes were discarded to nature without going through proper disposal process, waiting for nature to degrade the material.

2.2 Plastic pollution

While plastic is very useful it also has capability of causing adverse environmental problems. Plastic made products become waste at the end of its life span, and like other waste in history, it is discarded without proper treatment and left for nature to process. However, according to the second law of thermodynamics, "nature's capability to transform matter and energy is not unlimited" (Callan & Thomas, 2010, p. 7). Plastic is considered as one type of anthropogenic pollutant which needs to be treated properly. When plastic is discarded to nature, it does not disappear, but instead it can take hundreds of years to be degraded (Parker, 2018). It is a problem for nature to decompose it because of the materials it is made from (Merino & Ayer, 2018, p. 4). As mentioned earlier, plastic is primarily made from fossil fuels such as oil and gas. Extracting, refining and transporting oil and gas, producing the plastic products and burning the plastic causes large amounts of greenhouse gasses (Jortveit, 2018, p. 5&9). In Rwanda, plastic bags were wrongly disposed and thrown away in impropriate places. Burning the plastic through incineration released toxic and damaging smoke which covered the air, and the

misplaced plastics resulted into clogged draining systems. This led to the country entirely banning the usage of plastic bags (Hardin, 2018).

Nearly 55% of cumulative plastics have been discarded to landfills during past years (Ritchie & Roser, 2018). Just in Europe, 5.25 billion tonnes of total waste have been landfilled from 1995 to 2015, and 5-25wt% of it was plastic waste (Canopoli, Fidalgo, Coulon, & Wagland, 2018). The landfills occupy a large range of area and pollute soil, air and water. Biochemical and physical processes can be triggered by a mixture of different solid waste in landfills which leads to the emission of gaseous and liquid pollutants (Vaverkova, et al., 2019). These pollutants can harm animals and humans when released into the river and air. Therefore, as being one of the main types of solid wastes in landfills, plastic waste needs to be recycled and treated properly in order to reduce the negative impact of the landfills.

Apart from the various pollutions that plastics can generate, its negative impact on the marine environment and persistent effects on the ocean, wildlife, and humans are drawing growing concerns around the world. According to a group of scientists (Jambeck, et al, 2015), in 2010, 6.4 billion people generated 2.5 billion metric tons (MT) of municipal solid wastes, and about 11% of the wastes were plastic wastes, which means about 99.5 million MT of plastic wastes were discarded. Among those vast amounts of plastic wastes, 4.8 to 12.7 million MT were casted into the ocean. After the plastic wastes are discarded into the ocean, they float on the surface and are transported by currents and winds and ends up forming many garbage patches. Among them the "The Great Pacific Garbage Patch" (GPGP) which located on the North Central Pacific Ocean is the most famous one. Most of the plastic wastes in GPGP come from countries in Asia such as Japan and China. There are about 1.8 trillion plastic pieces which weight 79 thousand tonnes in GPGP, and the most common types are polyethylene (PE) and polypropylene (PP) (Lebreton, et al., 2018). According to Lebreton et al. (2018) one third of the objects that could be identified and analysed had Japanese words or sentences and one third of them had Chinese inscription, the rest of them came from 7 other countries. These plastic wastes are floating in the sea and are continuously broken down by the waves, the sun and temperature changes. As the years pass the plastics dissolve into smaller pieces ranging from 0.05 cm to over 50 cm. When the plastic pollutants are larger than 50 cm, they are categorized as macro-plastics, after they dissolve into smaller pieces, smaller than 0.5 cm, they are called micro-plastics.

Plastic wastes can harm animals and food webs not only when they are larger pieces but also when they are dissolved into micro pieces. Some of the larger pieces of plastic waste found

include among other things water bottles, bottle caps, ropes, fishing nets and packaging straps. When the plastic wastes are not transported by the current to garbage patches, they can be found around the coasts and pollute animal inhabitants. Animals sometimes mistake the plastic for food, and they fill their stomachs with the indigestible material and die from hunger. In other cases, if it is not eaten, it is trapping animals in fishing lines and plastic bags preventing them from movement (Merino & Ayer, 2018). Besides animal species like mammals, birds and reptiles that is being harmed by larger plastic pieces, other species like mussels, corals and salt-marsh grasses which have commercial importance are also being killed or injured (Rochman, et al., 2013a). According to Savoca, Wohlfeil, Ebeler, & Nevitt (2016), it has been found that more than 200 different species including marine fish, sea turtles, birds, penguins, and marine mammals consume plastic wastes in the ocean. The World Economic Forum states that more than 8 million tons of plastic waste infests our ocean yearly. If we don't reduce our plastic consumption, we will end up with more plastic than fish in our ocean by 2050 (Gray, 2018), and it has been predicted that 99% of seabirds in the world will by that time have ingested plastics to their system (Wilcox, Sebille, & Hardesty, 2015). Recently the effects of micro plastic pieces on marine ecosystems and food webs have drawn growing attention. During plastic production, usage and disposal processes, some of the hazardous chemicals that are used for producing plastic polymers can be released (Lithner, Larsson, & Dave, 2011). Half of the chemical ingredients of plastic composition is hazardous (Rochman, et al., 2013b), and moreover, those plastic wastes which are being disposed into the ocean can absorb organic pollutants into them (Clukey et al., 2018). This happens when macro-plastics are dissolved into microplastics. Microplastics can easily adhere waterborne organic pollutants due to their composition and have been considered as bioavailable due to their small size (Savoca, Wohlfeil, Ebeler, & Nevitt, 2016). This mixture of hazardous chemical ingredients and organic pollutants carried by the microplastics, ingested by various classes of marine wildlife, enters and transfers up the food webs. Marine animals such as zooplankton which live at the base of the food webs, are one route for microplastics to enter the food chain and pose a risk to secondary consumers such as fish and molluscs and possibly human health (Kosore et al., 2018). The scope of the plastic problem indicates the pressing need to take action.

2.3 The Plastic Market

Since there is not any substitute which have similar characteristics like plastic, its position in the industrial world and our society remains significant regardless of various kinds of environmental problems it is causing. From the perspective of economics, the environmental

problem caused by plastic production and consumption is considered a market failure. This is because the trigged environmental problems violate the assumption of a fully functioning market (Callan & Thomas, 2010, p. 52). The production and consumption of plastic materials in the plastic market generates a negative externality towards a third party, such as human health and the environment which encompasses the ocean, air and wildlife. The negative externality associated with production can be the emission of hazardous chemicals and greenhouse gases during plastic production process. In most cases, the negative externality is associated with plastic consumption (Callan & Thomas, 2010, p. 62). In the plastic market, once the ownership of plastic products has transferred from supplier to consumer, the cost of waste disposal and the various negative impacts of the plastic wastes are now carried by the consumer.

The market price of plastics does not reflect the external costs towards the group of third party. The reduced market price leads to more production of plastics (Callan & Thomas, 2010, p. 61). This is because in the plastic market, even though the plastic production firms are aware of the environmental damages originated from plastic wastes, they are still motivated to satisfy their own interests instead of taking into consideration the total wellbeing of society. Therefore, the cost of the environmental externality associated with plastic production is not included into the private market decision due to its externality to market exchange. This in consequence causes allocative inefficiency, marginal benefits are not equal to the marginal costs of plastic production, and with undervalued opportunity costs, the actual amount of plastic production is much higher than expected (Callan & Thomas, 2010, p. 62). Since there is lack of incentive mechanisms from both production side and consumption side to absorb the externality costs, the environmental problems induced by plastic waste is hard to be fixed by the plastic market alone. Therefore, a third party such as the government and policy makers are expected to interfere and bring in needed incentives to help the market work towards a solution for the associated market failure (Callan & Thomas, 2010, p. 52). The policy tools which governments usually implement are national bans, taxation of single-use plastics and introduction of educational awareness programs.

2.4 The goal of sustainable development

The goal of sustainable development points out the importance of balancing economic growth and sustainable usage of natural resources for long term perspective (Callan & Thomas, 2010, p. 13). It indicates the obligation and responsibility we have for the future generation where we need to consider the long-term consequences of our decisions. When it comes to plastic pollution, as mentioned earlier, there is a stronger concern and attention around the world to

find solutions for our past mistakes. The New Plastic Economy is driven by a collaboration between industries, cities, governments and NGOs. The ambitions are to create "a system aiming to achieve drastically better economic and environmental outcomes." (Ellen MacArthur Foundation, 2016, p. 4 &19). With this mutual goal, many international institutions, governments, multinational companies, organizations and individuals are exerting their efforts in order to fix this problem by starting with trying to reduce plastic waste and increase proper recycling.

In order to reduce the pollution of plastic wastes, governments around the world have in recent years implemented some regulations and policies. Countries such as America, United Kingdom, Australia and some countries in Europe have adopted interventions such as bans, partial bans and fees for plastic bag usage (Xanthos & Walker, 2017). For example, in the U.S., microbead-free waters act of 2015 was passed, which was an amendment to ban rinse-off cosmetics which contain plastic microbeads in order to reduce water pollution (U.S. Food and Drug Administration, 2017). Canada, U.K., Austria, Belgium and Sweden also banned the manufacturing of plastic microbeads during the time span of 2014 to 2017 (Xanthos & Walker, 2017). The usage of the plastic bag in Scotland has plummeted with a levy emplacement (Zero waste Scotland, 2019). Moreover, several countries in Africa and Asia, have also banned the usage of plastic bags with the concern for the environment. Kenya, Rwanda, Tanzania and Uganda banned the manufacturing and importing of plastic bags (AFP, 2011). In China, free provision of plastic bags that are less than 0.025 mm thick in supermarkets and shops were banned in 2008, and a levy was introduced for usage of bigger plastic bags. This legislation led to a decline in plastic bag usage by 66% within one year (Worldwatch Institute, 2019). In Malaysia, the state also placed a levy charge for plastic bag usage (Asmuni, Hussin, Khalili & Zain, 2015).

According to the Directive of the European Parliament and of the Council, an amendment for reducing the consumption of lightweight plastic bags was launched in 2015. The aim is to reduce the consumption of plastic carrier bags to 90 per person each year by the end of 2019, and 40 per person each year by the end of 2025 (Directive European Union, 2015). In cooperation with this amendment, EU industry showed strong commitment to plastic recycling, and the European commission expects 10 million tons of recycled plastics by the time of 2025 (European Commission, 2018). 72% of Europeans agreed to reduce their daily consumption of plastic bags (European Commission-Press release, 2018). Moreover, new rules are proposed in order to reduce marine litter: exclusively remove 10 single use plastic products such as straws

and plastic cotton buds, reduce the consumption of plastic food containers and drink cups, let the producers cover waste management costs and bring up customers awareness regarding plastics (European Commission-Press release, 2018). In 2018, UN's World Environment Day was about "Beat Plastic Pollution" which aimed to encourage all of us to bring up our awareness level in facing the world-wide plastic pollution damage and take action in reducing and recycling plastic wastes (World Environment Day 2018: Overview, 2018).

Beside governments and international organizations, multinational companies, private organizations and individuals have also begun a course of different actions to reduce the severity of the pollution. Multinational companies such as IKEA and Nestle are on a mission to reduce plastic by eliminating single-use plastic and make packaging reusable and recyclable (Miller, 2019; Butler, 2018). Organizations such as The Plastic Bank founded by Katz and Frankson aim to create value in plastic by giving money, items, blockchain secured digital tokens or by providing a service in exchange for plastic. According to them, increasing recycling and preventing plastics from entering the ocean can be induced when plastic has attributed some value. It helps people living in poor conditions make a better living for themselves by giving collected plastic waste to the plastic bank in exchange for reward (Plastic Bank, n.d.). Individuals such as Boyan Slat, a 23-year-old Dutch inventor founded The Ocean Cleanup project that aims to clean up half the Great Pacific Garbage Patch within a period of 5 years (The Ocean Cleanup, 2018). Ellen MacArthur has created a foundation that aims to create a "circular economy" which is a system that is based on restoration and regeneration (Ellen MacArthur Foundation, 2016, p. 32).

2.5 Recycled plastics

According to the Ellen Macarthur Foundation only 14% of plastic waste is gathered for recycling globally (Ellen MacArthur Foundation, 2016), but this percentage is expected to grow in the near future. In Europe, recycling of plastic waste increased by nearly 80% during 2006 to 2016, and more than 8.4 million tonnes of plastic wastes were recycled in 2016 (PlasticsEurope, 2018, p. 31). When plastic waste is recycled, they are combined with additives such as chemical substances, pigments, other organic or non-organic materials which influence the certain properties of the plastic and reduce their range of application. With certain treatments and processes the plastic can be recovered and become useful again (Mehat & Kamaruddin, 2011). For example, the recycled plastic bags can be transformed into plastic lumber for making benches or fences. Plastic bottles can be made into T-shirts, fleece jackets, sleeping bags and so on. Plastic bottle caps can be made into batteries for cars. Plastic packaging

foam can turn into picture frames and other home products (American Chemistry Council, b). By using proprietary technologies such as Repreve, Unifi (global textile company) has converted more than 10 billion plastic bottles into new products such as footwear and household products, and the company aims to recycle 20 billion bottles by 2020 (Caliendo, 2018).

The plastic recycling industry needs to be developed in order to follow up with the increase in plastic production and the accumulation of plastic waste. According to Millios, et al. (2018), there are some barriers such as regulatory, organizational and technological barriers which hold back the development of plastic recycling in society and result in accumulation of more plastic waste in the environment. A lot of recyclable material are difficult to recycle and have no value because of low market demand. Therefore, the market demand for products made from recycled plastic should be stimulated so that recycling factories can benefit and develop (Sedaghat, 2018; Kvåle, Heie, & Sundell, 2017, p. 37). We as individuals must also take responsibility and start by disposing our waste correctly.

2.6 Plastic in Norway

The Norwegian climate foundation 2018 report suggests three keywords that can help to deal with the plastic problem we are facing, and these are; reduce, recycle and raw material. Firstly, we must think of how we can live with less plastic and how major consumers of plastics such as the food industry and health care sector can use less plastic. Secondly, we must come up with more efficient ways to recycle plastic so that it can be reused multiple times. One way is to make sure the plastic that is being produced is 100% recyclable (Merino & Ayer, 2018, p. 26; Parker, 2018). Lastly, if we are going to cut down on greenhouse gas emissions, the raw materials used to produce the plastic must be biodegradable (Jortveit, 2018, p. 19).

In Norway the supermarkets have a station where consumers can recycle plastic bottles. The plastic bottles are put in a machine and individuals receive deposits as high as 3 NOK for bottles that can store over ½ litre (Infinitum, n.d.). According to NGO Grønt Punkt Norge, 80 percent of plastic collected from different municipalities is sorted into 5-7 different qualities and then shipped to North-Germany. Approximately 95 percent of people in Norway have the possibility to recycle plastic. Each municipality have their own recycling system. Some have a specific bin for plastic, other use a system called Optibag where they use a certain coloured bag for recycled plastic, and some have a system where you bring your plastic to a particular place where they recycle plastics (Grønt Punkt Norge AS, n.d.). According to Svein Erik S. Rødvik, approximately 100 000 ton of plastic is being used as packaging in the markets in Norway. 1/3

of this plastic gets collected by Grønt Punkt, 80 % from this collected plastic becomes a new product and 20% gets used as energy (Jortveit, 2018, p. 41 & 42).

2.7 Plastics in Helse Bergen, Haukeland university hospital

Western Norway Regional Health Authority (Helse Vest RHF) owns five hospitals including Helse Bergen, Haukeland university hospital (Helse Vest, n.d.; Helse Vest, 2017) which is the second largest hospital in Norway (Helse Bergen, 2018). The hospital is the most specialized medical institution with around 12000 employees. In 2017 they attended to more than 900 000 patients (Helse Bergen, 2019; Hartvedt & Skreien, n.d.). The total operating costs in 2017 was 11 billion NOK recorded in the financial statement (Helse Bergen, 2018).

Helse Bergen is environmentally certified after the ISO 14001-standard (Helse Bergen, 2017) which is an international standard for organization quality (Brun, 2017). Seminars are arranged for environmental coordinators to inform about the environmental work that has been done by the hospital and updates them about environmental issues. In 2017 the seminar was about food waste, plastic in the ocean and waste management among other topics (Helse Bergen, 2017, p.14).

Haukeland university hospital has an environmental hall that is placed under the foot of the mountain Ulrikken in Bergen. The hall is 115 meters long, 17 meters wide and 8.5 meters high (Dahl, 2016). All the sorted waste from the different wards in the hospital gets transported to the hall through conveyors (Pedersen, 2019). Helse Bergen generated 2 832 800 kg of waste in 2017. A large portion of it is recovered into energy (Helse Bergen, 2017, p. 5). The most common method used to treat health care waste is incineration (Alvim-Ferraz & Afonso, 2004). However, recycling is a better treatment option compared to incineration (Moharir & Kumar, 2019). Many of the plastic products are made of mixed plastics which makes it difficult to separate and impossible to recycle (Circular Economy, n.d.). Therefore, they are discarded into the residual waste bins where it is afterwards put in district heating (Helse Bergen, 2017, p. 6; Kvåle, Heie, & Sundell, 2017, p. 37).

The types of recyclable plastics used in the hospital are soft plastic, hard plastic and EPS (polystyrene) (Kvåle, Heie, & Sundell, 2017, s. 37). Table 2-2 describes each plastic type:

Table 2-2. Types of recyclable plastics in Haukeland university hospital

TYPES OF PLASTICS:		DESCRIPTION:
1.	Soft plastic	Uncoloured or coloured stretchable plastic: plastic covering cleaned hospital beds, plastic bags
2.	Hard plastic	Uncoloured or coloured non-stretchable plastic: bottles, containers and tumblers
3.	EPS (polystyrene)	Packaging: used for shipping equipment

(Information given by Haukeland university hospital on the 8th of March 2019)

Residual waste contains among other things non-recyclable plastics such as blood bags, bandages and urethral catheter (Kvåle, Heie, & Sundell, 2017, s. 37; Helse Bergen, 2004). The employees in the hospital do not contaminate the polystyrene bins. The issue with the current plastic sorting system is contamination of hard- and soft plastic bins. While all the wards in the hospital should segregate recyclable plastics into three fractions (soft, hard and EPS) there are still some wards who do not follow this system and mix plastic wastes. Instead of sending the waste to be recycled into new products it gets sent to incineration which leads to large hospital expenses. Segregating waste does not only generate environmental benefits, but also financial benefits (Helse i Vest, 2009). According to Jan Arne Netland (2009) it is cheaper to get rid of waste that is disposed properly compared to waste that is contaminated. Helse Bergen saves around 150 000 to 200 000 NOK in a month by sorting their waste correctly.

Haukeland university hospital are in general good at recycling compare to other Norwegian hospitals, but according to the environmental leader, it is believed that less than half of the valuable resources generated in the hospital gets recycled (Pedersen, 2019). Motivating employees and informing them on how to properly source plastic waste is important so that the resources can be best utilized.

3. Literature Review

This chapter is linked to previous studies that uses nudge interventions as a policy tool in many different contexts. Credible sources are used which are obtained from Google Scholar, Science Direct and the data base Oria.no. They help answer questions about what a nudge is, why use a nudge and how to use a nudge. The literature gives an idea of how previous studies tested out the effect of nudges through questionnaires and experiments, and what kind of results we can expect from conducting our experiment. Some of the journals used are the journal of; waste management, environmental science and pollution research, health economics, ecological economics, economic psychology and the journal of socioeconomics. A table with all the empirical literature that has been reviewed in this paper is provided in appendix A. It includes

name of the authors, date, location, research question, methodology & theory, econometric methods, collection of data and results of the studies.

A large empirical literature studies people's environmental values and actions (Blake, 1999; Chai, Bradley, Lo and Reser, 2015; Flynn, Bellaby & Ricci, 2010; Lane & Potter, 2017; Vlaeminck, Jiang & Vranken, 2014). The studies look at different factors such as values, beliefs, attitude, intentions, actions, norms, knowledge, motivation and behaviour. They also explore the "attitude-action gap" that is also referred to as "value-action gap" or "intention-action gap", which states that what people intend to do might not be what they end up doing. An interesting study from Australia looked at the climate value-action gap which is when people express concerns regarding the environment but do not fully commit to change their behaviours accordingly. The study found evidence of tendencies for consumers to imitate visible pro-environmental behaviour of their peers. In other words, peer-green behaviour encourages others to make better climate friendly choices (Babutsidze & Chai, 2018).

Previous studies have been using different theories to try to understand the value-action gap and people's decision-making process. To mention a few, the theories used are random utility theory, Lancaster's characteristic theory of value, theory of reasoned action, theory of planned behaviour, nudge theory, rational choice theory, theory of hyperbolic discounting, consumer theory and "value-belief-norm theory"(Afroz, Hanaki & Hasegawa-Kurisu, 2008; Babutsidze & Chai, 2018; Blake, 1999; Emberger-Klein & Menrad, 2018; Flynn, Bellaby & Ricci, 2010; Jakobsen & Serritzlew, 2017; Lane & Potter, 2017; Latinopoulos, Mentis and Bithas, 2018; McCoy et al., 2018; Ohtomo & Ohnuma, 2014). This study will use utility theory, rational choice theory, Self-determination theory, theory of planned behaviour and nudge theory to design the experiment and to understand the results of this study.

Ways to minimize the climate value-action gap are to remind people of environmentally friendly values, make pro-environmental actions easier and destructive actions costly, moreover, prolong peoples' commitment to these values. These guidelines are achievable by using different nudge interventions. Nudge theory has been widely used in fields such as education (Jakobsen & Serritzlew, 2016; Onji & Kikuchi, 2011), agriculture (Duflo, Kremer & Robinson, 2011), health (Goldzahl, Hollard & Jusot, 2018; Kopelman, 2011), transport and climate change (Avineri, 2012). Different studies consider different types of nudges such as provision of information, changing the physical environment or the default options, using social norms and regular feedback (Nielsen et al., 2016, p.16 & 17). McCoy et. Al (2018) showed that nudging through choice architecture can enhance the efficiency of a recycling program that is

already considered as successful. Their hypothesis was "As convenience becomes less of an obstacle to basic recycling behaviours, there will be an increase in recycling compliance rates". Results showed that just changing the location of the recycling containers changed the rate of recycling. A study from Japan looked at how a voice prompt at a supermarket could affect the behaviour of shoppers. The voice prompt intervention activated anti-plastic bag usage behaviour and influenced shoppers' motivation. The shoppers were aware of their decision and therefore took an environmental action on purpose and not spontaneously. Many behaviours which can be damaging to the environment are not done on purpose. Designing effective interventions and implementing the interventions continuously can reduce harmful unintended behaviours (Ohtomo & Ohnuma, 2014). Other nudges have been used in supermarkets to effect consumers' behaviour such as use of labels (Vlaeminck, Jiang & Vranken, 2014) and lambent devices (Kalnikaitė et al., 2011), placement of healthy foods in more accessible places (de Wijk et al., 2016). and placing baskets around the store so when people decided to change their mind about an item, they have the possibility to leave it in the basket and not in inappropriate districts (Badiu, Mitiu, Zidaru, Marcu & Iordănescu, 2016).

When studying the effect of a nudge, stated preferences (SP) and revealed preferences (RP) are reviewed. SP are when employees state what they prefer when asked directly to choose among different alternatives, for instance plastic cups or glass. RP are employees' preferences that are revealed from their actual behaviour (Grisolía & Willis, 2015).

Studies conducting field experiments investigate participants' revealed preferences by observing their real actions (Grisolía & Willis, 2015). A revealed preference study by Gupta (2011) showed that "bring your own bag, get cash back" intervention was the most effective one out of the three incentives tested; 1) informing people about the environmental impact of plastic bag use by providing positive and negative information, 2) cash back scheme and 3) provisions of substitutes such as cloth bags. Results showed that the number of consumers who used their own bag increased by 2% in four weeks. People who were most affected by the three interventions were non-earners; students, housewives and retired. The non-earners swapped to using their own bags.

Studies conducting a choice experiment or using a contingent valuation method investigate stated preference (Grisolía & Willis, 2015). Latinopoulos, Mentis and Bithas (2018) conducted a choice experiment study in Syros, a major Greek Island. They studied how people change their stated preferences and values when they are informed about the function of ecosystems, environmental impacts, environmental quality and risk. The aim was to reduce plastic waste in

the coastal marine environment. They had two samples of respondents, one was collected before an information campaign and the other sample was collected after. The results showed the public information campaign significantly affected the respondents' stated willingness to pay for protection of the marine environment.

A stated-revealed preference study evaluated the effect of an in-depth water education program on people paying their water bills in South Africa. The program included household visits where education officers gave information on water consumption and how to improve the management of water in the household. The aim was to decrease the water waste and the monthly water bill. In addition, informative brochures were given. Results showed that the water use decreased to some degree. The information campaign lowered the non-payments by 4% and the number of households paying their bill increased by around 25% in the short run (Szabó & Ujhelyi, 2015).

Economists often favour data collected from RP since it is based on individuals' actions rather than words (Grisolía & Willis, 2015). Because of the innate challenges when documenting actual impact of a nudge, a lot of research focuses on self-reported impact. The SP method is easy to control, very flexible and cheap to apply (Kroes & Sheldon, 1988). This thesis looks at SP through a self-reported questionnaire and RP through waste audits.

Willingness to pay (WTP) is a popular welfare measure used in the literature (Afroz, Hanaki & Hasegawa-Kurisu, 2008; Yue et al., 2010). It is defined as "the value or benefit the consumer expects to receive from consumption of the commodity" (Callan & Thomas, 2010, p.28). Orset, Barret and Lemaire (2017) evaluated the consumers' WTP for different types of plastics such as biodegradable, recyclable and organic plastic materials used for the packaging of water. They found that informing the consumers about the different plastic types and their environmental impacts had a significant affect and mattered in terms of the consumers' WTP. The WTP for plastic bottles decreased significantly when the respondents were informed of the negative environmental impact. However, the WTP for recycled plastic bottles increased when the respondents were informed about an eco-friendly alternative to plastic bottle. A SP study from India looked at the pre- and post-WTP for implementation of a waste management program. Interestingly the results showed that the post-WTP for the program declined by 50% compared to the pre-WTP when it was just a hypothetical public program. The perception of time, cost of segregating and storing garbage was not taken into consideration by the households. The benefits from the program did not outweigh the cost of lost leisure time (Sarkhel, Banerjee. Sa. &. Banerjee. So., 2015).

There are many different econometric methods used in the previous literature such as OLS regressions models, linear mixed model, ANOVA, Poisson regression model, Difference-in-Difference method, MANOVA, logit and probit models. The methods applied in this research is correlation analysis, factor- and reliability analysis, and OLS regression models.

Information and knowledge are key factors to overcome the problem of plastic waste. Miranda and Blanco (2010) describe the importance of environmental awareness and how it influences paper recovery in European countries. They state that information and education are requirements for reaching long-term changes in people's behaviour when it comes to a sustainable society and a market for secondary raw materials. Another study from Ohio also emphasizes the importance of awareness through education and outreach which can be an effective way to change behaviour regarding plastic usage (Bartolotta & Hardy, 2018). Students in Sharjah city, UAE showed tendency to interfere in the fight against plastic pollution. Gender, grade and mother's educational level were factors that effected student's awareness towards plastic pollution. Students with educated mothers were more prone to pro-environmental behaviours (Hammami et al., 2017). Cooper & Nisbet (2017) studied how to overcome the task of informing and influencing people about climate change through documentaries. They found out that informing people about the risks of climate change should also include information on what actions people can take to mitigate such risks. This will force people to make a positive change and not avoid or deny climate change. A study conducted in Malaysia looked at level of knowledge, awareness and attitude towards plastic waste. They found that environmental factors are stronger than financial factors in motivating people and encouraging them to participate in a "no plastic bag" campaign. The authors assume that the more information and convincing knowledge the respondents have about recycling, the more they will be willing to participate in the campaign and have a more positive attitude towards recycling (Afroz, Rahman, Masud & Akhtar, 2016).

Providing information has been frequently used as the main type of nudge (Nielsen et. al., 2016, p.16, Schmeiser, Stoddard and Urban, 2016, Van der Linden, 2015, Li, 2018). Researchers have provided information through designing leaflets, booklets and fliers that were distributed through mail or given directly to people. The information used came from professionals or they conducted interviews and designed booklets based on individual's interests or lack of awareness on certain topics (Clark, Maki & Morrill, 2014; Jakobsen & Serritzlew, 2016; Linder, Lindahl & Borgström, 2018; Verplanken & Roy, 2016). A longitudinal field study conducted in Sweden looked at what impact an informative leaflet had on food waste in an urban area. The leaflet

was designed with focus on theories from environmental psychology and behavioural economics. Promoting pro-environmental behaviour changes was the goal behind distributing the leaflets. The study was done in the span of two years and results showed that the informative leaflet significantly increased food waste recycling. The interesting finding was that even after 8 months since the distribution of the leaflet the difference between the experiment group and the control group was still significant (Linder, Lindahl & Borgström, 2018).

Providing information through labels and signs have been used by researchers. Evidence from a field experiment conducted in a supermarket showed that introducing environmental information labels made it easier for consumers to make environmentally friendly choices. They had different labels with information about the products carbon emissions, energy use, water use, land use and soil. When the consumers go to buy a product, they know the impact their choice has on the environment. The best label was preselected in an online survey and it increased the eco-friendly consumption by 5.3% (Vlaeminck, Jiang & Vranken, 2014). Other studies using eco-labels as a nudge are Emberger-Klein & Menrad (2018), Loureiro & Lotade (2005) & Teisl, Rubin, & Noblet (2008). Werner, White, Byerly & Stoll (2009) tested four different signs (validation/no validation, strong/weak arguments) to see if it encourages people to recycle. The weak argument sign with validation increased recycling more than the strong argument validation sign. Austin, Hatfield, Grindle and Bailey (1993) also used a sign prompt posted above the receptacles and results revealed that the sign improved and increased recycling.

Contrary to the studies mentioned above, there are examples of some studies that either failed or found weak or mixed effect from information interventions (Allcott and Taubinsky, 2015: Avitabile & De Hoyos, 2015; Bernstad, 2014; Bettinger, Long, Oreopoulus & Sanbonmatsu, 2012; Hastings, Neilson and Zimmerman, 2017; Miesler, Scherrer, Seiler & Bearth, 2016; Ratner et al., 2008; Slemrod, Blumenthal and Christian, 2001). A study conducted in France tested out four behavioural interventions to see if they could influence the usage of mammography. The control group got a standard invitation letter. The first treatment was to add the official logos of the three National Health Insurance funds in the envelope. The second treatment was to produce a clearer, easier and understandable letter. The third treatment mixed the first and the second treatment together. The fourth and last treatment was a social-norm treatment which included information about what other people are doing. The results showed that none of the interventions had any impact on mammography usage (Goldzahl, Hollard & Jusot, 2018). Campbell-Arvai, Arvai & Kalof (2014) found that providing information on

menus did not affect individual pro-environmental food choices. It did not have a significant effect on their choices of a meat-free menu option. Information through staff education showed also weak effects. Staff education was performed in hospitals in the UK to encourage segregation of waste. A waste audit was performed pre- and post-staff education. The post-waste audit was performed a month later and the results showed that educating the employees had no effect. The segregation of clinical and non-clinical waste did not improve. The researchers concluded that team engagement and supportive management are very important and necessary factors to have in order to succeed in improving the quality of waste segregation (Runcie, 2018). Poor segregations of hospital waste can be caused by factors such as lack of awareness and willingness to dispose the waste in its respective bin (Haylamichael, Dalvie, Yirsaw & Zegeye, 2011), lack of colour coding (Mbongwe, Mmereki & Magashula, 2008), lack of sufficient attention and proper source segregation (Al-Emad, 2011; Al-Khatib, Al-Qaroot & Ali-Shtayeh, 2009; Askarin, Vakili and Kabir, 2004; Gupta & Boojh, 2006) and lack of waste composition and quantity related records (Bdour, Altrabsheh, Hadadin & Al-Shareif, 2007).

4. Theory

Several theories are discussed in order to get a better understanding of the mechanisms of individual pro-environmental behaviour in a work situation. The chapter starts with Utility- and Rational Choice Theory that presents an economic perspective of human decision-making process. This is followed by Self-determination Theory which gives an insight into the origin of different motivation types behind pro-environmental behaviour. It goes on to the Job Characteristic Model that helps us imagine how an individual's recycling behaviour would be in a work environment. Afterward, a discussion about meaning and purpose serves a direction for designing some of the nudge interventions. Further it describes the Theory of Planned Behaviour which is the foundation for the questionnaire. Finally, the Nudge Theory defines the nudge concept and presents different types of nudges. All the theoretical perspectives help with designing the study and understanding and interpreting the data.

4.1 Utility theory

Utility, also known as welfare, is the degree of satisfaction that comes from an activity (Cipra, 2010, p.91). Utility theory describes an individual's choice, preferences & decisions. The theory is concerned with an individual's "judgements of preferability, worth, value, goodness or any of a number of similar concepts" (Fishburn, 1968). The fundamental utility theorem states that an individual when given a bundle of alternatives, chooses the alternative that is more attractive

i.e. yields the highest utility (Fishburn, 1970). Random utility theory assumes that a decision-maker is rational and will choose the alternative that gives maximum utility. It is applicable to a wide range of context (Cascetta, 2009), in our context it is employees' disposal choice. When facing the issue of plastic recycling in a working environment, the rational choice is to recycle plastic waste instead of trashing them. For a rational employee there are negative emotional connotations from wasting valuable resources. The utility the employees derive from disposing plastic waste correctly is the satisfaction of knowing that they are contributing to a better environment in and outside the hospital. Andreoni (1990) states that social pressure, guilt, sympathy and the so called "warm glow" can have a major effect on a decision-maker. Factors such as how individuals feel about themselves and how their colleagues see them can influence their recycling behaviour and their welfare (Czajkowski, Hanley & Nyborg, 2017). An individual will make a decision that is most likely influenced by the actions of others (Fishburn, 1968).

Some constraints that employees might face when trying to maximize their utility is time-, money-, knowledge- and information constraints. Confusion about whose responsibility it is to recycle, and a hectic work environment can also be restrictions. All these factors work as barriers from reaching the optimal utility which is to recycle plastic waste.

4.2 Rational Choice Theory

In economics, rational choice theory states that when humans are presented with various options, they will compare the cost and benefits and act rationally before making a decision. Rational choice theory denies the existence of non-rational actions (Browning, Halcli & Webster, 2000, ch.9). For years, academics and specialists have been using the traditional economic theory that assumes perfect rationality to deal with inefficiencies in the markets and imperfect resource allocations. Microeconomic theory states that a rational behaviour is characterized by three axioms; completeness, transitivity and continuity. Completeness describes the fact that a rational individual can completely distinguish the desirability of two alternatives. The two alternatives are either identically desirable or one is more desired than the other. Transitivity means that an individual put choices in such an order where the first choice is better than the second and third, and the second choice is better than the third. Continuity is when an individual prefers alternative A over B and therefore other alternatives that are "close to" A must also be preferred over B. According to the axioms individuals know what they want and make optimal choices accordingly (Riker, 1995, p. 24, Nicholson & Snyder, 2017, p.89).

