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The Effect of Nudging on Source Separation Behaviour

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The Effect of Nudging on Source Separation Behaviour

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Abstract

This research aimed to study whether nudges through general visuals prompt and social norms through framing would increase the amount of source separated waste in kilos. Also, we included the element of time to see whether additional time would strengthen the effect of the nudges. The participants included in this study were primarily students, faculty, staff, and visitors who used the source separation stations at the business school. The data was collected by sorting the content collected from predetermined source separation stations before weighing correctly and incorrectly sorted waste. The results indicated that there was a statistically significant difference in correctly source separated waste between baseline and each of the three treatments. Gastro location had a significant effect on both food and plastic waste. Starbucks location had a significant effect on food waste, while Amigo location had a significant effect on trash waste. In total, when considering all of the different locations, food waste had a significant effect of p =, 001 overall conditions. Trash waste equalled p =, 150, and plastic waste had p =, 021, meaning that a significant effect was found in food and plastic waste overall conditions, but not in trash waste. However, the results from the significance levels between each condition indicated additional information in that although there were effects, especially when making comparisons between baseline and the interventions. When comparing the effect sizes between the different interventions, the results indicated that the location Gastro cafeteria had significant values in some of the comparisons in concern to food and plastic waste. In the Starbucks coffee shop location, food waste was the only type of waste that had significant results, and only when comparing baseline with the second intervention. Lastly, in the Amigo kiosk location trash and plastic waste was found to be statistically significant in some comparisons between conditions. Although this study can report that the nudges did have an impact, the effect was not found to be statistically significant in concern to the hypotheses linear demands. Implications and suggestions for future research will be discussed.

1. Introduction

Appropriate waste management is known as a necessary condition for sustainable development. Sustainable resource management arose from the idea that 'waste' can be a 'resource' (Bringezu & Bleischwitz, 2017). These authors argue that all economies depend on smart usage of natural resources to facilitate well-being without hindering life-supporting ecosystems. This argument is consistent with the World Commission on Environment and Development's definition on a sustainable development which is described as; "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN, 2008, p. 1). The issue of waste covers both an environmental issue, but also the issues concerned with the efficient use of non-renewable resources. These two issues are linked as using non-renewable resources more efficiently will help improve the environment in the long run as the need for raw materials will be reduced (Rock, Hedley, and Gordon 2016, as cited in (Samuelsen & Støyle, 2016). The aforementioned is known as the circular economy perspective. A circular economy involves shifting the economy away from the "take-make-consume and dispose pattern of growth", moving towards reuse and recycling of resources (EuropeanCommission, 2014, p. 2). A circular economy system keeps the value in products for as long as possible, minimising waste and resource use (European EuropeanCommission, 2014). A promising tool to help the economy make more sustainable decisions is the principle of nudging. Nudging builds on the principle that the choices people make are dependent not only on things like price and technical information "but even more on how choices are presented to us" (Stoknes, 2015, p. 124). According to Moseley and Stoker: "nudges work best when citizens know that something is right and just need to have that choice brought to the forefront of their mind" (Moseley & Stoker, 2013, p. 8). We argue that people know that source separation of waste is the right thing to do, rather than simply disposing of waste.

1.1 Why BI?

We are two MSc students at BI Norwegian Business School in Oslo, the largest business school in Norway with its 851 employees and 14 453 students (BI, 2017). With a personal interest in environmental problems and with further inspiration from lectures, including courses in ethics and behavioural science, we were both motivated to conduct research concerning pro-environmental behaviour. Pro-environmental behaviour refers to "behaviour that harms the environment as little as possible or even benefits the environment" (Steg & Vlek, 2009, p. 309). This theory states that by adopting pro-environmental behaviour patterns, individuals can make an important contribution to accomplish long-term environmental sustainability. To promote pro-environmental behaviour, there is a need to understand the cognitive, motivational and structural factors and processes that are blocking environmental sustainability so that pro-environmental behaviours can be facilitated (Steg & Vlek, 2009). BI Business school is a forerunner when it comes to pro-environmental behaviour and aims to be as environmentally friendly as possible. They work systematically with environmental and climate work through the Eco-Lighthouse certification program. Also, the business school offers specialised courses and programs in the field of sustainability, in addition to integrating sustainability into all courses (bi.no, 2019). Some of BI's target areas towards 2022 is that the business school aims to remove all unnecessary plastics and disposable packaging by 2022. In addition to this, they also have a goal of realising a material recycling degree of 65% by 2022, and they work towards more environmentally friendly and sustainable campuses. Further, all conferences and events arranged at BI are organised by following the requirements set by the Norwegian Environmental Agency Miljøfyrtårn for green conferences. Finally, the business school contributes to biological diversity by having beehives on the roofs of the school (bi.no, 2019).

BI business school will be sharing knowledge and values within the field of sustainability and thereby impact the future labour market through their teaching, as many future leaders educated from BI. According to Adams: *"universities, their graduates and professors are expected to be at the forefront of* developments which impact people, planet and organisations. Moreover, universities have a significant influence on future leaders and teachers and parents of future generations" (Adams, 2013, p. 384). Although BI is a private business school and not a university, the same expectations apply here, if not even higher expectations, due to the high expenses that follow when attending a private business school. By this logic, it is also important to meet the needs and demands of future students, especially since the new generation of kids and young adults have shown such engagement towards pro-environmental behaviour. Inspired by the 16-year-old Swedish activist Greta Thunberg thousands of schoolchildren all over Europe have been marching through the streets, demanding climate action (bbc.com, 2019). The young generation today is both knowledgeable and dedicated to ensuring a greener future. The aforementioned is likely to result in higher demands from future students concerning sustainable operations at institutions like BI business school.

Following the advice from our supervisor, we got in touch with the facility administration at BI whose job concerned making the business school more environmentally sustainable. We got in contact with Hanne Vetaas from the facility administration who communicated to us that a team had previously been working on improving the waste management at the business school. After years working on this case, trying to get faculty, students, staff and others who attend BI, or passes through the building, to sort their waste correctly, they still found a problem in that people did not manage to source separate properly. The aforementioned is a challenge for BI as their sustainability strategy aims to achieve a material recycling rate of 65% within 2022 (bi.no, 2019).

With the basis on the climate crisis surrounding us together with the engagement from school children especially and the school's focus on sustainability work, BI was a natural choice when deciding where to carry out our study. Also, BI's problem concerning the lack of source separation behaviour among their students and others who attend the school quickly caught our attention. With fresh knowledge acquired from previous courses in decisionmaking and behavioural science, we felt curious to look into the concept of "nudging" from behavioural science. Thereby our research question; whether "nudging" can increase the proportion of correctly source separated waste at BI, and thereby improve the material recycling rate at BI Business School. The research question will be answered by testing the following three hypotheses:

Hypothesis 1: Nudging by general visual prompts will increase the amount of source separated waste in kilos.

Hypothesis 2: Nudging by general visual prompts and nudging through social norms, will increase the amount of source separated waste in kilos more than nudging by general visual prompts alone.

Hypothesis 3: The element of time will strengthen the effect of nudging by general visual prompts and nudging through social norms, and thereby increase the amount of source separated waste in kilos more than without the additional time.

1.2 A change process

From January 1st changes were made in concern to whom the supplier of the waste management at BI was, and along with that followed new rules for how to source separate the waste at BI business school. One challenge of starting up our research in the middle of this change process was that the new way of source separating waste was poorly communicated at different levels at the business school. As researchers, we were in touch with employees at different levels at the school to make the research run as planned. A few days into the data collection, we ran into problems as we received information that opposed what we had categorised as correctly separated waste. We were therefore forced to put the data collection on hold until we made an agreement with the facility management on what we would categorise as correctly and incorrectly source separated waste. One of the changes that created confusion was that the new supplier, Ragn Sells, did not want bio-waste packaging to be thrown in the food waste, meaning the opposite of what had previously been learned by students and others under a different waste management supplier. The food waste bins, being the same as during the previous supplier, also seemed to confuse students in consideration to where they were supposed to throw what type of waste.

1.3 Waste management

In Source separation, the consumers are expected to deliver unpaid work to society.

"In return, the society should provide a source separation system that minimises the demands on the consumer" (Thøgersen, 1994, p. 160).

Interestingly, today, when people talk about source separation or recycling, they often talk about the same thing. Recycling is, in fact, the process of using recovered materials for manufacturing a new product (Hopewell, Dvorak, & Kosior, 2009, p. 2116). According to Thøgersen (1994), however, unsorted waste cannot be recycled. The usable materials that end up in the mixed waste become worthless when everything is blended; one must source separate the different items for it to be recycled. For most people, the goal of source separation is recycling, and the goal of recycling is to protect the environment.

Human society has, for many years, been using resources and producing waste at rates that are not sustainable (Meadows, Meadows, & Randers, 1992). As early as back in the 1970s, there were concerns about the waste problem. From this, the principles behind the waste hierarchy evolved (Papargyropoulou, Lozano, Steinberger, Wright, & Ujang, 2014). The waste hierarchy was defined by European legislation in the Community Strategy for Waste Management in 1989 (European Parliament Council, 1989, as cited in Papargyropoulou et al., 2014). Since then, the waste hierarchy has been adopted globally as a well-known waste management framework. A similar framework; the '3Rs', provides a similar approach to waste management by prioritising the options of reducing, reusing and recycling waste (Sakai et al., 2011). The idea behind the waste hierarchy and the 3Rs' framework is to identify the options most likely to deliver the best overall environmental outcome. The most favourable option in the hierarchy is *prevention*, while at the bottom, we find the least favourable option of *disposal*.

The aim is to climb as high up in the waste hierarchy as possible as this will extract the maximum practical benefits from products and generate the minimum amount of waste (Papargyropoulou et al., 2014).

Research shows that the source separation of paper, glass, metal and plastic from household waste is considered to be an important contribution to environmental care, both because it saves natural resources, and it decreases the amount of household waste that has to be treated alternatively (Merrild, Damgaard, & Christensen, 2008). Therefore, it is especially important that the industry, schools and households source separate properly as the amount of waste coming from schools such as BI business school is significantly large.

1.4 Ragn-Sells

There are several different routes that waste can travel after being transferred from a source separation station, depending on the material. Once a company, such as Ragn-Sells, has picked up the waste and source separated materials, the question of where the materials go after they are picked up is usually unknown to many. Ragn-Sells, for example, only want organic waste to go into the bins for food waste. The reason for this is that the food waste is transported from the school and delivered to plants for processing and production of biogas. This biogas can, later on, be upgraded and used as fuel for vehicles. Interestingly, many buses and waste trucks in Oslo already runs on biogas produced by food waste (Ragn-Sells, 2019).

The waste handled by students and others at BI business school can be seen as the input to the waste management system from Ragn-Sells, and will therefore automatically affect the output, for example, the amount of food waste converted into biogas. One way to interpret source separation performance is by looking at the recycling rate, which is the percentage of the overall amount of waste that was source separated. In this thesis, we, therefore, claim that the source separation behaviour of students and others at the business school is crucial as this act is the first step in the waste management system. Further, one way to improve recycling rates in waste management is to improve the amount of waste being source separated, which may be accomplished by improving source separation behaviour.

2. Theory

In this part of the paper, we will present the theories used as the foundation when designing our three intervention nudges. Literature from the field of psychology and behavioural science provided the basis for understanding how humans make decisions, what keeps us from executing source separation behaviour, and lastly what tools to use when trying to change source separation behaviour.

2.1 Source separation behaviour

Despite some differences, most programs for source separation are similar in that they rely on the participation of consumers. To develop effective and sustainable ways to reduce the amount of waste ending up in the wrong place, scientists, policymakers, and community leaders need to understand the factors that lead people to source separate correctly. Prior research on source separation behaviour has largely taken an internal approach to explore how people's values, beliefs, and attitudes affect source separation behaviour (Schultz, Oskamp, & Mainieri, 1995). The internal attitudes and beliefs are only part of the story as people live in environments where external factors also influence behaviour (Todd & Gigerenzer, 2007). According to Pieters, this internal approach and external approach is what together make up the foundation for motivation, which again is the foundation for the intention to act. Further, he argues that a person's motivation leads to task performance only if the ability to perform the behaviour is present (Pieters, 1991).

2.1.1 Motivation

According to the Reasoned Action Model by Fishbein and Ajzen in 1975, as cited in Pieters in 1991, consumers who intend to perform a certain task will do so, given that the person has the necessary abilities. According to their theory, GRA 19703

humans are rational beings who systematically process information. It assumes that all human behaviour is intentional, meaning that every action comes from the decision to perform it, although these assumptions about human behaviour is not always a sufficient explanation. "Intentions are assumed to capture the motivational factors that influence behaviour" (Ajzen, 1988, as cited in Thøgersen, 1994, p. 149). Though, other external factors may prevent the intention from being realised into actual behaviour. The theory divides these motivational factors into a personal attitude component and a social normative component.

Firstly, the personal attitude toward source separation behaviour is created by the evaluations of the beliefs concerning the outcome of the behaviour. The outcomes may be positive, e.g., "feel good", or negative, e.g., "time-consuming". An intention to source separate is the result of the subjective weighing of attitudes and norms concerning the activity. For instance, a moderate attitude toward source separation may be compensated by a strong social encouragement to take part, and inversely (Pieters, 1991).

Secondly, when considering social norms to influence behaviour, it is important to differentiate between the "is", descriptive norm, and the "ought", the injunctive norm. The aforementioned is because each of them points to a separate source of motivation (Deutsch & Gerard, 1955, as cited in Cialdini, Reno, & Kallgren, 1990). The descriptive norm describes what typical or normal behaviour is. It describes what most people do, and by that motivates others with evidence as to what will likely be effective and adaptive action. Cialdini, 1988 (as cited in Cialdini et al., 1990) argued that such beliefs offer an information-processing advantage by demanding less cognitive effort in a decision-making process. "By simply registering what most others are doing there and by imitating their actions, one can usually choose efficiently and well" (Cialdini et al., 1990, p. 1015). The injunctive meaning of norms refers to rules or beliefs of what is morally right and wrong. The injunctive norm is in contrast to descriptive norms, which specify what is done, while injunctive norms specify what ought to be done. Very often, what is approved is also what is done; therefore, it is easy to confuse these two meanings of norms.

Verhallen and Pieters argue that to understand the reasons behind the intention or attitude of a person, one should weigh the costs and the benefits of the outcome of the behaviour. The costs concern the expected sacrifices involved in performing the act. Costs can be the money, time, and physical and mental effort required to perform the source separation behaviour. The benefits refer to the expected positive outcome of striving to perform the targeted activity. The consumer may also experience some direct benefits, such as a more tidy and clean surrounding, or the feeling of doing good for society (Verhallen & Pieters, 1984).

Since motivation is what causes the intention to act, we need to carry this forward when designing the second nudge concerning nudging through social norms. The nudge should aim to boost motivation to create an intention to act. When designing the nudges, emphasis should be put on the benefits of the act, and the costs of performing the source separation behaviour should be minimised to create motivation for the consumer (Verhallen & Pieters, 1984).

2.12 Ability

A person who intends to participate in a source separation program, but does not know how, or who has an incorrect knowledge about the rules, will not participate properly (Thøgersen, 1994). Vining and Ebreo argued that the greatest difference between those who source separate and those who do not is their knowledge of the collected materials. They found in their study included data from 197 Illinois households that those who source separated was found to have significantly more knowledge about source separation than those who did not source separate the waste (Vining & Ebreo, 1990).

Further, when there are changes made in an existing source separation system, patterns must be broken, and new patterns have to be formed and maintained. Ajzen and Fishbein mention the force of habit as one reason why intentions do not always lead to action (Ajzen & Fishbein, 1977). In a model suggested by Bagozzi habits moderated the relationship between intention and behaviour (Bagozzi, 1982). Also, Macey and Brown (1983), found habits to be the best predictor of behaviours repeated often (as cited in Thøgersen, 1994). Even if GRA 19703

a person begins to source separate by a conscious intention to do so, it is unlikely that the throwing away of every item of waste will be a thoroughly considered move. When the wrapping paper that covered the food stops being useful to the owner, we define it as "trash" (Thøgersen, 1994). In our mass consumption society today, consumers need to get rid of waste so often that it takes too much time to use our problem-solving capacity to source separate, every time the situation arises (Thøgersen, 1994). Instead, Thøgersen (1994) argued that we take on routines or habits which make us capable of performing the task almost automatically, investing a minimum of conscious attention. Therefore, until the habits of source separation are unlearned, there is a high risk of sorting failures as a consequence of the force of old habits.

Both Thøgersen (1994), and Vining and Ebreo (1990) refers to the importance of the ability to turn the intention to act into behaviour. Therefore, our first nudge concerned nudging through general visual prompts was designed to increase task-knowledge of students and others performing source separation behaviour, and by that increase their ability to source separate correctly.

In addition to task-knowledge, the ability to source separate correctly depends on habits. Macey and Brown (1983), found habits to be the best predictor of behaviours repeated often. Therefore, our last nudge was simply extra time to unlearn old habits before forming and maintaining them to perform the task almost automatically.

2.2 Decision-making process

From research in behavioural science, there has been limited success in the attempts of changing behaviours by education and information (Ölander & Thøgersen, 2014). The limited success has created new ways to accomplish behavioural change that has been increasingly explored and used. What these new ways have in common is that they arise from the notion that both the reflective and conscious processes control our behaviour, in addition to the automatic and unconscious processes. The dual process model may explain the gap between values and behaviour. Psychologists often refer to the dual-process model as a

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division between two types of cognitive processes, or two ways of thinking (Chaiken & Trope, 1999). Kahneman (2011) refers to the two as System 1 and System 2, whereas others choose to name the systems the Automatic System and the Reflective System (as cited in Thaler & Sunstein, 2009). System 2 is a reflective, goal-oriented system driven by our values and intentions. According to Kahneman and Tversky, the human brain is lazy, and therefore, we spend almost all our daily lives engaged in System 1. Only when something unexpected happens, or when extra effort is needed, we make use of our System 2. System 1, where we spend most of our time, is an automatic, effective system that requires little or no cognitive engagement. Whether individuals make use of their System 1, or System 2 in a decision-making process will impact how the information is processed and thereby also affect the outcome. Despite a goal to lose weight, for example, a person still buys the chocolate bar displayed next to the cashier. This action shows that certain environmental cues combined with a person's desire for immediate and certain pleasure become a higher priority than the desire to eat healthily. A typical nudge to prompt healthier behaviour would be to place fruits by the cashier instead of chocolates. Individuals approaching a source separation station is likely to have their focus on additional tasks, such as rushing to class, using their phone or having a conversation with a classmate. Since research predicts that the human brain is lazy, it is most often most effective to try and effect System 1 to remain cognitively at ease (Kahneman, 2011).

According to Duffy and Verges, well-designed waste bins should manage source separation in two ways. First, waste bins should be distinguishable from each other to support the correct separation of waste. Second, waste bins should reduce the need for cognitive effort to perform source separation behaviour. Improving these two ways about source separation should decrease the amount of incorrectly source separated waste that enters the recycling stream, and thereby also decrease the number of recyclables that enter the general waste stream (Duffy & Verges, 2009).

Based on how humans process information and further how the activation of either System 1, or system 2, will affect a person's decisions, the first nudge especially, was designed to make source separation easy. By using pictures to show how to source separate different items, the activation of a person's system 1 only was necessary to source separate correctly.

2.3 Choice architecture and nudging

Thaler and Sunstein (2009) developed the concept of choice architecture to reflect on how the choice presentation can influence decision makers. Choice architecture is any situation in which a person needs to make a decision, consciously or unconsciously, structured in such a way that people get a "gentle push" towards options that are believed to be best for themselves or humanity (as cited in Bovens, 2009). The so-called "gentle push" is more famous under the term "nudge" coined by Thaler and Sunstein through their book holding the same name. In this book, nudging became the collective term, where different approaches to behavioural change brought together (Thaler & Sunstein, 2009).

Building on the understanding of human decision-making processes, a nudge is often considered to be a cost-effective intervention that can influence choices. "A nudge as we will use the term is any aspect of the choice architecture that predictably alters people's behaviour without forbidding any options or significantly changing their economic incentives. For an intervention to count as a mere nudge, it must be easy and cheap to avoid" (Thaler & Sunstein, 2009, p. 6). The social environment has been widely shown through behavioural to be an important aspect of the choice architecture by setting the stage for and to "gently push" consumers into making certain decisions (Thaler & Sunstein, 2009).

Social nudges can be explained as "policy interventions to induce voluntary cooperation in social dilemma situations" (Nagatsu, 2015, p. 481). Previous research has shown that simple social nudges can be an effective way to overcome harmful behaviours and to boost behaviours beneficial for the environment, such as making people reuse towels at hotels (Goldstein, Cialdini, & Griskevicius, 2008). According to Sunstein (2015), one of the most powerful nudges is to communicate to people that most others are engaged in the behaviour of interest. These nudges are found to be most effective when it is local and specific. Sunstein addresses that many people are engaging in undesirable GRA 19703

behaviour and that in such cases, it can be helpful to highlight what people should do instead of what most people do, to promote source separating behaviour (Sunstein, 2015).

However, there is an ethical aspect of nudging (Sunstein, 2015). Thaler and Sunstein (2009) use nudging to demonstrate how the choice architects can make major improvements to the lives of others by designing 'user-friendly environments', with the aim being to manage social problems like obesity or climate change. They argue that nudging always will take place, even if unintended, so why not use nudging to improve what is valued by individuals, e.g. health, wealth and happiness. Although the concept of nudging behaviour probably arose from good intentions and clever ideas, some nudges, and some forms of choice architecture will have difficulties justifying the purpose of the nudge if it undermines either welfare, autonomy, or dignity (Sunstein, 2015). For nudging to be viewed as "fair" the concept of liberty must be taken into consideration as it is a central part of "libertarian paternalism". This concept of "libertarian paternalism" may seem contradictory as the components typically are viewed as mutually exclusive ideas. Although Thaler and Sunstein argue that if it is understood right, it reflects common sense. The libertarian aspect is generated by the insistence that people should be free to do what they want and to be able to opt in, or out, whenever they desire. The paternalistic aspect originates from the claim that it is legitimate for the "choice architect" to attempt to influence or direct behaviours to make people's lives healthier, longer and better. After all, the concept of nudging allows people to remain at liberty to behave otherwise.

Goodwin (2012) argues that Thaler and Sunstein (2008) may be overselling to which degree nudging is genuinely libertarian. A nudge is found to work best when people are unaware that their behaviour is being altered. Although, by exploiting the imperfections in human judgement and decisionmaking, the choice architect is aiming to replace the person's judgement of what behaviour that should be performed and by that colouring the 'nudgee's reality, and by that affecting their judgement. And this, Goodwin argues, threatens an individuals control over his or her ability to make decisions. Therefore, although it would be difficult to construct an argument as to why nudging is coercive, the extent to which nudging attempts to undermine an individual's control over his or her deliberation gives cause for concern. Besides, the paternalistic part of nudging does not always treat individuals as rational and seeks to manipulate them into a certain behaviour (Goodwin, 2012).

Although this criticism is important and crucial to consider before applying a nudge as a tool to change behaviour, we argue for the use of nudging as it will not interfere with anyone's liberty, neither will it be manipulative. Rather we will apply nudging in our research to make it easier for students and others at the business school to contribute to the common good.