4.3 Self-determination theory

Self-determination theory (SDT) aims to study the human functioning when encountering choices (Deci & Ryan, 1985). This functioning is originated from human motivation and personality which is considered as evolved inner resources during the process of self-personality development and behaviour self-regulation (Ryan, Kuhl & Deci, 1997, as cited in Ryan & Deci, 2000). The natural growth tendencies, psychological needs of people and the conditions which stimulate the process is investigated by the theory (Ryan & Deci, 2000). The level of self-determination underlying one's specific behaviour is the basis to distinguish different types of human motivation. Motivation is one's willingness to do something, not only initiates and gives direction to one's behaviour but also determines the persistency and intensity of one's behaviour. The sub-categories of motivation are; intrinsic motivation, extrinsic motivation and amotivation (Pelletier, Tuson, Green-Demers and Noels, 1998).

When the motivation of conducting certain behaviour comes from within an individual it is called intrinsic motivation. It is the source of energy which maintain an active organism (Deci & Ryan, 1985). Intrinsic motivation is affected by one's personal attitudes and values, and not controlled by an external force. For example, if one's particular behaviour such as recycling plastics is carried out by pure pleasure and there is contentment generated by conducting this activity alone instead of any other external forces like social pressure, then we say this behaviour is intrinsically motivated. Motivation inspired by external forces such as others or events is called extrinsic motivation and it is affected by injunctive norms such as "sets of beliefs about the behaviour of others" (Cialdini, 2003). The behaviour originated from extrinsic motivation is considered as instrumental behaviour in order to gain potential rewards or avoid potential punishments (Pelletier et al., 1998). Such rewards can be social acceptance from certain community or monetary award, and potential punishments can be a fine or loss of social acceptance. When there are no intrinsic motivation or extrinsic motivation in doing a behaviour, it is called amotivation (Pelletier et al., 1998). Pro-environmental behaviour such as recycling plastics are a kind of amotivation to a range of people, since there is lack of not only intrinsic motivation with intention of solely pleasure and satisfaction, but also external motivation with intention of getting rewards and avoiding any potential punishment. This is considered due to the lack of awareness and understanding of the consequences of their simple behaviour such as throwing away plastic waste in inappropriate places which have potential harmful impact. Therefore, we can expect people with amotivation in recycling plastic behaviour to improve

their self-determination level to external motivation or even intrinsic motivation once they understand the meaning and benefit of carrying out this kind of behaviour.

Like many other human behaviours, pro-environmental behaviours are not intrinsically motivated (Osbaldiston and Sheldon, 2003). However, extrinsic motivation can be converted into intrinsic motivation when social norms are absorbed and internalized. According to Ryan and Deci (2002, p.102), external behavioural regulations can be assimilated into individual's cognitive structure so that they are no longer understood as external regulations, but as originating from the individual's self, this process is called internalization. For example, an individual who recycle plastics because it coheres with his or her personal value system has internalized environmental beliefs that value and support this behaviour. Therefore, the individual feels plastic recycling behaviour is due to his or her volition, not because of coercion. When an individual is regulated in this way, the individual does not necessarily extract pleasure from performing the behaviour but is happy to perform the behaviour itself (Ryan & Deci, 2002, p.104). Many pro-environmental behaviours are performed because of this reason (Osbaldiston and Sheldon 2003). Therefore, even though recycling behaviour is not perceived as pleasurable by most people, people who actually put it into practice is because it coheres with his or her personal endorsed set of values. From the SDT we would expect that introducing nudge interventions to bring up the awareness and understanding level of the positive effects of pro-environmental behaviour are expected to influence people with amotivation and also enhance the internalization levels of people with external motivation.

Cognitive evaluation theory (CET) is a sub-theory within SDT which claims that key factors such as competence, relatedness and autonomy need to be satisfied in order to maintain and enhance intrinsic motivation (Deci and Ryan, 1985, ch.3). These are natural psychological needs which is crucial for optimal self-development, social development and individual wellbeing (Ryan & Deci, 2000). The need for competence can be satisfied when individual experiences a feeling of control over the action, the action is an optimal challenge and the individual can receive proper feedback. Positive feedback which fulfils perceived competence can facilitate intrinsic motivation, whereas negative feedback can decrease intrinsic motivation (Vallerand & Reid, 1984). The need for autonomy is fulfilled when the individual has opportunity of self-government which generates a sense of responsibility. Intrinsic motivation is increased with presence of choice compared to the absence of choice in doing a certain activity (Zuckerman, Porac, Lathin & Deci, 1978). The need for relatedness can be fulfilled when an individual has a feeling of belonging to a certain social group.

4.4 The Job Characteristics Model

Employees at Haukeland university hospital are required to segregate plastic waste. The hospital aims to reduce the costs originated from misplacing plastics and contribute to better the environment, hence, the emphasise and focus on correcting poor recycling behaviour. However, waste recycling can be perceived as a small part of the employees' job. According to Heckman and Oldham's job characteristics model of work motivation (1976), the experienced meaningfulness, experienced responsibility for outcome, and knowledge of the actual results of the work activity are three main critical psychological states which determines an employee's work productivity. The psychological state of experienced meaningfulness of work describes to which degree the employee perceives plastic recycling as a valuable and worthwhile task. The psychological state of experienced responsibility for outcome describes "to which degree the employee feels he or she is personally responsible for the result of plastic recycling task" (Heckman & Oldham, 1976). Even though plastic recycling is required as a task for employees from the hospital's view, according to the environmental leader, employees don't pay enough attention towards this task mainly due to a hectic work environment and the perception that recycling is a responsibility for environmental workers. Thus, the degree of experienced responsibility from work outcome is considered low. By designing interventions that can explain the importance and meaningfulness of plastic recycling both to the individual and the hospital, we expect the degree of experienced meaningfulness and responsibility from this task outcome can increase. The psychological state of knowledge of result means "to which degree the employee knows about the effectiveness of his or her performance on this task". The three main critical psychological states are taken into consideration when designing the interventions.

4.5 Meaning and purpose

According to Ariely, Kamenica & Prelec (2008), even though meaning is cheap in a way, undervaluing the importance of the understanding of meaning can be quite expensive, this applies to both employer and society. Moreover, labour is meaningful if it gets recognized and perceived as purposeful. Recognition means the labour one contributes gets recognized by other people. The purpose and meaning means to what extent one employee understand the interdependency between his/her work and others, or to some objectives. This is in contradiction with traditional Taylorism, in which employees don't get the opportunity to understand the correlation between their work. In this article, plastic recycling is considered as

a simple task in a work environment. Understanding the meaning and purpose behind recycling plastic, and giving recognition towards this behaviour, are expected to make this "labour" more meaningful to employees in the hospital. Perceived meaning effects the quantity and quality of output, and moreover, the quantity of output increases with perceived high meaning whereas the quality of output decreases with perceived low meaning (Chandler & Kapelner, 2013). This suggests, the quantity of recycled plastics gets increased with higher understanding of the purpose of the activity, and the quality of recycled plastics (placement of plastics in correct recycle bin) gets decreased with lower understanding of the meaning.

Browning et al. (2000) mention briefly the pigeon experiment conducted by Skinner who studied pigeon's behaviour and found that animal behaviour changed based on if they were given food or not. Humans compared to animals are motivated by other factors than only food such as "approval, recognition, love or money." According to Browning et al. (2000), George Homans saw approval as an equivalent to money. Money is an economic exchange while approval is a social exchange. This means giving approval and recognition can be an alternative to incentivizing employees for recycling plastic waste properly.

4.6 Theory of Planned Behaviour

When studying human behaviour, theory looks at psychological biases during the decision period. Psychologist look at actual choice behaviour and are interested in predicting how an individual will behave (Fishburn, 1968). We want to understand human decision-making and therefore focus on real life cases where individuals are humans who often make errors rather than studying perfectly rational cases. Real life cases are the type of cases that policy makers deal with daily and therefore neglecting perfect rationality will be more relevant for policy makers who put policies and public interventions in place to better society.

According to Poškus (2015) theory of planned behaviour is commonly used to understand recycling and sustainable behaviour. Theory of reasoned action (TRA) and theory of planned behaviour (TPB) is centred on a theoretical model that studies individuals' motivational factors that causes the likelihood of performing a specific behaviour such as recycling plastic. TPB is an extension of TRA which declared behavioural intention as the most important factor of an individual's behaviour. Ajzen (1991) considered the importance of individuals intentions to motivate and influence a behaviour. Intentions indicate the level of willingness and effort to perform a certain behaviour. The rule of thumb states: "the stronger the intention to engage in a behaviour, the more likely should be its performance". Direct causal factors of individuals

behavioural intention are; attitude and subjective norm. TRA is a limited model compared to TPB since it predicts behaviours that are under volitional control. It states that under volitional control an individual "decide at will to perform or not perform the behaviour" (Ajzen, 1991, p.181-182). TPB adds an extra variable; perceived control and attempts to find behaviours where there is a decline or incompletion in individuals' volitional control (Ajzen, 1991). The three factors can be explored to get a better understanding of what influences individuals' decisions to engage in a certain behaviour (Montaño & Kasprzyk, n.d.). Figure 4-1 represents the three variables that TPB proposes as predictions for the intention behind a behaviour: 1) attitude toward the behaviour, 2) subjective norm and 3) perceived behavioural control. These three variables affect employees' intention that in turn affect their behaviour (Ajzen, 1991; Montaño & Kasprzyk, n.d.; Rivis & Sheeran, 2003). According to Klöckner & Prugsamatz (2012) one can look at past behaviour to know how individuals might behave. How an individuals' behaviour has been in the past is according to psychology a good predictor of how an individual will behave in the future.
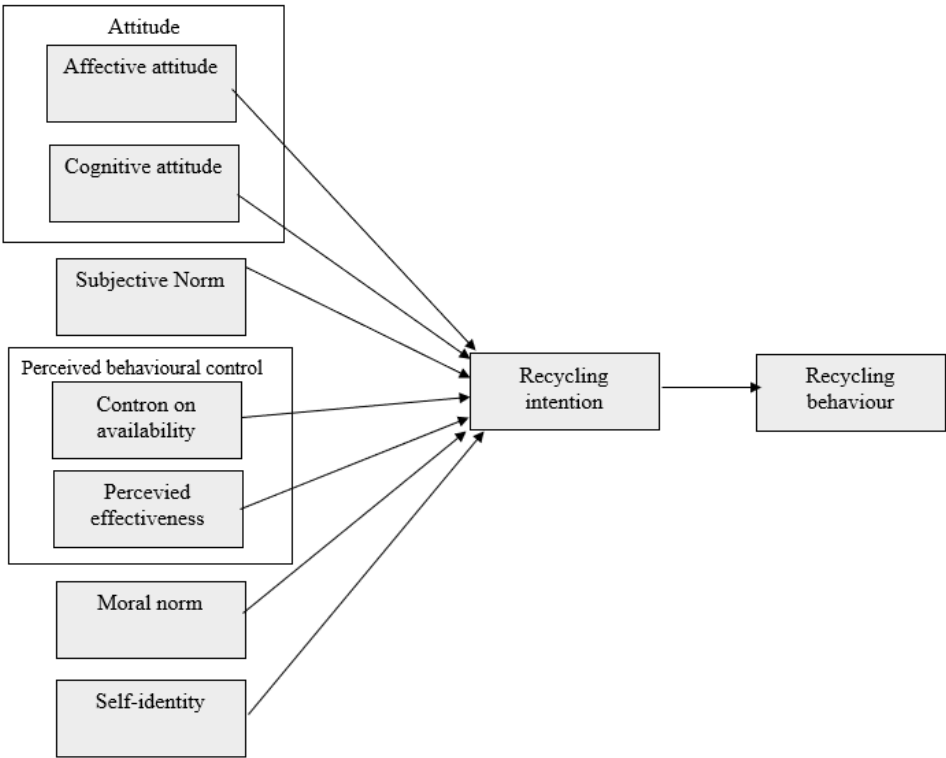
Figure 4 -1. Extended Theory of Planned Behaviour Model

Attitude (A) towards a behaviour explain employees' evaluation of the behaviour, whether they think it is favourable or unfavourable to recycle plastic waste in a hospital. An employee that has a strong belief that positive outcomes will come from recycling plastic is an employee with

a positive attitude. Contrary, an employee who has a strong belief that negative outcomes will come from recycling plastic is an employee with a negative attitude.

The TPB assumes that the attitude variable is based on cognitive beliefs. But this assumption has been criticized by authors such as Bagozzi and Yi (1988) and Zanna and Rempel (1988) who argue that the model lacks attention to the affective aspect of attitude. Considering attitude as a construct of two components; affective- and cognitive attitude has been empirically confirmed by several researchers (Batra & Ahtola, 1990; Edwards, 1990; Trafimow & Sheeran, 1998). Affective attitude (AA) is influenced by emotions and cognitive attitude (CA) is when an individual evaluates a behaviour in a rational way (Boers, Zebregs, Hendriks & Van den Putte, 2018).

Subjective norm (SN) is a social pressure that affects an individual to engage in a behaviour. It is determined by the individuals' normative beliefs, that is, if employees will comply with performing a behaviour based on whether important individuals approve or disapprove of performing that specific behaviour. Employees who believe that their boss think they should recycle plastic properly at work and are motivated to meet his/her expectations will have a positive subjective norm. Contrary, employees will have a negative subjective norm if they believe that their boss think they should not recycle plastic at work since it is not the main task (Ajzen, 1991; Montaño & Kasprzyk, n.d.; Rivis & Sheeran, 2003).

Perceived behavioural control (PBC), also known as self-efficacy beliefs, is the employees' perception of the degree of difficulty in engaging in a behaviour. The stronger the PBC is regarding recycling plastic which entails less obstacles and the belief of available resources, the more likely the employees are intended to recycle plastic. If employees perceive recycling to be difficult or easy will in turn effect intention and direct behaviour. In the original TPB model there is a stippled line going from PBC directly to behaviour. It shows that PBC can also affect behaviour directly (Ajzen, 1991; Montaño & Kasprzyk, n.d.; Rivis & Sheeran, 2003).

Kumar (2012) used two variables to indicate PBC; control on availability (COA) and perceived consumer effectiveness. Perceived effectiveness (PE) is closely related to the concept of PBC (Ajzen, 1991) and is usually used in studies investigating green consumer behaviour (Kumar, 2012). In the present study, COA is the degree of difficulty or ease in recycling plastic waste. Unavailability of resources for recycling plastic waste will make a motivated employee less likely to recycle. PE used in our model explains to which extent employees believe their

personal effort, when it comes to recycling, helps bring about solutions to the plastic problem (Vermeir & Verbeke, 2008). The stronger their belief that their efforts and actions matter the greater the likelihood of recycling.

Armitage and Conner (2001) conducted a meta-analysis of 185 studies and found that the TPB on average explained 27% and 39% of the variance in behaviour and intention respectively. The model has been criticized for insufficient consideration of affective and moral influences on behaviour. Therefore, besides the subcategories of attitude, subjective norms and perceived behavioural control one can add several additional variables to increase the predictive ability of the model. Ajzen (1991, p. 199) stated that the TPB "is in principle, open to the inclusion of additional predictors if it can be shown that they capture a significant proportion of the variance in intention or behaviour after the theory's current variables have been taken into account". Additional variables used in previous studies are moral norms, self-identity, situational factors, knowledge, motivation, awareness and concerns for the environment (Kumar, 2012; Macovei, 2015; Rise, Sheeran & Hukkelberg, 2010; Tonglet, Phillips & Read, 2004). The added variables improve the direct measure of behaviour (Nigbur, Lyons & Uzzell, 2010). According to Wooldridge (2015) if one adds more factors to a model that are helpful in explaining the dependent variable then more of the variation in the dependent variable can be explained.

The variable moral norm (MN) is originally from Schwartz's (1977) theory of personal normative influences on altruism. The idea behind the theory is that "altruistic behaviour is causally influenced by feelings of moral obligation to act on one's personally held norms". Individuals are motivated to do actions that are in line with their values and self-worth. There are standards set for individuals' behaviours that are based on internalized norms. These performance standards are self-reinforcing (Schwartz, 1977).

Self-identity (SI) is how an individual perceives themselves in terms of salient and enduring aspects (Rise, Sheeran & Hukkelberg, 2010). Yazdanpanah & Forouzani (2015) used both self-identity and moral norms as additional variables to the original TPB model. An example of a SI item is "Consuming organic food is an important part of who I am". A MN item is "I feel an obligation to purchase organic food rather than non-organic food".

TRA and TPB has been successfully used to predict and explain recycling behaviours and intentions (Chan & Bishop, 2013; Cheung, Chan & Wong,1999; Nigbur, Lyons & Uzzell, 2010;

Strydom, 2018) and environmental behavioural intentions in workplace (Greaves, Zibarras & Stride, 2013). Findings helped develop effective interventions in behavioural changes.

4.7 What is a 'Nudge'?

Since Richard H. Thaler and Cass R. Sunstein wrote the famous book "Nudge: Improving Decisions about Health, Wealth, and Happiness" (2008) the concept of nudging has become an attractive topic discussed in recent years. Nudge theory is a research area that has grown rapidly (McCoy et al., 2018, Schubert, 2017). The Cambridge dictionary's definition on a nudge is "to encourage or persuade someone to do something in a way that is gentle rather than forceful or direct" or "to push something or someone gently, especially to push someone with your elbow to attract the person's attention" (Cambridge Dictionary, n.d.). Thaler and Sunstein's describe nudge as "any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates" (Thaler & Sunstein, 2009, p.6). Essential to the nudge concept is that people can be guided to make better decisions for themselves, their families and the society (Thaler & Sunstein, 2009).

Thaler & Sunstein names people who think and choose "unfailingly well" for "Econs" and real or irrational people for "humans". Humans also known as Homo sapiens make hasty and irrational decision. They respond to incentives and in addition are influenced by nudges, whereas Econs only respond to incentives (Thaler & Sunstein, 2009, p.6-8). Thaler and Sunstein (2009, p.5-6) mentions in their book the phrase libertarian paternalism. Libertarian emphasizes peoples' freedom to choose whereas the paternalistic aspect of the phrase legitimizes the act of influencing peoples' behaviour by the so-called choice architects so that people make choices that benefits their lives. The responsibility of a choice architect is to structure the context in which people make decisions (Thaler & Sunstein, 2009, p.3). Libertarian paternalists want people to maintain their freedom of choice and at the same time allow interventions by private institutions and governments to steer people towards making better choices so they can live healthier and longer (Thaler & Sunstein, 2009, p.5).

Thaler and Sunstein (2009) categorizes types of nudges into three different sections; money, health and freedom. Hansen and Jespersen (2013, p.14-18) came up with another framework consisting of four types of nudges. In this framework, the four nudges are categorized based on

whether the nudge comes from automatic thinking (type 1) or reflective thinking (type 2), and whether the intentions behind the nudge are exposed to the subject (transparent) or whether the intentions cannot be reconstructed from the situation (non-transparent). The two ways of thinking was introduced by Thaler and Sunstein and is called the dual process theory. This theory confirms that the human brain works in ways that lead to two types of thinking; intuitive & automatic, and reflective & rational (Hansen & Jespersen, 2013, p.13). Automatic and reflective thinking has also been studied by Kahneman and Tversky, but they call the two types of thinking for system 1 and system 2, respectively. System 1 is automatic, unconscious, uncontrolled and quick thinking whereas system 2 is reflective, conscious, controlled and slow thinking (Kahneman, 2011). In this thesis we will use the terms automatic- and reflective thinking.

According to Hansen and Jespersen's (2013) type 1 transparent nudges effect people's automatic behaviour. The subjects cannot fully avoid the effect of the nudges and therefore one can argue that type 1 transparent nudges are not 100 percent libertarian. Examples are relaxing music coming from the speakers as people board a plane or changing the settings on the printing machine from one-sided to double-sided printing (Hansen & Jespersen, 2013, p.21). Type 1 non-transparent nudges are considered paternalistic since the choice architects manipulate the persons behaviour non-transparently (Hansen & Jespersen, 2013, p.26). An example is plate sizes and packaged food that can affect the consumption of food (Wansink, 2004, p.458). Type 2 transparent nudges, also called "empowering" nudges, affect people's behaviour that is based on their reflective thinking process. These types of nudges can be seen as libertarian since the people being nudged have the freedom to choose (Hansen & Jespersen, 2013, p.24). A common example is the "fly-in-the-urinal" intervention which is mentioned in Thaler and Sunstein's book (Thaler & Sunstein, 2009, p.4). Lastly is the type 2 non-transparent nudge which is seen as a very invasive way to manipulate people and at the same time it is a non-transparent way of nudging. All the responsibilities behind making a certain decision are given to the people. An example is choosing between different medical treatments (Hansen & Jespersen, 2013, p. 22 & 27).

5. Methodology

This chapter describes the research design and justifies the methodological choices made. It starts by describing the different research designs and then goes into more detail about the originally designed quasi-experiment used for this study. The chapter describes in depth the

design of the interventions, waste audits and questionnaire. Afterwards the hypotheses, analytical methods, reliability and validity of the results are presented.

5.1 Research Design

Research design explains the plan of how to collect relevant information and how to set up the analysis for a researcher to find solutions to the respective research question. The data collection methods are divided into qualitative and quantitative methods. Qualitative methods are for example observations, individual interviews or focus groups. Quantitative methods consist of data that is expressed through numbers. This study will conduct an online anonymous questionnaire and observe recycling behaviour through waste audits to collect qualitative and quantitative data (Gripsrud, Olsson & Silkoset, 2015, p.79-80).

According to Gripsrud et al. (2015, p.38) there are three different research designs: explorative, descriptive and causal design. Explorative design is used when a researcher aims to know more about a certain topic through qualitative methods and through looking at previous literature and secondary data. Secondary data is data that already exist and is collected by someone else. Primary data is gathered for the specific purpose of the researcher's study. It is often relevant to collect primary data to extend the understanding of a topic and to find relevant factors to include in the study. After gathering information and data from past studies the researcher develops different hypothesis to test. The main techniques used in an explorative design to collect primary data are focus groups and interviews (Gripsrud et al. 2015, p.39-41, 51 & 57).

Studies using questionnaire surveys to study a chosen sample from a target group use a descriptive design which does not required the use of primary data. The researcher can only claim that there is covariance but cannot claim any causal relationship. A questionnaire is an instrument used in many previous studies. All the respondents answer the same questions in the same designed order. The questionnaire can be conducted through phone, personal interview, online or sent by post. The anonymous questionnaire used for this thesis will be conducted online using the Qualtrics platform. The advantage of using an online questionnaire is cost-efficiency and flexibility. The respondents can answer the questions wherever they are and whenever they want. Another advantage is that when conducting an anonymous survey on Qualtrics it does not save e-mail, name, IP address or any other personal information of the respondents. The disadvantage is that the respondents can at any time leave the questionnaire and not finish answering all the questions. A self-reported questionnaire does not always give researchers the most valid information. Therefore, some researchers gather information also

through observations which can be done by using technical equipment or human observation. This study will carry out waste audits to record behaviour and see if the respondents self-reported answers match their actual behaviour. A combination of stated and revealed preferences will give a holistic picture and strengthen the information and conclusions in this thesis (Gripsrud et al. 2015, p.41-45, p.72 &75, p.124).

Causal design is used when a researcher wants to find the cause-and-effect relationship. This design uses experiments; true- or quasi- experiments. The quasi-experiment is a weaker test of causality compared to true experiment. It lacks either randomization or a control group. True experiment consists of participants that are randomly assigned to a control- and experimental group. The experimental group gets an intervention whereas the control group does not get exposed to any interventions, and it is important to prevent treatment spill-over contamination. After the manipulation has been carried out, a post-test (T1) of the results in both groups is conducted. Sometimes a pre-test (T0) is implemented before the intervention is carried out. The true- and quasi-experiment can be done in a laboratory setting or in the field. A lab experiment is when the researcher artificially creates reality and controls for the surroundings. The advantage of this type of experiment is that the researcher can control for any outside stimuli and environmental factors, but the disadvantage is that the respondents can behave differently when knowing they are being observed. Field experiment is conducted in the real world where the researcher studies a chosen sample in their natural environment. The advantage from this type of experiment is that the results can easily be transferred to similar situations and environments. The disadvantage is that the researcher cannot control for any possible external sources of variation (Gripsrud et al., 2015, p.45-49). This thesis will use a quasi-experimental field study to test out nudge strategies and see if they have some effect on employees stated and revealed preferences from five different wards. It is impossible for this study to have random sampling since intact wards had to be used.

Setting up a field experiment requires the permission from the Norwegian Center for Research Data (NSD). An application was sent and confirmation to collect primary data was given on the 2nd of April. A confirmation to collect data from Haukeland university hospital was given on the 18th of March (cf. appendix B).

Our research consists of all three designs; explorative design (understanding and gaining knowledge about the topic), descriptive design (primary data) and causal design (quasi-experimental field study).

5.2 Design of the original quasi-experimental field study

After gathering relevant information from the literature review and forming different ideas on how to conduct the experiment, a specific idea that fit our thesis topic was formulated. We reached out to different organizations through e-mail and phone calls and presented our research idea. Stavanger university hospital showed interest and referred us to the environmental leader at Helse Bergen. We had a video call meeting with the environmental leader and her project team from Haukeland university hospital, Helse Bergen. They were positive to the idea and agreed to cooperate with us on the experiment. We met the environmental leader in person and stayed in contact via emails and phone calls throughout the process of the project.

The sample size consists of employees from five different clinical wards. The heads of each ward volunteered to be in the experiment. The employees were not aware of the fact that they are part of an experiment. Table 5-1 shows the distribution of wards into groups:

Table 5-1. Distribution of wards into groups.

Groups:	Wards:
Control group (D1)	• Ward 1 (**65 employees**)
Experimental group 1 (D2)	• Ward 2 (**45 employees**)
	• Ward 3 (**10 employees**)
Experimental group 2 (D3)	• Ward 4 (**50 employees**)
	• Ward 5 (**57 employees**)

Ward 1, 2 and 4 operate similarly whereas ward 3 and 5 function differently, they are non-equivalent. Ward 3 is open from 08:00 to 16:00, whereas ward 1, 2 and 4 operates 24/7 with admitted patients. Ward 5 offers a very specialized healthcare service that attracts patients from everywhere in the country. Based on this information, the wards were selected to D1, D2 and D3. The aim is to make the three groups as similar as possible by distributing one "regular" ward and one "irregular" ward to each experimental group. These steps were taken to ensure higher internal validity (Gripsrud et al., 2015, p.49).

Before implementing any nudge interventions, the environmental leader accompanied by environmental coordinators from each ward conducted a pre-waste audit in all the groups. The pre-audit gave us an idea of how the employees sort their plastics and how many correctly recycled items (in kg) there were in each ward. Afterwards, nudge interventions were introduced to D2 and D3. The control group, D1, was not exposed to any interventions.

Since employees working in the different wards stay in their specific department and do not interact with other employees from the other wards, there are a very low probability of cross-sectional contamination. This means an employee from the control group will most likely not

be exposed to the interventions given to the experimental groups. Table 5-2 explains the design of the quasi-experiment:

Table 5-2. Design of the quasi- experiment

	D1:	D2:	D3:	
Pre-test	Waste audit	Waste audit	Waste audit	
Intervention	No intervention	• Nudge 1 • Nudge 2	• Nudge 1 • Nudge 3 • Nudge 4	**Revealed preference**
Post-test 1	Waste audit	Waste audit	Waste audit	
Post-test 2	Questionnaire	Questionnaire	Questionnaire	**Stated preference**

When designing the nudge interventions, we kept in mind Thaler and Sunstein's (2009, p.6) definition of a nudge which is "To count as a mere nudge, the intervention must be easy and cheap to avoid". In a hectic work environment such as in a hospital, it is important to make sorting plastic waste easy and to also constantly remind employees to recycle. Habits are difficult to change, but by giving nudges it is possible to disrupt automatic thinking and enlighten reflective thinking.

The first intervention, nudge 1, is provision of information through a document that was given to the employees in the experimental groups through email. Information is defined as "facts provided or learned about something or someone" (Oxford Dictionaries, n.d.). Provision of information can change individuals' intentions, but it cannot guarantee a change in actual behaviour (Klöckner & Prugsamatz, 2012). Therefore, we tested other nudge strategies that might change employees' habits. Nudge 2 is a poster with a positive message that recognizes employees' recycling efforts. Nudge 3 consists of three posters, one for each plastic type, that instructs employees to dispose waste properly. Nudge 4 is a sign that works as a reminder. D2 got nudges 1 and 2, and D3 got nudges 1, 3 and 4 which overall contains more extensive information.

The nudges were implemented on the 8th of April. Two weeks after, a post-waste audit was conducted to identify correct recycling achieved. A two-week period is neither too long nor too short, ensuring stability in recycling behaviour and limiting external stimuli to diminish the quality of the data. A questionnaire was also taking place after the intervention period. Conducting a questionnaire pre-intervention in addition to post-intervention might cause the Hawthorne effect; the respondents change their actual behaviour if they are aware that they are being observed which will weaken the reliability of the findings (Wickström & Bendix, 2000). It might also be too much to ask the employees to take the questionnaire twice. The number of respondents from a post-questionnaire might be lower than from a pre-questionnaire. Due to

these risks, the questionnaire was administered to employees after the two-week intervention period.

The data collected helped us compare the control group and the two experimental groups to see if the nudges had any effect on employees stated preferences (self-reported questionnaire) and revealed preferences (waste audits).

5.3 Nudge interventions

The nudge interventions were designed based on theories mentioned earlier (cf. Chapter 4) which helped expand our understanding and expectations towards people's environmental behaviour in a working environment. When designing the nudge interventions, we noted points made in the book "Thinking, Fast and Slow" by Daniel Khaneman (2011) on how to capture individuals' attention and get the right message out. Kahneman's advice is to use bold letters, bright colours, simple language, high quality paper and to make the message memorable using for instance rhymes or play-on-words. In addition to this we also took into consideration advice and suggestions given by the environmental leader and her team.

Nudge 1: Provision of information (document sent by email)

The design of this document was inspired by the leaflet used in the study of Linder, Lindahl & Borgström (2018) (cf. Chapter 3). The document includes information of why it is important to recycle and how to become more environment friendly at work with the hope of triggering a sense of perceived effectiveness. The information aims to effect employees' reflective thinking process so they can consciously adjust their attitude towards plastic recycling. Having a reason or purpose behind a particular action will strengthen the intrinsic motivation to act and increase the engagement. The title "Join your colleagues and recycle plastic waste" is expected to

motivate the employees and will act as a peer-pressure when they know that their colleagues are also recycling. An individual will make a decision that is most likely influenced by the actions of others (Fishburn, 1968). The document also emphasizes the fact that everyone has a responsibility to recycle. This is expected to increase the experienced responsibility from recycling outcome. Performance feedback from plastic recycling is included and states the average recycling fraction in previous years. The document is clear, easily understandable, visually pleasing and short, roughly 2 pages. The reader is expected to not lose interest or focus when going through the document. The information used was given by the hospital. Other sources used were Helse Bergen (2017) environmental rapport and Jortveit (2018).

Nudge 2: Recognition: a positive message

The inspiration for this poster came from the municipality of Stavanger (cf. appendix C). A poster was made with a positive message saying: "Thank you for recycling! Greetings from Helse Bergen" to show employees that Helse Bergen recognizes and appreciates their efforts. Adding "greetings from Helse Bergen" makes the poster more personal and strengthens the message. It was placed in the washroom where recycling takes place and in the hallway. Recognition will increase employees' effort and motivation to recycle plastic waste. This nudge aims to effect employees' automatic thinking process and serves as a reminder if proper recycling is neglected.

Nudge 3: Posters instructing proper recycling

The posters cover information about all the plastic recyclable products in the hospital; polystyrene (EPS), soft- and hard plastic. They include examples of products for each plastic type and explain how they should be disposed. The soft plastic poster includes a rule of thumb that says, "If you can easily pull your thumb through the plastic so that it stretches, then it is soft plastic". It is aimed to help differentiate plastic types and make the message memorable. If employees are still unsure where to throw the plastic waste, they are informed to dispose the waste in the residual bin to decrease contamination of recyclable bins. On the bottom of the posters there is important points made such as "The plastic needs to be clean!" written in bold letters. There is an issue with recycling unclean post-use material. It is important that the post-use material is clean before it is put into the recycling bin so that the recycling process becomes easier and the material does not end up in incineration or landfills (Sedaghat, 2018; Kvåle, Heie & Sundell, 2017, p.37).

Posters were placed above the recycling bins in the washroom, so it is always available at the time of sorting, making recycling quick and easy. The information and pictures used in the posters were given by the hospital. The pictures used are of actual plastic products used in the hospital. It helps employees to easily identify the plastic item they need to dispose. The idea to put Helse Bergen's logo on the posters where given by the environmental leader and her team. This strengthens the credibility of the posters and information may therefore be taken more seriously.

Nudge 4: Reminder

**STOPP! HAR DU
SORTERT?**

The poster was inspired by a similar poster used in Uppsala university in Sweden (Mcnabb, 2017). The sign says "STOP! HAVE YOU RECYCLED?". Stop signs has also been used in other universities such as University of Canterbury in Christchurch, New Zealand (Nimmo, 2016) and also presented in the study by Runcie (2018). It is a sign that everyone has seen before in the streets and traffic. It is expected to catch the employees' attention when seeing a familiar sign and automatically their eyes will be directed to the reminder underneath. Austin et al. (1993) found that recycling improved when signs and the recycling bins were positioned in close proximity. This sign will be placed together with nudge 3 in the washroom above the bins.

According to Sussman & Gifford (2012) a large sign is more effective than a small sign. Nudge 2 and 4 were printed in A3 whereas Nudge 3 in A4. They were printed in good quality paper (at Attende copy and graphical center) and were sent to the environmental leader through post (cf. appendix D). All the nudges designed are non-intrusive interventions, meaning the nudges will not come in the way of the employees' daily work and they can easily ignore them or choose to pay attention and benefit from them. They are simple and cheap nudge interventions where neither negative or positive incentives or restrictions are implemented.

5.4 Waste audit

Waste audits can be conducted in many ways. Some audits analyse a 24-hour waste sample (Figueira & Whalen, 2011) while others analyse waste that has been collected over a few days to a week (Syversen, Bjørnerud, Skogesal & Bratland, 2015). According to MacLaren (1996, p.18) the sample must cover at least "one week or the point in which operations begin to repeat themselves". The design of the waste audit used in this paper was inspired from several sources

(ROAF, 2018; Syversen et al. 2015; McGain, Story & Hendel, 2009; MacLaren, 1996). We constructed a simple but detailed step-by-step guide of how to conduct an audit that fit into the context of this thesis which was used by the audit team (cf. appendix E). The audit team consisted of the environmental leader and environmental coordinator who have adequate qualifications and experience.

Waste audits include a pre- and post-test to measure accuracy of plastic recycling, compare results and to see if any progress has been made. It involves weighting a bag of waste, then opening the bag and separating the wastes into different categories. The different waste categories are afterwards put into clear bags and weighted. Residual waste is the most common waste to analyse. It is also acceptable to analyse other materials such as plastic, paper, glass or metal when analysing the quality of recycling (Syversen, Bjørnerud, Skogesal & Bratland, 2015, p.9). The residual waste in the hospital contains blood packs, diapers and other unhygienic material. There is an inability to identify items contaminated with blood or urine and it was therefore not manageable for the audit team. Moreover, there are no contamination found in bins of Polystyrene (EPS) according to the environmental leader, mainly due to its distinct physical appearance, whereas soft and hard plastic are harder to distinguish. Hence, the audits were focused on hard- and soft plastic recycling bins.

The waste sample consists of wastes generated in the span of a week over two waste audits. The audit was performed by hand-sorting the plastic material and weighting the correct and incorrect content disposed. The same measurement equipment and techniques were used for both audits. The weight of the correct sorted plastic is presented as a percentage of the weight of total plastic waste (wt%), i.e. weight percentage of the ration of correct sorted fractions, and vice versa for the incorrect sorted fractions. It is crucial to make employees unaware of the waste audits in order to avoid the Hawthorne effect, thus the waste analysis should be done in secret (Wickström & Bendix, 2000). The audit could only be conducted in the washrooms inside the wards. Hence, data was collected in the washrooms behind closed doors to minimize the Hawthorne effect and threat of weak reliability.

The pre-audit was planned to be conducted during a period of two weeks starting from 25th of March to the 5th of April. Two weeks was also set aside for the post-audit which took place on the 23rd of April to the 3rd of May (cf. appendix F for a timetable of the project).

5.5 Questionnaire

It is important to get reliable and valid measures for the different terms and variables used in a questionnaire (Gripsrud et al, 2015, p.79 & 94). The questionnaire in this thesis is developed using the TPB guidelines (Ajzen, 2002; Ajzen, 2013) and previous studies who base their questionnaire on TPB (Arvola et al., 2008; Graves, Sarkis & Zhu, 2013; Kumar, 2012; Pakpour, Zeide, Emamjomeh, Asefzadeh & Pearso, 2014; Peberdy, Jones & Green, 2019; Tonglet, Phillips & Read, 2004; Strydom, 2018; Yazdanpanah & Forouzani, 2015). To assure content and construct validity we use items and terms that are validated in previous studies. Some questions were taken directly from other studies and other questions had to be modified to fit the context of this thesis. The questions where first designed in English and later translated to Norwegian. We followed Gripsrud et al. (2015, p.117) guidelines for formulating questions; 1) Use simple and clear words, 2) Avoid leading questions, 3) Avoid implicit assumptions, 4) Avoid generalization and 5) Avoid double questions.

Before sending out the questionnaire it is important to conduct a pilot study where ideally 5-10 people answer the questionnaire in order to see if there are some unclear questions or any other issues regarding the questions or the questionnaire set up that needs to be clarified. Five of our friends and family members went through the questionnaire multiple times. Their feedback helped us make adjustments and improvements which strengthens the reliability. The questions are put in the Qualtrics platform. A progress bar was added in order to encourage employees to complete the questions and boost the response rate. The online anonymous questionnaire was first sent out for a pre-test to check if there were any technical issues. Then a link to the questionnaire was sent to the environmental leader, forwarding it to the heads of each ward who sent the link to their employees through e-mail. The date of sending out the questionnaire was on the 23rd of April and the deadline was set on the 10th of May. Multiple reminders were sent out to the employees who did not respond to the questionnaire to show that their participation is important.

In total the survey was sent out to 177 employees. After the deadline, we collected data from 50 respondents where 13 of the questionnaires were incomplete. Two of the incomplete questionnaires were still used when running structural equation model (SEM) and regression analysis. Because of these two respondents answered all the questions expect for the question about which ward they work in. This information is needed when testing the effect of the nudges on the stated preferences across groups. To complete this test, we had to remove 13 incomplete questionnaires, resulting in a total response rate of 21%.

5.5.1 Measures

Before answering any questions, the respondents were clearly informed about the purpose of the questionnaire, who are collecting the data and what the data will be used for. Their rights were presented, and contact information was given for any further question. Lastly, they were asked to give their consent to participate in the questionnaire (cf. appendix G).

Socio-demographic factors in the questionnaire included gender, age, education level, work situation and income level. A question asking which ward the respondent works in was added to help separate the answers given by employees from D1, D2 and D3. There are predefined answer categories given for the questions about background variables which are at a nominal level (Grisprud et al., 2015, p.104).

Qualtrics skip and display logic were used. When respondents are asked, "Which ward do you work in?" and if they choose ward 1, they skip following questions about interventions since they belong to the control group. However, if they choose for instance ward 2 or ward 3, they get displayed a question asking, "Have you noticed this poster in the ward during the past two weeks (as pictured below)?". If they answer "no" then the questionnaire ends. If they choose "yes" they get a follow up question which asks, "To what extent did the poster effect your recycling behaviour compare to before?". The choices they can choose from are in 5 intervals from "None at all" to "a great deal". These questions are placed on the last part of the questionnaire.

The TPB guidelines to construct a questionnaire developed by Ajzen (2013) use a semantic differential scale. This is a rating scale that consists of 7-points. There are two extreme variables that are given, one variable on each side of the scale that rate the different items. The questions have 1-point as the lowest score and 7-points as the highest score. From the feedback given after running a pilot test was a strong preference towards alternative answers instead of numbers. We decided therefore to use a Likert-scale in most questions except for question number 2 where it naturally fit better to use a semantic 7-point scale. The Likert-scale use an answer scale with 7 alternatives: strongly disagree, disagree, slightly disagree, neutral, slightly agree, agree and strongly agree (Gripsrud et al., 2015, p.107). Table 5-3 shows the factors, items and the Cronbach alpha (internal reliability) for each factor:

Table 5-3. Items used in the questionnaire

Factors	Items	Cronbach's alpha (α)
Intention (Q1) [IN]	**Item 1.** I intend to recycle plastic when I am at work **Item 2.** I will actively recycle plastic waste at work **Item 3**. I will recycle plastic waste at work in the next four weeks **Item 4.** I will recommend others to recycle plastic waste at work	**0.8925**

Attitude [A] (Q2, Q3): Cognitive attitude [CA]	**Item 1-5.** I believe recycling plastic waste is:
	       Complicated – Easy
	       Not rewarding – Rewarding
	       Waste of time – Useful
	       Not responsible – Responsible
	       Unhygienic – Hygienic
	Item 6. I believe recycling plastic waste will contribute to reducing pollution and improve the environment
		0.8596

Affective attitude [AA]	**Item 1.** I feel good when I recycle plastic waste **Item 2.** I feel like I am doing my civil duty when recycling plastic waste	**0.9506**
Subjective norm (Q4) [SN]	**Item 1.** My family expects me to engage in recycling plastic waste **Item 2.** My friends expect me to engage in recycling plastic waste **Item 3.** My colleagues expect me to engage in recycling plastic waste **Item 4.** My boss expects me to engage in recycling plastic waste **Item 5.** My society expects me to engage in recycling plastic waste	**0.6832**
Perceived behavioral control [PBC] (Q5, Q6): Control on availability [COA]	**Item 1.** I am familiar with the different plastic types that we use at work **Item 2.** I am familiar with the different plastic types that are recyclable at work **Item 3.** I am familiar with the difference between hard plastic and soft plastic **Item 4**. I am familiar with the recycling system of plastic waste at work **Item 5.** The hospital gives satisfactory resources for recycling plastic waste **Item 6**. I can easily recycle plastic waste when I need to at work **Item 7.** I have full control over recycling plastic waste at work	**0.8979**
Perceived effectiveness [PE]	**Item 1.** It is worthless for the individual to do anything about the plastic waste **Item 2.** Since one person cannot have any impact on the plastic pollution, it does not matter what I do **Item 3.** Each person's actions can have a positive effect on society by recycling their plastic waste	**0.7484**
Behaviour (Q7) [B]	**Item 1.** I choose to recycle plastic waste if the recycling station is easily accessible **Item 2.** I choose to recycle plastic even if there is a distance for me to go to the recycling station **Item 3.** If I understand the potential harm plastic products can cause to the environment, I recycle these products properly after use	**0.7210**
Moral norm (Q8) [MN]	**Item 1.** Because of my values and principles, I feel it is important to try to recycle plastic waste **Item 2.** I feel a moral obligation to recycle plastic waste for the sake of the environment **Item 3**. I will get bad conscious if I do not recycle plastic waste **Item 4.** I feel guilty if I do not recycle plastic waste **Item 5.** Everyone should share the responsibility to recycle plastic waste	**0.9020**
Self-identity (Q9) [SI]	**Item 1.** Reducing plastic waste in my everyday life is an important part of who I am **Item 2**. I consider myself to be aware when it comes to recycling plastic	**0.7836**

There is high internal consistency within each factor. Reliability analysis measures how accurate the number of items explains a specific variable. Calculating complex variables such as attitude requires more than one question or item. The reliability coefficient of these questions or items are found by this formula: Cronbach alpha=(α/α-1) x (1-(α/α+2b)), (α) equals the

amount items and (b) is equal to the sum of correlations between the items. The rule of thumb states that if the Cronbach alpha is higher than 0.7, but not too close to 1, the measurement will be considered reliable. The more items we have for each factor and the stronger the correlation between the items, the higher the Cronbach alpha will be (Grisprud et al., 2015, p.170-175). As seen from table 5-3, the reliability coefficients were acceptable (α >0.7), expect for the items related to the factor subjective norm which have a slightly poor reliability (α=0.6832). The reason for this can be that personal considerations tend to dominate the effect of perceived social pressure (Ajzen, 1991). The sources used to construct the items are found in the appendix H. The full questionnaire and the descriptive data extracted from Qualtrics is found in appendix K.

5.6 Hypotheses

To answer the research question and the sub-research questions, we prepared hypotheses that will be tested empirically. Hypothesis 1 is designed to test if the nudge interventions influence the experimental groups and which combination of nudges has the strongest effect on actual recycling behaviour. Additionally, we want to see if there is a gap between employees' statements and actual behaviours.

H1a: The combined effect of nudge 1, 3 & 4 given to D3 have a stronger positive effect on correct disposal of plastic waste compared to the combined effect of nudge 1 & 2 given to D2

H1b: There will be no changes in recycling behaviour in D1

H1c: There is no gap between stated and revealed preferences for groups D2 and D3

Hypothesis 2 is inspired by previous research papers who used the framework of TPB model (Kumar 2012; Strydom, 2018; Tavallaee, Shokouhyar & Samadi, 2017). The hypotheses are derived to test which variables in the study's extended TPB model have a positive effect on recycling intention and in turn recycling behaviour.

H2a: A has a positive effect on IN

H2b: SN has a positive effect on IN

H2c: COA has a positive effect on IN

H2d: PE has a positive effect on IN

H2e: MN has a positive effect on IN

H2f: SI has a positive effect on IN

H2g: IN has a positive and direct effect on B

5.7 Analytical Methods

The collected data were analysed on STATA version 15 where regression-, correlation-, factor- and reliability analysis were conducted. Excel was used to analyse the waste audit and make diagrams and charts.

A regression analysis is used to study the relationship between dependent and independent variables. Simple linear regression model looks at two variables, X and Y, whereas multiple regression model enables us to control for multiple factors that simultaneously affect the dependent variable (Wooldridge, 2015, p.18 & 56). This study will run both types of models. The regression models look like this: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + ... + \beta_n X_n + \varepsilon$, where Y is the dependent variable that measures plastic recycling intention or recycling behaviour, the β is the coefficient that measures the effect a change in the independent variable, X, by one unit, has on Y. The error term (ε) contains factors that are not explained in the model but effect the dependent variable. There will always be disturbance in our model, but the aim is to always have a combination of independent variables that gives the lowest possible error term. Dummy variables are constructed for the qualitative factors such as gender, where female takes the value 1 and male 0, and work situation where full-time takes value 1 and part-time takes value 0. A multiple regression model is tested through using F-test (Wooldridge, 2015, p.59, 90, 119, 182-184). Regression analysis can never prove any causation. However, it is used to find a potential significant relationship between X and Y (Gripsrud et al., 2015).

Correlation analysis measures the association between two variables and varies between the value –1 and +1. Perfect correlation is when having a value of -1 or +1. A value of zero means no correlation between the variables (Ubøe, 2016, p.118). This study looks at the correlation values between the TPB factors.

The quality of data is evaluated through reliability and validity criteria. A measure will never be free from any mistakes but will have a degree of reliability and validity (Grisprud et al., 2015, p.99 & 120). Reliability reflects in which degree we can trust the results, whereas validity represents the quality of the measurement (Grisprud et al., 2015, p.51-52).

5.7.1 Factor analysis

Factor analysis finds the items that are strongly correlated and groups them together. There are two types of factor analysis: Exploratory- and confirmatory factor analysis. Exploratory factor analysis explores the data and attempts to construct a pattern where each item would fit a chosen factor. Confirmatory factor analysis aims to fit items in specific factors based on a set of hypotheses or a theory. This study runs both exploratory and confirmatory factor analysis to analyse the underlying factor structure of the TPB variables (Grisprud et al., 2015, ch.12).

5.7.2 Internal- and External Validity

In experimental studies it is normal to look at internal and external validities. Internal validity refers to the degree to which a researcher can be confident that results are from the experimental manipulations and not from alternative explanations. External validity is about generalizability and refers to the degree to which findings from a study can be applied to similar situations (Druckman, Green, Kuklinski & Lupia, 2011, p.44 & 57). Lab experiments tend to have higher internal validity whereas field experiments tend to have higher external validity. True experiments tend to have high internal and external validity compared to quasi-experiments (Grisprud et al., 2015, p.49).

Since we cannot control for outside stimuli in a field experiment, we cannot state with 100 percent certainty that the nudge interventions, ceteris paribus, lead to employees disposing plastic waste correctly. The difference between the control and experimental groups can be caused by the interventions, but it can also be caused by uncontrollable external factors. Factors that affect the variance of the ordinary least square (OLS) estimators are heteroskedasticity, and multicollinearity. Heteroskedasticity is when the error term (ε), subjects to the independent variables, does not have the same variance: $\text{Var} (\varepsilon \mid x_{1,...}, x_n) \neq \sigma^2$. To test if OLS has heteroskedasticity we use the Breusch-Pagan test where H_0 states that there is no heteroskedasticity. If the p-value is lower than the significance level, then we reject the null hypothesis and conclude with presence of heteroskedasticity. Corrective measures such as the use of robust standard errors therefore needs to be taken. Multicollinearity takes place when there is "high correlation between two or more independent variable". To test if OLS has a multicollinearity problem a VIF test was conducted. If VIF<10, then multicollinearity is not a problem for estimating the β coefficients. A way to reduce the chance of multicollinearity and the variance of unbiased estimators is to collect more data (Grisprud et al., 2015, p.81-84, 86, 221; Wooldridge, 2015, p.86).

6. Analysis

This chapter presents the results from the waste-analysis and questionnaire, which reflect employees revealed and stated preferences. It also includes hypotheses testing and discusses the reliability and validity of the results.

6.1 Results from Waste Audit

Unexpected events took place during the experiment period which caused ward 4 to be excluded from the experiment i.e. D3 consists of only one ward, ward 5. This is further discussed in chapter 7. During the pre-audit, ward 1 and 3 did not separate soft and hard plastic, but instead put the two plastic types into one recycle bin (mixed recyclable plastic). After the pre-audit, all the wards except for ward 1 (control group) had implemented the recycling system segregating the plastic into two fractions; hard- and soft plastic. The control group was not informed about the new segregation system. Since there was no hard plastic found in the mixed bin in the control group (only soft plastic and contaminated waste), we assume that we can compare the audits for soft plastic across all three groups.

The audit team collected in total 18.95 kg of plastic waste divided across four wards, of which, 11.86 kg was recyclable, and 4.88 kg was non-recyclable plastic. The waste samples contained a week worth of plastic waste. In the pre-audit, a total of 12.01 kg of plastic waste was collected during a span of four days, whereas in the post-audit, a total of 6.94 kg of plastic waste was collected during a period of two weeks. More soft plastic was collected than hard plastic; 14.52 kg were soft plastic waste including contamination and 4.43 kg contained hard plastic waste including contamination. This is illustrated in figure 6-1:
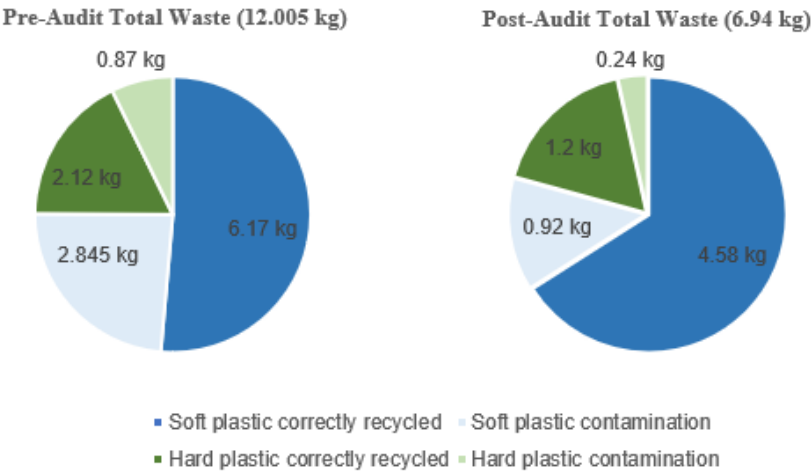

Figure 6-1. Amount of waste collected in kilograms

The results from pre- and post-waste audits were analysed and compared across the group D1 (control group), D2 (experimental group 1) and D3 (experimental group 2). They reflect the actual recycling behaviours of plastic in the hospital wards. An overview of the data is presented in table 6-1. The overall results show that during the pre-audit D3 had the highest correct disposal rate 81% compared to 73% and 60% for D1 and D2 respectively. During the post-audit, D1 had the highest correct disposal rate of 93% compared to 84% and 79% for D2 and D3 respectively. The relative change of correct disposal of plastic waste for D2 was the highest presenting 42%, while D1 had a relative change of 26% and D3 with -2%.

Table 6-1. Waste quantities of soft and hard plastics across groups

Group	No. Employees	Ward	Pre-waste audit			Post-waste audit			Relative change (%)
			Correctly Recycled (kg)	In-correctly recycled (kg)	Correctly Disposed waste(%)	Correctly Recycled (kg)	In-correctly recycled (kg)	Correctly disposed Waste(%)	
Soft plastic:									
D1	65	Ward 1	1.32	0.49	0.73	1.48	0.12	0.93	0.26
D2	55	Ward 2 & 3	2.95	1.86	0.61	0.70	0.10	0.88	0.43
D3	57	Ward 5	1.90	0.50	0.79	2.40	0.70	0.77	-0.02
Total soft plastic waste			**6.17**	**2.85**	**0.68**	**4.58**	**0.92**	**0.83**	**0.22**
Hard plastic:									
D1	65	Ward 1	-	-	-	-	-		
D2	55	Ward 2 & 3	0.62	0.57	0.52	0.60	0.14	0.81	0.56
D3	57	Ward 5	1.50	0.30	0.83	0.60	0.10	0.86	0.03
Total hard plastic waste			**2.12**	**0.87**	**0.71**	**1.20**	**0.24**	**0.83**	**0.18**
Total (soft and hard plastic):									
D1	65	Ward 1	1.32	0.49	0.73	1.48	0.12	0.93	0.26
D2	55	Ward 2 & 3	3.57	2.43	0.60	1.30	0.24	0.84	0.42
D3	57	Ward 5	3.40	0.80	0.81	3.00	0.80	0.79	-0.02
Total plastic waste			**8.29**	**3.72**	**0.69**	**5.78**	**1.16**	**0.83**	**0.21**

The incorrect content found in both pre- and post-audit comprised of mainly gloves, paper and non-recyclable plastic waste that is meant to be thrown in residual waste bins. Analysis of soft and hard plastic is further conducted. A visual pre- and post-audit of correctly and incorrectly disposed soft and hard plastic is presented in figure 6-2:
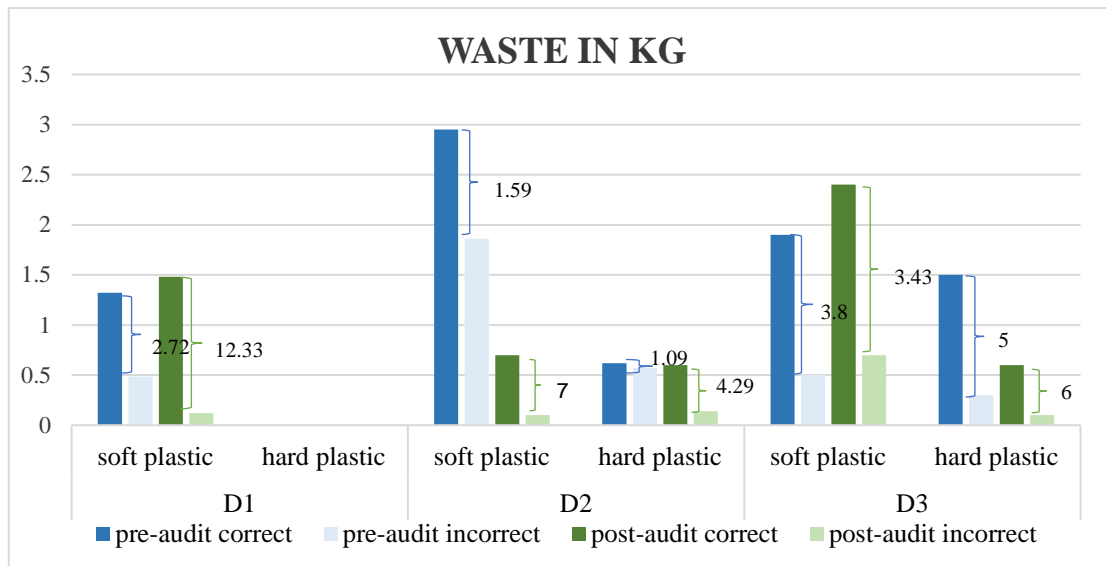
Figure 6-2. An overview of the amount of correct and incorrectly disposed soft and hard plastic in kilograms. The numbers represent the correct/incorrect waste ratio

The ratio of correct to incorrect waste for D1 increased from 2.72 to 12.33 kg. This means, in the pre-audit, when employees in D1 recycle 1 kg of plastics incorrectly they tend to recycle 2.72 kg of plastics correctly. In the post-audit, for 1 kg of incorrect waste the employees tend to recycle 12.33 kg correct plastic waste. In other words, there is an improvement in the ratio of correct/incorrect waste.

In D2, the same ratio for recycling of soft plastic increased from 1.59 to 7 kg and for hard plastics it increased from 1.09 to 4.29 kg. The ratio for the total amount of plastic waste changed from 1.47 to 5.42, improving by 3.95 kg. This may indicate that the nudge interventions improved D2 employees' recycling ability.

In D3, the same ratio for hard plastic recycling increased from 5 to 6 kg, however for soft plastic recycling the ratio decreased slightly from 3.8 to 3.43 kg, indicating a total decrease of 0.5 kg. This may mean that the nudge interventions didn't influence D3's actual recycling behaviour. The reason why D3 did not benefit as much as D2 from the nudges might be because some employees were not exposed to the posters in the recycling room (cf. Figure 6-5).

SOFT PLASTIC:

When taking a closer look at table 6-1, further analysis reveals differences in recycling behaviour of soft plastic. While D1 and D2 decreased in the total weight of soft plastic waste (soft plastic incl. contamination) collected in the post-audit compared to the pre-audit, the waste collected in D3 increased slightly. The possible cause of this might be seasonality taking into consideration that the post-audit was conducted after Easter holiday.

There are differences in the correct disposal of soft plastic between and across experimental groups and control group. Pre-waste audit indicates D3's sorting accuracy of soft plastic (79%) were higher than D2 (61%) and slightly higher than D1 (73%). Even though the total weight of the waste collected in D3 is lower than that collected in D2 (2.40 kg vs. 4.81 kg), the percentage of correct disposed plastic is much higher. The reason could be that the employees in ward 5 are more knowledgeable about the two different plastic types and are more aware and thorough when disposing waste.

The correct disposal of soft plastic in D1 improved from 73% to 93% even though they were not targeted by any interventions. This improvement suggests that the quality of sorted recyclable plastic waste improved (less contamination), but it does not necessarily indicate that employees in D1 became better at recycling. The case can be that the plastic recycling bin contained less of the wrong content, but that more recyclable plastic (valuable resources) ended up in residual waste. If this is the case, then recycling of recyclable plastic did not increase. Since we did not have the opportunity to study residual waste, we cannot be certain if this is the case and these are therefore only speculations.

Table 6-2. Waste quantities of soft plastics for wards 2 and 3

SOFT PLASTIC	D2			
	Pre-audit		Post-audit	
Wards	w2	w3	w2	w3
Correct content (kg)	0.45	2.5	0.6	0.1
Incorrect content (kg)	0.26	1.6	0.1	0
Total weight of waste	0.71	4.1	0.7	0.1
% correct disposal	63%	61%	86%	100%
Contamination rate	37%	39%	14%	0%
Relative change	+43%			

As seen from the table 6-2, there was a 43% relative change in recycling of soft plastics in D2 which is a large improvement, thus a further investigation of the recycling in ward 2 and ward 3 is analysed. In total, 4.1 kg of waste was collected in the pre-audit in ward 3 where 1.6 kg were contaminated waste. However, in the post-audit of ward 3, only 0.1 kg of waste was collected and there was no contamination found. This resulted in 100% correctly disposed waste which does not necessarily reflect the true recycling behaviour of the whole ward because the total waste collected is very small (0.10 kg). The sample size is not robust enough which makes it difficult to generalize the findings to the entire population. The lack of waste analysed can significantly skew results and make D2 look better in terms of correct disposal. The small sample size maybe due to seasonal variation. Since ward 3 was closed on the 18th, 19th and 22nd of April outside of the weekends, there was not a large amount of waste accumulated to

be analysed. There is no specific measurement of resource allocation in the study area. However, a scenario could be that during the shutdown less amounts of resource were allocated to the ward and therefore there was less plastic packaging to be disposed.

D1 had 26% more correctly disposed soft plastic waste. D2 who received nudge 1 and 2 experienced a relative change of 43% in correct disposal of soft plastic. In comparison D3, after the interventions (Nudge 1, 3 and 4) were put in place, a slight decrease was observed in correct disposal by 2%. Note that they were already best at recycling in the pre-audit compared to the other groups. Therefore, there might be less room for improvement for D3. The results are illustrated in the figure 6-3:
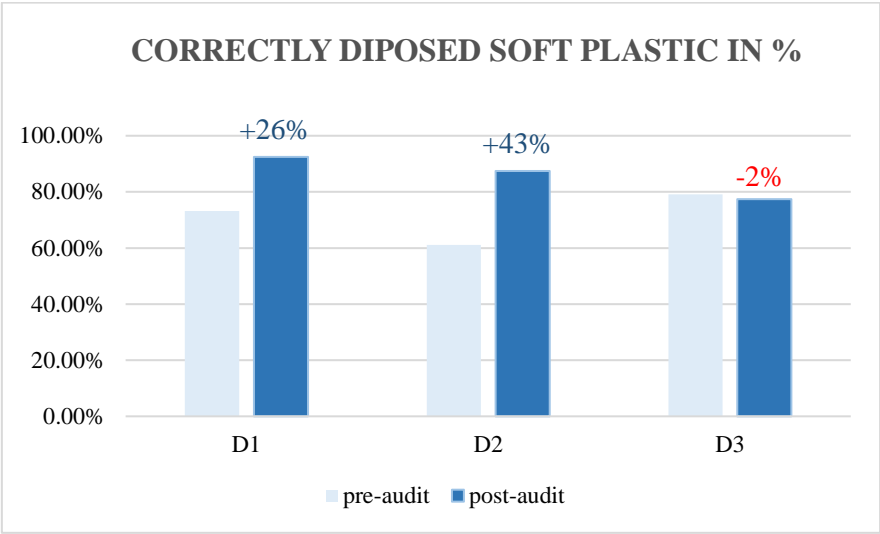
Figure 6-3. Percentage of correct disposed soft plastic

HARD PLASTIC:

Since D2 had the largest improvement of recycling hard plastic across the groups, a further investigation of the wards in D2 was conducted. As seen from table 6-3 there were no hard plastic recorded in ward 3 in the pre-audit since they started segregating plastic into two fractions only after this period. During the post audit, the correct disposal rate of hard plastic in ward 3 was 71%. In ward 2, the rate increased from 52% in the pre-audit to 83% in post audit, which is a large improvement.

Table 6-3. Waste quantities of hard plastics for wards 2 and 3

HARD PLASTIC	D2			
	Pre-audit		Post-audit	
Wards	w2	w3	w2	w3
Correct content (kg)	0.62	-	0.5	0.1
Incorrect content	0.57	-	0.1	0.04
Total weight of waste	1.19	-	0.6	0.14
% correct disposal	52%	-	83%	71%
Contamination rate	48%	-	17%	29%
Relative change	+56%			

The data presented in table 6-1 clearly shows variations in pre-audit measurements, ranging from 52% in D2 to 83% in D3. D2 did a better job of correctly disposing hard plastic in the post-audit after getting the interventions (52% vs 81%). D3 however did not improve as much (83% vs 86%) even though they got a combination of three nudges that were presumed to have a strong effect. D3 had originally a good percentage of correct disposal and this might be the reason why they didn't have large improvement.

We observed a relative increase of 3% in correct disposal of hard plastic in D3 which received multiple nudges (Nudge 1, 3 and 4). In comparison, D2 which received less interventions (Nudge 1 and 2) experienced a relative change of 56% in correct disposed hard plastic waste. There was no hard plastic found during the audits for D1. The results are illustrated in the figure 6-4:
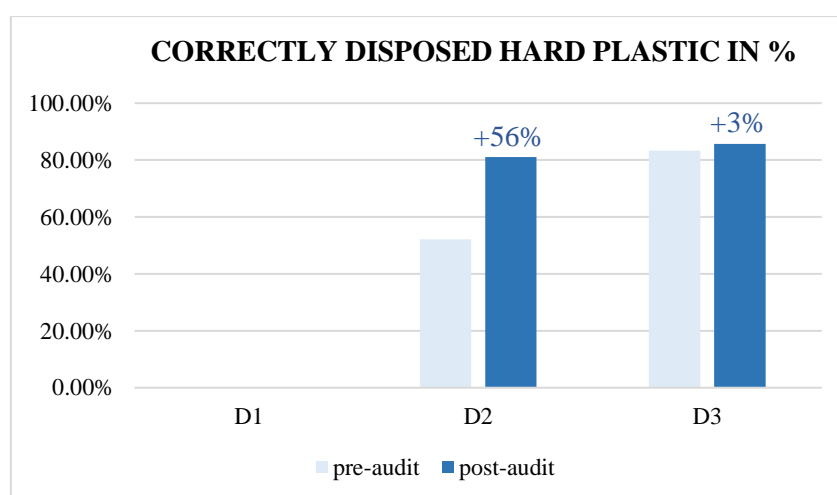

Figure 6-4. Percentage of the correct disposed hard plastic

6.2 Results from the questionnaire

6.2.1 Data cleaning

Before analysing the collected data from the questionnaire, we had to look for any missing values and reverse the scoring scale of any negatively connoted items form the questionnaire. There were two missing observations in the data set from two different respondents (cf. Table 6-4). Instead of eliminating them from the analysis we chose to use interpolation to fill the missing values. The formula is: $(V_{q-1} + V_{q+1})/2$. The missing value is calculated by taking the average value of the score from the previous question + the score from the following question. Another possibility is to treat these two values as missing. Both approaches were tested and the results from the analysis were the same.

Table 6-4. Overview of missing values

Missing observations from the questionnaire
Question 2 item 5
Question 4 item 5

The scale for Item 1 and 2 measuring the variable perceived effectiveness (PE) were reversed since these items were connoting negative attitudes toward plastic recycling. By reversing the scale, we ensure the scoring system for all the items are uniformed in direction.

6.2.2 Demographic characteristics

Overall there are more females than males in our study and most of the respondents work full time. The other demographic variables are slightly different for each group. D3 contains relatively older employees with the highest level of education (5 years or more) and highest income. Most of the respondents from D2 are younger with not as high education and income as D3. All the respondents from D1 are young and the majority have three years of higher education with an income level ranging from 300 thousand to 500 thousand NOK. With a small sample size, differences in demographics are bound to take place.

Table 6-5. summary of respondents' demographic information (N=37)

Groups	D1		D2		D3	
Variables	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
No. respondents	6	16.22%	15	40.54%	16	43.24%
Gender						
Male	0	-	1	6.67%	4	25%
Female	6	100%	14	93.33%	12	75%
Age						
18-29	4	66.67%	6	40%	-	-
30-39	2	33.33%	3	20%	1	6.25%
40-49	-	-	5	33.33%	5	31.25%
50-59	-	-	1	6.67%	7	43.75%
60-69	-	-	-	-	3	18.75%
Education						
High school	-	-	3	20%	3	18.75%
Higher educ<=3 yrs.	5	83.33%	6	40%	-	-
3< Higher educ< 5 yrs.	1	16.67%	5	33.33%	7	43.75%
Higher educ >=5 yrs.	-	-	1	6.67%	5	31.25%
Other	-	-	-	-	1	6.25%
Employment status						
Full-time	5	83.33%	13	86.67%	16	100%
Part-time	1	16.67%	2	13.33%	-	-
Income						
300 000 – 500 000 NOK	5	83.33%	9	60%	5	31.25%
500 000 – 700 000 NOK	1	16.67%	6	40%	9	56.25%
700 000 – 900 000 NOK					2	12.50%

The results for the last questions in the questionnaire relating to the nudge interventions are presented in figure 6-5:
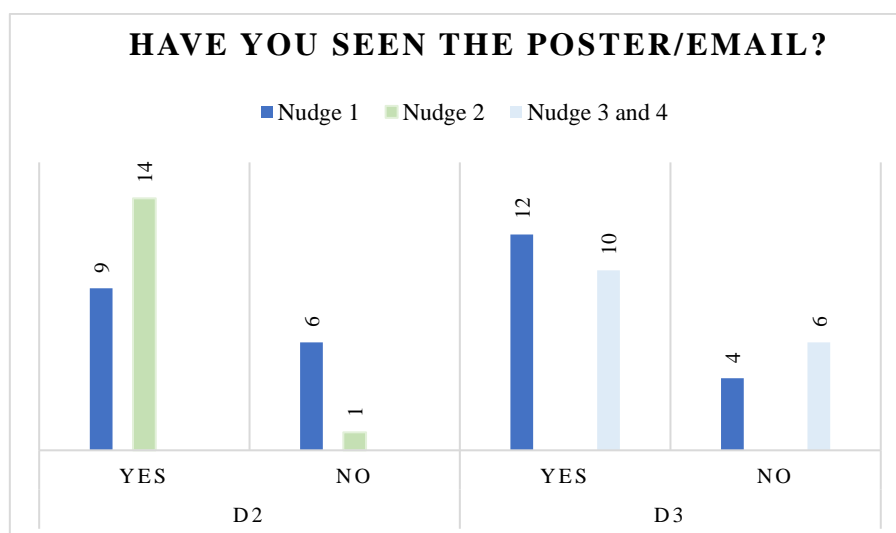

Figure 6-5. Present how many employees read/saw the nudge interventions

The informative document sent by email (nudge 1) was not read by all the employees. More employees from D3 read the document compared to D2 (12 vs 9). The poster with a positive message (nudge 2) was seen by most of the employees in D2 except for one, this employee

reported that she did not read nudge 1 either. Nudge 2 was not only put up in the washroom but also in the hallway, so it was exposed to every employee entering the wards. For D3 nudge 3 and 4 were only put up in the washroom which might explain why six respondents did not see the posters. This may indicate that not all employees go to the washroom to segregate the plastic waste or that the employees who took the questionnaire were away during the intervention period (sick leave or holiday). One respondent from D3 did not see nudge 3 & 4 and did not read nudge 1.