2.4 The barriers

In accordance with Thaler and Sunstein's theory (2009), Stoknes (2015) argues that communicating what most of us do is only effective in improving source separation behaviour when the message is positive because the human instinct is to imitate others (Stoknes, 2015). Previous research has shown that people throw more trash on the ground in areas where littering already is present (Cialdini et al., 1990). Therefore, in situations where there is no majority already performing the desired behaviour, a social nudge should highlight what people should do, rather than what the majority does. In his book; What We Think About When We Try Not To Think About Global Warming, Stoknes (2015) identifies various barriers that block climate messages from getting through to people. He explains that people have an invisible defence wall inside that keeps us from absorbing certain messages and thereby restrain us from meaningful responses and action (Stoknes, 2015). He describes three principles addressed to break down or work around these barriers; 1) Turn the barriers upside down, 2) Stick to positive strategies, and 3) Act as social citizens, not individuals. Firstly, some of the actions he claims will remove the barriers is to make the issues feel near, human, personal and urgent. Stoknes (2015) argues that communication should be framed in a supportive manner and not create negative feelings. Second, positive strategies are effective as a solution because it makes people want to perform the behaviour rather than implement it because of duty, guilt, rules, or fear of

punishment (Bain, Hornsey, Bongiorno, & Jeffries, 2012). Lastly, the action of a society working together towards a common goal is more powerful than individuals working separately. A strategy to get individuals to work together is to send signals that most people care and also communicate that more people are joining to support the desired behaviour (Stoknes, 2015). The strategy above was further supported by Denrell who argued that: "the number of friends who engage in some activity can also influence your estimate of the value of this activity" (Denrell, 2008, p. 48). Also, a larger group of individuals performing the activity may lead others to have a higher estimate of the success rate; then they would if a few individuals took part in the activity. The effect of changing societal behaviour about, for example, source separation, is powerful because the feeling of being alone in making the change will often make the change seem meaningless because people believe that their simple actions will not be enough to make an impact that matters (Stoknes, 2015). Earlier experimental evidence also found that individuals are less likely to make sacrifices for the common good if they are uncertain whether more people will join (Van Dijk, Wit, Wilke, & Budescu, 2004).

At Nordic Choice Hotels, for example, this has been a success. The hotels invested in creating a sustainable hotel chain, and therefore, they have chosen to make an impact by building a food revolution (Choice Hotels, 2018). Two simple nudges have made a big impact in reducing the food waste at the hotels. By reducing the plate size and using a sign with a direct social cue encouraging guests to help themselves to food at the buffet more than once, they reduced the food waste by 20 % (Kallbekken & Sælen, 2013). Such results have encouraged us to research nudging further, especially with an emphasis on social nudges to help increase the amount of waste being source separated at BI.

Theory by Kahneman (2011) about System 1 and system 2 thinking suggest that people often make the easy choice to retain cognitive ease. Therefore, when the goal is to trigger a certain behaviour, reducing various barriers (including the time it takes to understand what to do) is important. Stoknes (2015) also argues that using the information and framing with the effort to make, in our case source separation, the norm, will not be helpful if there are practical barriers in the way when people try to perform the desired behaviours. GRA 19703

Based on the importance of breaking down, or working around the three barriers, we used this theory as a base when designing the nudges to get through to those executing the source separation behaviour.

Further, the experimental evidence found by Van Dijk, Wit, Wilke, & Budescu (2004) indicated that individuals are less likely to make sacrifices for the common good if they are uncertain of whether or not more people will join. This finding made us cautious about how the nudges should be designed. Therefore, we decided that one nudge should be framed by stating what is typical behaviour at BI business school, thereby creating a descriptive norm (Appendix L). Also, when designing the social norms, we concluded that it should be based upon rules or beliefs of what is morally right and wrong, to thereby create an injunctive norm (Appendix, M). In this way, students and others at BI business school get the impression that source separation is both a rule and typical behaviour.

2.5 Research on bin proximity

Examples of research that has shown promising effects of nudging will now follow.

Firstly, manipulation through the increased amount of source separation bins and change to the look of these bins did not increase the amount of source separated waste at a University campus according to O'Connor et al. (O'Connor, Lerman, Fritz, & Hodde, 2010). However, previous research on source separation by Miller et al. found that combining bin proximity with visual prompts did increase the source separated amount of waste at a University with rather a positive result. Their research showed the importance of proximity; if the source separation station for bottles was placed in the classroom, it increased the amount of recycled plastic bottles (Miller, Meindl, & Caradine, 2016). Also, the effect of bin proximity on source separation behaviour has been replicated (Ludwig, Gray, & Rowell, 1998).

Another variable that has been researched about increasing source separated waste, is what effect different types of waste bins can have on the accuracy of source separation. The study conducted by Andrews, Gregoire, Rasmussen, & Witowich, found that source separation bins should be put close to trash bins to decrease the amount of possible contamination in the source separation bins (Andrews, Gregoire, Rasmussen, & Witowich, 2013). These results were somewhat similar to Austin et al.'s finding where a trash bin placed next to a source separation bin resulted in decreased contamination in the trash bin (Austin, Hatfield, Grindle, & Bailey, 1993). Furthermore, Andrews et al. (2013) and Heathcote et al. (2010) has both found that a system of three or four compartments works better to decrease contamination and increase the waste diversion rates (Heathcote et al., 2010).

Our original plan was to study whether bin proximity would affect source separation behaviour. Research on bin proximity was shown to have an impact. Although, at BI, we observed that the bin proximity and visibility already was as it should be. Therefore we decided to focus on other ways to nudge source separating behaviour.

2.6 Research on nudging by general visual prompts

Concerning our first hypothesis we looked into similar research and found that by including additional visual prompts, Miller et al. found a more significant effect than by bin proximity alone, making their study different from O'Connor et al.'s (2010) study (Miller et al., 2016). Often, the only feature differentiating waste bins from each other is a printed label, colour or symbol indicating the material appropriate for the different waste bins. Although some studies have found that posting signs above the waste bins increased compliance to source separate (Werner, Rhodes, & Partain, 1998), labels alone may not provide effective information. The use of informal signs clearly showed an effect and has also been reported by Reid, Luyben, Rawers, & Bailey, who suggested that the combination or comparison of the independent variables: prompting and proximity, should be researched further to find what strategy works best to increase the amount of waste being source separated (Reid, Luyben, Rawers, & Bailey, 1976). Informational prompts were also proven a success in Zandecki's study, where informational prompts increased the amount of source separated materials (Zandecki, 2012). Lastly, Sussman & Gifford's study on energy conservation showed that visual prompt signs placed in laundry rooms made it eight times more likely that people would turn off the lights than without the signage. It was especially efficient with larger signs (Sussman & Gifford, 2012). Furthermore, Sussman, Greeno, Gifford & Schannell study on compostsupportive behaviour in a cafeteria, found a significant increase in ideal composting behaviour after implementing visual prompt signs (Sussman, Greeno, Gifford, & Schannell, 2013). Therefore, we believe that by making signs that provide faculty, students, staff and others with simplified information in a more direct way it will increase the amount of waste being source separated.

2.7 Research on nudging by general visual prompts and social norms

Concerning our second hypothesis, Heathcote et al. (2010) found that the most important barrier that keeps us from successfully implementing changes that can result in greater source separation habits is the lack of knowledge on how to source separate correctly. Therefore, they suggested a campaign or some way to educate students, faculty, staff and others so that they have the information they need to be able to source separate properly. The framing of the information on the signs should be suitable in that it can activate values in the individual. Also, using the power of social norms to nudge individuals has been proven to work by stating that most people do reuse their towels instead of only preaching about the positive effects of being environmentally friendly (Lehner, Mont, & Heiskanen, 2016). Furthermore, placing a sign by the buffet, encouraging hotel guests to visit the buffet several times instead of just one time, reduced the food waste because the guests put less food on each plate (Kallbekken & Sælen, 2013). Also, nudging farmers by using social norms showed an effect in maintaining the benefits of agri-environmental schemes. By giving the farmers information about what other farmers intended to do, it increased the likelihood of permanent proenvironmental practices in farming (Kuhfuss et al., 2016). Lastly, social norms are found to be strongly related to pro-environmental behaviour or source separating behaviour as well as personal norms. Research has provided findings that suggest

an interdependent relationship between personal norms and source separation behaviour, meaning that nudging or reinforcing people by the use of social encouragement to change will probably have an effect on either their source separating behaviour or personal norms, which again will lead to growth in the other (Huber, Viscusi, & Bell, 2017).

2.8 Research on the effect of time on Nudging

Concerning our third hypothesis, Thögersen (1994) claimed that old waste handling habits must be dissolved before new habits can arise. As new habits are taught and maintained, the source separation behaviour will be better with time, and thereby increase the amount of waste source separated correctly. As previously mentioned, this study was conducted during a time with changes concerning the correct way of source separating waste at the business school. What students, teachers, and others had been previously taught had changed. Also, these changes were poorly communicated to those performing the source separation behaviour. By Thögersen's claims, we wanted to look at whether the aspect of time would give the students, teachers, and others at the business school a better chance to unlearn old habits, and be accessible to creating new ones through the nudging placed at the source separation stations.

Another study by Van Gestel, Kroese & De Ridder found that their replication of Kroese et al. (2016) study on nudging healthy food products by moving them to the checkout counter gave positive effects even over a longer period (Van Gestel, Kroese, & De Ridder, 2017). Similarly, Venema, Kroese & De Ridder results indicated that the implementation of a default nudge, placing adjustable desks at the standing position, increased the likelihood of people using the stand-up desk four times, compared to the baseline condition, even two months after the default nudge was first implemented. However, the study also found that the effect of the default nudge decreased somewhat over time (Venema, Kroese, & De Ridder, 2018).

Firstly, the theory about the decision-making process and how the dualsystem affects how humans make decisions will be the foundation for the first nudge. This nudge will be an informational nudge to make the source separating process as effortless as possible by designing signs that speaks to peoples system 1, and further increase their task-knowledge through this. Secondly, based on theory from Sunstein, Stoknes, Fishbein and Ajzen, and Thøgersen the second nudge will be framing social norm signs which aim to activate social norms and thus improve people's motivation to source separate food waste. Further, the information signs aimed to activate social norms will be created to work around the three barriers. Lastly, in the third nudge, a time factor was added based on theory concerning the process of unlearning old habits before replacing them with new ones, aiming for an almost automatic decision.

3. Method

3.1 Setting up the choice architecture

Before we started to collect data for the baseline, we had to make sure that all four areas targeted in our research were set up in a way that presented the same source separating alternatives. Therefore, we set up the choice architecture in all four areas before we started the data collection process. The base of the choice architecture was in our eyes not complete since there were no bins to separate plastic, except for one bin in the cafeteria that was put up as a test to see whether the bin was applied. We raised this concern with the management who then agreed to set up four extra bins for clean plastic waste, and one extra bin for trash. In this way, the four areas targeted in our study were equal in their choice architecture before the collection of data started for the baseline, first, second, and third intervention.

3.2 Sample and procedure

The participants included in this study were primarily students, faculty, staff and visitors that passed through BI regularly. The campus in Nydalen consists of one building with four blocks and seven floors. The approximate number of students attending the school each year was approximately 14 000 (BI, 2017). The stations for source separation were located in various areas in the

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baseline condition, namely; outside the cafeteria called Gastro, outside of the kiosk called Amigo and outside of the coffee shop called Starbucks. All trash containers were already in close proximity to consumers. There were mainly six types of waste bins at BI. However, since this study was dependent upon a complete choice architecture, the areas chosen in this study included one additional bin for clean plastic waste at all targeted areas. Although the focus of the study was food waste, trash waste and clean plastic waste, a full description of the bins for bottles, pizza boxes and paper will be given. The researchers do this to be transparent and to make it easier to understand what waste goes where so that it is easier to replicate. The waste bins outside the Gastro cafeteria contained 11 waste bins, namely three food waste bins, two for bottles, three for trash, and two for clean plastic waste. The bins were already placed close to the eating area, approximately one meter, in the cafeteria and highly visible for all. The number of waste bins outside of the Amigo kiosk was ten. All of the bins outside of the kiosk was already nearby, three and five meters, to the eating area and highly visible for all participants. There were two stations of bins, after which each one had one food waste bin, one trash bin, one plastic waste bin, one bottles bin and lastly, one paper bin. The waste bins outside the Starbucks coffee shop counted five bins; of which one was for food waste, one for trash, one for clean plastic waste, one for bottles and the last one for paper. They were all close to the eating area. The visual appearance of the different types of waste bins in the baseline condition was as follows. All of the different types of waste bins had the same visual appearance. All of the bins were approximately 110 cm high, 40 cm wide and 42 cm in depth. Furthermore, they all had a dark grey finish. More specifically, the food waste bins all had a brown edge around the entrance and an accommodating brown apple core on the front of the bin. Secondly, the bins for recyclable bottles also had a coloured edge around the entrance of the bin, although this type had a yellow edge and a yellow bottle on the front of it, in addition to a different type of entrance made so that only bottles could fit into it. Thirdly, the trash bin had a light grey edge around the entrance and a light grey question mark inside a circle on the front of the bin. Fourthly, the bins meant for recyclable plastic had a blue edge and a blue plastic bag on the front, and also a text in white on the front

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between the entrance and the plastic bag stating: "Clean plastic packages only", to prevent any other waste entering. Fifthly, the pizza box bin had an open entrance, meaning that you could put the whole pizza box inside without having to put it through a type of entrance. Also, the bin had a pizza sign on the front of it, and different compared to the others in that it was about two-thirds of the height as the other bins. Lastly, the paper bins had a green edge with a green paper symbol on the front of them, and a much smaller entrance so that only paper sheets and newspapers could enter the bin.