Employees were also asked to what extent the nudge interventions effected their recycling behaviour compared to their previous recycling behaviour. The scores are presented in figure 6-6:
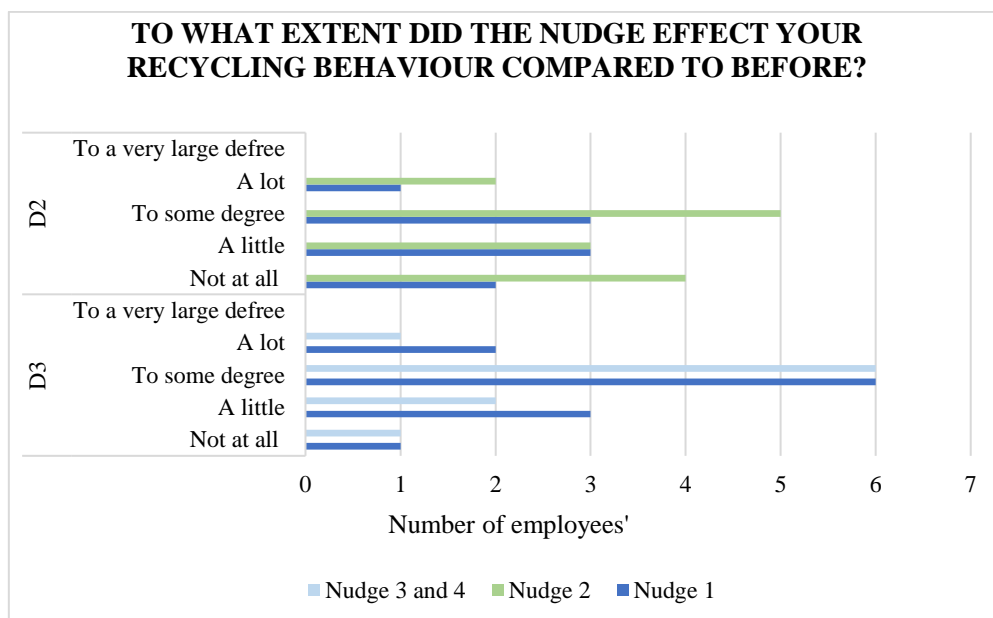
Figure 6-6. To what extent did the nudge effect your recycling behaviour compared to before?

According to the respondents who saw the nudges in D3, 16.7% (2 out of 12 employees) reported that nudge 1 had a lot of influence in their recycling behaviour and 10% (1 out of 10) reported that nudge 3 and 4 had a lot of influence. 50% (6 out of 12) reported that nudge 1 effected their recycling behaviour to some degree whereas 60% (6 out of 10) reported that nudge 3 and 4 influenced them to some degree. 25% (3 out of 12) and 20% (2 out of 10) of employees stated that nudge 1 and nudge 3 & 4 respectively had little influence on their recycling behaviour.

According to the respondent who saw the nudges in D2, 14% (2 out of 14) reported that nudge 2 effect their recycling behaviour a lot, compared to 11% (1 out 9) reported for nudge 1. 35.7% (5 out of 14) stated that nudge 2 had to some degree an effect on their recycling behaviour

compared to 33.3% (3 out of 9) for nudge 1. 33.3% (3 out of 9) and 21% (3 out of 14) stated that nudge 1 and 2 respectively had little effect. Lastly, 28.6% (4 out of 14) reported that nudge 2 had no effect at all and 22.22% (2 out of 9) reported that nudge 1 had no effect at all on their recycling behaviour.

The overall analysis indicates that nudge 1 was more influential compare to nudge 3 & 4 in D3, which means providing information on the meaning and purpose behind recycling had a slightly stronger effect compared to providing information on how to recycle. This is not surprising, since D3 revealed the highest percentage of correct recycling across all the groups prior to implementing interventions. This indicates that they do not necessarily need help on how to recycle but a more effective way to motivate them is to give them information on why they should recycle. Hence, the value and effect of nudge 3 & 4 were limited.

Overall it seems like Nudge 2 was more influential and had a stronger effect on stated recycling behaviour compared to nudge 1 in D2. This indicates that a simple positive nudge had a stronger effect on employees in D2 compared to an email providing information on why they should recycle. The reason can be that the wards in D2 were very hectic during the intervention period which might cause employees to have automatic, unconscious and intuitive thinking process when recycling. Hence, having a simple poster with a short positive message serves as a reminder to recycle, and at the same time points out that their efforts are being recognized, seem to have had a stronger impact on their recycling behaviour.

6.2.3 Mean score for the factors in the questionnaire

The mean score of the items within each variable was calculated to make an index for each variable (Strydom, 2018). The scale used to measure the items were from 1 to 7; one implicates strongly disagree and seven implicates strongly agree. Figure 6-7 presents the mean scores of the variables[1].

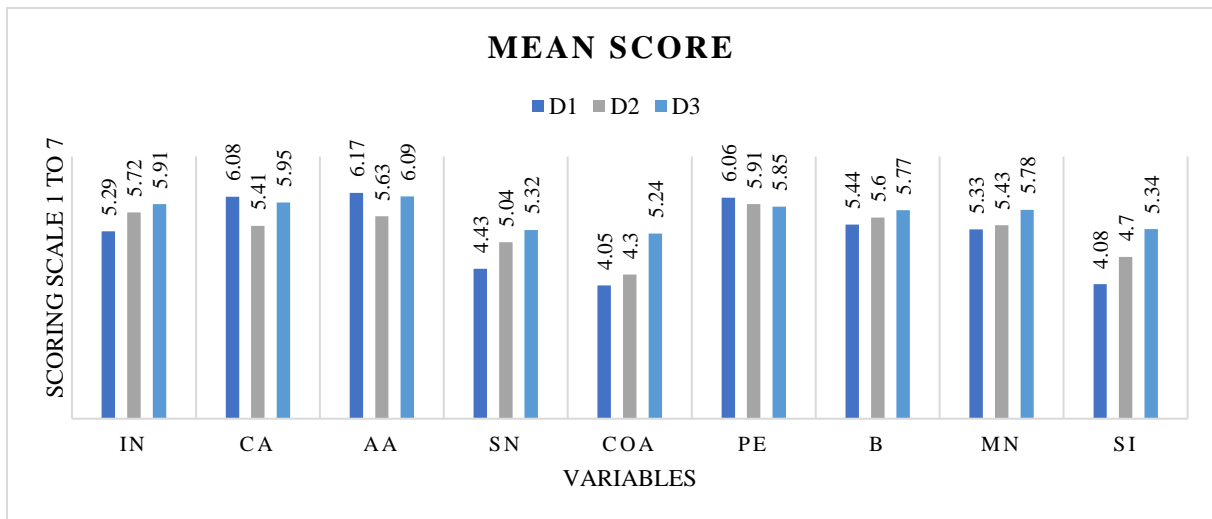[1] The list of the abbreviations can be found on page 6

Figure 6-7. Mean score of each factor across groups

The average score for variable IN and B is relatively similar ranging from 5.29 to 5.91 across groups. This means the employees not only have a positive intention to recycle but they also choose to implement the behaviour. Overall the highest level of agreement on average were found on items measuring CA, AA and PE with a mean score ranging from 5.41 to 6.17. This means employees in our study not only cognitively approve the rationality of plastic recycling behaviour, but they also affectively agree with recycling plastic waste and are internally motivated. More importantly they hold the belief that their efforts and actions do matter to bring a solution to the plastic waste problem. However, items measuring COA were on average the lowest across groups, ranging from 4.05 to 5.24. The scores are moving from neutral to slightly agree towards the level of difficulty or easy in recycling plastic waste.

SN average score ranges from 4.43 to 5.32 across groups indicating that social pressure is somewhat affecting employees' engagement in recycling plastic waste which means their recycling behaviour is affected by external motivation to some degree. Most employees scored higher on SN item 3, 4 and 5, ranging from 4.89 to 6 on average (cf. Appendix I[2]). This implies that social pressure from people at the workplace (boss and colleagues) and the society have a stronger effect on the engagement to recycle plastic waste at work compared to pressure from family and friends (SN item 1 and 2).

When looking at MN and SI, the average score for MN ranged from 5.33 to 5.78 and SI ranged from 4.08 to 5.34 across groups which means their recycling behaviour is affected by intrinsic motivation. The employees generally agreed that the behaviour of plastic recycling have a

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[2] A table presenting the descriptive statistics (mean and SD) for each item in the questionnaire is found in appendix I.

positive relationship with their internalized values and norms. In other words, they have moral obligation and responsibility towards plastic recycling. Moreover, employees slightly agree that plastic recycling is a part of who they are.

D1 stayed neutral on items measuring SN, COA and SI where the scale ranged from 4.05 to 4.43 on average, nonetheless they scored on average highest on items measuring CA, AA and PE. This means employees in D1 have a high and positive attitude towards plastic recycling and perceives it as an effective behaviour. However, they tend to be neutral when it comes to opinions or wishes of others towards their recycling behaviour, the link between their self-identity and recycling, and the level of difficulty or ease in plastic recycling.

D3 scored on average the highest on items measuring IN, SN, COA, B, MN and SI. Compared to the other groups D3 seems to have the most control and are fairly knowledgeable when it comes to recycling plastic waste (COA). They are very familiar with the recycling system of plastic waste at work and the difference between the two plastic types (hard and soft plastic). This indicates that they are well-informed which implies a degree of ease in recycling plastic waste. Employees in D2 scored lowest on items measuring CA and AA across all groups. They are on average scoring slightly lower than D3 on the items measuring most of the variables, except for PE were D2 reported a mean score of 5.91 whereas D3 reported a mean score of 5.81.

6.2.4 Correlation analysis

The Pearson correlation shows the relationship between the variables, results are presented in 6-6. SI and SN are positively and highly correlated with IN (r=0.661 and r=0.649) which means that there is a strong relationship between these variables. There is a very high and significant correlation between MN and AA (r=0.813) which implies that the variables give similar information.

Table 6-6. Pearson Correlation between latent variables

	IN	CA	AA	SN	COA	PE	B	MN	SI
IN	1								
CA	0.538**	1							
AA	0.554**	0.555**	1						
SN	0.649**	0.525**	0.386*	1					
COA	0.472**	0.391*	0.083	0.584**	1				
PE	0.021	0.364*	0.447**	-0.010	-0.164	1			
B	0.435**	0.319	0.442**	0.334*	0.190	0.412*	1		
MN	0.505**	0.493**	0.813**	0.406*	0.180	0.493**	0.663**	1	
SI	0.661**	0.412	0.450**	0.430**	0.292	0.385*	0.675**	0.565**	1

*p<0.05, **p<0.01

The correlations between independent variables to intention were positive and significant except for PE. One would expect that the respondents with high recycling intention scores are correspondingly represented by the high PE score, but a correlation of 0.021 suggests a relationship of very low and insignificant strength. However, there is a significant correlation between PE and recycling behaviour (r=0.412) which suggests a relationship of medium strength. One might also expect that respondents with high recycling behaviour scores are represented by the high SN scores, however, this is not the case in our study (r=0.334, significant but low to medium strength). One can argue that employees in this study gets more motivated to recycle plastic waste from sources independent of subjective norm. Such sources can be MN and SI. Our data suggests a stronger relationship between MN and B (r=0.663) and SI and B (r=0.675) which implies that respondents with high recycling behaviour are represented by high scores of MN and SI. The results from the correlation analysis are taken into consideration when conducting factor- and regression analysis.

6.3 Factor analysis

To answer hypothesis 2 a factor analysis had to be conducted to test if any path was positive and significant. Some previous studies conduct both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (Plucker, 2003; Gerbing & Hamilton, 2009; Nosi, D'Agostino, Pagliuca and Pratesi, 2017). Firstly, in this study, EFA is conducted as a forerunner to conducting the CFA to test if any underlying factor structure identified by EFA matches the extended TPB model. A general rule is to have a sample size of a minimum of N=50 when conducting an EFA which is not accomplished in this study. However, some researchers argue that a sample size below N=50 can also yield good quality results if there are high loaded factors, low number of factors and a high number of items (de Winter, Dodou & Wieringa, 2009).

The first attempt to conduct an EFA on the TPB items results in 10 factors. A factor with an eigenvalue above 1 should be retained for further investigation (Gripsrud et al. 2015, ch.12). The factors that gave an eigenvalue above 1 are the 10 factors presented below:

Table 6-7. Initial Eigenvalues

Total Variance Explained

	Initial Eigenvalues		
Factor	**Total**	**% of Variance**	**Cumulative %**
1	12.72	34.39	34.39
2	6.16	16.64	51.04
3	2.66	7.19	58.23
4	2.14	5.79	64.02
5	1.78	4.81	68.82
6	1.63	4.40	73.22
7	1.41	3.82	77.04
8	1.28	3.46	80.50
9	1.12	3.03	83.53
10	1.05	2.83	86.36

Extraction Method: Maximum Likelihood

The cumulative variance explains the number of factors one needs in order to explain the variance in the model. For instance, a seven-factor solution will explain 77.04% of the variance. The scree plot presented in figure 6-8 shows that only three of the ten factors proved to be the most important in the amount of explained variance. The red line starts at eigenvalue 1 and anything above the red line indicates the number of factors that should be retained in the model. This study chose to limit the number of factors to 7 since the model has seven variables (attitude, subjective norm, perceived control, moral norm, self-identity, intention and behaviour). The three remaining factors were therefore excluded from further analyses.
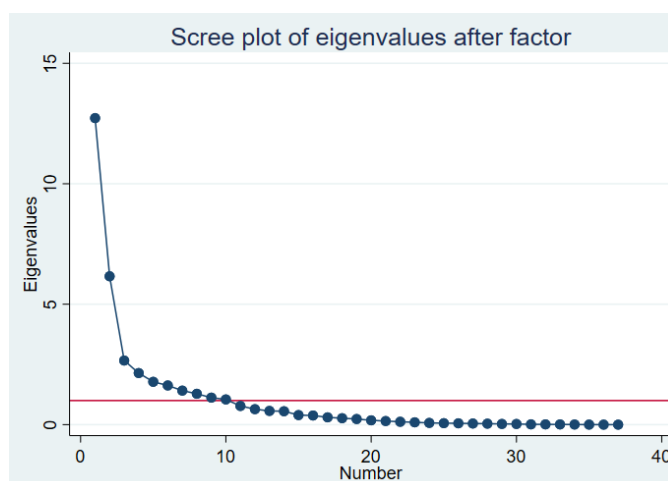
Figure 6-8. Scree plot

Further, the EFA was rotated using a varimax method to get a clearer structure of the items. The factor loading describes the strength of the relationship between a variable and its items. The rule of thumb is to keep items with a factor loading above 0.3 (Gripsrud et al. 2015, ch.12). The finding was that all the different items were scattered into the seven factors and none of the items were one-dimensional when analysing each variable. The original pattern of the items in the questionnaire was now mixed up into a different pattern. The factors were overall not

64

consistent with the factors proposed in the study's model. The results from the EFA are presented in appendix J. where loadings below 0.3 are not displayed.

Since the aim is to have the items in the questionnaire belong to their original variables, the CFA would be a better fit. CFA is a restricted factor model where solutions cannot be rotated, and items are fit according to our theoretical model. Factor loadings above 0.3 are considered acceptable and factor loading above 0.7 are considered very good (Gefen, Straub and Boundreau, 2000; Tavallaee, Shokouhyar & Samadi, 2017)

To evaluate the extended TPB model a structural equation modelling (SEM) was run to estimate CFA with maximum likelihood method. The first step was to use SEM to construct the model and test the correlation between all the variables: Attitude (CA and AA), SN, MN, Perceived behavioural control (COA and PE), SI, IN and B (7 variables). Then the estimation was run to gain the factor loadings for the items. The loading values suggested that items in PE and COA cannot be combined into one factor. In addition, PE and COA were negatively correlated (r= -0.1636), hence PE and COA were separated into two factors for the SEM to be estimated. The model had in the end a total of 8 variables. The model constructed using SEM is presented in appendix J.

When the model was estimated, the initial estimation results ($\chi 2$= 1899.943, RMSEA=0.234, CFI=0.410, TLI=0.352, SRMR=0.156 and CD=1.00) suggested quite poor goodness of fit of the model. The general rule is that if RMSEA is below 0.08 and if CFI and TLI are above 0.9 then the model is acceptable and shows a good fit (Hooper, Coughlan & Mullan, 2008). Therefore, in order to improve the model-fit, factor loading values above 0.4 were kept, items with lowest loading values were eliminated, and at least 2-3 items were kept for measuring one variable (Raubenheimer, 2004; Ajzen, 2002). Six items were eliminated; CA item 1, 3, 5 and COA item 4, 5, 6. Modification indices were studied to find high covariance between error terms for items. However, even though there were relatively high covariance between the error terms for moral norm item 3 and 4, the model could not be estimated when a covariance arrow was connected between the two error terms. According to the results ($\chi 2$= 952.093, RMSEA=0.183, CFI=0.610, TLI=0.560, SRMR=0.151 and CD=1.00), the goodness of fit indices of the new model improved largely, but still suggesting a poor model fit, which means the data collected does not fit well with our hypothesized TPB model. The main reason for this poor result is the small sample size. The recommendations for minimum sample size are different across scholars, in general the larger the sample size the better. A sample size of 50 is considered very poor, 100 is poor and 200 is considered a fair amount (Mundfrom, Shaw & Ke,

2005). Our sample size was too small when considering the number of items and variables in the model. Hence, no matter how many combinations of items were included or eliminated, the model would never get a satisfied goodness of fit.

6.4 Multiple regression analysis

Before starting to run regressions, the data was screened using scatter plots, studying the means and standard deviation of items, testing for multicollinearity by using VIF and testing for homoscedasticity (linearity, normality of residuals etc.). This was done to make sure that no assumptions were violated in order to run an OLS multiple regression. Ranging from 1.72 to 3.72, none of the VIFs are above the recommended cut-off threshold of 10, hence there are no multicollinearity in this study. The Breusch-pagan test for homoskedasticity was significant implying that there are no heteroskedasticity (Wooldridge, 2015).

Different regression models are tested starting with:

Model 1: $IN = \beta_0 + \beta_1 A + \beta_2 SN + \beta_3 PBC + \beta_4 MN + \beta_5 SI + \varepsilon$

All items within each variable in this multiple regression are included in the variable indexes. Mean value of all the items from CA and AA is calculated as an index called attitude (A). Mean value of all items measuring COA and PE is calculated to make the index called Perceived behavioural control (PBC). The results from the multiple regression are shown below:

IN	B-Coefficient	P-value	P <0.1
A	0.300	**0.098**	Significant
SN	0.515	**0.012**	Significant
PBC	-0.056	0.769	Insignificant
MN	-0.070	0.663	Insignificant
SI	0.39	**0.005**	Significant
R^2= 0.659	Adj. R^2= 0.608	Prob > F = 0.000	n=39

The results show that A, SN and SI have a positive and significant effect on employees' intentions to recycle plastic waste at work. SN has the strongest effect on intention with a coefficient of 0.515. With TPB explaining 66% of the variance in recycling intention, the results from our study do not compare well with the results from Armitage and Conner (2001) meta-analysis who reported that TPB explains 39% of the variance in intention. Our high percentage explaining the variance in intention might be because of the inclusion of moral norm and self-identity in the regression and the inclusion of many items measuring A (8 items) and PBC (10 items). We should be cautious when using R^2 as a goodness of fit measurement since it is a measure that only increases when more independent variables are added to a regression. Therefore, it is a poor tool for conveying information on whether one or more variables are suitable in a model (Wooldridge, 2015, p.68-69).

Model 2: $B = \beta_0 + \beta_1 IN + \varepsilon$

B	B-Coefficient	P-value	P <0.05
IN	0.328	**0.003**	Significant
R^2= 0.2095,	Adj. R^2= 0.2095	Prob > F = 0.003	n=39

The second model run is a simple regression where behaviour is now the dependent variable and intention is the independent variable. It shows that the effect of intention on stated recycling behaviour is positive and significant. In other words, the higher the intention, the higher the likelihood of recycling plastic waste. TPB explains 21% of the variance in recycling behaviour which compared to Armitage and Connor's meta-analysis is slightly lower than the average of the 185 behavioural studies (26.4%).

Model 3: $IN = \beta_0 + \beta_1 A_{new} + \beta_2 SN + \beta_3 COA_{new} + \beta_4 PE + \beta_5 MN + \beta_6 SI + \varepsilon$

This model contains variables that have eliminated some items. Based on gathering information from Cronbach alpha values, correlation analysis, factor loadings from EFA and CFA, we eliminated CA item 1, 3 and 5 and COA item 4, 5, 6 that did not contribute much in explaining the variables. These are the same items eliminated in the SEM. Additionally, COA and PE were not combined into one variable (PBC) since the variables were negatively correlated and collectively did not measure PBC. New mean scores were calculated; Anew contains the mean value of CA item 2, 4, 6, and AA item 1 and 2 and COAnew contains the mean value of COA item 1, 2, 3. The results are:

IN	B-Coefficient	P-value	P <0.05
Anew	0.471	**0.008**	Significant
SN	0.312	0.111	Insignificant
COAnew	0.070	0.519	Insignificant
PE	-0.360	**0.011**	Significant
MN	0.045	0.779	Insignificant
SI	0.460	**0.001**	Significant
R^2= 0.725,	Adj. R^2= 0.67	Prob > F = 0.000	n=39

Anew and SI has a positive and significant effect on intention to recycle implying that the employees have a strong belief that positive outcomes will come from properly recycling plastic waste. The variable perceived effectiveness showed an interesting result. PE has a negative and significant relationship with intention to recycle at work. However, when looking at the responses on the items measuring PE, employees scored low on item 1 (It is worthless for an individual to do anything with the plastic waste) and 2 (Since one person does not have any effect on plastic pollution, it doesn't matter what I do) indicating that they disagree with these statements and they scored high on item 3 (Each person's behaviour can have a positive effect on society by recycling plastic waste) indicating that they agree with the

statement. The employees believe that their behaviour has an influence on plastic recycling, but maybe due to working in the healthcare sector their PE has a negative effect on their willingness to recycle at work.

Note that PE item 1 and 2 were reversed before taking the mean of all three items to make the index PE in the regression. The finding of a significantly negative relationship between PE and IN is strange at first glance. However, our unit of analysis are employees who work in a hectic and busy work environment. Even though their personal scores on perceived effectiveness are high (on average 5.91), their willingness and intention to recycle at <u>work</u> is low. The items measuring PE did not specify that the statements were targeted to the workplace whereas all the items measuring IN specified clearly the intention to recycle "at work". In other words, employees have a high PE, but it might not necessarily mean a positive and high PE on the intention to recycle at work specifically. As seen from the correlation analysis, the correlation between PE and IN was low and insignificant (r=0.021).

Model 4: $IN = \beta_0 + \beta_1 age + \beta_2 gender + \beta_3 education + \beta_4\ income + \beta_5 A_{new} + \beta_6 SN + \beta_7 COA_{new} + \beta_8 PE + \beta_9 MN + \beta_{10} SI + \varepsilon$

IN	B -Coefficient	P-value	P <0.1
Age	-0.008	0.949	Insignificant
Gender	0.593	**0.074**	Significant
Education	0.124	0.412	Insignificant
Income	-0.391	**0.095**	Significant
Anew	0.470	**0.008**	Significant
SN	0.384	**0.054**	Significant
COAnew	0.036	0.78	Insignificant
PE	-0.341	**0.020**	Significant
MN	-0.114	0.482	Insignificant
SI	0.472	**0.001**	Significant

R^2= 0.7821,　　　Adj. R^2= 0.7043　　　Prob > F = 0.000　　　n=39

For this multiple regression, we added demographic variables. Dummy variables were constructed for gender before running the model. Due to most of the employees working full time and the study's small sample size, a decision was made to remove the variable "employment status" from the regression. The results show that gender has significant and positive effect on intention to recycle, and income has a significantly negative effect on recycling intention (at 10% significance level). This means that female employees showed higher intention to recycle plastic waste. Employees with higher income showed a lower intention to recycle plastic waste. From the demographic variables (cf. table 6-5) it is shown that employees with high income also have high education level. There is a correlation between income and education (r=0.4461, medium strength). The findings tell us that employees that have high income (high education level) do not necessarily have the best intentions when it

comes to recycling plastic waste at work. They might think it is not their responsibility to throw plastic waste in the recycling bin and that their focus at work should be solely on treating patients. However, this speculation contradicts the employees stated preference where respondents scored high on item 5 measuring moral norm (everyone should share the responsibility to recycle plastic waste).

6.4.1 Comparison between D2 and D3:

Model 2 (simple regression) and 3 (multiple regression) were tested for the experimental groups. The results show that model 3 was significant for D2 and D3, explaining 86% and 88% of the variance in recycling intention respectively. The coefficient for PE is significant at a 5% level for both groups. This indicates that employees from D2 and D3 perceive individual plastic recycling effort as effective. Variable SI shows a significant coefficient at 5% level for D3, but it is insignificant for D2. This is not surprising since employees in D3 are relatively older with higher education and higher income compare to D2, hence SI has significantly strong effect on IN (0.794). We assume that younger employees are more self-conscious and have a greater instability of self-identity. The results from model 2 for D2 is significant at 10 % level (Prob>F=0.079), but insignificant *for* D3 (Prob>F=0.196). IN has a positive and significant effect on the stated recycling behaviour for D2.

Model 3						
Group	D2			D3		
IN	B-Coeff.	P-value	P<0.05	B-Coeff.	P-value	P<0.05
Anew	0.138	0.674	Insignificant	0.507	0.121	Insignificant
SN	0.577	0.104	Insignificant	-0.300	0.329	Insignificant
COAnew	-0.213	0.415	Insignificant	0.077	0.729	Insignificant
PE	-0.943	**0.014**	Significant	-0.366	**0.020**	Significant
MN	0.509	0.284	Insignificant	0.014	0.935	Insignificant
SI	0.422	0.102	Insignificant	0.794	**0.006**	Significant
	N = 15, R^2 = 0.863, Prob > F = 0.004			N = 16, R^2 = 0.877, Prob > F = 0.012		

Model 2						
Group	D2			D3		
B	B-Coeff.	P-value	P<0.1	B-Coeff.	P-value	P<0.1
IN	0.294	**0.079**	Significant	0.300	0.196	Insignificant
	N = 15, R^2 = 0.219, Prob > F = 0.079			N = 16, R^2 = 0.166, Prob > F = 0.196		

When testing regression model 3 for D1 STATA would not give any results (Std. Error, t-value, p-value and 95% CI) expect for the coefficient of the independent variables. This might be because the model has too many independent variables compared to the number of observations (n=6). Testing Model 2 for D1 however resulted in a coefficient of 0.41 that was insignificant (p-value=0.25). According to Tabachnick and Fidell (2007), a recommended sample size for conducting multiple regression analysis is calculated using this formula: n=50 + 8 *k (k is the number of independent variables). The regressions models testes in this study do not yield valid results since the recommended sample size is not achieved.

6.5 Hypotheses testing

Hypothesis 1 includes three sub-hypotheses H1a, H1b and H1c which were designed to test the power of the nudge interventions on recycling behaviour of plastic waste:

> **H1a**: The combined effect of nudge 1, 3 & 4 given to D3 have a stronger positive effect on correct disposal of plastic waste compared to the combined effect of nudges 1 & 2 given to D2.

When looking at the total plastic waste (the sum of soft and hard plastic) we see from table 6-1 that D2 has a higher percentage of correct disposed plastic waste compared to D3 (84% vs. 79%). There were less miss-sorted plastic waste in the recycling bins. Therefore, hypothesis 1a is rejected, meaning the effect of nudge 1,3&4 combined had a weaker effect on correct disposal of plastic waste compared to the effect of the combination of nudge 1 and 2.

The combination of nudge 1, 3 and 4 were presumed to have a stronger effect and increase the proportion of correctly disposed plastic waste since it contained information on how to recycle, why we should recycle and a reminder. Nudge 1 aimed to provide meaning and purpose behind recycling. Nudge 3 was aimed to instruct and guide the employees to correctly dispose plastic waste. The aim of Nudge 4 was to remind the employees to recycle and make them reflect on how they dispose plastic waste. Nudge 3 and 4 where informative, colourful, eye-catching and they were always available. They could be seen at the moment of recycling when information is needed. The data however reveals the contrary. D2 had higher correct disposed plastic waste percentage wise compared to D3. Overall the nudge interventions may have awakened employees' interest to look for information and discuss with other colleagues about how to sort plastic waste correctly.

The combination of nudge 1 and 2 which contained information of why we should recycle and a simple positive recognition message, aimed to increase experienced meaningfulness and experienced responsibility from this recycling task, also increase the quantity and quality of correct recycling. This is illustrated in the figure 6-9:
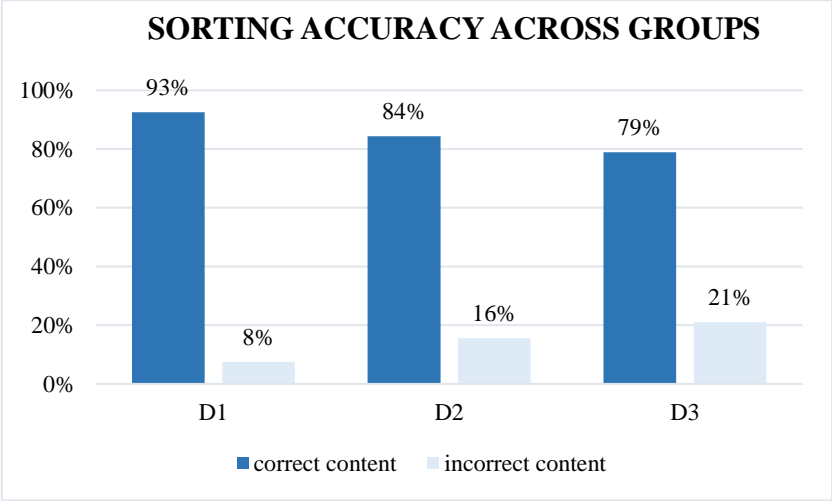

Figure 6-9. Results of Sorting accuracy of plastic waste after the intervention period across groups

When testing H1a based on the plastic types separately, the results show that D3 had more correct disposed hard plastic percentage wise (86% representing 0.6 kg) than D2 (81% representing 0.6 kg). In conclusion, H1a holds for hard plastic, meaning the combination of nudge 1, 3 and 4 had a stronger effect on the amount of correct recycling of hard plastic percentage wise compared to the cumulative effect of nudge 1 and 2. However, H1a is rejected for soft plastic since D3 disposed 77% correctly which represents 2.40 kg whereas D2 disposed 88% correctly which represents 0.7 kg.

H1b: There will be no changes in recycling behaviour in D1

H1b is rejected since it is revealed from the waste audits that despite not being exposed to any of the nudge interventions and regardless of the very low possibility of cross-contamination, D1 did experience an improvement of recycling behaviour (relative change of 26% for plastic recycling). It is difficult to say with 100% certainty that the nudge interventions were the cause for the change in correct disposal of plastic waste across groups since the control group (D1) improved from 73% to 93% correct disposal.

H1c: There is no gap between stated and revealed preferences for groups D2 and D3

The stated preferences from the self-reported questionnaires presents a slightly different picture than the results revealed from the waste audit (cf. Section 6.2.3). The percentages below are based on the employees in D2 who saw the nudges:

- 78% (7 out of 9 employees) of respondents from D2 reported that nudge 1 had an effect on their recycling behaviour and 22% (2 out 9 employees) reported that it did not have an effect at all.
- 71% (10 out of 14 employees) of respondents reported that nudge 2 effected their recycling behaviour and 29% (4 out 14 employees) reported that it did not have an effect at all.

22% and 29% reported no effect from the nudges, however, the revealed data from the waste audit shows that D2 had the largest improvement in correct disposal of plastic waste across groups. They went from 60% to 84% correct disposal of plastic waste which is a very large improvement (42% in relative change). The majority of respondents (78% and 71%) reported that the nudges had an effect on their recycling behaviour.

The self-reported answers from D3 show a different picture compared to what was revealed in the waste audits.

- 92% (11 out of 12) of respondent reported that nudge 1 effected their recycling behaviour and 8% (1 out of 12) reported that the nudge 1 had no effect at all.
- 90% (9 out of 10) of respondents reported that nudge 3 ad 4 did influence their recycling behaviour, 10% (1 out of 10) reported that the nudges did not have an effect at all.

The self-reported results from D3 are not reflected in the relative change where they decreased slightly in correct disposal of plastic waste (-2%). Even though they reported that the nudges influenced their recycling behaviour and that they have control over the recycling process (cf. Figure 6-7), their actual recycling behaviour did not confirm that. There is a slight gap between the self-reported answers and the actual recycling behaviour observed.

Table 6-8. results from testing hypothesis 1c

Groups	Intervention	Stated preference		Revealed preference	H1c: Results
		Effect	No effect	Relative change	
D2	Nudge 1	78%	22%	42%	Fail to reject
	Nudge 2	71%	29%		
D3	Nudge 1	92%	8%	-2%	Reject
	Nudge 3&4	90%	10%		

As presented from table 6-8, H1c holds for D2 but is rejected for D3 which means the stated preferences from respondents in D2 was consistent with their revealed preferences. However, that is not the case for D3 where stated and revealed preferences are slightly contradictory.

There is a gap between environmental values and action and the nudge interventions given to D3 did not help much to minimize that gap (relative change = –2%).

Hypotheses 2:

To answer the sub-research question: Which variables within the framework of the theory of planned behaviour has the strongest effect on recycling intention and behaviour? we analysed the questionnaire based on TPB to test hypothesis 2.

> **H2a:** A has a positive effect on the IN
>
> **H2b:** SN has a positive effect on the IN
>
> **H2c:** COA has a positive effect on the IN
>
> **H2d**: PE has a positive effect on IN
>
> **H2e:** MN has a positive effect on the IN
>
> **H2f:** SI has a positive effect on the IN
>
> **H2g:** IN has a positive and direct effect on B

Even though SEM reported a poor goodness of fit, it does not necessarily imply that the construct of our model is completely inaccurate. We therefore analysed the path descriptions to see if any of our hypothesis holds. The parameter estimates from confirming our factors using SEM are shown in table 6-9:

Table 6-9. Results from testing the hypothesis 2

Hypothesis	Path Description	β-value	Std. Error	z	P>|z|	Results
H2a	A → IN	0.505	0.402	1.25	0.210	Insignificant
H2b	SN → IN	0.767	1.116	0.69	0.492	Insignificant
H2c	COA → IN	-0.227	0.730	-0.31	0.756	Insignificant
H2d	PE → IN	-0.116	0.334	-0.35	0.728	Insignificant
H2e	MN → IN	-0.234	0.297	-0.79	0.431	Insignificant
H2f	SI → IN	0.152	0.429	0.35	0.723	Insignificant
H2g	IN → B	0.482	0.157	3.07	**0.002**	Significant

The findings failed to establish relationships between A and IN, SN and IN, COA and IN, PE and IN, MN and IN and lastly SI and IN. The results were found by looking at the direct path coefficients (β-value) from the SEM analysis. The first six hypotheses were rejected and only H2g was significant which states that intention has a significantly positive and direct effect on recycling behaviour. There are external factors that influence the path going from IN to B. Examples are a hectic day at work due to lack of staff or incoming new patients with special needs which might make it difficult for employees to be thorough when disposing plastic waste.

Even though they might have the best intentions it does not necessarily represent actual behaviour. Thus, employees may consider themselves as being recyclers, but the actual act of recycling may be missing.

6.6 Reliability and Validity of the results

The reliability of the results is dependent largely on the methodology used and the implementation of the study. The reliability of the waste audit is weak since the sampling period included changes in operations due to holidays. We deliberately chose to set up the second waste audit two weeks after implementing the interventions with the aim of limiting any possible external factors to impact the results. But since the timing of the experiment was not optimal, having a two-week period between interventions and the audit was not effective. These factors significantly affected the quantity and quality of the waste sample.

The fact that the variables measured in the questionnaire are examined based on a wide range of literature, research papers and TPB, minimizes the potential of measurement biases. The results from the questionnaire are highly reliable and the factors contains high internal consistency which is reflected by the high Cronbach alpha values. Measuring items based on psychological constructs can be difficult since self-reported responses can be biased. However, we tried to decrease the chances of bias by having an anonymous questionnaire in addition to explaining the purpose of the questionnaire and who is behind the study, being as transparent as possible (Grisprud et al. 2015, p.99-102).

Our study includes a pre- and post-waste audit and a control group which leads to a stronger internal validity to the quasi-experimental field study and filters out experimental noise. The fact that the study used the same instrumentation measures throughout the experimental period also increase the internal validity. The answers from the respondents are reliable and there were no extreme values (high or low) disrupting the data set which increases the internal validity. A threat for the internal validity is the unexpected events that took place during the experiment and impacted the quality of the results unintentionally. Further details about inconsistencies are discussed in section 7. The fact that control group changed recycling behaviour and lack of confidence that results are from the experimental manipulation only and not from alternative explanations, weakens the internal validity. The study's external validity is not strong, this is because lack of randomization increasing the possibility of selection bias in addition to the sample size not being big enough to conclude that our results represent the whole population. It is difficult to generalize our results since the demographics are different across groups which

implies that the difference in characteristics may be related to outcome differences (Gripsrud et al. 2015, p.49; Campbell & Stanley, 1966, as cited in Huitt, Hummel & Kaeck, 1999). Note that it was impossible for this study to have random sampling since intact wards had to be used. We need to be cautious when drawing cause and effect statements because the sample sizes for the waste audit (one-week sample) and the response rate from the questionnaire are not very robust. To get more robust results, a longitudinal study would be better fitting with more substance and good quality data. Overall the results do not contain a very high reliability and validity, but the findings can still give a small glimpse into employees stated and revealed preferences.

7. Discussion

The chapter aims to reflect on methodologies used and discuss events that have taken place during the experimental period in order to create opportunities for future research to confirm, build on or enrich the findings of this study. It contains reflections on important aspects and discusses the limitations encountered and lessons learned.

7.1 Unexpected circumstances that rose during the experiment

Field experiments can offer some challenges where researchers face different obstacles. As mentioned in methodology (cf. chapter 5.1), a weakness with field experiments are the fact that they are in reality not that controllable. Although the environmental leader in the hospital went to each ward and explained to the heads of the wards thoroughly how the experiment will be conducted, what interventions will be implemented and when different tasks (hanging up posters, sending out questionnaire, conducting waste audit) need to be done, unexpected circumstances still took place. Unexpected events rose during the experiment and it is important to acknowledge the obstacles and not ignore them so that data is interpreted correctly. Experimental mortality is considered a limitation since ward 4 dropped-out over the course of the study (Campbell & Stanley, 1966, as cited in Huitt, Hummel & Kaeck, 1999). Ward 4 voluntarily signed up to participate in the field experiment but did not complete all the assigned tasks since the ward was shut down during the intervention period and as a result, the posters were not hung up and the second waste audit were not conducted. However, experimental mortality did not cause a significant threat to the study's internal validity since the number of employees in D1 (65 employees), D2 (55 employees) and D3 (57 employees) were somewhat similar after the ward 4 was eliminated from the experiment.

Weaknesses like the ones encountered can compromise the quality of the data. In methodology we mentioned the premises that was taken when distributing the wards into groups (cf. chapter 5.2). The aim was to make the three groups in our experiment as similar as possible to ensure a higher internal validity. The original experiment design changed after ward 4 dropped out from the whole experiment, D3 consisted of only one ward, ward 5. Fortunately, D3 included two wards in the original design, so excluding ward 4 from the experiment did not diminish the significance of the data collected from ward 5. However, it made the difference between the groups larger; D1 contained a ward that operates "regularly" meaning they function 24/7 with admitted patients, D2 included one regular and one irregular ward and lastly D3 contained one irregular or "special" ward in terms of how the ward functions. These implications weaken the probability of a high internal validity. The evidence of causation in our quasi-experimental field study is therefore less convincing. The differences between the groups stated and revealed preferences might be caused by the differences in which nudge interventions they were exposed to. However, it could also be caused by confounding factors or the fact that the three groups characteristics and how they function and operate are slightly different. These are points we need to keep in mind when interpreting results and making conclusions.

7.2. Discussion on Findings

This section will discuss similar studies and compare findings to our results. In general, the fact that D3 stated that they have high control over recycling plastic waste and are fairly more knowledgeable compared to D1 and D2 confirms that information has the potential to increase knowledge and is in line with the study of Morten Jakobsen & Serritzlew Søren (2015). D3 received the most information compared to other groups.

Austin et al. (1993) experienced a 29% improvement of recycling behaviour after signs and recycling bins where put in close proximity. Our study challenges this finding and presents overall mixed results. Both experimental groups were given posters that were placed above the recycling station. However, D2 improved their plastic waste separation with a relative change of 42% whereas D3 had a relative change of -2%. The explanation of the mixed results may lie in the difference of information displayed on the posters above the receptacles.

The email information containing why-information on recycling plastic in combination with a positive and simple poster seemed to have a positive effect on recycling behaviour. The results build on existing evidence from the longitudinal study of Linder, Lindahl & Borgström (2018) where they found that an informative leaflet significantly increased household food waste

recycling. Bernstad (2014) distributed a leaflet to households with Why-information using environmental precaution to influence motivation and How-information used as sorting instruction. In contradiction to Linder et al. (2018), results show that the written why and how information had no impact on food waste recycling and source separation. This is in line with our results that reveal that a combination of how-, why-information and a reminder (nudge 1,3&4) did not improve correct plastic waste separation. Note that our unit of analysis, the time length of our study and the way chosen to present the information (email vs. leaflet) are different.

The study of Hou, Hurwitz, Kavanagh, Fortin & Goldberg (2010) revealed that daily reminders through text-message "did not improve oral contraceptive pill adherence". Even though we remind employees in a different way, through a poster with a big stop sign, the intention is the same, to remind people to do an action, in our case recycle plastic waste. The results we found are in line with Hou et al. (2010) since the stop sign did not seem to add to the power of the combination of nudges tested and in turn did not encourage employees to properly dispose plastic waste.

The results from hypothesis 2a and b contradict the claims of Strydom (2018) who experienced a positive and significant effect between A & IN and SN & IN. The reason might be mainly due to the poor goodness of fit of our SEM. However, Strydom found that intention has a positive and direct effect on recycling behaviour, which is in line with our findings (i.e. H2g).

7.3 Limitations and lessons learned

Sample size: The sample size of this study considerably limits its generalizability. It limits the strength of the statistical tests conducted and the testing of statistical differences between groups. The relationship between employees stated and revealed preference cannot be fully explored because of the limited observations from the waste audits and the questionnaire.

One weeks' worth of waste collected in the pre-and post-audit during time of irregular operations in the hospital is an inadequate sample. It only displays a snapshot of employees recycling behaviour. The waste analysis is not reflective of the recycling behaviour of D1, D2 and D3 due to most importantly a small sample size. Factors such as seasonal variation, changes in consumption patterns and timing of the audit which took place before and after Easter holiday effected the sample size. To strengthen the waste audit more, a possibility is to extend the audit period so it entails three to four weeks' worth of waste that would be available for the audit team to analyse. Other measures to take to remedy the weaknesses of the small sample size could be

to compare the number of recycling bags to residual waste bags that accumulates during a week to see if recycling bins increased or not.

This study had a low response rate from the questionnaire (21%). The effort needed to survey employees were not difficult (online) but getting them to take the questionnaire was a slight challenge. Even after multiple reminders and extending the deadline for another week, the response rate did not increase much. We predicted that most employees would take our questionnaire since it was sent by their supervisor, that was however not the case. What we could have done differently is to incentivize employees with external rewards for participating in the questionnaire.

Low response rate on the questionnaire have many implications on how we can analyse the data. A larger sample size would be better for conducting factor analysis since EFA and CFA are large-sample techniques. It could then possibly provide a better goodness of fit measure for our model. It would also be better for testing multiple independent variables in a regression. A long questionnaire tends to have more unfinished responses. If we used less items on some questions, we would have had a shorter questionnaire and possibly a larger sample.

Timing: Having the field experiment implemented during irregular times was a great source of error. Timing of the experiment was not thought of thoroughly. Even though the timing of the questionnaire was right after Easter holiday, the response rate remained low. Easter holiday caused an issue with the quality of the data collected, in addition to the 1st of May which was labour day. Some employees go on a longer break and takes the 2nd and 3rd of May off as well. These holidays effected the response rate of the questionnaire and the quality of the waste audit. Although employees can respond to the questionnaire wherever they are and whenever they are available, we assume that the majority would not do it since they might relate the questionnaire to work and therefore try to avoid it during their holiday period. If the interventions were implemented during regular times, the employees might have been more receptive to the nudges and answering the questionnaire. The study of Onji & Kikuchi (2011) conclude that the responsiveness of libertarian paternalistic nudges depends on the unit of analysis's preferences and the timing of the intervention. A lesson learned is that nudges should be initiated well before any major holiday such as Easter, Christmas and summer holiday. These holidays change regular work routines and the number of employees working drops significantly.

Measurement tools: Weighting the waste might not be the best measurement tool since measuring correct recycling rate as weight percentage may lead to the heaviest plastic waste

fractions being emphasised on the expense of the plastic waste fractions that are much lighter in weight. A small plastic product can weigh more than a big plastic bag. It would probably be more sufficient to count the number of wrong and correct plastic items or to measure the volume in addition to weighing the waste to eliminate bias results. If we had the chance to analyse residual waste, it would make our waste analysis more thorough and reliable. We would then have data on how much recyclable plastic that gets thrown into residual waste which is valuable information.

Nudge interventions: We cannot say with certainty that the nudge interventions were the only cause of the changes in correct disposal of plastic waste due to the timing of the experiment and other events that took place invited irregular operations in the wards. Testing the nudges separately would provide us answers of which nudge in particular had the strongest positive effect. Since we had five wards originally, we could have had one ward as control group and given each ward one nudge to test the effect of each nudges separately. Another possibility is to give stronger feedback. Perhaps the feedback in the email intervention (nudge 1) could have been stronger by presenting extracted feedback from the outcomes of the pre-waste audit.

Control group: To prevent the Hawthorne effect, D1 was not told to start separating plastic recyclables into two fractions; hard- and soft plastic. Since there were no hard plastic found in the mixed plastic bin, we treated the data from the audit as if the bin in D1 was a soft-plastic recycle bin and compared results across groups. If we had the chance to do thing differently, we would made sure that the control group had the same segregation system as the experimental groups. The comparison of results across groups would be more accurate.

In conclusion, the biggest lessons learned is that the sample size and timing are very important, because choosing the right time and having a large sample size will improve the reliability and validity of the results, minimizing the probability of errors. It is also important to study the unit of analysis and understand their working environment before designing any interventions, so you target the unit of analysis effectively. Additionally, we learned that even though questionnaires can be sent by the manager of an institution directly to employees, we should not expect a high response rate.

7.4 Volunteering to be in the experiment

This section reflects on the heads of the wards volunteering to be on the experiment. The environmental leader approached three wards in the beginning and had a meeting with the head of different wards in the hospital where she explained to them our project idea. The word about

the experiment spread and two other wards were interested in being in the experiment. In total five heads volunteered their wards to the experiment. These department leaders might have volunteered because they are more susceptible to environmental causes and they care and do a lot of environmental measures. We would expect that less environment friendly departments would not volunteer to be in the experiment. They might think it is not relevant to them or that the experiment will take too much time and effort especially if the wards do not act in an environmentally friendly manner. Another way of looking at it, is that the decision to volunteer might be influenced by the fact that the environmental leader of the hospital went personally to the wards and presented the project. Therefore, out of respect for the environmental leader they accepted to be a part of the experiment without really engaging in the project and knowing what the project entails.

8. Conclusion

This study aims to examine the effect of nudge interventions on recycling behaviour in a work environment by investigating employees stated and revealed preferences. We began by researching and understanding how a hospital operates and evaluated potential factors that can influence employees recycling behaviour. Thereafter we designed effective nudge interventions inspired by previous studies and theory. Employees stated preferences was studied by structuring and distributing an online questionnaire based on the theory of planned behaviour. Revealed preferences was investigated by studying the results from the waste audits. The effectiveness of the nudge interventions where measured and analysed in two ways; changes in recycling behaviour measured by the accuracy of sorting plastic waste through comparing pre- and post-waste audit, and analysing the stated preferences measured by self-reported questionnaires. Finally, we examined the gap between stated preferences and revealed preferences.

Individual's recycling behaviour is influenced by hectic and fast-pace work conditions. Each employee has many tasks to accomplish during their work time and the task of plastic recycling is not perceived as a part of their work responsibility, thus, easy to neglect the overall possible consequences. This study finds that the nudge interventions do have some effect on employees' recycling behaviour, especially simple positive nudge and nudge which illuminate the meaning and purpose of recycling. We conclude that in a work environment which is hectic and stressful, plastic recycling can be easily neglected. The nudge combination of simple positive nudge which serve as a recognition of recycling behaviour and email nudge with information of the

meaning and purpose behind recycling can increase correct recycling behaviour. When considering the gap between revealed and stated preferences, overall results indicate that simple positive poster and an informative email on why to recycle has the potential to close the climate value-action gap, whereas the combination of how and why to recycle and a reminder did not minimize the gap between employees stated and revealed preferences.

As for the variables from the framework of the extended TPB model, the SEM presented no significant relationship between any variables tested (A, SN, COA, PE, MN, SI) and intention (H2a-f). Nonetheless, intention to recycle appears to be the most important variable to explain recycling behaviour (H2g). Results from running different multiple regression models show that there is a significant relationship between attitude, perceived effectiveness and self-identity and recycling intention. Note that the results are not very robust due to possibilities of external sources of variation.

Overall the results show that through simple and affordable nudges, recycling behaviour can be altered in an environment friendly direction which is in line with the nudge theory (Thaler & Sunstein, 2009). Nudge interventions do have the potential to encourage employees to correctly dispose plastic recyclables. Hopefully, the findings in this thesis can contribute to the literature and provide new insight into recycling behaviour of employees working in the health care sector.

8.1 Further Research

Based on the conclusions, a long-term effect of this study is desired to further clarify the effects on the nudge interventions in regular times of hospital operations when all the wards are implementing the same segregation system. A longitudinal study would also possibly identify any potential long-term effects of simple and cheap nudges. Instead of pilot study, the experiment can expand with more wards, more respondents and larger waste audits.

We suggest that different nudges could be investigated further such as placing the bins differently, shaping the bins so they fit better in the washrooms, having different colour bags for each type of plastic material, educational sessions, training programs and feedback. Having better fitting bins will help make the employees manoeuvre easily through the washroom. Future research should test stronger forms of informative and encouraging feedback. Examples are to give feedback about how employees recycled last month, how much money was saved and what products were made from the recyclable material that was correctly sorted.

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APPENDIX:

Appendix A

#	Paper	Location	Research/ research question	Method and theory	Econometric methods	Collection of data	Results
1.	Dionysis Latinopoulosa, Charalampos Mentisb, Kostas Bithasb (2018)	Island of Syros in Greece	Does a public information campaign affect the stated WTP for programs that protect the marine and coastal environment from plastic waste?	Discrete choice experiment (Lancaster's characteristic theory of value, random utility maximization model)	Conditional logit model	Questionnaire	The results show that public information campaigns significantly affected the WTP of the citizens
2.	Caroline Orset, Nicolas Barret, Aurélien Lemaire (2017)	France	How consumers of plastic water bottles are responding to environmental policies?	WTP-analysis	OLS regressions on pooled data	Online Questionnaire	The WTP for plastic bottles decreased significantly when the respondents were informed of the negative environmental impacts whereas the WTP increased when the respondent were informed about a specific kind of plastic bottle that does not harm the environment
3.	Kanupriya Gupta (2011)	Delhi, India	Testing out different types of policies that could help control the plastic bag usage in Delhi.	Field experiment	Probit model	Questionnaire	Interventions such as "bring your own bag, get cash back" scheme was the most effective→ reduced use of plastic bags by 5.5%
4.	Prasenjit Sarkhel, Sarmila Banerjee & Somdutta Banerjee (2015)	Bally Municipality, India	WTP for a pre- and post-program for solid waste management	Contingent valuation method (CVM)	composite error bivariate probit model and OLS regression	double-bounded dichotomous choice questions	The household WTP post-program implementation declines compared to the WTP pre-program implementation. (costs (time required for waste segregation is an important factor) are higher than the benefits)
5.	Rafia Afroz, Keisuke Hanaki, Kiyo Hasegawa-Kurisu (2008)	Dhaka, Bangladesh	WTP of respondents in Dhaka city to improve the waste collection sytem	CVM (random utility theory)	Double bounded logit model	Face-to-face interviews	On average the respondents WTP 13 BDT are (USD 0.18) each month for waste collection service. All the respondents

	Paper	Location	Research question	Method	Econometric methods	Collection of data	Result
							are willing to pay and want to improve the waste management service.
6.	Shoji Ohtomo & Susumu Ohnuma (2014)	Japan	Testing out a voice prompt to reduce plastic bag usage at supermarkets	Field study. A dual motivation model (theory of planned behavior)	linear mixed model analysis	Observations + Questionnaires handed out in the supermarket and returned back by mail	The intervention resulted in drawing the shoppers into the influence of motivational processes and succeeded in activating anti-plastic bag use behavior.
7.	Pieter Vlaeminck, Ting Jiang & Liesbet Vranken (2014)	Belgian supermarket	Testing out if complete, easily-interpretable and standardized labels promote eco-friendly consumption	Two-step approach: 1) online survey, 2) Field experiment; on-line choice experiment	Conditional logit model	Participants fill out a pre- and post-questionnaire	The best label that was preselected in an online survey increased the eco-friendly consumption by 5.3%
8.	Robert L. Clark, Jennifer A. Maki & Melinda Sandler Morrill (2014)	US	Can simple informational nudges increase employee participation in a 401(k) plan?	Field experiment	Logit model	Online survey	a statistically significantly large increase of young workers participated in the plan compared to the other young workers who did not get the intervention. Provision of information has the potential to affect people's choices.
9.	Andrea Szabó & Gergely Ujhelyi (2015)	South Africa	What are the causes of nonpayment and which policies are effective at addressing them?	Field experiment (utility theory)	OLS regression	Baseline survey	The study shows that strategies other than increased enforcement such as education visits can lower nonpayment.

	Paper	Location	Research question	Method	Econometric methods	Collection of data	Result
10.	Chengyan Yue, Charles R. Hall, Bridget K. Behe, Benjamin L. Campbell, Jennifer H. Dennis, and	US	Are consumers willing to pay more for biodegradable containers than for plastic ones?	Hypothetical conjoint analysis and non-hypothetical experimental auctions (utility theory)	Mixed order probit model and ordered probit model	Hypothetical conjoint internet survey	Participant were willing to pay a price premium for biodegradable plant containers.

	Roberto G. Lopez (2010)					
11.	Rafia Afroz, Ataur Rahman, Muhammad Mehedi Masud & Rulia Akhtar (2016)	Malaysia	The study looks at the level of knowledge, awareness, and attitude towards plastic waste and distinguish the key drivers that encourage households in Kuala Lumpur, Malaysia, to participate in "no plastic campaign"	Knowledge, awareness, attitude and motivational analysis	Logistic regression model	Face-to-face interviews	35% of households are willing to participate (WTP) in the "no plastic campaign". The study show that motivation is a significant determinant, but not for recycling plastic behavior of households. People who know more about recycling and are more convinced of their knowledge have a more positive attitude toward recycling compared to their counterparts.
12.	Jill F. Bartolotta & Scott D. Hardy (2018)	Northeast Ohio, US	The study examines the barriers and benefits to positive behavior for plastic bags and plastic bottles	-	-	Online survey via Qualtrics platform	The results show that the residents of northeast Ohio support a ban on plastic bags and plastic water bottles, with more enthusiasm for ban on plastic bags. Financial incentives and solutions focused on education and outreach which are an effective way to influence behavior change.
13.	Kimberly McCoy, Justin J. Oliver, D. Scott Borden & Scott I. Cohn (2018)	Colorado, US	*"This paper aims to test a nudge, or intervention, designed through behavioral insights at a university campus to discover cost-effective means for increasing recycling participation and methods for estimating waste removal cost savings"*	Meta-analysis (nudge theory, theory of planned behavior, rational choice theory, theory of hyperbolic discounting)	t-test	Baseline observations	The nudge significantly lowered rates of recycling in the trash and waste diversion rates improved. Results show that the nudge can enhance recycling programs that are already considered as successful.
14.	Zakaria Babutsidze & Andreas Chai (2018)	Australia	The study looked at how the concern about climate change and behavioral predisposition to act in a prosocial nature can be effectively harnessed to effectively encourage consumers to voluntarily adopt	Discrete choice modelling	Analysis of variance (ANOVA), poisson regression modelling	Anonymous online web-based survey (Qualtrics)	Results suggests that consumers tend to adopt a similar number of MPs as their neighbors. Consumers tend to imitate visible pro-environmental behavior of their peers.

						mitigation practices (MPs)
15.	Bas Verplanken & Deborah Roy (2016)	Peterborough, England	Studying if behavior change interventions are more effective when delivered in the context of life course changes	Field experiment	Multiple regression analysis	Questionnaire handed out and questionnaires sent by post + personal interviews	The results of the study support the hypothesis that *"when old habits are temporarily disturbed, people may be more sensitive to new information and adopt a mind-set that is conducive to behavior change."* The intervention was more effective among households who had recently relocated.
16.	Morten Jakobsen & Serritzlew Søren (2015)	Danish municipality of Aarhus	Testing if nudging by providing information have an impact on knowledge among citizens	Randomized field experiment (Nudge theory)	Ordered logistic regression + OLS regression	Questionnaires sent by mail	The results show that the intervention influenced parental knowledge on how they can help their children learn to read.
17.	Noah Linder, Therese Lindahl & Sara Borgstrom (2018)	Hökaräng en, Sweden	Testing out if information interventions designed based on theories from environmental psychology and behavioral economics can be effective in promoting recycling of food waste in an urban area	Longitudinal field experiment (theories from environmental psychology and behavioral economics, community-based social marketing (CBSM))	Difference-in-difference method + Multivariate linear panel regression	Food waste was collected, weighed and reported every second week	The intervention increased food waste recycling and was statistically significant.
18.	Mohammad Bakri Ala Hammami, Eman Qasem Mohammed, Anas Mohammad Hashed, Mina Amer Al-Khafaji, Fatima Alqahtani, Shaikha Alzaabi & Nihar Dash (2017)	Sharjah city, UAE	The aim of the study is to study students level of awareness, attitudes and behaviors towards plastic pollution.	Cross-sectional study	Multiple linear regression model. Chi-squared test, t-test and one-way ANOVA.	Anonymous questionnaire distributed to students in classrooms	Students showed tendency to be involved in the fight against plastic pollution. Students with educated mothers are inclined towards pro-environmental behavior.
19.	Lèontine Goldzahl, Guillaume Hollard & Florence Jusot (2018)	France	Testing out four behavioral interventions to see if it will increase mammography use	Large-scale randomized experiment (nudge theory)	Logit models	Questionnaire and observations	None of the four treatments had any significant effect on mammography use.

20.	Maria L. Loureiro & Justus Lotade (2005)	State of Colorado, U.S.	Analyzing the effect of socioeconomic factors affecting consumer's WTP for eco-labels in coffee and estimate consumer's mean WTP for different labeling programs	Parametric survival analysis	Weibull regression model	Face-to-face survey	Females with high income and that are more sensitive toward environmental issues are more likely to pay a premium for the three labeling programs.
21.	Mario F. Teisl, Jonathan Rubin & Caroline L. Noblet (2008)	U.S.	Testing out a designed model that links how the characteristics of the individual and the information simultaneously influence an information program's success	Multi-equation psycho-economic modeling, Conceptual model based on Lancaster's choice model	simultaneous ordered-probit system of equations	Survey consisting of 41 questions was sent by mail in three waves	The results show that a well-designed label is important as it has a significant impact on individuals' perceptions of the eco-friendliness of products
22.	Rebecca K. Ratner, Dilip Soman, Gal Zauberman, Dan Ariely, Ziv Carmon, Punam A. Keller, B. Kyu kim, Fern Lin, Selin Malkoc, Deborah A. Small, Klaus Wertenbroch (2008)	-	Review different finding in behavioural decision research and try to explain why consumers need help in decisions	Review paper	-	-	-
23.	Agnes Emberger-Klein & Klaus Menrad (2018)	Germany	Analyzed the impact of providing information on consumers at a supermarket and consumers use of and preferences for carbon labels	Mixed method approach. Discrete choice experiment (random utility theory)	Multinomial logit model	focus group workshop and two in-store surveys	providing additional information about labels can enhance the use of carbon labels. Consumers' decision-making process are in general not impacted by the labels
24.	Maximilian Schemeiser, Christiana Stoddard & Carley Urban (2016)	U.S.	Would providing students with salient information about potential default early on in college lead them to make different choices of majors?	Natural experiment framework	Difference-in-difference-n-difference framework (DDD)	Administrativ e data from the Montana University System (secondary data)	Students who received the intervention (informing students that they may be unlikely to pay back their loans) were more likely to change behaviour. They will change over to higher earning majors.
25.	Victoria Campbell-Aravi, Joseph Aravi & Linda Kalof (2014)	U.S.	Conducting an experiment to see if the intervention motivates people at campus to make pro-environmental food choices	Choice experiment	Binary logistic regression analysis	survey	The default menu configuration had a significant influence on participants' choice of a meat-free menu option. Provision of information on the menus did not have a significant affect.

26.	Sander van der Linden (2015)	Dutch public university	*"advance a social-psychological understanding of how to effectively reduce bottled water consumption"*	Experiment	Multivariate Analysis of Variance (MANOVA)	Online survey sent to students through e-mail	A combination of provision of information and social norms was more convincing and evoked intentions to reduce buying water bottles.
27.	Linda Miesler, Corinne Scherrer, Roger Seiler & Angela Bearth (2016)	Switzerland	Examining the effectiveness of "informational nudging" in sensitizing young adults on the risk of becoming unable to continue in a profession as a result of illness/accident	Online experiment (nudge theory)	Logistic regression model	Online survey	The informational nudge did not motivate the respondents to look more into the issue.
28.	Hsueh-Hsiang Li (2018)	U.S.	Do mentoring, information, and nudge reduce the gender gap in economic majors?	Randomized controlled experiment	Multinomial logit regression	Two waves of survey	The treatments have a significant effect on female students with grades above the median and increased the probability of majoring in economics by 5.41-6.27%.
29.	(2011)	UK	*How can product information be consolidated, pruned down, and presented to supermarket shoppers in an easy-to-understand and meaningful form that will actually help them make better choices on the basis of values they care about?*	Field experiment	Binomial test	Asked participants questions + Observations	The lambent device generated a significant nudge effect. 72% of the products chosen by the people with the lambent shopping handle had lower mean food mileage compared to the control group using a normal shopping trolley.
30.		Cugir, district Alba	test peoples' actions of leaving items they no longer want on different districts in the stores	Field experiment (Nudge theory)	Graphic analysis	Interview + observations	The nudge (basket put in different districts= stimuli baskets) had a desired effect reducing the number of products in inappropriate districts
31.	René A. de Wijk, Anna J. Maaskant, Ilse A. polet, Nancy T.E. Holthuysen, Ellen van Kleef, Monique H. Vingerhoeds (2016).	Netherlands	*"Investigate the effect of accessibility on consumers' purchase of healthier whole grain and other types of bread"*	In-store experiment	ANOVA	observations	*"There were consistent significant differences in sales between supermarkets, types of bread, day of the week, but not between low and high accessibility"*

32.	Andreas Chai, Graham Bradley, Alex Lo and Joseph Reser (2015)	Australia	*"how the amount of discretionary time that individuals have at their disposal influences both what type of sustainable consumption practices they adopt and the size of this value–action gap"*	Secondary data (household production theory, broaden-and-build theory, theory of time perspective, conservation of resources theory and job demands-resources theory)	Order logit model	Anonymous online-based survey (Qualtrics)	*"discretionary time was found to have a positive influence on the overall propensity for individuals to adopt sustainable consumption practices across a wide range of consumption domains."* Negative correlation between discretionary time and the size of the value-action gap
33.	Rob Flynn, Paul Bellaby & Miriam Ricci (2010)	England and Wales	*"studying public perceptions of the potential risks, costs and benefits of a hydrogen energy system and also their views about the uses of hydrogen in transport"*	Represents finding from two recent studies by the authors ("value-belief-norm theory")	-	Focus groups and telephone questionnaires	the gap between values and action is significant when it comes to attitudes towards hydrogen energy
34.	James Blake (1999)	UK	The paper focuses on policies that address the "value-action gap" in environmental policy	(theory of reasoned action and theory of planned behavior)	-	-	*"The research suggests that policy must be sensitive to the everyday contexts in which individual intentions and actions are constrained by socioeconomics and political institutions."*
35.	Ben Lane & Stephen Potter (2007)	UK	The study reports the findings of two research projects that looks at attitudinal barriers inhibiting the adoption of cleaner vehicles	Report (theory of planned behavior, "value-belief-norm theory")	-	Survey + interviews	Consumers go for products that are convenient and easy to use
36.	Hunt Allcott & Dmitry Taubinsky (2015)	U.S.	How much does information provision affect demand for CFLs (compact fluorescent lightbulbs)?	Two randomized experiments (consumer utility theory, optimal policy theory)	Welfare analysis	Survey, interview	Consumers still demand CFLs even after being powerfully informed
37.	Ciro Avitabile & Rafael de Hoyos (2015)	Mexico	*«study whether 10th grade students with information about the returns to upper secondary and tertiary education and a source of financial aid for tertiary education can contribute to improve student performance"*	Experiment	OLS regressions	Baseline survey	*"pure informational treatment is not an effective strategy to reduce upper secondary dropout rates in Mexico and are not able to improve learning outcomes among students from disadvantage backgrounds since the increase in effort has to be*

						complimented by other inputs"
38.	Eric P. Bettinger, Bridget Terry Long, Philip Oreopoulus & Lisa Sanbonmatsu , (2012)	U.S.	Testing different interventions; personal assistance and provision of information to see if it effects students completing the FAFSA application form and applying for financial aid to attend college	Randomized field experiment	OLS regressions	Interview, focus groups	results show no improved outcomes with the FAFSA for families who only received aid information
39.	Justine Hastings, Christopher A. Nilson & Seth D. Zimmerman (2017)	Chile	The study looks at the effect of information about labor market outcomes and cost has on college enrollment choices	Field experiment	Multinomial logit	Survey sent by email to students	*"findings suggest that although providing information on earnings and cost outcomes for different degree programs offer a high return on investment for policymakers, it is unlikely to substantially reduce rates of default"*
40.	Joel Slemrod, Marsha Blumenthal & Charles Christian (1999)	Minnesota U.S.	*"how many resources should be devoted to taxpayer assistance rather than monitoring; can evasion be reduced by appeals to taxpayers' conscience, or sense of duty?"*	Controlled experiment	Multivariate regression analysis, difference-in-difference method	observation	*"While the treatments were designed with the purpose of signaling a certain, thorough audit, in actuality they may have had only very limited success in capturing the attention of taxpayers."*
41.	Peter Kopelman (2011)	UK	*"tackling obesity- to "nudge" or to "shove"?"*	debate	-	-	*"real success in tackling obesity requires the health of the population to be seen as a priority not simply by government ministers but by society at large."*
42.	Esther Duflo, Michael Kremer & Jonathan Robinson (2011)	kenya	*«analyze the impact of different policies depending on the distribution of patient, impatient, and stochastically present-biased farmers."*	Randomized field Experiment (nudge theory, timing of discount)	Regerssion framework	Interview + survey	*"this paper suggests that small, time-limited discounts can potentially help present-biased farmers commit to fertilizer use and thus overcome procrastination problems, while minimally distorting the*

						investment decisions of farmers who do not suffer from such problems»
43.	Kazuki Onji & Rina Kikuchi (2011)	Japan	Testing libertarian paternalistic intervention to see if it has an effect on students procrastination in a language course	Quasi-experiment (nudge theory)	OLS regression, probit model, difference-in-difference analysis	Questionnaire	*"prompts affect behavior, especially when reinforced, but the responsiveness depends on the class preferences and the timing of interventions."*
44.	Erel Avineri (2012)	-	*"brief review on the use and potential of behavioural economics from the perspective of transport and climate change, in two main contexts: travel demand modelling and design of behaviour change measures"*	Review (nudge theory, theory of choice, theory of planned behaviour, norm activation theory, Smith's theory of Moral Sentiment, prospect theory)	-	-	-
45.	Anna Bernstad (2014)	Malmö, Sweden	Testing two different interventions: written information (why and how information) and installation of equipment to see if it has an effect on household food waste recycling	Case study (ABC-theory, nudge theory)	Weighing the waste, waste composition analysis	observations	Written information had no impact on food waste recycling among households. The equipment helped increase source-separation
46.	Carol M. Werner, Paul H. White, Sari Byerly & Robert Stoll (2009)	-	*"One purpose of this article is to explore the technique of "validating complaints" as a way to reduce reactance and increase positive reactions to the sign, thereby increasing a sign's long-term impact."*	Two experiments (Elaboration likelihood model (ELM) theory)	MANCOVA analysis, hierarchical regression	questionnaires	The weak argument sign with the validation increased recycling more than the strong argument validation sign.
47.	John Austin, David B. Hatfield, Angelica C. Grindle and Jon S. Bailey (1993)	U.S.	*"examining the effects of specific and informative response-approach, prompts on recycling behavior in an office environment."*	Experiment, multiple baseline design across two departments	Graphical representation of data	Data was collected daily by counting the recyclable material that ended up in the trash cans and recycling bins. Observations	*"Department A resulted in a 54% improvement over baseline. Department B resulted in a 17% improvement, whereas positioning the signs and receptacles in close proximity resulted in a 29% improvement over baseline."*

48.	Ruben Miranda & Angeles Blanco (2010)	Europe	Looks at environmental awareness and how it can play an important role in overcoming paper recycling limits	Expert panel evaluation method	Graphical analysis	Secondary data	*"Generally, in countries with a low collection rate, the citizens' environmental awareness needs to be addressed first, while, in countries with already high collection rates (as well as high citizens' environmental awareness), an improvement of the collection systems represents a key to continuing the expansion of paper recovery."*
49.	Harriet Runcie (2018)	UK	Report of a multicenter quality improvement project on the use of clinical waste bins at two NHS trusts	Experiment, waste audit pre and post intervention	Chart demonstration	Observations (waste audit)	The post waste audit showed no improvements (intervention was staff education)
50.	A.A. Al-Emad (2011)	Yemen	*"evaluate waste-workers' and hospital administrators' knowledge and practices regarding medical waste handling"*	Study conducted in 5 government and 12 private hospitals in Sana	Percentage calculations	Questionnaire, Interviews and observations	*"most hospitals were not differentiating between domestic and medical waste. Budgets were not allocated for waste management purposes, which caused shortages in waste facilities handling equipment and supplies and absence of training programs for staff, resulting in poor knowledge and practices of waste workers"*
51.	Mehrdad Askarian, Mahmood Vakili & Gholamhosein Kabir (2004)	Iran	*"determine the amount of different kinds of waste produced and the present situation of waste management"*	Studying private hospitals	Percentage calculations	Interviews, questionnaires, observations and weighing the waste	*"there aren't any training courses about hospital waste management and the hazards associated with them. The training courses that are provided are either ineffective or unsuitable"*
52.	Bonte Mbongwe, Baagi T. Mmereki & Andrew Magashula (2008)	Botswana	«reviews current waste management practices at the healthcare facility level and proposes possible options for improvement in Botswana."	review	Graphical representation	Survey	Lack of color coding

53.	A. Bdour, B. Altrabsheh, N. Hadadin & M. Al-Shareif (2007)	Jordan	Assessment of medical wastes management practices	review	Quantitative and qualitative analysis of medical waste. Statistical analysis, scatter diagram. Calculating quantity of waste per day per bed (kg/bed/day). OLS regressions	Survey	-
54.	Saurabh Gupta & Ram Boojh (2006)	India	Studies biomedical waste management in India	report	Calculating the quantity of waste per day (kg/day)	Data collected from hospital records, interviews and by physical check (observations)	-*"careless and indiscriminate disposal of waste"* - *"lack of education, awareness and trained personnel"*
55.	Issam A. Al-Khatib, Yousef S. Al-Qaroot & Mohammad S. Ali-Shtayeh (2009)	Nablus city, Palestine	Assesses healthcare waste management	review	Kg and percentage calculations	observational checklist, a questionnaire and in-depth interviews with key personnel in charge of medical waste management	*"the solid medical waste management sector does not receive the required attention and local governments and other related institutions do not have a sufficiently robust waste management policy and system"*
56.	Israel Deneke Haylamicheal, Mohamed Aqiel Dalvie, Biruck Desalegn Yirsaw and Hanibale Atsbeha Zegeye, 2011	Ethiopia	An evaluation of the healthcare waste management in Ethiopia	Evaluation, review	Statistical analysis: Univariate and bivariate analysis	Two questionnaire surveys	-lack of color coding -Lack of awareness and willingness -lack of proper segregation and storage -lack of staff training

Appendix B

Confirmation to collect primary data from NSD

NSD Personvern
02.04.2019 10:11

Det innsendte meldeskjemaet med referansekode 832433 er nå vurdert av NSD.