In accordance with the theory, we first designed nudges of *general visual prompts* that were aimed to speak to people's system 1. We decided to use pictures showing where to throw what. These pictures were placed both on top of the trash bins and were visible on the information screens all over campus. We believed that the issue at the business school was that people did not understand what was supposed to go into what waste bin. We chose to use pictures and as little text as possible, as pictures are easier information to process than just text and thereby speaks to our system 1 thinking. Besides, a picture was easier for a non-native speaker to interpret. The aim with the general visual prompts was to make it as convenient and easy as possible for everyone who passed by the source separation stations to source separate their waste properly to extract the maximum practical benefits from products that were possible to source separate and thereby generate the minimum amount of waste.

Next, we created a different nudge to break down the three barriers presented by Stoknes (2015) through *social norms*. We designed posters informing about the food waste thrown into the food waste bin as this gets converted into biogas. To strengthen the feelings of being near the issue, we put a picture of the local buses used all around Oslo as some of these runs on biogas. We made sure that the messages were all positively loaded to motivate the students, teachers and others to act upon the desired behaviours. Lastly, one message was formulated to create a feeling of togetherness where the society at BI would work together towards reaching a goal of achieving a material recycling rate of 65% within 2022. GRA 19703

Limited research has investigated how nudges can be used to increase correctly disposed recyclables. The research known to us has great weaknesses in the form of small sample sizes and mixed results, we, therefore, wished to apply our study to help fill the gap in the research on nudges and pro-environmental behaviour, and at the same time make a contribution to BI business school and their aim to increase the material recycling rate. Further, we had to take into consideration that our research was conducted during a time of change, making it necessary to create new habits concerning the way of source separation at the business school. As we now live in a VUCA (volatility, uncertainty, complexity and ambiguity) world (Bennett & Lemoine, 2014) changes are unavoidable and we, therefore, wanted to incorporate an intervention looking at whether nudges would have a stronger impact over *time* as caused by the process of unlearning old habits and replacing them with new ones.

Baseline

The baseline condition lasted for eight days after which food waste, trash waste and plastic waste was collected from three areas, namely: Gastro cafeteria, Starbucks coffee shop and Amigo kiosk. It was no intervention implemented in this condition.

Intervention 1

The first intervention was nudging by *general visual prompts*. The intervention was implemented by putting up informational signs with pictures and short written messages of what should go into each bin. We decided to use pictures and as little text as possible so that the nudge would speak to the participant's System 1, and thereby be able to process the information faster and put the waste into the correct bin. The signs were also placed at eye level to make it easy to see, and thereby make it easier for the participants to pay attention to the signs. Therefore, the general visual prompts nudge was aimed to speak to people's System 1 and thereby make automatic decisions when source separating (Kahneman, 2011). This intervention also lasted for eight days.

The first intervention consisted of three different signs; one for food waste, one for trash and one for clean plastic waste. All of the signs had the same white background and the same type of layout. The sign made for food waste had the same brown colour as the apple and the edge of the bin. At the top with white lettering in a red box, it said: "ONLY FOOD WASTE HERE!", before more information followed underneath. With a white background and red lettering, the signs stated further: "SEPARATE YOUR FOOD WASTE FROM THE CONTAINERS!". Underneath the pictures adjoining word(s) were put to strengthen the explanatory factor of the sign. Firstly, with a picture of a hot food dish with an adjoining: "CAFETERIA FOOD", then a picture of fruit with the statement: "FRUITS", before the last picture of a salad with the suited word: "SALADS", finished the end of the sign; going from top to bottom(Appendix D). The second sign was made for the trash waste and had the same white background as the others. It also had a grey feature in the layout to make it fit with the bin which had a grey question mark on it and a grey edge. At the top of the sign with white letters in a red box, the sign stated as follows: "ONLY TRASH AND UNCLEAN PLASTIC HERE!".

Further, underneath the statement was a picture of different containers from the cafeteria with the appropriate explanatory word, followed by a picture of snuff, before coffee cups and napkins, all with adjoining words ended the information flow, going from top to bottom(Appendix E). The last sign was for plastic. It too had a white background, but it was different from the others in that it had a blue layout factor so that it suited its blue edged bin that had a blue plastic bag on it. Firstly, the sign had white lettering in a red box at the top that stated: "ONLY CLEAN PLASTIC HERE!". Underneath, it had pictures with adjoining and appropriate words for explaining the pictures just as the other signs. Firstly, there was a picture of clean plastic packaging, then snuff boxes, clean enough plastic, and lastly, a Starbucks plastic coffee cup(Appendix F). In addition to the signs put on top of the source separation stations, there were signs portrayed at all of the tv-screens at BI from the day the first intervention started. These signs where a little different from the ones placed on top of the bins. The different slides consisted of a written text that indicated how the different waste items were to be thrown, followed by a picture of someone throwing the waste into the correct bin(s). If necessary, the slides also showed how to separate waste, for example, by separating the coffee cup lid from the cup. We decided to use the tv-screens as a way to capture an audience and appeal even more to their System 1 by making the information more available to all students, staff and other people who passed through BI.

Intervention 2

The second intervention was put in place by framing social norms in the form of signs put at eye level as visual prompts, and the condition lasted for eight days. The signs consisted of two different types. Type one had a dark blue background with white lettering in the written statements and two photos. The written statements were as follows: "Separate your food waste from the container. OTHER PEOPLE AT BI DO!" and "Remember to separate your food waste from these bins is converted into biogas". The former statement was placed at the top of the sign, while the latter one was placed at the bottom of the sign. Below the first statement was the first picture which entailed a photo of food waste. From that photo, there was an arrow pointing downwards towards the second picture, which entailed a photo of a bus that used biogas as fuel(Appendix L).

The second sign also had a dark blue background with both written statements and a photo. At the top of the sign in white lettering, the first statement expressed: "Let's do one little thing every day together to help save the planet. RECYCLE!". The second statement was placed at the bottom of the sign, underneath a picture of the earth being held in two hands. The statement read as follows: "BI works to achieve a material recycling rate of 65% within 2022. HELP US TO REACH THIS GOAL!"(Appendix M). The same signs were also portrayed at all of the tv-screens at the business school, where they were shown from day one of the second intervention. The reason why we put the different visual prompts in the first and second intervention at eye level was that research had shown that putting items at eye level could significantly increase the effect of nudging, by making the items more available (Sugden, 2009). We believed that by putting the visual prompts at eye level, it would help the participants to become more aware of the signs and further make them more prone to source separate correctly.

Intervention 3

Intervention number three was the only intervention that did not follow the same system as the previous interventions. This means that while the former interventions all lasted eight days, Monday through Thursday every executive week, this intervention lasted four days, Monday through Thursday, and started after having a break from the data collection. Means that the study started with two weeks of baseline, followed by the next two executive weeks with intervention 1, the next two executive weeks with intervention two. Then, a pause followed by having four weeks without any data collection followed by the one week with four days of data collection for the third intervention. During the period without any data collection, the interventions where still in place, meaning that both the *general visual prompts* and the framing by *social norms* prompts, both by signs and tv-screens, were still present. The reason for the wait was to see whether or not *time* influenced the effect of nudging.

3.3 Measures

The data was collected at BI Norwegian Business School in Nydalen, Oslo. The dependent variable was correctly source separated material in each type of source separation bin by faculty, students, staff and others. There were three different types of bins used to collect data: the food bins, the trash bins and the bins for clean plastic. The independent variable was the type of nudge used in the three different interventions: 1) nudging by *general visual prompts*, 2) nudging by framing visual prompts through *social norms* in combination with the first intervention, and lastly 3) the effect of *time* on the two nudging interventions. The materials were recorded by sorting each waste bag into two piles of either correctly source separated materials or incorrectly source separated materials. What waste was counted as correctly source separated or incorrectly source separated was made clear by the signs. Besides, the experimenters trained observers to understand what was and what was not correctly source separated waste dependent on which type of bin from which the material came. The observers were trained to check the experimenter's reliability and integrity when conducting the study. Those above will be explained further later on in the paper.

The different types of waste included food waste, paper, plastic, bottles, and trash. Food waste included all types of food and tea-bags, while trash included all types of non-recyclable waste that did not fit under any of the other types or that consisted of more than one material making it difficult to source separate. Plastic, on the other hand, was correctly source separated if it was clean, meaning that clean plastic should be thrown into the plastic bin, while unclean plastic should be thrown into the trash bin. The other types of waste were excluded from the study because it was too little waste to collect and because these bins were much less problematic. As mentioned, the differences between correctly source separated and incorrectly source separated waste was made clear by a short training period where the observers watched what the experimenters did, while the experimenters at the same time explained their choices for what constituted correctly or incorrectly source separated waste. The experimenters would point to examples, especially examples of mixed-waste and unclean plastic, which could be more difficult to spot. The experimenters also made sure that the observers understood the importance of excluding coffee, water, soda and other liquids from the study. This was to be accomplished by pouring the excessive liquids out of the cups, bottles etc. and also squeeze the liquids out of paper sheets, napkins or other materials. If the liquids were not to be excluded in this study, the weight would be far off from what the experimenters were trying to achieve when measuring waste. The business school generated large amounts of waste, and there were risks connected to flies and smell. Therefore, the waste was collected and weighed from nine until approximately one PM every Monday to Thursday. The study collected data four days a week for seven weeks, making the number of data collection a total of 28 days. Additional observers would also help to observe the experimenters when sorting the waste and to weigh it, to reach a better level of both reliability and integrity.

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3.4 Interobserver agreement and integrity checklist

Interobserver agreement and a procedural integrity checklist were used to collect data to ensure reliable results and integrity. All of the observers were trained to collect data in the same way, meaning that they were trained to divide each waste bag into two piles of waste, consisting of one with correctly source separated waste and one with incorrectly source separated waste. This was accomplished by starting with one location being the cafeteria and food waste, for example, and then continuing with the same location, but with the trash waste bags. When all of the bags in that location had been sorted and weighed, the next location would be sorted and weighed. What was accepted as correctly source separated versus incorrectly source separated waste was also made clear. The experimenters checked that the observers understood the different types of source separated waste. However, for either of the two independent observers to check one or both of the experimenters sorting as either correctly or incorrectly source separated waste, they had to know what constituted correctly or incorrectly source separated waste in each type of waste bag. Therefore, this study trained the observers by showing them how the experimenter's source separated the waste, in a slow manner and with a lot of explanations as to what constituted correct or incorrect source separation in each type of waste: food, trash and plastic.

Inter-Observer Agreement was measured by having either the first or second observer(s) or both, observe both experimenter one and two while they separated the waste from the waste bin into two piles, one consisting of correct source separated waste and the other of incorrectly source separated waste. If the observer agreed with the experimenter's division of correctly and incorrectly source separated waste, meaning that all of it was separated properly according to the training, the interobserver agreement sheet and the integrity checklist sheet would indicate reliability in the results. If the observer disagreed with the experimenter's separation, it might have indicated a lack of reliability. The results from this study's reliability will firstly be presented in the form of a point-to-point Interobserver Agreement sheet (see Appendix B). By having the results from the observers weighted kilos and the numbers of the experimenters weighted kilos, this study showed both transparency and reliability in the results. Whether or not the interval constituted as in agreement or disagreement was decided by how many grams \pm it was off. If the result was off by more than \pm 5 grams, then the interval was considered as in disagreement with the study. The interobserver agreement was calculated in the following way:

the number of intervals with an agreement

the number of intervals with agreement + the number of intervals with disagreement

= X * 100 = final agreement IOA in percent

Secondly, the study was also checked by measuring integrity by using an integrity checklist(Appendix C). The observers checked the integrity of the study by checking off either an X for correctly performed or a 0 for incorrectly performed. They checked whether or not the experimenter had sorted and validly separated the waste, that the experimenter had weighed the source validly separated waste, and that the experimenter had written the actual, weighed result on the data collection sheet. The total score was given in a per cent at the bottom of the sheet.