Følgende vurdering er gitt:

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet med vedlegg den 02.04.2019, samt i meldingsdialogen mellom innmelder og NSD. Behandlingen kan starte.

MELD VESENTLIGE ENDRINGER
Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde dette til NSD ved å oppdatere meldeskjemaet. Før du melder inn en endring, oppfordrer vi deg til å lese om hvilke type endringer det er nødvendig å melde:

nsd.no/personvernombud/meld_prosjekt/meld_endringer.html

Du må vente på svar fra NSD før endringen gjennomføres.

TYPE OPPLYSNINGER OG VARIGHET
Prosjektet vil behandle alminnelige kategorier av personopplysninger frem til 17.06.2019.

LOVLIG GRUNNLAG
Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse som kan dokumenteres, og som den registrerte kan trekke tilbake. Lovlig grunnlag for behandlingen vil dermed være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 bokstav a.

PERSONVERNPRINSIPPER
NSD vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om:

- lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke

- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke behandles til nye, uforenlige formål
- dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet
- lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet

DE REGISTRERTES RETTIGHETER
Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: åpenhet (art. 12), informasjon (art. 13), innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), underretning (art. 19), dataportabilitet (art. 20).

NSD vurderer at informasjonen om behandlingen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13.

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER
NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32).

For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og/eller rådføre dere med behandlingsansvarlig institusjon.

OPPFØLGING AV PROSJEKTET
NSD vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til med prosjektet!

Kontaktperson hos NSD: Karin Lillevold
Tlf. Personverntjenester: 55 58 21 17 (tast 1)

Confirmation from Haukeland university hospital

Skjema: «Førespurnad om datainnsamling ved HUS for masterstudentar»

Ferdig utfylt skjema sendes til studentoppgaver@helse-bergen.no

Hensikta med skjemaet er å få oversikt over alle datainnsamlingar knytt til masteroppgåver som skal gjennomførast med utgangspunkt i Haukeland universitetssjukehus (HUS).

Alle masterstudentar må sende inn skjema også om datainnsamlinga er del av eit prosjekt tilknytte HUS.

Det er ei føresetnad at gjeldande lover, forskingsetiske retningslinjer og metodar for datainnsamling følgjes. Vi understreker at alle masterprosjekt må følgje rutinane for forsking ved HUS.

Fylles ut av søkar

Namn på student/søker	Rofaida Basefer og Dilnur Tursun		
Er studenten ansatt ved HUS?	Ja		Hvis ja, oppgi avdeling/klinikk og stillingsprosent:
	Nei	X	
Navn på utdanningsinstitusjon	Handelshøyskolen ved Universitetet i Stavanger		
Hovedveileder. Navn og arbeidssted	Gorm Kipperberg, Førsteamanuensis i Handelshøyskolen ved UiS		
Biveileder. Navn og arbeidssted			
Eventuell kontaktperson ved HUS for masteroppgaven?	Ja	X	Hvis ja, navn og kontaktopplysninger HUS: Linda Karen Eide miljøleder i Helse Bergen
	Nei		
Tema og foreløpig problemstilling	Tema: sortering av plastavfall Problemstilling: Har dulting potensialet til å motivere ansatte til å sortere plast ordentlig på arbeidsplassen?		
Datainnsamling/metodikk: Kryss av for en eller flere.	Intervju		Kommenter eventuelt kort om metodikk
	Spørreskjema	X	Vi ønsker å teste ut dultestrategier (eks. plakater) for å se om det kan påvirke ansatte til å endre holdninger og begynne å sortere plast på en riktig måte. Kontrollgruppen skal ikke få noen dulteintervensjoner imotsetnign til eksperimentgruppen. Observasjon (Avfallskontroll) vil gi oss data på ansattes faktiske handlinger, mens en anonym nettbasert spørreundersøkelse vil gi oss data på ansattes selvrapporterte preferanser om sortering av plastavfall. Avfallsanalysen (utføres før og etter dulteintervensjonene er satt på plass) vil gi oss data på hvor mye gjenvinnbar plast blir feilplassert. Spørreundersøkelsen (utføres etter intervensjonene er implementert) vil gi oss en bedre forståelse på ansatte tanker og meninger om sortering av plastavfall.
	Observasjon	X	
	Registerdata		
	Journaldata		
	Laboratorieforsøk /eksperimentelle forsøk	X	
	Andre metodikker		
Utvalgt/populasjon: Kryss av for en eller flere.	Ansatte	X	
	Pasienter		
	Pårørende		
	Andre		

Er datainnsamlingen del av et større prosjekt?	Ja		Hvis ja beskriv overordet prosjekt kort; herunder om datainnsamlingen til masterprosjektet er inkludert i overordnet godkjenning.
	Nei	X	
Kostnader	Vil det være kostander ved gjennomføring av datainnsamling i sykehuset? Beskriv kort hvordan de er tenkt dekket.		
	Nei		
Hvilke konsekvenser og ev merarbeid vil datainnsamlingen ha for HUS?	Beskriv kort: De ansatte som skal involveres er knyttet til følgende avdelinger: - Post 2 Urologi, Avdeling for urologi, Kirurgisk klinikk - Post 3 gastrokirurgi, Avdeling for Gastrokirurgi - Poliklinikk Bryst- og endokrinkirurgi - Post 1 gastrokirurgi nedre, Avdeling for Gastrokirurgi - Post Brannskade, Seksjon for Brannskade, Avdeling for plastikk En link til spørreundersøkelsen blir sendt til Linda Karen Eide som videresender den til lederne på hver avdeling. Lederne sender undersøkelsen til sine ansatte via e-post. Når de ansatte trykker på linken for å ta den anonyme undersøkelsen så blir ikke IP adresse, navn, epost adresse eller noen annen informasjon lagret. Vi bruker et nettbasert verktøy som heter Qualtrics som sikrer at respondantene er anonyme. Ansvaret til å henge opp plakater på skyllerom kan bli gitt til en ansatt på avdelingen. Lederen på avdeling kan også utføre dette. Hvis det er mulig å få tilsendt et bilde av skyllerommet så kan vi se hvor det er best å henge opp plakatene. Deretter vil vi forklare detaljert hvor vi ønsker at plakatene skal bli plassert. Det er avklart med Linda Karen Eide at det er hun som skal koordinere avfallskontrollen og hun skal også ha med seg miljøkoordinator på de ulike avdelinger. Linda skal koordinere oppheng av plakater.		
Plan for tilbakeføring av resultat til HUS	Forklar kort: Vi planlegger å dele den ferdigstilte masteroppgaven med HUS		

Fylles ut av HUS

Tillatelse gitt av klinikk/avdeling	Ja	Dato og navn	Kommentar:
Svarer på veven av Kir. Klinikk	X	18/3 - 2019	
	Nei	Dato og navn	Kommentar:

Appendix C

Nudge 1

Bli med dine kolleger og kildesorter plastavfall!

Hvorfor er det viktig å kildesortere plast?

Haukeland universitetssykehus produserer store mengder med plastavfall hvert år. Vi jobber nå med et nasjonalt plast prosjekt hvor målet er blant annet å gjenvinne mer plast. De siste årene har gjenvinningsfraksjonen av plast vært i gjennomsnitt 70 000 kg.[1] Vi ønsker å øke gjenvinningsgraden med fokus på å kildesortere riktig.

Utslipp av miljøskadelige stoffer påvirker miljøet. Målet er «å redusere utslipp av miljøskadelige stoffer til jord, luft og vann».[1] Å ta vare på miljøet blir en stadig viktigere del av vår arbeidsdag. Derfor må alle ta ansvar for å sortere plastavfall på en riktig måte og redusere sykehusets miljøfotavtrykk. Visste du at:

- ➤ En kilo gjenvunnet plast = 2 kilo mindre CO2-utslipp
- ➤ Vi sparer to kilo olje for hver kilo plast som blir gjenvunnet
- ➤ Plastemballasje som er ren og tørr kan gjenvinnes opptil seks ganger! [2,3]

Se på plastavfall som råstoff og ikke søppel. Plast er et material som er brukbar til veldig mye! Gjennom å kildesortere riktig kan avfallet vi genererer bli til en ressurs. Plastavfallet sendes til resirkulering og blir til nye produkter. Dette vil føre til sparing av klimautslipp og bruk av naturressurser.

Ulik typer plast krever ulik behandling slik at plasten kan gjenbrukes som råmateriale. Plastemballasje på Haukeland universitetssykehus blir sortert inn i tre ulike kategorier:

1) **MYK PLAST**   2) **HARD PLAST**   3) **ISOPOR**

Plast-emballasje   Hard plast-emballasje   EPS (Isopor®)

VIKTIG: Det er vitkig å passe på at hard- og myk plast ikke blandes. De skal sorteres hver for seg i hver sin balje! Alt som ikke kan gjenvinnes havner i restavfallet.

Du kan hjelpe sykehuset spare store kostnader ved å unngå feilplassert avfall!
Hvis annen type avfall havner i gjenvinningsstasjonene for plastavfall vil avfallet bli ansett som forurenset. I stedet for å sende avfallet til gjenvinning blir det sendt til fjernvarme. Prisene for levering av forurenset avfall er høye.

Hva kan du gjøre for å bli mer miljøvennlig på jobb?

- Kildesorter plastavfall på en riktig måte
- Påminn hverandre om å sortere riktig
- Spør om hjelp hvis du er usikker på hvor du skal kaste plasteavfallet
- Engasjer deg i miljøarbeidet på sykehuset
- Meld avvik om du oppdager feil sortering

Vi ønsker at du tar initiativ og prøver ditt beste til å kildesortere plastavfall grundig selv i et hetisk arbeidsmiljø. Du vil da bidra til økonomiske gevinster og miljø- og klimagevnister!

Nudge 3:

Appendix E

Waste audit step by step:

Step 1: Collect hard plastic waste and soft plastic waste from all 5 departments participating in the experiment. Mark the bags with date, type of plastic and name of the department the waste was collected from.

Step 2: find a place where you can open the bags and analyse the waste without the employees seeing what you do. The employees should not be informed about the waste audit. If they know they are being observed, they will change their behaviour. Employee behavioural changes should be due to the interventions we are testing and not because they know that they are being observed (avoid the Hawthorne effect).

Step 3: Once you have found a place to perform the analysis, you can start by weighing all the bags. Write down how much each bag weighs before opening them.

Step 4. After weighing, open one bag at a time. It is recommended to finish analysing a bag at a time before starting a new one. Take out everything that is not the correct material and set it aside.

Step 5: When you have sorted the plastic waste into two categories: correct and wrong material then you need to put the wrong content in a separate bag and weigh it. Now you need to write down much misdirected waste weighs.

The bags containing hard plastics are sorted into two categories; hard plastic and wrong material (everything that is not hard plastic). Each category is then weighed:

	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5
Hard plastic (kg)					
wrong content (kg)					
Total weight (kg)					
Comments:					

The bags containing soft plastics are sorted into two categories soft plastic and wrong content. Each category is then weighed:

	Ward 1	Ward 2	ward 3	ward 4	ward 5
Soft plastic (kg)					
Wrong content(kg)					
Total weight (kg)					
Comments:					

Appendix F

Original timetable of the project	
25th of March – 5th of April	Waste audit 1 (2 weeks)
8th of April – 19th of April	Nudge interventions (2 weeks)
23nd of April – 5th of May	Sending out the questionnaire (2 week deadline)
24nd of April - 3rd of May	Waste audit 2 (2 weeks)
29th of April and 2nd of May	Sending out reminder to answer the questionnaire

Actual timeline of the project	
1st of April	Waste audit 1
9th of April - 19th of April	Nudge interventions were implemented for two weeks
23nd of April - 10th of May	Sending out the questionnaire (extended the deadline)
24nd of April	Waste audit 2
25th of April, 29th of April, 2nd of May, 9th of May	Sending out reminder to answer the questionnaire

Appendix G (information on the questionnaire)

Undersøkelse om plastsortering på arbeidsplassen

Vi invitere deg til å delta på en kort spørreundersøkelse om plastsortering på arbeidsplassen som er laget av to masterstudenter fra Handelshøgskolen ved Universitetet i Stavanger (UiS). Undersøkelsen er en del av at miljø-økonomisk forskningsprosjekt i samarbeid med Haukeland universitetssykehus. Forskningsprosjektet går ut på å forstå de ansattes forhold til plastsortering på arbeidsplassen.

Undersøkelsen er helt anonym, og det er frivillig å delta. Det tar ca. 10 minutter å svare på spørsmålene. Det er ingen riktige eller gale svar. Vi behandler opplysninger om deg basert på ditt samtykke.

Noen av spørsmålene kan virke gjentagende, derfor ber vi deg vennligst lese hvert spørsmål nøye før du svarer. Svarene du oppgir er med på å gi Haukeland Universitetssykehus en bedre forståelse av deres ansattes meninger og preferanser når det gjelder plastsortering.

Dine rettigheter

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg,
- å få rettet personopplysninger om deg,
- få slettet personopplysninger om deg,
- få utlevert en kopi av dine personopplysninger (dataportabilitet), og
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

Hvis du har noen spørsmål angående spørreundersøkelsen eller forskningsprosjektet, vennligst ta kontakt med:

Handelshøgskolen ved Universitetet i Stavanger ved Rofaida Basefer, rfb.rla@gmail.com (masterstudent),

Dilnur Tursun, d.tursun@stud.uis.no (masterstudent) eller Gorm Kipperberg, gorm.kipperbeg@uis.no (prosjektansvarlig)

Jeg har lest og forstått informasjonen om prosjektet «Plastsortering på arbeidsplassen», og er villig til å svare på spørsmålene i denne undersøkelsen. Jeg gir mitt samtykke til:

- o å delta i spørreskjema om "Plastsortering på arbeidsplassen"

Appendix H.

Factors	Items	Source
Intention	**Item 1.** Jeg planlegger å sortere plast når jeg er på jobb **Item 2.** Jeg vil aktivt sortere plastavfallet på jobb **Item 3.** Jeg kommer til å sortere plastavfall på jobb de neste 4 ukene **Item 4.** Jeg vil anbefale andre til å sortere plastavfall på jobb	Ajzen (2013), Ajzen (2002), Sparks & Sheperd (1992), Kumar (2012)
Attitude: Cognitive attitude **Affective attitude**	**Item 1-5.** Jeg tror at sortering av plastavfall er: Komplisert – Enkelt Ikke givende – Givende Bortkastet tid – Nyttig Ikke ansvarlig – Ansvarlig Uhygienisk – Hygienisk **Item 6.** Jeg tror sortering av plastavfall vil bidra til å redusere forurensing og forbedre miljøet **Item 1.** Jeg føler meg bra når jeg sorterer plastavfall **Item 2.** Jeg føler at jeg gjør min borgerlige plikt ved å sortere plastavfall	Tonglet et al. (2004), Halvorsen (2010), Ajzen (2013), Ajzen (2002)
Subjective norm	**Item 1.** Familien min forventer at jeg skal engasjere meg i sortering av plastavfall **Item 2.** Vennene mine forventer at jeg skal engasjere meg i sortering av plastavfall **Item 3.** Kollegaene mine forventer at jeg skal engasjere meg i sortering av plastavfall **Item 4.** Sjefen min forventer at jeg skal engasjere meg i sortering av plastavfall **Item 5.** Samfunnet mitt forventer at jeg skal engasjere meg i sortering av plastavfall	Kumar (2012), Vermier and Verbeke (2008)
Perceived behavioral control: Control on availability **Perceived effectiveness**	**Item 1.** Jeg er kjent med de ulike plastikktypene som vi bruker på jobb **Item 2.** Jeg er kjent med de ulike plastikktypene som er gjenvinnbare på jobb **Item 3.** Jeg er kjent med forskjellen på hardplast og myk plast **Item 4.** Jeg er kjent med sorteringssystemet av plastavfall på jobb **Item 5.** Sykehuset gir tilfredsstillende ressurser for sortering av plastavfall **Item 6.** Jeg kan enkelt sortere plastavfall når jeg trenger det på jobb **Item 7.** Jeg har full kontroll over sortering av plastavfall på jobb **Item 1.** Det er verdiløst for den enkelte å gjøre noe med plastavfall **Item 2.** Siden en person ikke kan ha noen påvirker på plastforurensning, spiller det ingen rolle hva jeg gjør **Item 3.** Hver persons handlinger kan ha en positiv påvirkning på samfunnet ved å sortere plastavfallet sitt	Tonglet et al. (2004), Kumar (2012), Sparks & Sheperd (1992), Strydom (2018)
Behaviour	**Item 1.** Jeg velger å sortere plastavfall hvis sorteringsstasjonene er lett tilgjengelige	Kumar (2012)

	Item 2. Jeg velger å sortere plast selv om det er en avstand for meg å gå til sorteringsstasjonen **Item 3.** Hvis jeg forstår de potensielle skadene plastprodukter kan forårsake på miljøet, sortere jeg disse produktene ordentlig etter bruk		
Moral norm	**Item 1.** På grunn av mine verdier og prinsipper føler jeg at det er viktig å prøve å sortere plastavfall **Item 2.** Jeg føler en moralsk forpliktelse til å sortere plastavfall for miljøets skyld **Item 3.** Jeg får dårlig samvittighet hvis jeg ikke sorterer plastavfall **Item 4.** Jeg føler meg skyldig hvis jeg ikke sorterer plastavfall **Item 5.** Alle burde dele ansvaret til å sortere plastavfall	Tonglet et al. (2004), Arvola et al. (2008)	
Self-identity	**Item 1.** Å sortere plastavfall i hverdagen min er en viktig del av hvem jeg er **Item 2.** Jeg betrakter meg selv å være bevisst når det kommer til gjenvinning av plast	Yazdanpanah & Forouzani (2015)	

Appendix I. Descriptive statistics on items

| Factors	Items	Mean	Std. Dev.
Intention (Q1)	IN_item1	5.38	1.74
	IN_item2	5.97	1.12
	IN_item3	5.89	1.17
	IN_item4	5.68	1.36
Attitude (Q2, Q3): Cognitive attitude	CA_item1	4.70	1.85
	CA_item2	5.70	1.49
	CA_item3	5.81	1.71
	CA_item4	6.19	1.33
	CA_item5	5.81	1.41
	CA_item 6	6.32	0.91
Affective attitude	EA_item1	5.92	1.34
	EA_item 2	5.92	1.32
Subjective norm (Q4)	SN_item1	4.43	1.57
	SN_item2	4.32	1.65
	SN_item3	4.89	1.31
	SN_item4	5.70	1.10
	SN_item5	6.00	1.13
Perceived behavioral control (Q5, Q6): Control on availability	COA_item1	4.84	1.59
	COA_item2	4.49	1.56
	COA_item3	5.16	1.36
	COA_item4	5.22	1.36
	COA_item5	4.10	1.81
	COA_item6	4.41	1.76
	COA_item7	4.49	1.66
Perceived effectiveness	PE_item1	2.03	1.57
	PE_item2	2.03	1.34
	PE_item3	6.03	1.04
Behaviour (Q7)	B_item1	5.95	0.74
	B_item2	5.19	1.29
	B_item3	5.81	1.00
Moral norm (Q8)	MN_item1	5.92	1.01
	MN_item2	5.89	1.07
	MN_item3	5.11	1.59
	MN_item4	4.62	1.66
	MN_item5	6.27	0.84
Self-identity (Q9)	SI_item1	4.59	1.46
	SI_item2	5.16	1.30

The scale for PE item 1 and PE item 2 is not reversed.

Appendix J. Factor analysis

Exploratory factor analysis:

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
IN_item1			0.7670				
IN_item2	0.3864	0.6466	0.3020			0.3233	
IN_item3	0.3102	0.6761	0.3735				
IN_item4		0.3929	0.5638			0.4555	
CA_item1		0.3865			0.6011		
CA_item2		0.7717					
CA_item3		0.7113				-0.3035	
CA_item4		0.8119					
CA_item5		0.6291			0.4614		
CA_item6	0.4044	0.6683					
AA_item1	0.7953	0.4593					
AA_item2	0.6678	0.5911					
SN_item1	0.3717		0.6530				
SN_item2			0.6718				
SN_item3				0.4153	0.5533		
SN_item4				0.5067	0.4381		
SN_item5	0.3487	0.4762		0.4547			0.3492
COA_item1				0.8411			
COA_item2				0.8825			
COA_item3				0.8388			
COA_item4				0.3663	0.5884		
COA_item5					0.6745		
COA_item6					0.8514		
COA_item7				0.5692	0.7104		
PE_item1 (reversed)						0.8129	
PE_item2 (reversed)	0.3580					0.7501	
PE_item3						0.3991	0.3617
B_item1	0.3164	0.3067					0.6632
B_item2	0.3115		0.5776				0.3579
B_item3	0.6555						0.5933
MN_item1	0.7511						0.3346
MN_item2	0.7537	0.3186					0.3291
MN_item3	0.8805						
MN_item4	0.8354						
MN_item5	0.6150	0.3336				-0.3075	
SI_item1	0.3787		0.7741				
SI_item2			0.6880				0.4447

Confirmatory factor analysis (CFA):
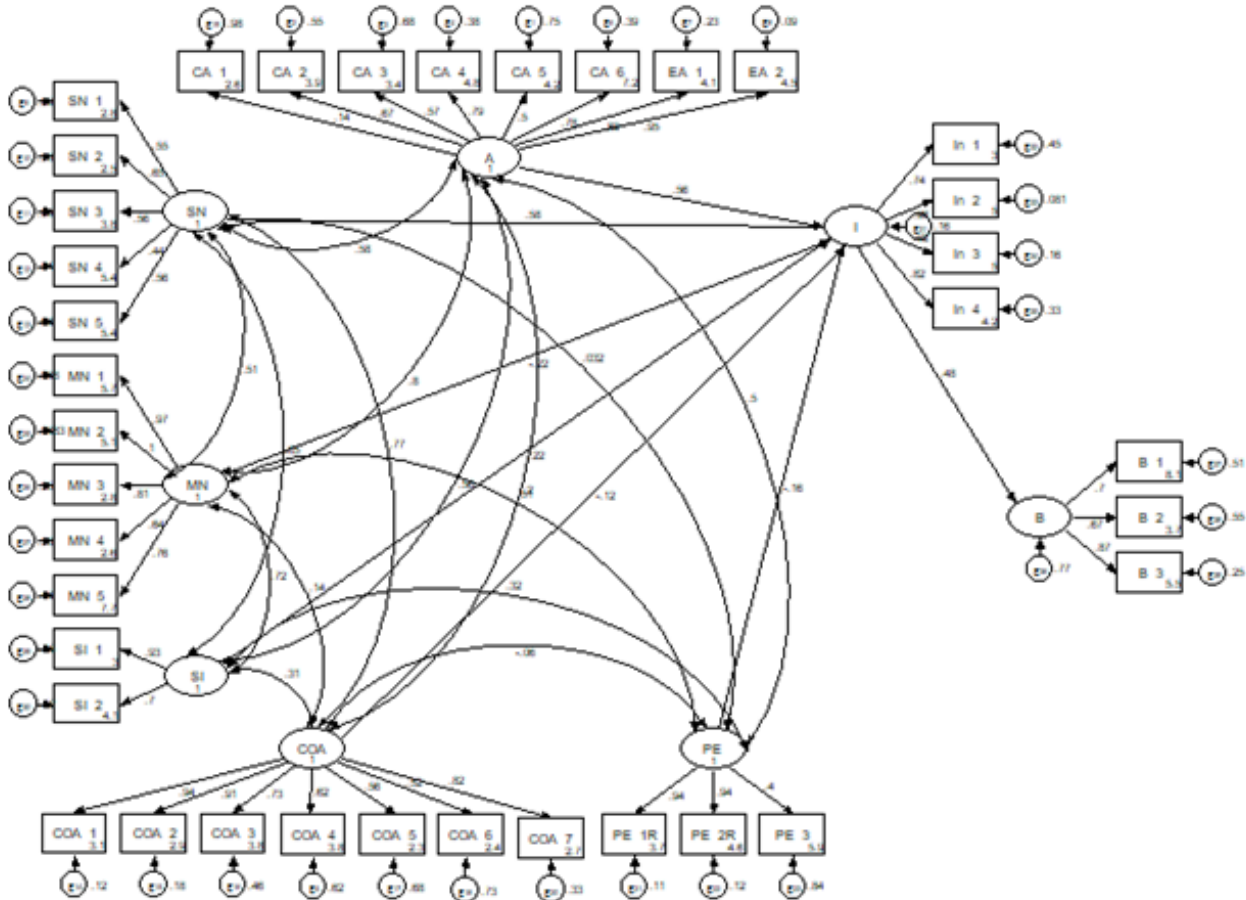
Appendix K: Questionnaire set up on Qualtrics and Descriptive data

Jeg har lest og forstått informasjonen om prosjektet «Plastsortering på arbeidsplassen», og er villig til å svare på spørsmålene i denne undersøkelsen. Jeg gir mitt samtykke til:

○ å delta i spørreskjema om "Plastsortering på arbeidsplassen" (1)

- -

Page Break

Q1 I hvilken grad er du enig med følgende påstander:

	Sterkt uenig (1)	Uenig (2)	Delvis uenig (3)	Nøytral (4)	Delvis enig (5)	Enig (6)	Sterkt enig (7)
Jeg planlegger å sortere plast når jeg er på jobb (1)	○	○	○	○	○	○	○
Jeg vil aktivt sortere plastavfallet på jobb (2)	○	○	○	○	○	○	○
Jeg kommer til å sortere plastavfall på jobb de neste 4 ukene (3)	○	○	○	○	○	○	○
Jeg vil anbefale andre til å sortere plastavfall på jobb (4)	○	○	○	○	○	○	○

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Page Break

Q2 Jeg tror at sortering av plastavfall er:

	1	2	3	4	5	6	7	
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Komplisert	◯	◯	◯	◯	◯	◯	◯	Enkelt
Ikke givende	◯	◯	◯	◯	◯	◯	◯	Givende
Bortkastet tid	◯	◯	◯	◯	◯	◯	◯	Nyttig
Ikke ansvarlig	◯	◯	◯	◯	◯	◯	◯	Ansvarlig
Uhygienisk	◯	◯	◯	◯	◯	◯	◯	Hygienisk

☐

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Q3 I hvilken grad er du enig med følgende påstander:

	Sterkt uenig (1)	Uenig (2)	Delvis uenig (3)	Nøytral (4)	Delvis enig (5)	Enig (6)	Sterkt Enig (7)
Jeg tror sortering av plastavfall vil bidra til å redusere forurensning og forbedre miljøet (1)	◯	◯	◯	◯	◯	◯	◯
Jeg føler meg bra når jeg sorterer plastavfall (2)	◯	◯	◯	◯	◯	◯	◯
Jeg føler at jeg gjør min borgerlige plikt ved å sortere plastavfall (3)	◯	◯	◯	◯	◯	◯	◯

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Q4 I hvilken grad er du enig med følgende påstander:

	Sterkt uenig (1)	Uenig (2)	Delvis uenig (3)	Nøytral (4)	Delvis enig (5)	Enig (6)	Sterkt enig (7)
Familien min forventer at jeg skal engasjere meg i sortering av plastavfall (1)	○	○	○	○	○	○	○
Vennene mine forventer at jeg skal engasjere meg i sortering av plastavfall (2)	○	○	○	○	○	○	○
Kollegaene mine forventer at jeg skal engasjere meg i sortering av plastavfall (3)	○	○	○	○	○	○	○
Sjefen min forventer at jeg skal engasjere meg i sortering av plastavfall (4)	○	○	○	○	○	○	○
Samfunnet mitt forventer at jeg skal engasjere meg i sortering av plastavfall (5)	○	○	○	○	○	○	○

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Q5 I hvilken grad er du enig med følgende påstander:

	Sterkt uenig (1)	Uenig (2)	Delvis uenig (3)	Nøytral (4)	Delvis enig (5)	Enig (6)	Sterkt enig (7)
Jeg er kjent med de ulike plastikktypene som vi bruker på jobb (1)	○	○	○	○	○	○	○
Jeg er kjent med de ulike plastikktypene som er gjenvinnbare på jobb (2)	○	○	○	○	○	○	○
Jeg er kjent med forskjellene på hardplast og myk plast (3)	○	○	○	○	○	○	○
Jeg er kjent med sorteringssystemet av plastavfall på jobb (4)	○	○	○	○	○	○	○
Sykehuset gir tilfredsstillende ressurser for sortering av plastavfall (5)	○	○	○	○	○	○	○
Jeg kan enkelt sortere plastavfall når jeg trenger det på jobb (6)	○	○	○	○	○	○	○
Jeg har full kontroll over hvordan jeg skal sortere plastavfall på jobb (7)	○	○	○	○	○	○	○

Page Break

Q6 I hvilken grad er du enig med følgende påstander:

	Sterkt uenig (1)	Uenig (2)	Delvis uenig (3)	Nøytral (4)	Delvis enig (5)	Enig (6)	Sterkt enig (7)
Det er verdiløst for den enkelte å gjøre noe med plastavfall (1)	○	○	○	○	○	○	○
Siden en person ikke kan ha noen påvirkning på plastforurensning, spiller det ingen rolle hva jeg gjør (2)	○	○	○	○	○	○	○
Hver persons handlinger kan ha en positiv påvirkning på samfunnet ved å sortere plastavfallet sitt (3)	○	○	○	○	○	○	○

Page Break

Q7 I hvilken grad er du enig med følgende påstander:

	Sterkt uenig (1)	Uenig (2)	Delvis uenig (3)	Nøytral (4)	Delvis enig (5)	Enig (6)	Sterkt enig (7)
Jeg velger å sortere plastavfall hvis sorteringsstasjonen er lett tilgjengelige (1)	○	○	○	○	○	○	○
Jeg velger å sortere plast selv om det er en avstand for meg å gå til sorteringsstasjonen (2)	○	○	○	○	○	○	○
Hvis jeg forstår de potensielle skadene plastprodukter kan forårsake på miljøet, sortere jeg disse produktene ordentlig etter bruk (3)	○	○	○	○	○	○	○

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Q8 I hvilken grad er du enig med følgende påstander:

	Sterkt uenig (1)	Uenig (2)	Delvis uenig (3)	Nøytral (4)	Delvis enig (5)	Enig (6)	Sterkt enig (7)
På grunn av mine verdier og prinsipper føler jeg at det er viktig å prøve å sortere plastavfall (1)	○	○	○	○	○	○	○
Jeg føler en moralsk forpliktelse til å sortere plastavfall for miljøets skyld (2)	○	○	○	○	○	○	○
Jeg får dårlig samvittighet hvis jeg ikke sorterer plastavfall (3)	○	○	○	○	○	○	○
Jeg føler meg skyldig hvis jeg ikke sorterer plastavfallet (4)	○	○	○	○	○	○	○
Alle burde dele ansvaret til å sortere plastavfall (5)	○	○	○	○	○	○	○

Page Break

Q9 I hvilken grad er du enig med følgende påstander:

	Sterkt uenig (1)	Uenig (2)	Delvis uenig (3)	Nøytral (4)	Delvis enig (5)	Enig (6)	Sterkt enig (7)
Å redusere plastforbruk i hverdagen min er en viktig del av hvem jeg er (1)	○	○	○	○	○	○	○
Jeg betrakter meg selv å være bevisst når det kommer til gjenvinning av plast (2)	○	○	○	○	○	○	○

Page Break

Q10 Hva er ditt kjønn?

○ Kvinne (1)

○ Mann (2)

Page Break

Q11 Hvor gammel er du?

○ 18 - 29 år (1)

○ 30 - 39 år (2)

○ 40 - 49 år (3)

○ 50 - 59 år (4)

○ 60 - 69 år (5)

○ 70 år eller mer (6)

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Q12 Hva er ditt høyeste utdanningsnivå?

○ Videregåendeskole   (1)

○ Høyere utdanning (3 år eller mindre)   (2)

○ Høyere utdanning (mellom 3 til 5 år)   (3)

○ Høyere utdanning (5 år eller mer) (4)

○ Annet, vennligst oppgi: (5) _____

- -

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Q13 Hva beskriver best din nåværende arbeidssituasjon?

○ Jobber fulltid   (1)

○ Jobber deltid   (2)

○ Annet, vennligst oppgi: (3) _____

- -

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Q14 Hvor mye tjener du årlig netto (før skatt)?

○ Mindre enn kr 100 000   (1)

○ 100 000 – 300 000   (2)

○ 300 000 – 500 000   (3)

○ 500 000 – 700 000   (4)

○ 700 000 – 900 000   (5)

○ 900 000 – 1 100 000   (6)

○ Mer enn kr 1 100 000   (7)

○ Vil ikke svare   (8)

- -

Page Break ——————————————————————————————————————

Q15 Hvilken avdeling jobber du i?

○ Ward 2   (1)

○ Ward 4   (2)

○ Ward 3   (3)

○ Ward 1   (4)

○ Ward 5   (5)

Skip To: End of Block If Q15 = ward 1

- -

Page Break

Because of confidentiality we cannot show the names of the wards, however the respondents were given the real name of the wards in the questionnaire so they could answer the question

Q16 Har du lest en e-post som ble tilsendt deg for omtrent to uker siden om plastsortering (som vist på bildet nedenfor)?
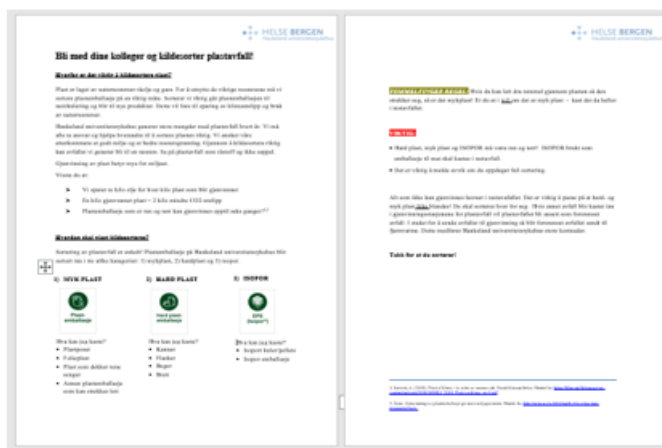
○ Ja (1)

○ Nei (2)

- -

Display This Question:
If Q16 = Ja

Q17 I hvilken grad har denne e-posten med informasjon om plastsortering (fra spørsmål 16) hjulpet deg til å sortere riktig?

○ Ikke i det hele tatt (1)

○ I liten grad (2)

○ I noen grad (3)

○ I stor grad (4)

○ I svært stor grad (5)

- -

Page Break

Q18 Har du lagt merke til denne plakaten i avdelingen de siste to ukene?

○ Ja (1)

○ Nei (2)

- -

Q19 I hvilken grad har denne plakaten (fra spørsmål 18) påvirket din sorteringsatferd sammenlignet med før?

○ Ikke i det hele tatt (1)

○ I liten grad (2)

○ I noen grad (3)

○ I stor grad (4)

○ I svært stor grad (5)

Page Break

Q20 Har du lagt merke til disse plakatene i skyllerommet de siste to ukene?

○ Ja (1)

○ Nei (2)

Q21 I hvilken grad har disse plakaten (fra spørsmål 20) endret sorteringsadferden din sammenlignet med før?

○ Ikke i det hele tatt (1)

○ I liten grad (2)

○ I noen grad (3)

○ I stor grad (4)

○ I svært stor grad (5)

End of Block: Default Question Block

Default Report

QID2 - Jeg har lest og forstått informasjonen om prosjektet «Plastsortering på arbeidsplassen», og er villig til å svare på spørsmålene i denne undersøkelsen. Jeg gir mitt samtykke til:
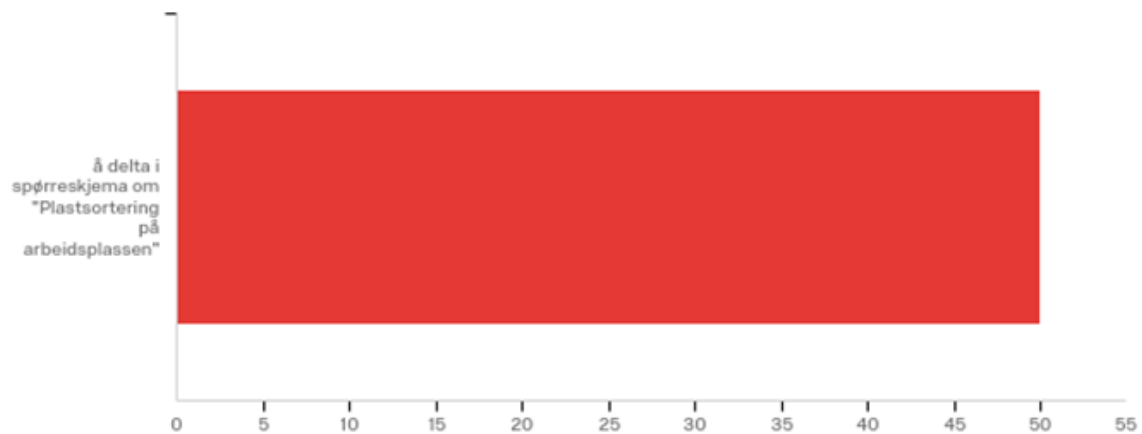
Q1 - I hvilken grad er du enig/uenig med følgende påstander:
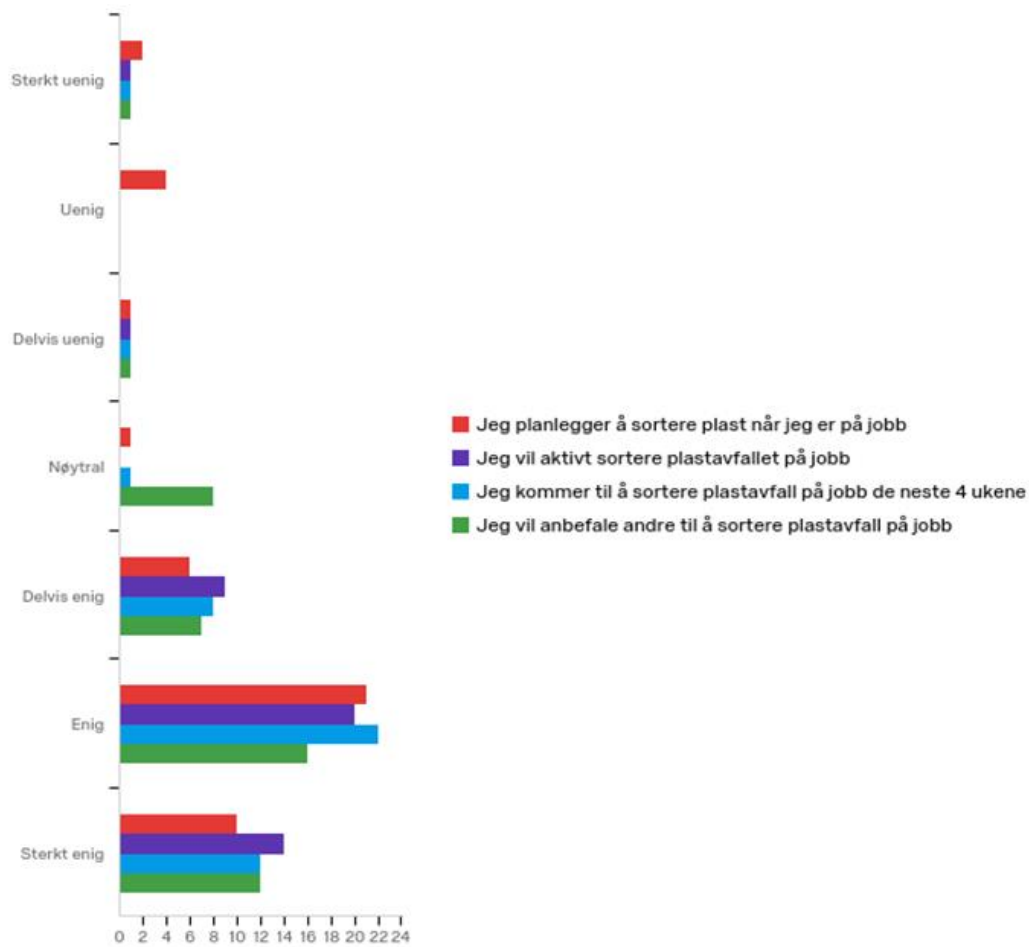
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Jeg planlegger å sortere plast når jeg er på jobb	1.00	7.00	5.40	1.68	2.82	45
2	Jeg vil aktivt sortere plastavfallet på jobb	1.00	7.00	5.93	1.12	1.26	45
3	Jeg kommer til å sortere plastavfall på jobb de neste 4 ukene	1.00	7.00	5.87	1.13	1.27	45
4	Jeg vil anbefale andre til å sortere plastavfall på jobb	1.00	7.00	5.58	1.31	1.71	45

#	Question	Sterkt uenig		Uenig		Delvis uenig		Nøytral		Delvis enig		Enig		Sterkt enig		Total
1	Jeg planlegger å sortere plast når jeg er på jobb	4.44%	2	8.89%	4	2.22%	1	2.22%	1	13.33%	6	46.67%	21	22.22%	10	45
2	Jeg vil aktivt sortere plastavfallet på jobb	2.22%	1	0.00%	0	2.22%	1	0.00%	0	20.00%	9	44.44%	20	31.11%	14	45
3	Jeg kommer til å sortere plastavfall på jobb de neste 4 ukene	2.22%	1	0.00%	0	2.22%	1	2.22%	1	17.78%	8	48.89%	22	26.67%	12	45
4	Jeg vil anbefale andre til å sortere plastavfall på jobb	2.22%	1	0.00%	0	2.22%	1	17.78%	8	15.56%	7	35.56%	16	26.67%	12	45

Q2 - Jeg tror at sortering av plastavfall er:
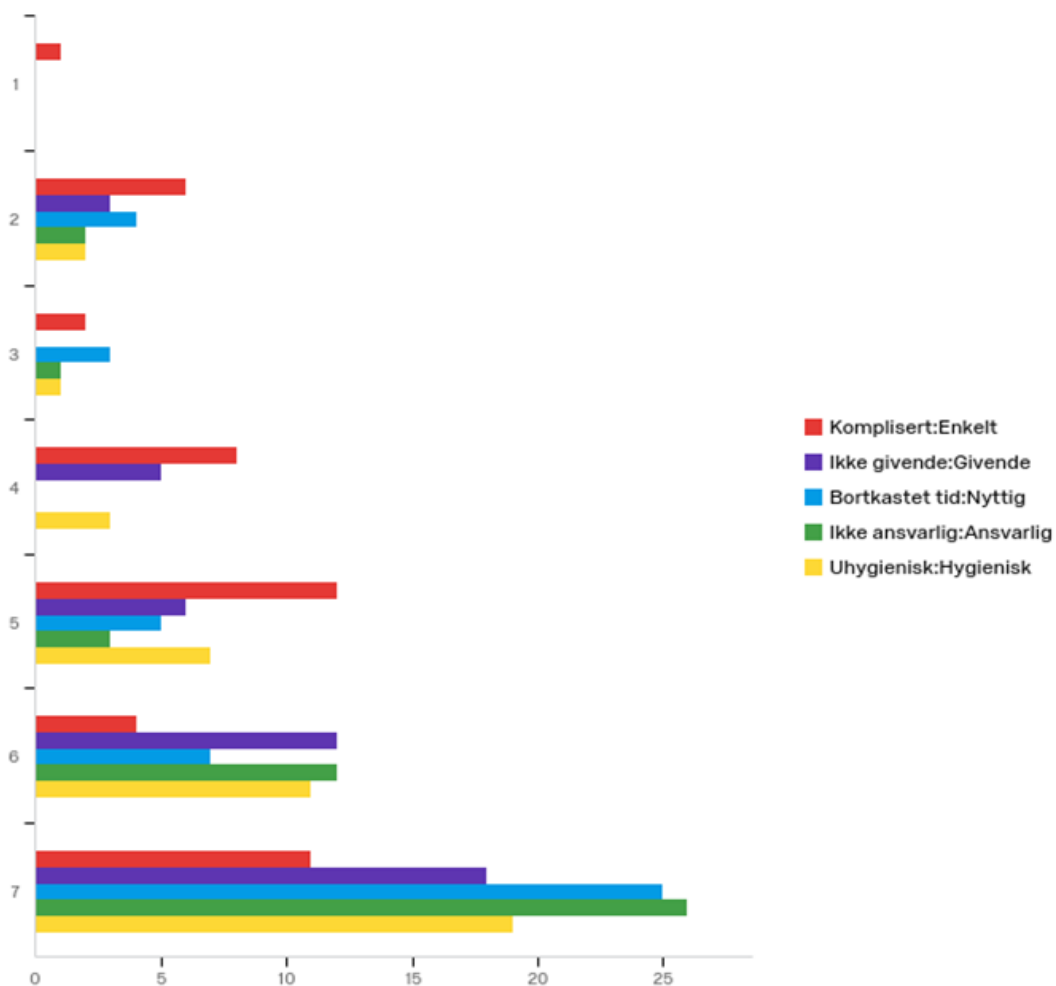
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Komplisert:Enkelt	1.00	7.00	4.82	1.74	3.01	44
2	Ikke givende:Givende	2.00	7.00	5.77	1.43	2.04	44
3	Bortkastet tid:Nyttig	2.00	7.00	5.89	1.65	2.74	44
4	Ikke ansvarlig:Ansvarlig	2.00	7.00	6.27	1.23	1.52	44
5	Uhygienisk:Hygienisk	2.00	7.00	5.88	1.35	1.82	43

#	Question	1		2		3		4		5		6		7		Total
1	Komplisert:Enkelt	2.27%	1	13.64%	6	4.55%	2	18.18%	8	27.27%	12	9.09%	4	25.00%	11	44
2	Ikke givende:Givende	0.00%	0	6.82%	3	0.00%	0	11.36%	5	13.64%	6	27.27%	12	40.91%	18	44
3	Bortkastet tid:Nyttig	0.00%	0	9.09%	4	6.82%	3	0.00%	0	11.36%	5	15.91%	7	56.82%	25	44
4	Ikke ansvarlig:Ansvarlig	0.00%	0	4.55%	2	2.27%	1	0.00%	0	6.82%	3	27.27%	12	59.09%	26	44
5	Uhygienisk:Hygienisk	0.00%	0	4.65%	2	2.33%	1	6.98%	3	16.28%	7	25.58%	11	44.19%	19	43

Q3 - I hvilken grad er du enig/uenig i følgende påstander:
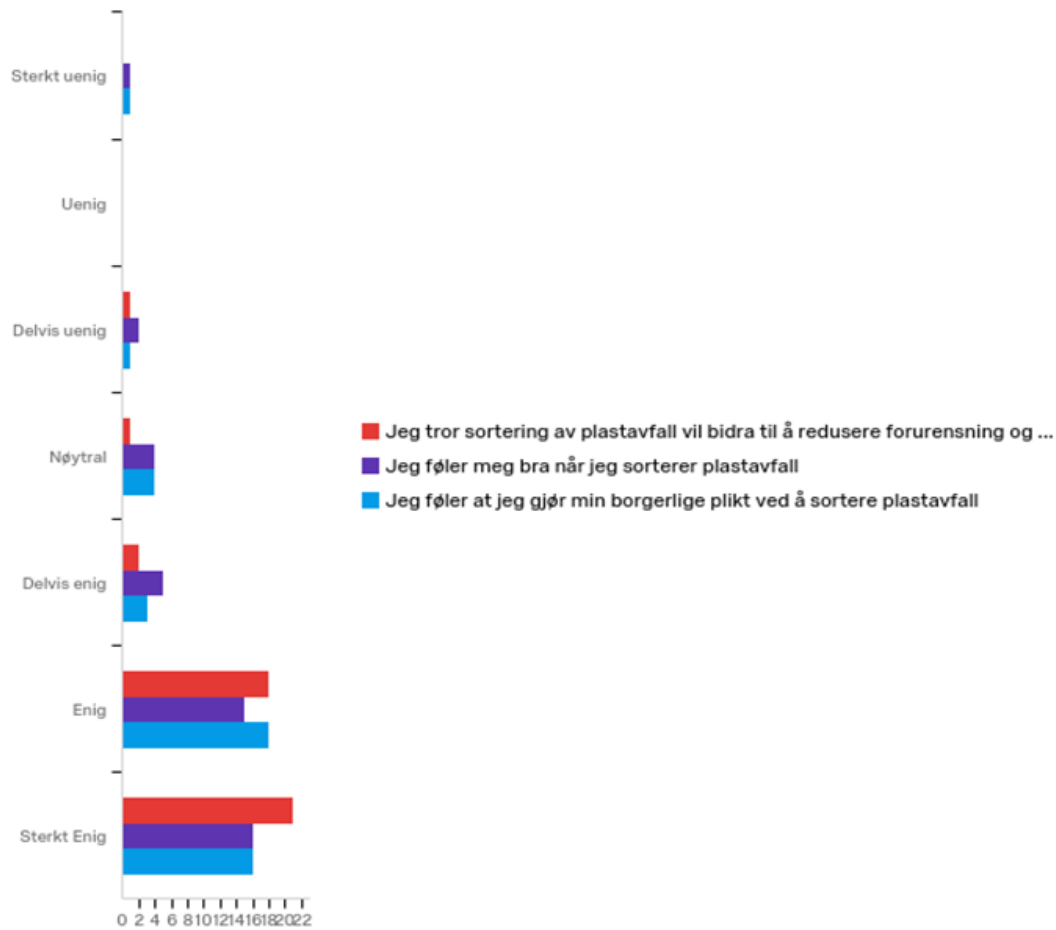
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Jeg tror sortering av plastavfall vil bidra til å redusere forurensning og forbedre miljøet	3.00	7.00	6.33	0.86	0.73	43
2	Jeg føler meg bra når jeg sorterer plastavfall	1.00	7.00	5.81	1.35	1.83	43
3	Jeg føler at jeg gjør min borgerlige plikt ved å sortere plastavfall	1.00	7.00	5.93	1.26	1.60	43

#	Question	Sterkt uenig		Uenig		Delvis uenig		Nøytral		Delvis enig		Enig		Sterkt Enig		Total
1	Jeg tror sortering av plastavfall vil bidra til å redusere forurensning og forbedre miljøet	0.00%	0	0.00%	0	2.33%	1	2.33%	1	4.65%	2	41.86%	18	48.84%	21	43
2	Jeg føler meg bra når jeg sorterer plastavfall	2.33%	1	0.00%	0	4.65%	2	9.30%	4	11.63%	5	34.88%	15	37.21%	16	43
3	Jeg føler at jeg gjør min borgerlige plikt ved å sortere plastavfall	2.33%	1	0.00%	0	2.33%	1	9.30%	4	6.98%	3	41.86%	18	37.21%	16	43

Q4 - I hvilken grad er du enig/uenig i følgende påstander:

Familien min forventer at jeg skal engasjere meg i sortering av plastavfall
Vennene mine forventer at jeg skal engasjere meg i sortering av plastavfall
Kollegaene mine forventer at jeg skal engasjere meg i sortering av plastavf...
Sjefen min forventer at jeg skal engasjere meg i sortering av plastavfall
Samfunnet mitt forventer at jeg skal engasjere meg i sortering av plastavfa...

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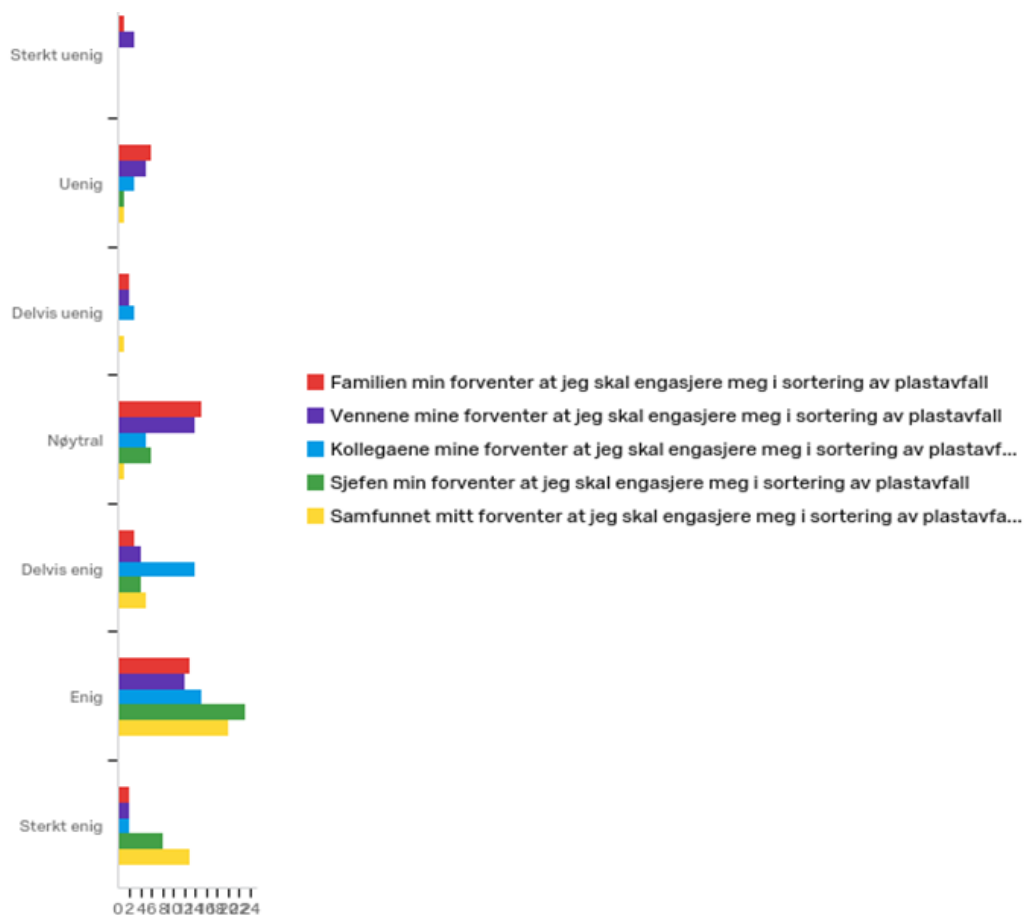
#	Field	Minimum	Maximum	Mean	Deviation	Variance	Count
1	Familien min forventer at jeg skal engasjere meg i sortering av plastavfall	1.00	7.00	4.43	1.55	2.39	42
2	Vennene mine forventer at jeg skal engasjere meg i sortering av plastavfall	1.00	7.00	4.31	1.65	2.74	42
3	Kollegaene mine forventer at jeg skal engasjere meg i sortering av plastavfall	2.00	7.00	4.98	1.26	1.59	42
4	Sjefen min forventer at jeg skal engasjere meg i sortering av plastavfall	2.00	7.00	5.71	1.08	1.16	42
5	Samfunnet mitt forventer at jeg skal engasjere meg i sortering av plastavfall	2.00	7.00	5.98	1.07	1.15	41

#	Question	Sterkt uenig		Uenig		Delvis uenig		Nøytral		Delvis enig		Enig		Sterkt enig		Total
1	Familien min forventer at jeg skal engasjere meg i sortering av plastavfall	2.38%	1	14.29%	6	4.76%	2	35.71%	15	7.14%	3	30.95%	13	4.76%	2	42
2	Vennene mine forventer at jeg skal engasjere meg i sortering av plastavfall	7.14%	3	11.90%	5	4.76%	2	33.33%	14	9.52%	4	28.57%	12	4.76%	2	42
3	Kollegaene mine forventer at jeg skal engasjere meg i sortering av plastavfall	0.00%	0	7.14%	3	7.14%	3	11.90%	5	33.33%	14	35.71%	15	4.76%	2	42
4	forventer at jeg skal engasjere meg i sortering av plastavfall	0.00%	0	2.38%	1	0.00%	0	14.29%	6	9.52%	4	54.76%	23	19.05%	8	42
5	Samfunnet mitt forventer at jeg skal engasjere meg i sortering av plastavfall	0.00%	0	2.44%	1	2.44%	1	2.44%	1	12.20%	5	48.78%	20	31.71%	13	41

Q5 - I hvilken grad er du enig/uenig i følgende påstander:

Legend:
- Jeg er kjent med de ulike plastikktypene som vi bruker på jobb
- Jeg er kjent med de ulike plastikktypene som er gjenvinnbare på jobb
- Jeg er kjent med forskjellene på hardplast og myk plast
- Jeg er kjent med sorteringssystemet av plastavfall på jobb
- Sykehuset gir tilfredsstillende ressurser for sortering av plastavfall
- Jeg kan enkelt sortere plastavfall når jeg trenger det på jobb
- Jeg har full kontroll over hvordan jeg skal sortere plastavfall på jobb

#	Field	Minimum	Maximum	Mean	Deviation	Variance	Count
1	Jeg er kjent med de ulike plastikktypene som vi bruker på jobb	2.00	7.00	4.83	1.51	2.28	42
2	Jeg er kjent med de ulike plastikktypene som er gjenvinnbare på jobb	1.00	7.00	4.48	1.50	2.25	42
3	Jeg er kjent med forskjellene på hardplast og myk plast	2.00	7.00	5.24	1.38	1.90	42
4	Jeg er kjent med sorteringssystemet av plastavfall på jobb	1.00	7.00	5.26	1.36	1.86	42
5	Sykehuset gir tilfredsstillende ressurser for sortering av plastavfall	1.00	7.00	4.02	1.71	2.93	42
6	Jeg kan enkelt sortere plastavfall når jeg trenger det på jobb	1.00	7.00	4.24	1.78	3.18	42
7	Jeg har full kontroll over hvordan jeg skal sortere plastavfall på jobb	1.00	7.00	4.40	1.59	2.53	42

1	de ulike plastikktypene som vi bruker på jobb	0.00 %	0	14.29 %	6	7.14%	3	7.14%	3	33.33 %	1 4	28.57 %	1 2	9.52%	4	42
2	Jeg er kjent med de ulike plastikktypene som er gjenvinnbare på jobb	2.38 %	1	11.90 %	5	11.90 %	5	16.67 %	7	28.57 %	1 2	23.81 %	1 0	4.76%	2	42
3	Jeg er kjent med forskjellene på hardplast og myk plast	0.00 %	0	7.14%	3	7.14%	3	7.14%	3	26.19 %	1 1	38.10 %	1 6	14.29 %	6	42
4	Jeg er kjent med sorteringssyste met av plastavfall på jobb	2.38 %	1	2.38%	1	7.14%	3	9.52%	4	26.19 %	1 1	38.10 %	1 6	14.29 %	6	42
5	Sykehuset gir tilfredsstillende ressurser for sortering av plastavfall	9.52 %	4	9.52%	4	23.81 %	1 0	11.90 %	5	23.81 %	1 0	14.29 %	6	7.14%	3	42
6	Jeg kan enkelt sortere plastavfall når jeg trenger det på jobb	9.52 %	4	14.29 %	6	14.29 %	6	0.00%	0	30.95 %	1 3	28.57 %	1 2	2.38%	1	42
7	Jeg har full kontroll over hvordan jeg skal sortere	4.76 %	2	11.90 %	5	16.67 %	7	0.00%	0	42.86 %	1 8	19.05 %	8	4.76%	2	42

Q6 - I hvilken grad er du enig/uenig i følgende påstander:
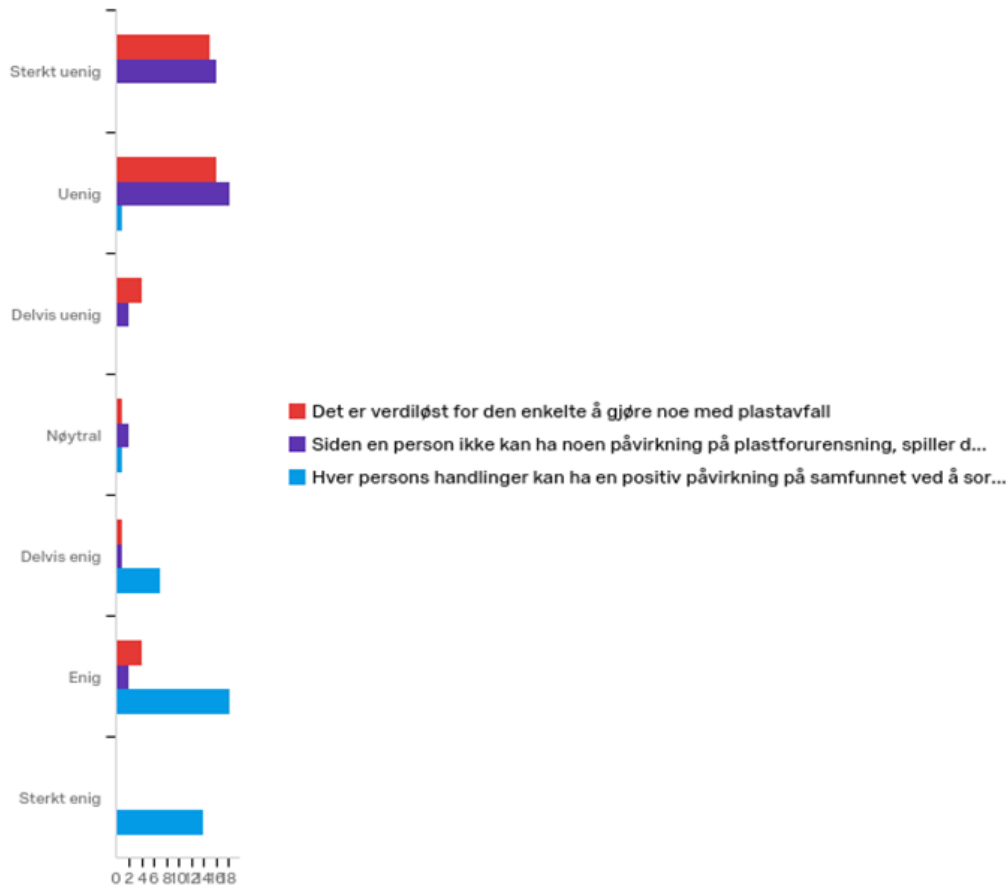
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Det er verdiløst for den enkelte å gjøre noe med plastavfall	1.00	6.00	2.24	1.51	2.28	41
2	Siden en person ikke kan ha noen påvirkning på plastforurensning, spiller det ingen rolle hva jeg gjør	1.00	6.00	2.02	1.28	1.63	41
3	Hver persons handlinger kan ha en positiv påvirkning på samfunnet ved å sortere plastavfallet sitt	2.00	7.00	6.02	1.00	1.00	41

#	Question	Sterkt uenig		Uenig		Delvis ueni g		Nøytr al		Delvis enig		Enig		Sterkt enig		Tot al
1	Det er verdiløst for den enkelte å gjøre noe med plastavfall	36.59 %	1 5	39.02 %	1 6	9.76 %	4	2.44%	1	2.44%	1	9.76%	4	0.00%	0	41
2	Siden en person ikke kan ha noen påvirkning på plastforurensni ng, spiller det ingen rolle hva jeg gjør	39.02 %	1 6	43.90 %	1 8	4.88 %	2	4.88%	2	2.44%	1	4.88%	2	0.00%	0	41
3	Hver persons handlinger kan ha en positiv påvirkning på samfunnet ved å sortere plastavfallet sitt	0.00%	0	2.44%	1	0.00 %	0	2.44%	1	17.07 %	7	43.90 %	1 8	34.15 %	1 4	41

Q7 - I hvilken grad er du enig/uenig i følgende påstander:

Legend:
- Jeg velger å sortere plastavfall hvis sorteringsstasjonen er lett tilgjenge...
- Jeg velger å sortere plast selv om det er en avstand for meg å gå til sorte...
- Hvis jeg forstår de potensielle skadene plastprodukter kan forårsake på mil...