3.5 Operational definitions

The operational definition of food waste was all types of food waste and tea bags. Secondly, the definition of paper waste was simply all paper sheets and newspapers. Further, plastic waste was defined as clean plain plastic, meaning no unclean plastic or mixed materials. Bottles were defined as bottles consisting of materials like plastic, glass or metal. Lastly, trash waste was defined as anything that could not be included in any of the other types of waste, such as mixed waste, snuff, carton and unclean plastic containers or packaging.

3.6 Aaparatus

The waste disposal was weighted in the basement of BI Norwegian Business School by using a luggage weight scale. The reason why the study used a weight scale was that although there were two experimenters, one would weigh while the other one would write down the results on the data collection sheet. In this way, the data collection process became more effective. Besides, the scale was checked at least three times in a row per bag to see too that the scale worked properly and that the result was at its most accurate. The luggage scale was chosen because of its practicality of having a hook attached to it, making it easy to weigh the waste bags. Also, the experimenters believed it to be the most accurate way to weigh waste, as opposed to a regular weight scale, such as a bathroom scale.

3.7 Design

The design used in this study was a multiple component design to demonstrate: baseline (A), the effect of nudging by *general visual prompts* alone (B), the effect of *general visual prompts* and framing by the visual prompt: *social norms*, combined (BC). Lastly, the effect of *time* on general visual prompts and framing by the visual prompt: *social norms* (BCD). A-B-BC-BCD, making it a total of four conditions.

4. Results

The results were analysed in five different ways. Firstly, by inspecting the data results from the different graphs created to illustrate the results by location and by comparing the different types of waste results. Secondly, the results were analysed by a means comparison of correctly source separated waste in per cent by locations, type of waste and conditions. Thirdly, the results were analysed by running an ANOVA one-way comparison, and a comparison of means to retrieve information about the results significance, mean and standard deviation values by locations and type of waste across all conditions. Fourthly, a comparison of significance levels between conditions indicated how significant each condition was, how significant the increase was from one condition to the next, and whether
or not it reflected the logical linearity of the hypotheses. Lastly, the results of the studies interobserver reliability and integrity were found by analysing how well the observers agreed or not with the experimenters in concern of how the results of the study were measured.

4.1 Data results and graphs

The results from the data collection, as shown in the graphs below, were reported as the percentage of correctly source separated weight in kilos(y-axis) per day throughout the total 28 days(x-axis). The different conditions were indicated by vertical lines and by naming them on top of each demarcated area.

Gastro

The results from Gastro indicated by the graph showed a small effect if any over the first two conditions. However, *food waste* and *clean plastic waste* did seem to have some effect when entering the *social norms* condition. On the other hand, *trash waste* indicated no effect. Data indicated it to have the same results in the first to days of *baseline* as the last two days in the *time* condition. Overall, the graph indicated a possible effect for the location Gastro in the *food* and *plastic waste* types, especially when entering the *social norms* condition. The *trash waste* type, however, did not indicate any effect by any intervention (Figure 1).



Figure 1. Gastro cafeteria results in per cent of correctly source separated waste by the condition.

Starbucks

The graph depicting Starbucks indicated possible effects for some of the waste types. The *clean plastic waste* started at about 50 % in the *baseline* condition before reaching around 50-80 % in the visual prompt condition. Furthermore, the graph indicated that the results for *clean plastic* waste withheld the results in the social norms condition before it decreased by about 10 % in the *time* condition. The results from the *food* waste indicated some effect in that the results started around 50-60 % in the baseline condition before reaching 60-80 % in the visual prompt condition. Furthermore, the results for food waste indicated a further increase in the *social norms* condition, when the results indicated a peek at the start of the interval with half of the data points reaching around 90 % correct. However, the next four data points decreased to around 60-70 %, before increasing again to reach 70-80 % in the time condition. The results indicated little or no effect in the *trash* waste category by the condition. Although the trash waste results started at approximately 50-60 % in the *baseline* condition, before reaching the same amount of correct in the visual prompt condition. Furthermore, the trash waste reached about 60 % in the social norms condition before decreasing to 50-60 %, meaning the same results as in the *baseline* condition.





Amigo

The results from the graph of Amigo indicated that some of the waste types might have affected. However, two of the different types of waste, namely *food* waste and *clean plastic* waste, both started at around 50-60 % in the *baseline* condition, while *trash* waste, on the other hand, started at around 40 % in the *baseline* condition. In the *visual prompt* condition *food* waste, *trash* waste and *clean plastic* waste all increased; however, only *food* waste and *clean plastic* continued to increase more in the next condition: *social norms*. While both *food* waste and *clean plastic* waste increased from rates of 50-80% in the *visual prompt* condition and continued equally in the *social norms* condition, the *trash* waste rated around 50-70% in the *visual prompt* condition to around 50-60 % in the *social norms* condition. Although *food* waste had a drop in the last data points before the *time* condition, it increased to 80 % again before ending at 70 % at the final data point. The last data point in the *social norms* condition for *clean plastic* waste was at 60 % before it mildly increased in the *time* condition, thereby ending at 65 %. Lastly, *trash* waste which rated around 50-60 % in the *social norms*

condition increased to approximately 72 % in the first data point in the *time* condition before decreasing immediately and ending at the final data point of 55 %. Overall, *trash* waste indicated little or no effect. However *food* waste and *clean plastic* waste may have had some effect in the *visual prompt* and *social norms* conditions, although both of the waste types ended in a decrease of approximately the same percentage of correctly weighed kilos as in the *baseline* condition.





Comparing locations: food waste

The results from comparing the *food* waste in a graph indicated that all locations increased their percentage of correctly source separated *food* waste in percentage by 8-20 % depending on the location of the waste. While the former indication was based on the first and last data points in the graph for each location, the following indication has based the lines in the graph. The lines indicated an effect to some extent in that they started from the lower left and indicated a slow increase making the lines turn upward as they move to the right on the x-axis. The graph also indicated that the locations called Starbucks and

Amigo was somewhat better at source separating correctly than Gastro through all conditions. There was one extreme value in this graph in the *baseline* condition made by the location Starbucks dropping to a 0 % correctly source separated food waste rate.





Comparing locations: trash waste

Comparing the results from Gastro, Starbucks and Amigo for the *trash* waste in a graph indicated quite clearly that Gastro had the least amount of correctly source separated *trash* waste through all conditions. It also indicated that although Starbucks started as being the best at source separation in the *baseline* condition, Amigo increased the amount of correctly source separated *trash* waste to such a degree that it ended up having the highest rate throughout the conditions of *visual prompts, social norms* and *time*. Gastro, on the other hand, did not seem to have been affected much by the different conditions. However, Amigo's results may have been affected by the conditions in that it increased from about 50 % at *baseline* to 60-70 % in the *visual prompt* condition further leading to around 65-75 % correct in the *social norms* condition. Although the rates of all the data



points from all locations decreased in the *time* condition, Amigo may have been affected positively in the two previous conditions.

Figure 5. Comparison of the results from all locations in per cent of correctly source separated trash waste by the condition.

Comparing locations: plastic waste

The graph comparison of *clean plastic* waste indicated overall that Gastro had the lowest degree of correctly source separated *clean plastic* waste, that Amigo had the most correctly source separated *clean plastic* waste and that Starbucks was in the middle in comparison to the other locations. The graphs results indicated that all locations were affected by nudging. However, the effect decreased somewhat in the *time* condition. Gastro started at about 40 % before reaching 45-50 % in the *visual prompt* condition, and further land at a stable 50 % in the *social norms* condition, lastly Gastro landed at around 50-60% in the *time* condition. However, Gastro had both an extreme value of 80 % correctly source separated *clean plastic* waste in the *time* condition as well as having an ending point of 45 %, the latter indicating a possible decrease leading back to *baseline* or it is an extreme value. Starbucks on the other hand, started at about 50 % in the *baseline* condition with one extreme value of 100 % correctly source separated

clean plastic waste, before reaching about 55-70 % in both the *visual prompt* condition and in the *social norms condition*. Furthermore, the values ended at between 40-70 % in the *time* condition with an ending point at 60 % correctly source separated *clean plastic* waste. Lastly, Amigo started at about 50-70 % in the *baseline* condition before reaching 50-80 % in the *visual prompt* condition, before reaching 60-95 % in the social norms condition, and ending up at 60-65 % correctly source separated *clean plastic* waste in the *time* condition, with the last data point hitting 65 %.



Figure 6. Comparison of the results from all locations in per cent of correctly source separated plastic waste by the condition.

4.2 Means comparison

Locations and type of waste

The results from the mean comparison indicated a difference between both locations and type of waste. Firstly, the locations were different but also similar when starting at the *baseline* condition for *food* waste. Amigo had 12,77 % better source separation than Starbucks and 12,48 % better source separation than Gastro at the *baseline* condition for *food*. In the *baseline* condition, when testing *trash*;

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however, Amigo was the least good location when it came to source separating correctly. Starbucks had 12,8 % better source separation than Gastro and 20,23 % better source separation than Amigo in the *baseline* condition. In the *baseline* condition, when checking how well the *clean plastic* was source separated at BI, Amigo was again, the best location with 59,91 %. Meaning, that Amigo Source separated 3,13 % better than Starbucks, and 19,33 % better than Gastro. Overall, however, Starbucks was somewhat better at source separating than Amigo by 4,33 % and 28,71 % better than Gastro.

Secondly, in the *visual prompt* condition with *food* waste, Amigo continued to have the best source separating rate by percentage. To be exact, Amigo was 2 % better than Starbucks and 16,12 % better than Gastro. In the second condition *trash* waste was source separated best by Starbucks as in the *baseline* condition. Starbucks was 3,07 % better than Amigo and 9,43 % better than Gastro. Lastly, when it came to source separating *clean plastic* waste in the second condition, Starbucks turned out to be the best location. However, Starbucks was only 0,45 % better than Amigo, yet 16,86 % better than Gastro. Overall, Starbucks was a little better at source separation than Amigo, 1,52 %, and much better at source separation than Gastro, 40,41 %.

Thirdly, in the *social norms* condition with *food* waste as the type of waste, Starbucks was 11,63 % better at source separating *food* waste than Gastro and 15,54 % better Amigo. Further, Starbucks was 3,61 % better at source separating *trash* waste than Amigo in the third condition, and 16,88 % better than Gastro. When it came to the third type of waste, *clean plastic*, Amigo was 6,68 % better at source separating *clean plastic* than Starbucks and 15,61 % better than Gastro. Overall, Starbucks was still better at source separation in the third condition than Amigo and Gastro. In percentage, Starbucks was 12,47 % better than Gastro.

Lastly, in the fourth condition, which was how *time* affected the two nudging conditions, Starbucks was better at source separating *food* waste by 3,27 % than Amigo and 4,94 % better than Gastro. When it came to source separating *trash* waste correctly, Amigo was only 1,61 % better than Starbucks and 8,1 % better than Gastro. Further, Amigo was 4,98 % better at source separating *clean* *plastic* than Gastro, and 6,16 % better than Starbucks. Overall, Amigo was 4,5 % better than Starbucks at an overall source separation, and 14,75 % better than Gastro. Furthermore, the results indicated that Gastro cafeteria was the least good at source separating correctly throughout all conditions, while Starbucks was the best at the first three conditions before Amigo turned out as the best one in the last condition. However, Starbucks coffee shop and Amigo kiosk were quite similar in their results throughout the study as opposed to Gastro cafeteria.

Conditions

When it came to comparing the results by conditions, there were many differences between both locations and types of waste. Firstly, when it came to food waste, the amount of waste source separated at all conditions increased in all locations. However, Starbucks increased the greatest with 24,62 % more correctly source separated food waste in the *time* condition on average than in the *baseline* condition. Gastro had a consecutive and stable increase through all conditions that ended up at 19,39 % more correctly source separated food in the time condition on average than in the baseline condition. Amigo increased the least out of the three locations with an increase of 8,58 % in the *time* condition on average as compared to the baseline condition of correctly source separated food waste. Starbucks and Amigo both decreased: Starbucks had a decrease from 28,03 % in the social norms condition, to 24,62 % in the time condition, while Amigo had a decrease from 5,8 % increase in the visual prompt condition, to a decrease of - 0,28 % in the social norms condition. Overall, the total sum of all the locations increases showed an average increase of 52,59 % in the time condition on average compared to the results in the *baseline* condition.

Secondly, the results found in concern to *trash* waste was found to be the least confident compared to the results found in the other types of waste. Gastro increased with only 2,6 % in the *time* condition on average compared to the *baseline* condition. Starbucks, on the other hand, decreased on average with - 3,71 % in the *time* condition compared to the *baseline* condition. However, Amigo increased largely with an average of 18,13 % more correctly source separated trash waste in the *time* condition compared to the *baseline* condition. By

comparison, Amigo was the only location with a stable consecutive increase on average from the *baseline* condition to the *time* condition. However, this was not the case for the other two locations. Although Gastro increased by 2,96 % from the *baseline* condition to the *visual prompt* condition, it decreased to - 3,26 % in the *social norms* condition, before increasing to 2,6 % in the *time* condition. Starbucks on the other hand, decreased by - 0,41 % in the *visual prompt* condition of 0,82 %, before ending on a decrease of -3,71 % on average in the *time* condition when compared to the *baseline* condition. In total, the sum of all the locations increases and decreases showed an overall average increase of 17,02 % in the *time* condition compared to the *baseline* condition.

Thirdly, the results of the amount of correctly source separated *plastic* waste on average differentiated greatly over the different locations. Firstly, Gastro increased 17,75 % on average in the *time* condition compared to the *baseline* condition. On the other hand, Starbucks only increased on average by 0,37 % in the *time* condition as compared to the *baseline* condition. Similarly, Amigo only increased on average by 3,4 % in the *time* condition compared to the *baseline* condition. Gastro had a stable increase in overall conditions.

On the other hand, while Starbucks had a stable increase from the *baseline* condition to the *social norms* condition, it decreased in the *time* condition. The measurements thereby showed a decrease from the *social norms* condition to the *time* condition - 8,26 %. Similarly, Amigo also had a stable increase over the same conditions before it decreased by - 8,78 % on average from the *social norms* condition to the *time* condition. Overall, the sum of all locations on average in total was found to be 21,52 % making it the second greatest increase in total below *food* waste and above *trash* waste in the ranking.

	Types of		Visual	Visual Social	
Location	waste	Baseline	prompt	norms	Time
Gastro	Food	48,95 %	51,11 %	65,06 %	68,34 %
Starbucks	Food	48,66 %	65,23 %	76,69 %	73,28 %
Amigo	Food	61,43 %	67,23 %	61,15 %	70,01 %
Sum means food		53,01 %	61,19 %	67,63 %	70,54 %
Gastro	Trash	46,82 %	49,78 %	43,56 %	49,42 %
Starbucks	Trash	59,62 %	59,21 %	60,44 %	55,91 %
Amigo	Trash	39,39 %	56,14 %	56,83 %	57,52 %
Sum means trash		48,61 %	55,04 %	53,61 %	54,28 %
Gastro	Plastic	40,58 %	47,65 %	56,48 %	58,33 %
Starbucks	Plastic	56,78 %	64,51 %	65,41 %	57,15 %
Amigo	Plastic	59,91 %	64,06 %	72,09 %	63,31 %
Sum means					
plastic		52,42 %	58,74 %	64,66 %	59,60 %
Sum means		<u>51,35 %</u>	<u>58,32 %</u>	<u>61,97 %</u>	<u>61,47 %</u>

Table 1. Means comparison of correctly source separated waste in per cent.

4.2 ANOVA and Means Comparison

A one-way ANOVA variance analysis was used to determine whether there were any statistically significant differences between the different types of waste or locations in the study across all conditions combined. Also, a means comparison was used to indicate the means and standard deviations for each location and type of waste. The latter was used to indicate how the measurements for each type of waste and location spread out from the average mean.

Mean of Food Waste

The mean graph of *food* waste indicated that the different conditions had a positive effect on source separation. The effect increased per condition, meaning that there was a stable continuous increase throughout all three interventions.



Figure 7. Means plot of correctly source separated food waste by the condition.

Mean of Trash waste

The mean graph of *trash* waste indicated that the different conditions had a positive effect on some conditions. The effect increased from *baseline* to the *visual prompts* condition (Nudge1), before it decreased in the *social norms* condition (Nudge2). Lastly, the values increased somewhat in the final *time* condition (TimeNudge). The results indicated that there was not a stable continuous increase throughout all three interventions, but that there was a continued effect, although it decreased to some extent.



Figure 8. Means plot of correctly source separated trash waste by the condition.

Mean of Plastic waste

The mean graph of *plastic* waste indicated that the different conditions had a positive effect on some conditions. The effect increased per condition from *baseline* to the *visual prompts*, Nudge1, condition and further to the *social norms*, Nudge2, condition, meaning that there was a stable continuous increase throughout the first two interventions. However, the last condition, namely how *time* affected the two previous nudging conditions combined, showed a decrease in the amount of correctly source separated *plastic* waste in per cent.



Figure 9. Means plot of correctly source separated plastic waste by the condition.

Mean of Total waste

The mean graph of *total* waste indicated that the different conditions had a positive effect on some conditions. The effect increased per condition, meaning that there was a stable continuous increase throughout the first two interventions. However, in total, the amount of correct source separated total waste(food, trash and plastic waste) neither increased or decreased in the *time* condition.





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4.3 Mean, standard deviation and significance

The results from the statistical one-way analysis ANOVA in concern to the significance and the comparison of the mean and standard deviation of all locations and all types of waste showed significant differences between the groups. Firstly, the means and standard deviations indicated that in the Gastro location, food and plastic waste was sorted better than trash waste. The means and standard deviations for *food* and *plastic* were higher than for *trash* waste, meaning that the values were less close to the average for *food* and *plastic* than it was for *trash.* The values for Starbucks indicated that *food* waste was better sorted than trash and plastic. Food waste had a higher value in both means and standard deviation compared to the *trash* and *plastic* waste. This indicated that *trash* and plastic waste was closer to average at Starbucks than food waste was. At the Amigo location, trash waste was better sorted than food and plastic waste. Although the means of *food* waste and *plastic* waste was higher than that of *trash* waste, the standard deviation of *trash* waste was higher than that of *food* and plastic waste, meaning that the values of food and plastic waste was closer to the average than the values of *trash* waste was.

Secondly, the significance values for *food* waste and *plastic* waste in Gastro location was 0,007 (p = ,007) and 0,015 (p = ,015), meaning that both results were below 0,05 and thereby, statistically significant differences were found between correct source separated waste by waste types and the different nudging conditions: from *baseline* to the last condition. In the Starbucks location, *food* waste was the only type of waste that was statistically significant, p-value =, 025. In the Amigo location *trash* waste was the only type of waste that was statistically significant with a p-value of, 003. However, in total when only considering the types of waste the results indicated that both *food* (p = ,001) and *plastic* (p = ,021) waste was statistically significant.

Location	Type of Waste	Mean	Std Deviation	Significance	
Gastro	Food	56,9389	13,18671	0,007	
	Trash	47,1057	7,37825	0,362	
	Plastic	49,6789	12,07949	0,015	
	Total			0,000	
Starbucks	Food	64,9200	20,24395	0,025	
	Trash	59,2064	7,83410	0,836	
	Plastic	61,5068	13,56740	0,509	
	Total			0,001	
Amigo	Food	64,2346	11,27173	0,459	
	Trash	51,7461	12,02514	0,003	
	Plastic	65,0636	11,14092	0,166	
	Total			0,007	
All locations					
Food				0,001	
Trash				0,150	
Plastic				0,021	

Table 2. Table of means, standard deviations and significance values for all types of waste and locations across all conditions combined.

4.4 Comparison of significance levels between all conditions

The results from the comparison of significance levels between all conditions indicated differences in the strength of the significance level in concern to both location and condition. Firstly, when comparing the means from *baseline* with the means from the first intervention, *general visual prompts*, the only location and type of waste that was statistically significant was Amigo *trash*. In total, Amigo was also indicated to have the only overall *total* waste means to be statistically significant. Secondly, in comparing the means from *baseline* with the means from the second intervention, *social norms*, Gastro *food*, Gastro *plastic*, Starbucks *food*, Amigo *trash*, and Amigo *plastic* all had statistically significant results.

Overall, all locations had a significant increase in the amount of *total* waste correctly source separated. Thirdly, comparing the baseline condition with the third intervention, the effect of time on nudging, indicated that Gastro food, Gastro plastic and Amigo trash had a significant increase in the amount of correctly source separated waste. Overall, in concern to total waste per location, Gastro and Amigo were the only locations that had a significant result in *total* waste. Fourthly, when comparing the means from the first intervention, general visual prompts, with the second intervention, social norms, the results indicated that Gastro *food* was the only statistically significant result besides in total that is. In total, Gastro and Starbucks showed statistically significant differences between the first and second intervention of total waste measured. Fifthly, when comparing the second interventions means with the third interventions means, the results indicated that none of the locations, types of waste or total waste had any statistically significant results. Lastly, when comparing the first interventions means with the third interventions means the results indicated that Gastro food waste, Gastro total waste, and Starbucks total waste were statistically significant.

Location	Type of waste	B/I1	B/I2	B/I3	I1/I2	I2/I3	I1/I3
Gastro	Food	0,726	0,012	0,013	0,026	0,568	0,025
Gastro	Trash	0,445	0,403	0,573	0,113	0,204	0,934
Gastro	Plastic	0,116	0,003	0,013	0,125	0,815	0,188
	Total	0,257	0,000	0,003	0,004	0,470	0,011
Starbucks	Food	0,137	0,015	0,093	0,132	0,647	0,347
Starbucks	Trash	0,926	0,827	0,503	0,756	0,344	0,569
Starbucks	Plastic	0,333	0,265	0,972	0,875	0,244	0,338
	Total	0,997	0,003	0,082	0,000	0,376	0,014
Amigo	Food	0,278	0,961	0,172	0,346	0,280	0,709
Amigo	Trash	0,008	0,000	0,008	0,891	0,884	0,857
Amigo	Plastic	0,465	0,022	0,356	0,240	0,183	0,921
	Total	0,005	0,008	0,002	0,964	0,833	0,857

Table 3. The significance levels between conditions; of which baseline is labelled 'B', interventions are labelled as 'I', and the number of each intervention are labelled as either '1', '2' or '3'.

4.5 Interobserver reliability

Interobserver reliability was checked by four different raters over three days, meaning that three out of 28 days were checked in concern to the studies reliability. The results of the interobserver reliability indicated that the correlation between the observers and the experimenters in measuring correctly and incorrectly source separated waste had high levels of significance. Firstly, the correlation between the measured results of correctly source separated waste by observers and experimenters had a significance level (2-tailed) of, 000 and a Pearson correlation of, 999**. Secondly, the correlation between the measured results of incorrectly source separated waste by the observers and the experimenters had a significance level (2-tailed) of, 000 and a Pearson correlation of, 999**.

Thirdly, when rating the measures in consideration to being either in agreement or disagreement by the trial-by-trial checklist, the experimenters and observers results were 100% in agreement, thereby being within the \pm 5 grams in deviation when comparing the results.

4.6 Integrity

The integrity checklist was used by four different people to rate over four days. Four out of 28 days were checked in concern to the studies integrity. Meaning that other raters checked 14,3 % of the days. The results of the integrity checklist indicated that 100 % of the different observers observed that the experimenters had sorted and validly separated the waste.

Further, the results showed that 100 % of the observers observed that the experimenters had weighed and source validly separated the waste. Lastly, the results indicated that 100 % of the observers observed that the experimenters had written the actual, weighed results on the data collection sheet. All in all, the results from the integrity checklist proved a 100 % agreement by the raters as to how valid the experimenters measured and conducted the study.

5. Discussion

Four conditions evaluated source separation: baseline, nudging by general visual prompt signs, nudging by framing social norms signs, and the effect of time on general visual prompt signs and social norm signs. The study was conducted in the basement of BI Norwegian Business School in Nydalen, Oslo. The following discussion will comment on the results and discuss the possible effects of nudging

and whether the time influenced the effect of nudging. Theories mentioned above and possible compliance with previous research will be discussed. Also, deviations, extreme values, strengths, limitations and future suggestions will be presented.