Categories (top to bottom): Sterkt uenig, Uenig, Delvis uenig, Nøytral, Delvis enig, Enig, Sterkt enig
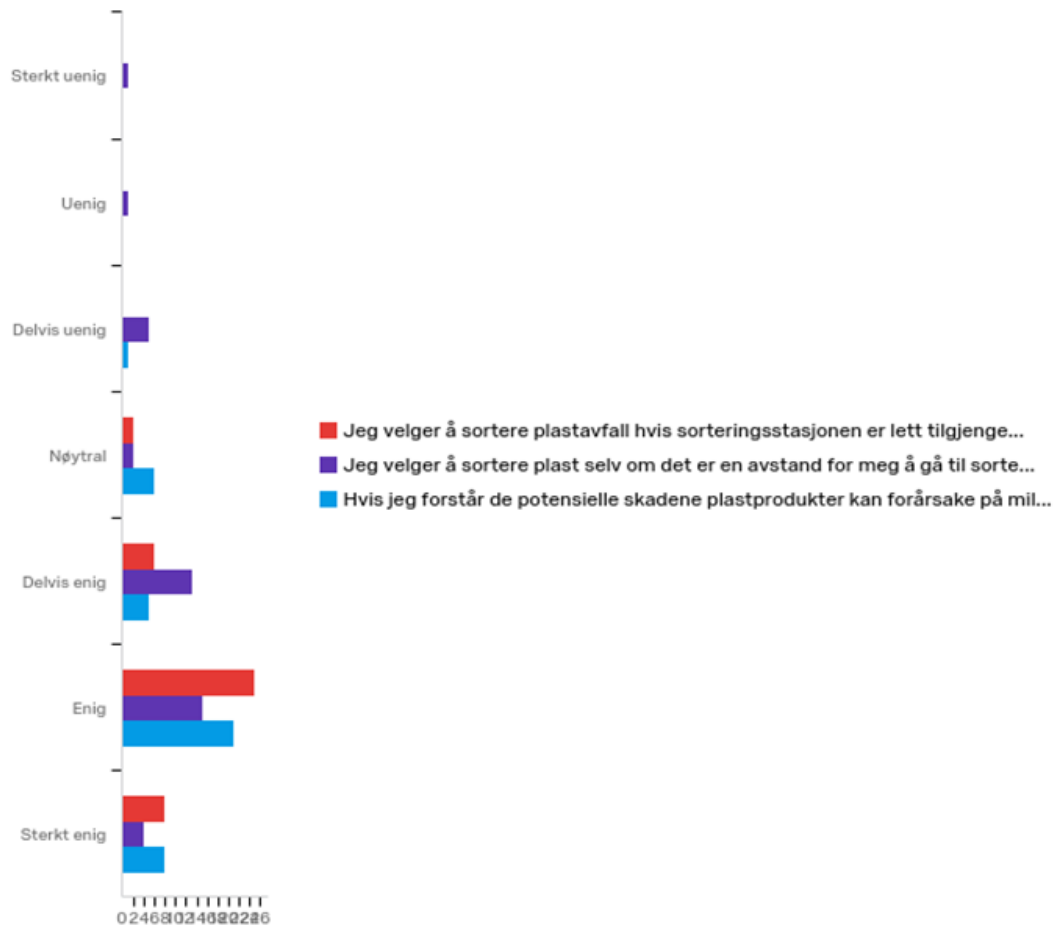
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Jeg velger å sortere plastavfall hvis sorteringsstasjonen er lett tilgjengelige	4.00	7.00	5.95	0.73	0.53	41
2	Jeg velger å sortere plast selv om det er en avstand for meg å gå til sorteringsstasjonen	1.00	7.00	5.10	1.38	1.89	41
3	Hvis jeg forstår de potensielle skadene plastprodukter kan forårsake på miljøet, sortere jeg disse produktene ordentlig etter bruk	3.00	7.00	5.71	1.02	1.04	41

#	Question	Sterkt uenig		Uenig		Delvis uenig		Nøytral		Delvis enig		Enig		Sterkt enig		Total
1	Jeg velger å sortere plastavfall hvis sorteringsstasjonen er lett tilgjengelige	0.00%	0	0.00%	0	0.00%	0	4.88%	2	14.63%	6	60.98%	25	19.51%	8	41
2	Jeg velger å sortere plast selv om det er en avstand for meg å gå til sorteringsstasjonen	2.44%	1	2.44%	1	12.20%	5	4.88%	2	31.71%	13	36.59%	15	9.76%	4	41
3	Hvis jeg forstår de potensielle skadene plastprodukter kan forårsake på miljøet, sortere jeg disse produktene ordentlig etter bruk	0.00%	0	0.00%	0	2.44%	1	14.63%	6	12.20%	5	51.22%	21	19.51%	8	41

Q8 - I hvilken grad er du enig/uenig i følgende påstander:

Legend:
- På grunn av mine verdier og prinsipper føler jeg at det er viktig å prøve å...
- Jeg føler en moralsk forpliktelse til å sortere plastavfall for miljøets sk...
- Jeg får dårlig samvittighet hvis jeg ikke sorterer plastavfall
- Jeg føler meg skyldig hvis jeg ikke sorterer plastavfall
- Alle burde dele ansvaret til å sortere plastavfall
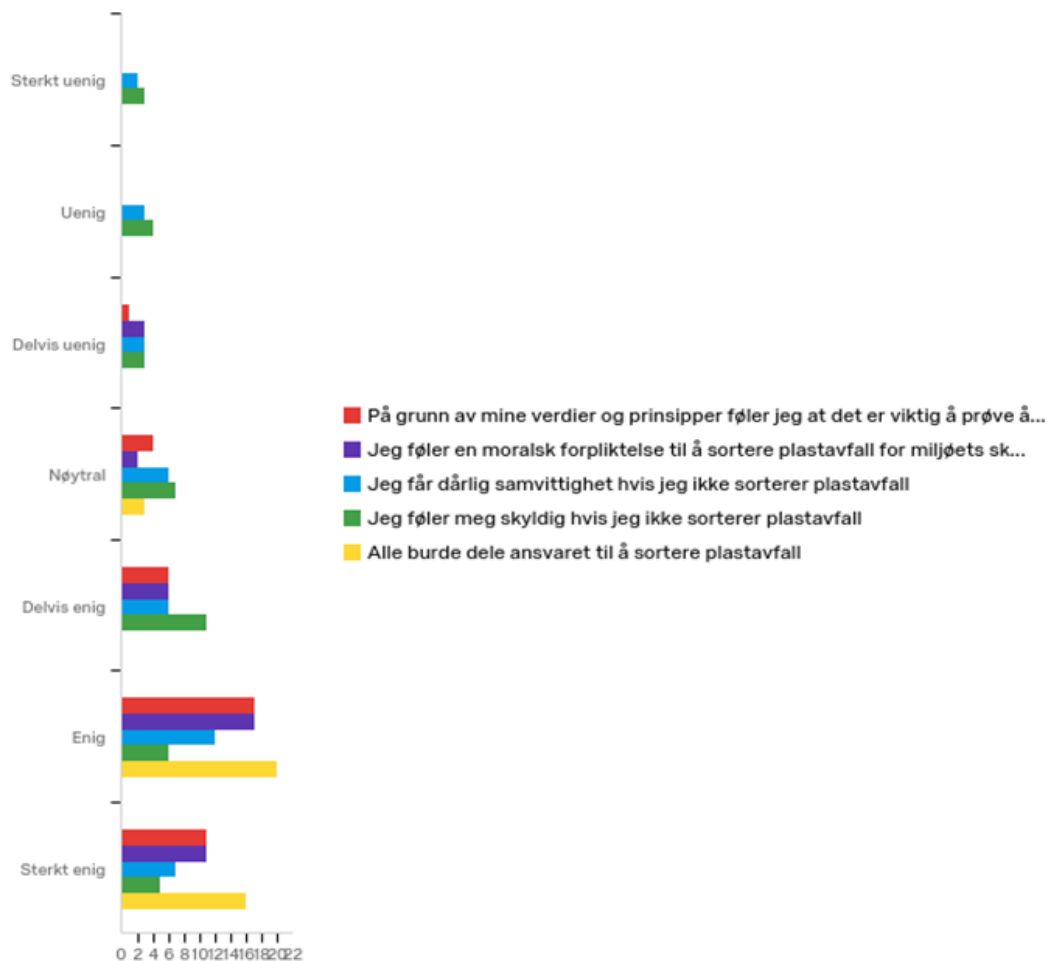
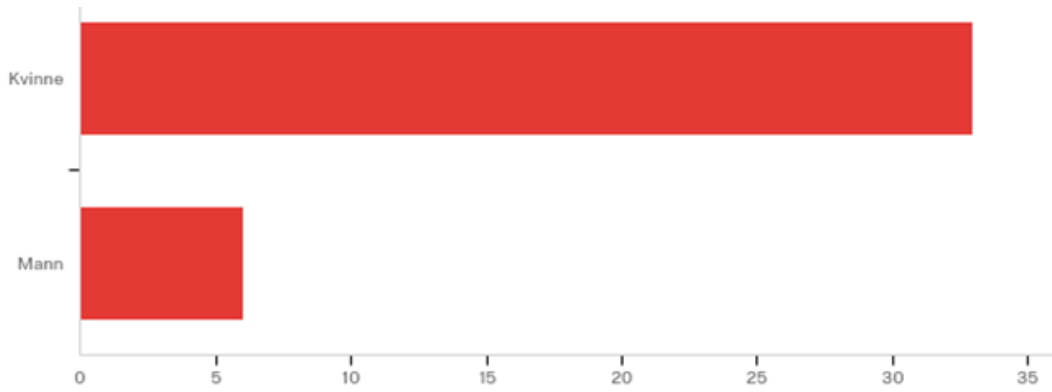| #	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	På grunn av mine verdier og prinsipper føler jeg at det er viktig å prøve å sortere plastavfall	3.00	7.00	5.85	1.03	1.05	39
2	Jeg føler en moralsk forpliktelse til å sortere plastavfall for miljøets skyld	3.00	7.00	5.79	1.14	1.29	39
3	Jeg får dårlig samvittighet hvis jeg ikke sorterer plastavfall	1.00	7.00	4.92	1.73	2.99	39
4	Jeg føler meg skyldig hvis jeg ikke sorterer plastavfall	1.00	7.00	4.46	1.74	3.02	39
5	Alle burde dele ansvaret til å sortere plastavfall	4.00	7.00	6.26	0.81	0.65	39

#	Question	t uenig		Uenig		Delvis uenig		Nøytral		Delvis enig		Enig		Sterkt enig		Total
1	På grunn av mine verdier og prinsipper føler jeg at det er viktig å prøve å sortere plastavfall	0.00%	0	0.00%	0	2.56%	1	10.26%	4	15.38%	6	43.59%	17	28.21%	11	39
2	Jeg føler en moralsk forpliktelse til å sortere plastavfall for miljøets skyld	0.00%	0	0.00%	0	7.69%	3	5.13%	2	15.38%	6	43.59%	17	28.21%	11	39
3	Jeg får dårlig samvittighet hvis jeg ikke sorterer plastavfall	5.13%	2	7.69%	3	7.69%	3	15.38%	6	15.38%	6	30.77%	12	17.95%	7	39
4	Jeg føler meg skyldig hvis jeg ikke sorterer plastavfall	7.69%	3	10.26%	4	7.69%	3	17.95%	7	28.21%	11	15.38%	6	12.82%	5	39
5	Alle burde dele ansvaret til å sortere	0.00%	0	0.00%	0	0.00%	0	7.69%	3	0.00%	0	51.28%	20	41.03%	16	39

Q9 - I hvilken grad er du enig/uenig i følgende påstander:

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Å sortere plastavfall i hverdagen min er en viktig del av hvem jeg er

Jeg betrakter meg selv å være bevisst når det kommer til gjenvinning av pla...
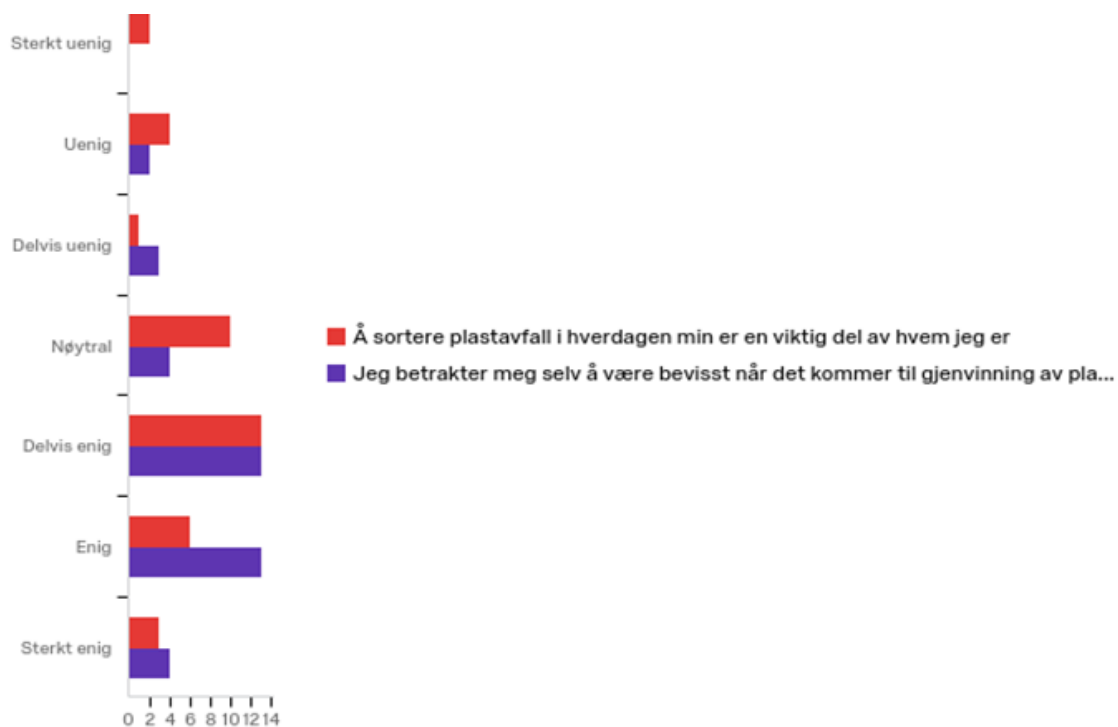
			Minimum	Maximum	Mean	Deviation		
1	Å sortere plastavfall i hverdagen min er en viktig del av hvem jeg er		1.00	7.00	4.49	1.52	2.30	39
2	Jeg betrakter meg selv å være bevisst når det kommer til gjenvinning av plast		2.00	7.00	5.13	1.26	1.60	39

#	Question	uenig		Uenig		uenig		I		enig		Enig		enig		I
1	Å sortere plastavfall i hverdagen min er en viktig del av hvem jeg er	5.13%	2	10.26%	4	2.56%	1	25.64%	10	33.33%	13	15.38%	6	7.69%	3	39
2	Jeg betrakter meg selv å være bevisst når det kommer til gjenvinning av plast	0.00%	0	5.13%	2	7.69%	3	10.26%	4	33.33%	13	33.33%	13	10.26%	4	39

Q10 - Hva er ditt kjønn?

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Hva er ditt kjønn?	1.00	2.00	1.15	0.36	0.13	39

#	Answer	%	Count
1	Kvinne	84.62%	33
2	Mann	15.38%	6
	Total	100%	39

Q11 - Hvor gammel er du?
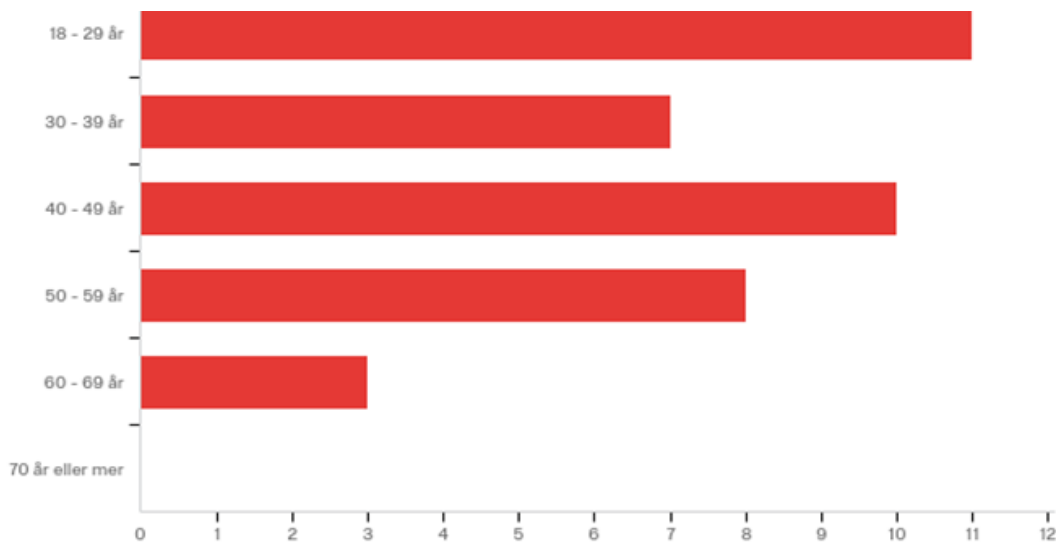
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Hvor gammel er du?	1.00	5.00	2.62	1.29	1.67	39

#	Answer	%	Count
1	18 - 29 år	28.21%	11
2	30 - 39 år	17.95%	7
3	40 - 49 år	25.64%	10
4	50 - 59 år	20.51%	8
5	60 - 69 år	7.69%	3
6	70 år eller mer	0.00%	0
	Total	100%	39

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Q12 - Hva er ditt høyeste utdanningsnivå?
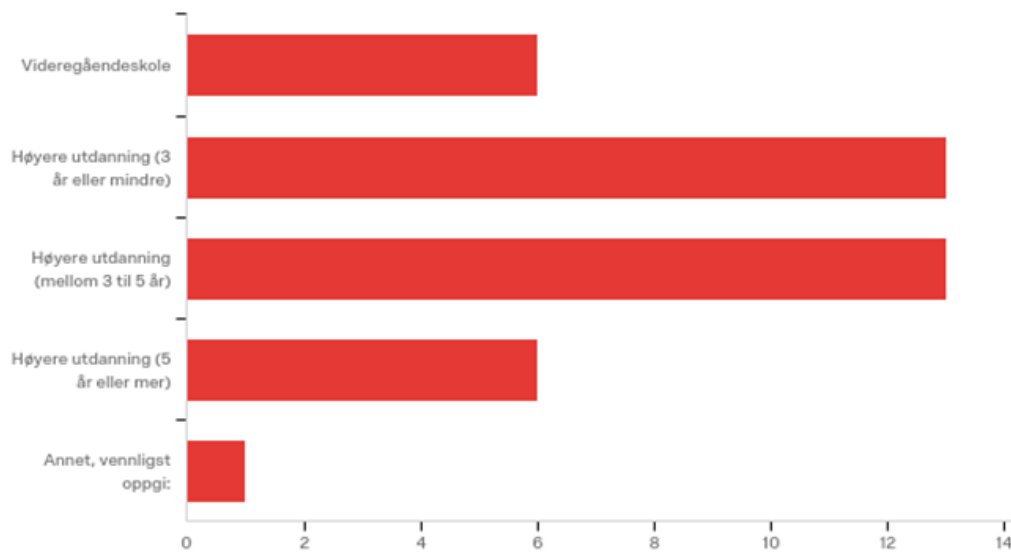
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Hva er ditt høyeste utdanningsnivå? - Selected Choice	1.00	5.00	2.56	1.01	1.02	39

#	Answer	%	Count
1	Videregåendeskole	15.38%	6
2	Høyere utdanning (3 år eller mindre)	33.33%	13
3	Høyere utdanning (mellom 3 til 5 år)	33.33%	13
4	Høyere utdanning (5 år eller mer)	15.38%	6
5	Annet, vennligst oppgi:	2.56%	1
	Total	100%	39

Annet, vennligst oppgi: - Text

Fagbrev

Q13 - Hva beskriver best din nåværende arbeidssituasjon?
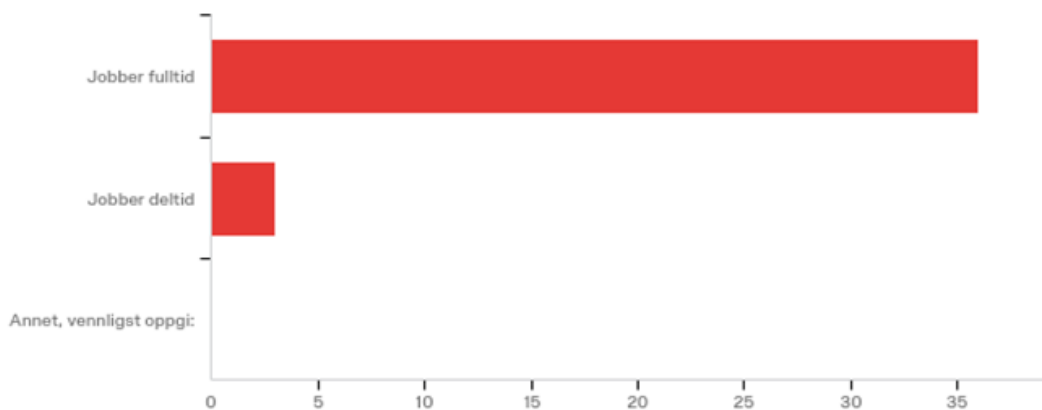
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Hva beskriver best din nåværende arbeidssituasjon? - Selected Choice	1.00	2.00	1.08	0.27	0.07	39

#	Answer	%	Count
1	Jobber fulltid	92.31%	36
2	Jobber deltid	7.69%	3
3	Annet, vennligst oppgi:	0.00%	0
	Total	100%	39

Q14 - Hvor mye tjener du årlig netto (før skatt)?
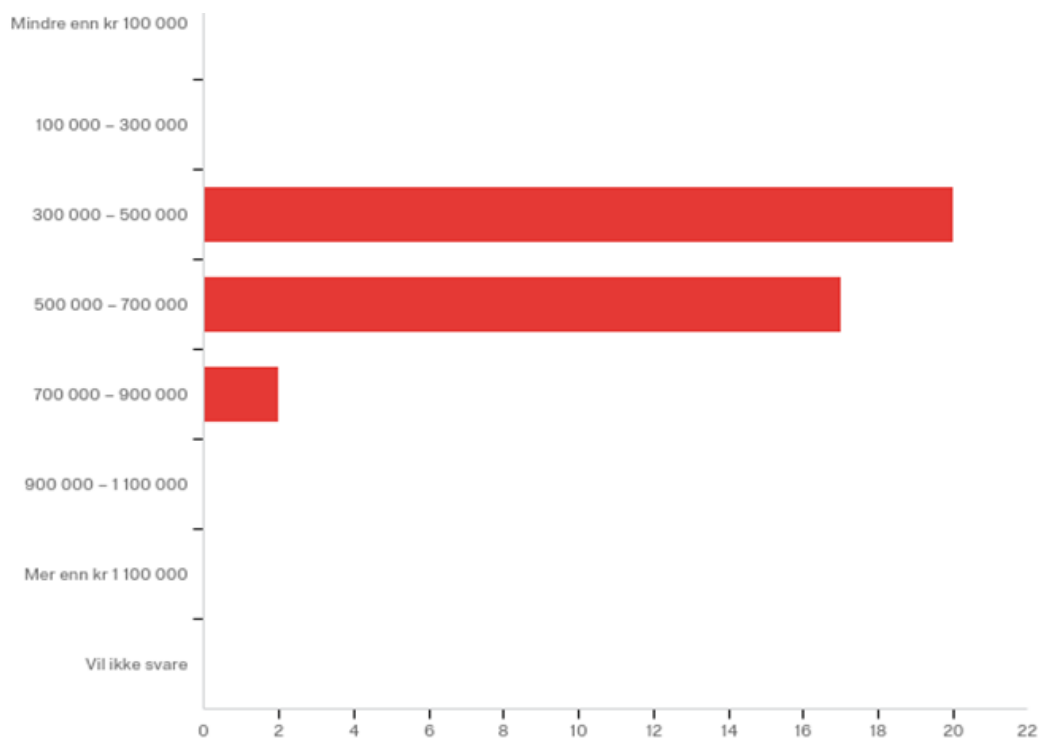
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Hvor mye tjener du årlig netto (før skatt)?	3.00	5.00	3.54	0.59	0.35	39

#	Answer	%	Count
1	Mindre enn kr 100 000	0.00%	0
2	100 000 – 300 000	0.00%	0
3	300 000 – 500 000	51.28%	20
4	500 000 – 700 000	43.59%	17
5	700 000 – 900 000	5.13%	2
6	900 000 – 1 100 000	0.00%	0
7	Mer enn kr 1 100 000	0.00%	0
8	Vil ikke svare	0.00%	0
	Total	100%	39

Q15 - Hvilken avdeling jobber du i?

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Hvilken avdeling jobber du i?	1.00	5.00	3.38	1.75	3.05	37

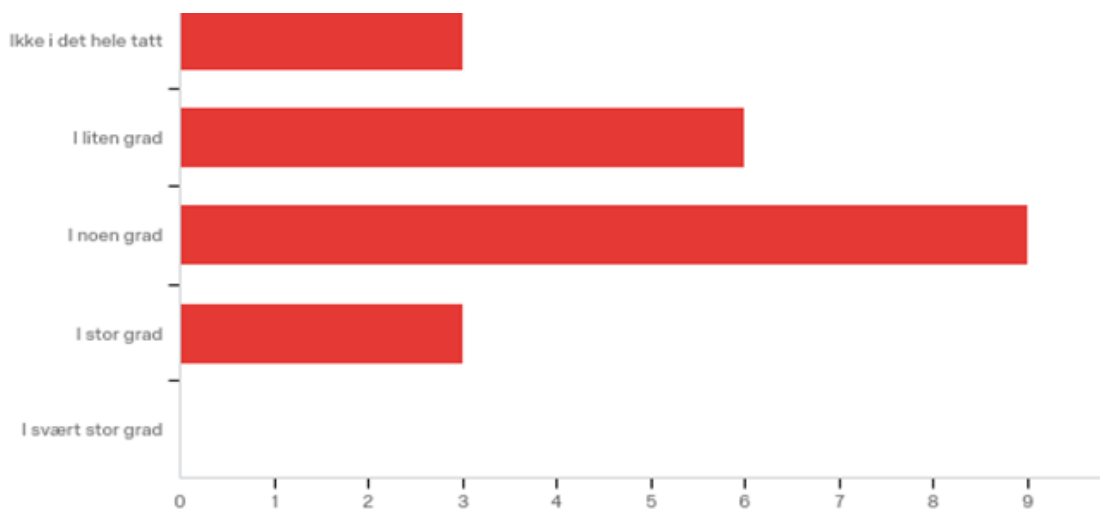| #	Answer	%	Count
1	Ward 2	32.43%	12
2	Ward 4	0.00%	0
3	Ward 3	8.11%	3
4	Ward 1	16.22%	6
5	Ward 5	43.24%	16
	Total	100%	37

Q16 - Har du lest en e-post som ble tilsendt deg for omtrent to uker siden om plastsortering (som vist på bildet nedenfor)?
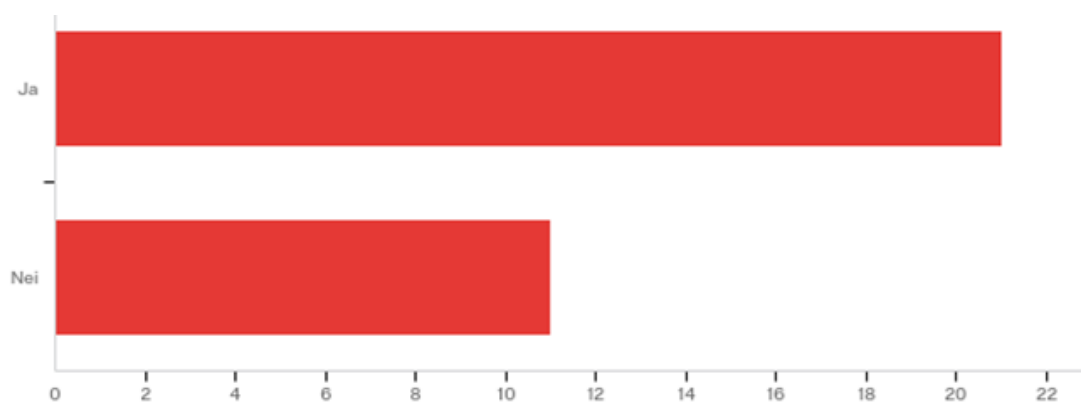
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Har du lest en e-post som ble tilsendt deg for omtrent to uker siden om plastsortering (som vist på bildet nedenfor)?	1.00	2.00	1.34	0.47	0.23	32

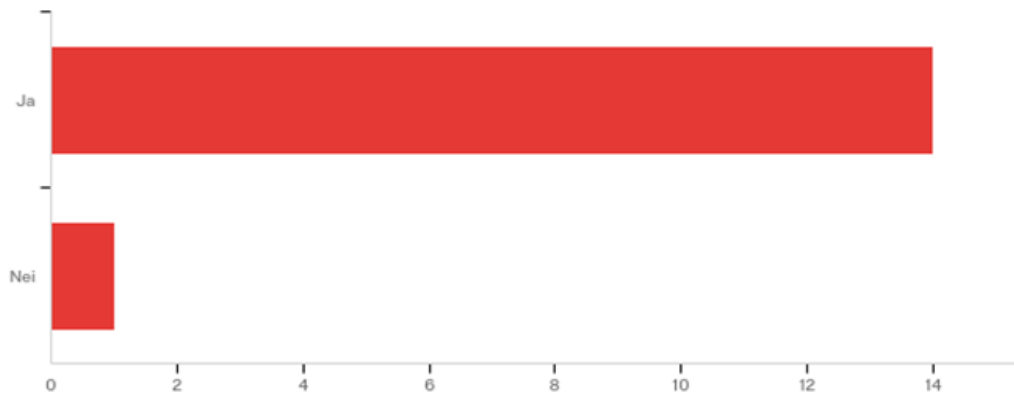| #	Answer	%	Count
1	Ja	65.63%	21
2	Nei	34.38%	11
	Total	100%	32

Q17 - I hvilken grad har denne e-posten med informasjon om plastsortering (fra spørsmål 16) påvirket din sorteringsatferd sammenlignet med før?

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I hvilken grad har denne e-posten med informasjon om plastsortering (fra spørsmål 17) påvirket din sorteringsatferd sammenlignet med før?	1.00	4.00	2.57	0.90	0.82	21

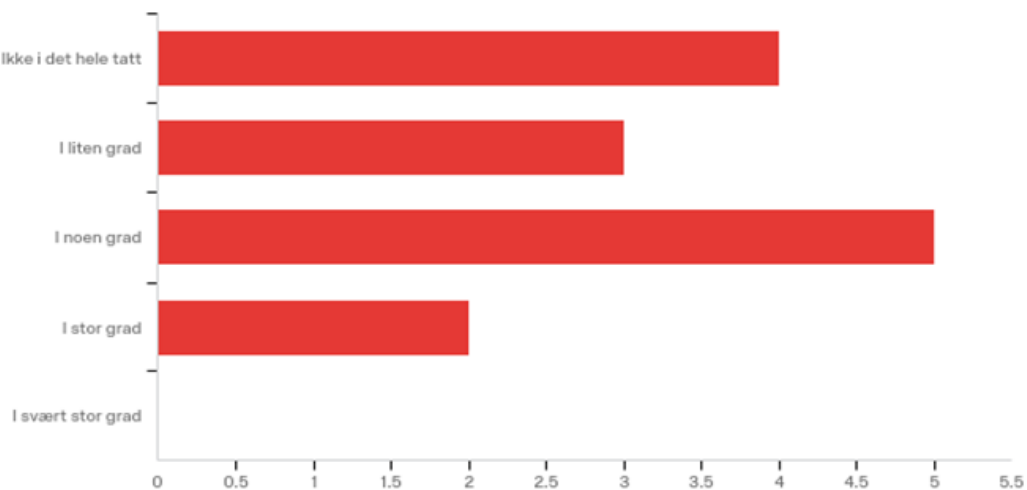| #	Answer	%	Count
1	Ikke i det hele tatt	14.29%	3
2	I liten grad	28.57%	6
3	I noen grad	42.86%	9
4	I stor grad	14.29%	3
5	I svært stor grad	0.00%	0
	Total	100%	21

Q18 - Har du lagt merke til denne plakaten i avdelingen de siste to ukene (som vist på bildet nedenfor)?

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Har du lagt merke til denne plakaten i avdelingen de siste to ukene (som vist på bildet nedenfor)?	1.00	2.00	1.07	0.25	0.06	15

#	Answer	%	Count
1	Ja	93.33%	14
2	Nei	6.67%	1
	Total	100%	15

## Q19 - I hvilken grad har denne plakaten (fra spørsmål 18) påvirket din sorteringsatferd sammenlignet med før?

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I hvilken grad har denne plakaten (fra spørsmål 19) påvirket din sorteringsatferd sammenlignet med før?	1.00	4.00	2.36	1.04	1.09	14

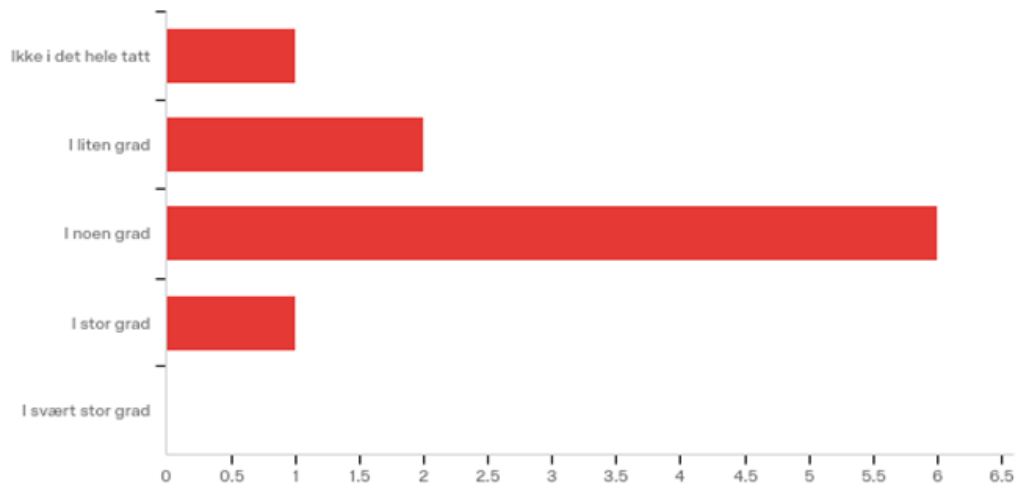| #	Answer	%	Count
1	Ikke i det hele tatt	28.57%	4
2	I liten grad	21.43%	3
3	I noen grad	35.71%	5
4	I stor grad	14.29%	2
5	I svært stor grad	0.00%	0
	Total	100%	14

Q20 - Har du lagt merke til disse plakatene i skyllerommet de siste to ukene (som vist på bildene nedenfor)?
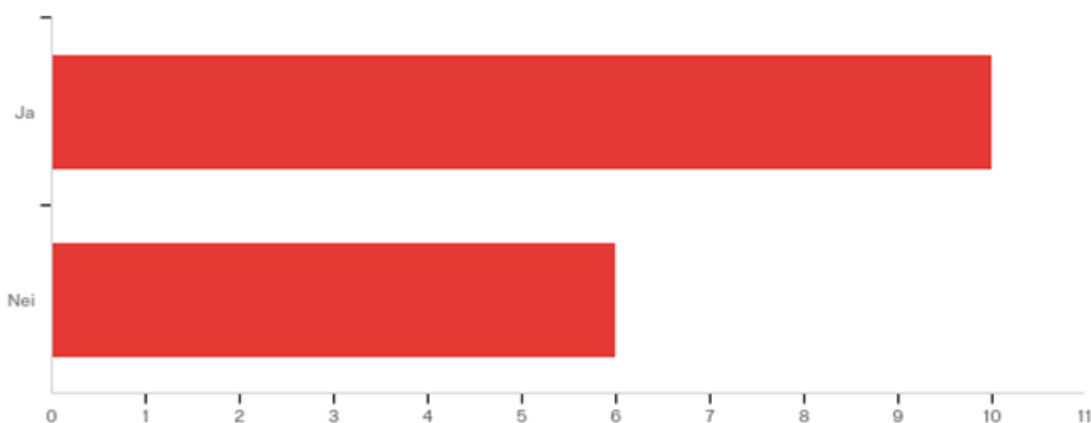
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Har du lagt merke til disse plakatene i skyllerommet de siste to ukene (som vist på bildene nedenfor)?	1.00	2.00	1.38	0.48	0.23	16

#	Answer	%	Count
1	Ja	62.50%	10
2	Nei	37.50%	6
	Total	100%	16

Q21 - I hvilken grad har disse plakaten (fra spørsmål 20) påvirket din sorteringsatferd sammenlignet med før?

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I hvilken grad har disse plakaten (fra spørsmål 21) påvirket din sorteringsatferd sammenlignet med før?	1.00	4.00	2.70	0.78	0.61	10

#	Answer	%	Count
1	Ikke i det hele tatt	10.00%	1
2	I liten grad	20.00%	2
3	I noen grad	60.00%	6
4	I stor grad	10.00%	1
5	I svært stor grad	0.00%	0
	Total	100%	10

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