5.1 Results

5.1.1 Statistical significance

The experimenters used a one-way ANOVA variance analysis to determine whether there were any statistically significant differences between the conditions and the different types of waste in the study. Meaning whether the interventions put in place had any effect on source separation. The findings indicated that the significance values for both *food* waste and *plastic* waste in the Gastro location were below 0,05 and that they, therefore, were statistically significant differences between the correct source separated waste by waste types and the different nudging conditions: from baseline to the last condition. In the Starbucks location *food* waste was the only type of waste that was statistically significant, and in the Amigo location *trash* waste was the only type of waste that was statistically significant. In total when only considering the types of waste, the findings indicated that *food* (p =, 001) and *plastic* (p =, 021) waste was statistically significant in total overall, trash waste, on the other hand, was not (p =, 150)(Table 2). This means that although the study showed significant values and increased in most of its results, the nudging did not seem to have the best effect on source separating *trash* waste. Since the p-value was lower than, 05 for both the *food* and *plastic* waste in total, there was less than 5 % probability of random chance being the cause of the effects in this study.

5.1.2 Nudging by general visual prompts

The data indicated that nudging by general visual prompts increased the amount of source separated waste in kilos in most locations and most types of waste. The only location and waste type that did not increase in the average percentage of correctly source separated waste was at Starbucks *trash*. However, not all increases were as noteworthy. From the means plot of *food* waste(Figure 7), the correct amount of source separated *food* waste increased from approximately 53 % in *baseline* to 62 % in the *visual prompt* condition. In the means plot graph for *trash* waste(Figure 8) the amount increased from 48,50 % to 55 %, while the means plot graph for *plastic* waste(Figure 9) showed an increase from approximately 52,50 % in the *baseline* condition to 58,75 % in *visual prompt* condition. Overall, this indicated an increase from 154 % in the *baseline* condition to 168 % in the *visual prompt* condition according to the means plot for *total* waste (Figure 10). The data indicated a total increase for all waste types of 14 % from *baseline* to the *visual prompt* condition.

From the comparison of significance levels between conditions table, the p-values indicated that Amigo *trash* and Amigo *total* waste was the only statistically significant results. The data indicated that the means from *baseline*, when compared to the means from the first intervention, was different to such a degree that one location and mainly one type of waste in that location was statistically significant. This means that the results only indicated to a small degree that there was some statistically significant effect as a result of the first intervention, nudging by *general visual prompts*, and only in one location (Table 3). Overall, the data conducted indicated that:

Hypothesis 1: Nudging by general visual prompts will increase the amount of source separated waste in kilos

was uncertain in its statement since it was only statistically significant in one out of three locations. The results did, however, show an effect in terms of an increased amount of correctly source separated waste, although not to a significant extent at all locations and with all types of waste.

These findings are somewhat similar to the ones found by Miller et al. (2016), and Reid et al.'s (1976) studies in that informal sign prompt did increase the rates of source separated waste, but that the results were not as strong as were hypothesised. Zandecki (2012) also found similar results, whereas informational prompts did increase the average amount of source separation. However, the initial effects got lost over time when informational signs were introduced

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separately, meaning without any other intervention in connection to it. On the other hand, Sussman & Gifford (2012) found a more significant effect from informational signs. People were eight times more likely to switch off the lights in washrooms with signs than in washrooms without informational signs, making the nudge quite effective in their encouragement towards energy conservation. In this way, Sussman & Gifford's (2012) study found more prominent and significant results than what was found in this study. The ideal composting increased significantly in Sussman, Greeno, Gifford & Scannell's (2013) study, from 12,5 % in the baseline condition to 20,5 % after having implemented pro-composting signs, further highlighting the importance of informational prompts to nudge pro-environmental behaviour.

The aim with the general visual prompt nudge was to increase the level of task-knowledge among students and others making use of the source separation stations at BI business school to increase correctly source separation behaviour. The intervention was based on Thøgersen (1994) theory stating that even though a person has the intention to source separation, he or she may not know how, or may even have incorrect knowledge about how to source separate correctly. Further, Vining and Ebreo (1990) argued that the greatest difference between those who source separate and those who do not is their knowledge of the collected materials. Further, The general prompt nudge was built on Kahneman's (2011) theory of system 1 and system 2 thinking. Whereas the nudge was designed to make source separation easy by using pictures to show how to source separate different items, so that only the activation of a person's system 1 was necessary to source separate correctly.

As we created the general visual prompts both to increase task-knowledge, and further to target people's system 1 to make it cognitively easy to source separate correctly. We were therefore somewhat surprised to see the varying results. Although previous studies had highlighted the possible positive effects of nudging by informational prompts, this study found similar results in effect, but not to a significant level between conditions. Meaning that there might have been an issue in having over-ambitious hypotheses, and thereby expect a greater result

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without considering such limitations as time, the number of observations and the strength of previously learned behaviour.

5.1.3 Nudging by framing social norms

As previously noted, there was an increase in correctly source separated waste from baseline to the first nudging condition. For the next hypothesis to be strengthened the social norm condition, therefore, had to increase the amount of waste source separated correctly further from the visual prompt condition, meaning that the number of per cent source separated waste had to increase even further. The means table(Table 1) indicated that all values except that of Amigo food and Gastro trash increased incorrectly source separated waste from the visual prompt condition to the social norms condition. Also, according to the means plot of food waste, the amount of correctly source separated food waste increased from approximately 62 % in the visual prompt condition to 68 % in the social norms condition(Figure 7). Further, in the means plot for trash waste, the graph indicated a decrease from 55 % in the visual prompt condition to 53,75 % in the social norms condition(Figure 8). Furthermore, the means plot graph of the *plastic* waste indicated an increase from approximately 58,75 % in the visual prompt condition to 64,75 % in the *social norms* condition(Figure 9). Lastly, the means plot of *total* waste indicated an increase from 168 % in the visual prompt condition to 190 % in the social norms condition, meaning that the total increase of correctly source separated waste was 22 % from the visual prompt condition to the social norms condition(Figure 10).

When it came to the comparison of significance levels between the conditions table, the second interventions results indicated that: 1) when the means from baseline were compared to the means from the second intervention, Gastro *food*, Gastro *plastic*, Gastro *total*, Starbucks *food*, Starbucks *total*, Amigo *trash*, Amigo *plastic* and Amigo *total*, all were statistically significant. However, 2) when the means from the first intervention was compared to the means from the second intervention, Gastro *food*, Gastro *food*, Gastro *total* and Starbucks *total* was the only statistically significant results, indicating that the second intervention,

nudging by *social norms*, only indicated an effect to some extent. Thereby results indicated that:

Hypothesis 2: Nudging by general visual prompts and nudging through social norms, will increase the amount of source separated waste in kilos more than nudging by general visual prompts alone,

was slightly strengthened in its statement. However, it is important to note that the increase and effect were most reliable when it came to *food* waste, *plastic* waste and *total* waste, while *trash* waste, on the other hand, had a decrease in this intervention.

These results are coherent with what Stoknes (2015) has stated in concern to positive strategies. By using supportive statements and by creating both a connection to the output of trash, for example transforming food waste into biogas, people feel closer to the cause and may thereby be affected to change their behaviour, because they are motivated to do so. Also, the establishment of one united BI, all working together to reach a common goal may also have helped to strengthen the hypothesis. Heathcote et al. (2010) had somewhat similar results in that they also found that the one major barrier standing in the way of increasing waste diversion rates was the lack of knowledge that people had in concern to proper source separation methods. Meaning that although our results were not clear in confirming that the intervention affected source separating behaviour, the intervention did indicate the importance of information processing and that students and others may need more information, perhaps in the beginning of each semester, to understand the correct way to source separate at BI. People are social beings and will be affected by external factors like social norms. Primarily, food waste and plastic waste had an increase in correctly source separated waste after the social norms intervention was put in place. Not only did the amount of correctly source separated waste increase by food and plastic waste, but it also increased in total waste. Meaning that, although the p-value levels were not under ,05 in all locations, some locations were statistically significant. Also, if the number of observations had been larger per condition, it may have affected the results either positively or negatively, either way, it might have helped to create a clearer picture. Huber, Viscusi, & Bell (2017) found that if a person were upset

about their neighbour's incorrect source separation behaviour, it would reliably predict a person's typical pattern of behaviour for the participation in source separation, and the other way around. Also, they found that societal and personal descriptive norms can promote source separation, for example through using a societal descriptive norm of source separation to influence personal descriptive norms so that people at home also source separate correctly. These findings are similar to the ones found in this study, especially in concern to the way the social norms was framed. The social norms were descriptive and positive, aiming to reach a wide audience without having an injunctive statement of force, which may be what makes descriptive norms statements more powerful than injunctive ones. In this way, nudging by framing social norms can help to encourage people to change into having more pro-environmental behaviour and thereby help them to source separate correctly.

5.1.4 The effect of time on nudging

The previous results from the study indicated that there was a significant increase from *baseline* to the *visual prompt* condition and from the *visual prompt* condition to the *social norms* condition. For the third hypothesis to be strengthened, the measures have to increase even further. According to the means table(Table 1), most locations and types of waste increased slightly. However, Starbucks *food, trash* and *plastic* as well as Amigo *plastic* waste decreased in the *time* condition. Further, the means plot for *food* waste indicated an increase from 68 % in the social norms condition to 71 % correctly source separated *food* waste in the *time* condition(Figure 7). The means plot for *trash* waste, however, indicated a slight increase from 53,50 % in the *social norms* condition to approximately 54,50 % in the *time* condition(Figure 8).

Furthermore, the means graph portraying the *plastic* waste results indicated a decrease from 64,75 % in the *social norms* condition to approximately 59 % in the *time* condition(Figure 9). Lastly, in the *total* waste means plot, the results indicated a continued and stable value from 190 % in the *social norms* condition to 190 % in the *time* condition(Figure 10). This means that although the

results indicated a positive increase for *food* waste and *trash* waste in the *time* condition, the decrease in correctly source separated *plastic* waste from the *social norms* condition to the *time* condition was significant enough to render the total waste of food as only being stable in total.

The table consisting of the comparison of significance levels between conditions indicated that there were statistically significant differences between *baseline* and the third intervention, the effect of *time* on nudging, as well as between the second intervention and the third intervention. Firstly, the results indicated significance between *baseline* and the third intervention in that Gastro *food*, Gastro *plastic*, Gastro *total*, Amigo *trash* and Amigo *total*, all had statistically significant results between groups. Secondly, the results showed that the significance levels between the second intervention, *social norms*, and the third intervention indicated that none of the locations was statistically significant. Thereby:

Hypothesis 3: The element of time will strengthen the effect of nudging by general visual prompts and nudging through social norms, and thereby increase the amount of source separated waste in kilos more than without the additional time,

was uncertain in its statement as there were no statistically significant difference from the second to the third intervention. Also, the total waste graph indicated that it was no change but rather a stable line from the second to the third intervention. Lastly, it was a lack of observation since there were only four days of data collection in this intervention.

These results were in some ways, both similar and different from what could be expected based on Thögersens (1994) research. The hypothesis was based upon Thögersens research in concern to the logic of how time is needed to change habits. Some examples indicate the possibility of time being a responsible factor for people's differences in behaviour and habits in concern to source separation (Thøgersen, 1994). If people can perform the source separation behaviour by having the task-knowledge, and further have the time needed to adapt to new habits, the amount of correctly source separated waste should GRA 19703

increase. Time should, therefore, be an important factor not only to change habits but to create habits that provide an almost automatic decision.

However, when considering the number of observations this study entailed, time may not have had the intentional effect because the study had a time limit that resulted in less data than what would have been preferable. If the study had a larger amount of observations making it similar to a longer study of a bigger scale, the results might have been different. Logically, for the factor 'time' to be properly researched, it probably needs more observations to be able to draw significant conclusions on whether the factor affects nudging or other variables. Also, there is a question of whether the results conducted during the four days were low or high in comparison to the days before and after the data was collected. The authors may have been lucky or unlucky in their findings as a result of there being only four days of observations.

Studies by Van Gestel, Kroese & De Ridder (2017) and Venema, Kroese & De Ridder (2018) found that nudging gave positive effects over a longer period, and further that the target behaviour increased four times compared to the baseline condition two months after the nudge was implemented. However, the latter study also found that the effect of the nudge decreased somewhat over time, thereby indicating that although nudging may have long-term effects, the effects may decrease somewhat from the first initial reactions of the implementation. The initial reactions may be higher as people may react to something new having been put in place, such as signs. Later on, the effect may, therefore, decrease to some degree as a result of people getting used to the signs, or other means. However, as formerly stated, long-term effects may still be possible as a result of nudging, or at least stable, as shown in this study. The number of observations in the last intervention made the conclusions difficult to draw in that few observations may not give a clear picture of what the results might have depicted after the study ended.

It was difficult to know whether the stable results in total waste from the social norms condition to the time condition indicated that the time condition did not affect the nudging. Little or no research has looked into whether the effects of nudging increases with time. We based our third hypothesis on literature claiming

that unlearning of habits takes time and that the condition of time, therefore, would give students, teachers, and others who make use of the source separation station at BI a better chance to be accessible to create new habits. Therefore, various results from our research, and no previous research to build on, the results from this research alone is not enough to conclude whether the time condition will have a positive or negative impact on nudging.

5.2 The complexity of the hypotheses

As the hypotheses in this study were quite complex in its design, and thereby in high demand of a linear relationship between all conditions, they thereby proved to need a large effect to state whether the hypotheses were strengthened. Since the effect was intended to increase significantly with each nudging intervention, this study's hypotheses did not result in significant values between the interventions. However, the authors would like to highlight the significant values between baseline and each intervention, as well as the increased per cent of correctly source separated waste in kilos, which were also highly visible on the graphs. Together these results create a picture of the nudges affecting. This means that although not all effects were significant between interventions, in addition to the positive effect the interventions had on the source separation behaviour at BI.

5.3 Different Locations - different results

The results collected in this study proved very interesting in that there was found different results in different locations and by type of waste, both pictured in the graph(Figure 4, 5 and 6) and by the significance levels between locations(Table 3).

Differences were observed in the *baseline* results from different locations. This continued throughout all of the different interventions which made the authors question why they were different and why they varied to such a degree. Firstly, Gastro cafeteria started as having the lowest amount of correctly source GRA 19703

separated waste overall. However, after implementing the second intervention, Gastro increased the amount of correctly source separated *food* and *plastic* waste to a level similar to the other two locations for the rest of the conditions. Secondly, Amigo kiosk started as having the best overall results as compared to the other locations at *baseline*. In the *food* category, Amigo lessened the effect size, but in the *plastic* and *trash* category, the increase was large enough to become the best location with the highest amount of correctly source separated plastic and trash waste in the second and third interventions. Thirdly, Starbucks started as the best location to source separate *trash* waste correctly, but when it came to *food* and *plastic* waste, the location was second best in the *baseline* condition. However, as the different interventions were implemented, Starbucks was one of the best if not the best throughout all three interventions in the food category. When it came to trash waste; however, Starbucks was second best by conditions and lessened the increase to revert to baseline scores in the time condition. In the *plastic* waste category, Starbucks had one of the best inclines in the first and second condition, but it decreased when ending in the time intervention. By this comparison, the authors were able to see that food waste had the overall best effect in that all three locations had a somewhat stable increase through all interventions. What was very interesting in the *plastic* waste category, however, was that Gastro location went from being the worst to having similar final values as the other locations. The authors argue that the changes at Gastro may have been slow due to the number of people, the stressful environment and the possibility of people taking less time to disperse of their sources, as being a possible answer to the differences in results per location. While Gastro was the main cafeteria with the most traffic and much more waste in total, Amigo and Starbucks had less traffic and had a calmer atmosphere. Also, there was a question of whether there was a problem with imitation behaviour and group dynamics. For example, the authors often observed that several of the same items such as the same kebabs in the same wrappers had been thrown incorrectly one after another into the same bin. The behaviour could be explained by descriptive norms theory in that it may be easier for people to choose where to throw their waste when someone else in the group already has made a choice, thereby choosing by doing

the same act the least cognitively demanding (Cialdini et al., 1990). The aforementioned is also supported by Denrell (2008), who argued that observing how your friend's act can also influence how you estimate the value of the activity. Further, the larger the group performing the activity is, the more other individuals will recognise the value of the behaviour.

The significance levels between the different locations depicted similar and different results between locations and types of waste. When comparing the different levels of significance between baseline and the first intervention, the first and second intervention as well as between the second and third intervention, some interesting findings emerge. Firstly, Gastro Cafeteria started out as having insignificant results (p = .726) in the *food* category after implementing the informational prompts, however significant results were found between the first and second intervention, social nudges(p =, 026) and ending with an insignificant result(p = 568) between the second intervention and the third one, how time effects nudging. In comparison, neither Starbucks coffee shop or Amigo kiosk had any significant results in the same compared conditions when it came to food waste. In the trash category, Amigo started with significant results when comparing *baseline* to the first condition (p =, 008), however when comparing the first and second intervention (p =, 891) and the second and third (p =, 884) neither had significant results. To make a comparison, Starbucks and Gastro had insignificant results throughout all previously stated comparisons. Lastly, when it came to *plastic* waste, none of the locations had any significant results in the aforementioned comparisons. However, in the comparison between baseline and the second intervention Gastro and Amigo both had significant results, in addition to Gastro also having significant results between baseline and the third intervention. The reason why the latter comparisons have not been highlighted previously in the discussion is that the hypotheses rely on a linear increase from baseline to the third intervention. The significance levels indicated that although Gastro might not have been the location with the best results from the start, the location still had the most significant increase in correctly source separated waste as a result of the nudging interventions. By comparison, Amigo and Starbucks had less significant results by having a greater amount of correctly source separated

waste from the start in the baseline condition. This means that although the different locations started differently and all had different times of peaks and lows, they all ended up increasing their amount of source separated waste in total, which will help BI to reach the goal of having 65 % correct source separated waste overall.

5.4 Deviations and extreme values

When it came to the weight of different types of waste, there were some deviations. Some types of waste weighed more than others. For example, plastic weighed very little, while food waste weighed a lot. This means that when there was a lot of plastic incorrectly recycled, for example, that it was found in the food waste bin, it did not necessarily reflect in the weighted results. This was also found at Starbucks, where the paper waste was soaked in coffee, thereby making it even more heavy than usual, and therefore it affected the results even more, especially when it was thrown incorrectly in the clean plastic waste bin. Also, the results could be highly affected by one item alone, for example, when someone threw a glass bottle in the plastic bin.

Extreme values was another issue in this study since there were some occasions where the business school either had projects or seminars where multiple people followed each other and threw away food in the same bin. Research done by Cialdini et al. (1990) can explain the behaviour mentioned above. Their research claimed that observing other people provides suggestions about the relative utility of behaviours in new settings and creates an opportunity to copy this behaviour. Also, there were times where one person had thrown a stack of newspapers in the wrong bin or where a student had thrown many pizza boxes in the wrong bin.

5.5 Strengths

Validation

This study was socially valid in that there was a current problem with the source separation at BI. Students, faculty and others did not seem to understand

where the different types of waste should be thrown. Although the bins where quite explicit in their visual presentation. The studies intention was always to strengthen the source separation at BI to help solve their problems and in this concern to help BI to reach their recycling goals.

Reliability and integrity

The reliability of this study was strong. The experimenters decided early on that they wanted to use both interobserver reliability and an integrity checklist to confirm the reliability of the study. The integrity checklist proved that the observers were 100 % in agreement with how valid the experimenters conducted their study. Also, the interobserver reliability indicated that the correlation between the measured results of correctly source separated waste by observers and experimenters had a significance level of, 000. Also, the correlation between the measured results of incorrectly source separated waste by the observers and the experimenters had a significance level of, 000, which means that the results of the agreement were statistically significant. When rating the measures in consideration to it being either in agreement or in disagreement trail-by-trial, the experimenters wanted the observers to weigh the waste themselves in addition to making sure that the experimenters conducted the study validly and reliably. The observer's results were 100% in agreement, 100 % IOA, thereby being within the ± 5 grams in deviation from the experimenter's results.

Generalisation

Another strength in our study is the possibility of our results being generalised, meaning that the results can be applied to other schools, universities and businesses. Although the results from the last intervention were not significant in increasing source separation behaviour, the general visual prompts and social norms did affect source separation behaviour to some extent. Even though some of the results were not significant between conditions, there were some significant results when comparing baseline with the different interventions and a clear effect, although the effect size was not as large as the hypotheses had demanded. The general visual prompts and the social norms can be generalised to contexts and places similar to the ones in this study. However, the findings for hypothesis three: whether time effects nudging, is only stable and therefore, it is uncertain whether this type of intervention can be generalised. A positive aspect of this study is that it is cost-effective to implement, and the transparency makes it easy to replicate.

5.6 Limitations

Insufficient time

Because of limited time for data collection, the experimenters had to go for a research design that made it possible to test the three hypotheses. Ideally, we would have picked a design where we could first measure baseline, secondly set up the first intervention of visual prompts, further remove the visual prompts and measure baseline again, before moving on with the second intervention of social norms. In this way, we would have been able to know whether the increases in source separated waste in the second hypotheses was from adding the social norms nudge, or whether the increase came from the former, visual prompt nudge. However, the main reason we had for not doing it in this way was because of the nature of the problem and social validity. The problem was how to increase source separation by increasing the information people at BI had in concern to this. Therefore, it was somewhat unethical and backwards to reverse the process back to baseline, when this was not the nature of learning. What has been learned cannot be forgotten simply by removing the nudge. Also, the point of the study was to increase the amount of correctly source separated waste at BI, not reduce it.

The weight scale

The weight scale or luggage scale had some limitations in that it was unable to give accurate results when measuring very little weight, such as a few plastic items that weighed between 0,01 kg to 0,05 kg. The scale was, in fact, unable to weigh accurately beneath the weight of 0,05 kg since it never indicated any results under this weight and the results around 0,05 kg to 0,07 kg most of the time was inconsistent when rechecking the result.

The tv-screens

From the last day of the first intervention, the tv-screens had shut off because of technical issues. The screens were out of order for five days, meaning that this could have potentially affected the results from day 17 until day 20 of our data collection.

Signs missing

There was a problem with missing signs throughout the study. For example, at the weekend between day 16 and 17 of our data collection, three signs went missing. Luckily, these limitations were spotted quickly and replaced with new signs within a short period. Sometimes it was necessary to put up temporary signs that were laminated before the proper signs were bought and replaced. The signs were always immediately replaced with little or no delay because the experimenters always checked whether or not all of the signs were placed as they were intended to every time they attended the business school, which included both the time of data collection and other days in between.

Design

The multiple component research design used in this study was appropriate considering its practicality and the limited time the experimenters had in accomplishing the study within a set time, while the process for handling the waste at BI was undergoing a process of change. However, multiple component designs have its drawbacks in that it may be difficult to conclude as to what condition had the most impact since the first condition lasted for eight days or two weeks before the next condition was implemented in another eight days or two weeks. Therefore, it may be difficult to conclude as to what condition that was the most effective and whether or not the second intervention may have had better effects on its own. Given the amount of time each condition was implemented and that the second condition was implemented while the first one was ongoing, the separate possible effects may have been missed.

5.7 Conclusion

The results from our research on nudging av source separation behaviour indicated that there was a statistically significant difference in correctly source separated waste between baseline and each of the three interventions. However, as our hypotheses demanded that there should be a significant increase between all interventions as well, the results from the significance levels between each condition indicated that when the effect sizes were compared between the different interventions, the results indicated that there was only some locations and some types of waste that were significant. Even though this study can report that the nudges did have an impact and that they did have an effect, the effect was not found to be statistically significant in concern to the hypotheses linear demands. More research is needed concerning the effect time has on nudging. Further, we suggest a study that covers a longer period to collect more data as this will result in stronger indications of whether nudging is an effective tool to increase source separation behaviour.

5.8 Future suggestions to BI

Hierarchical agreement

One of the most important suggestions we have to BI Norwegian Business School is that there is a need for hierarchical agreement. What is meant by this is that people working towards the same goal in the same organisation needs to be on the same page at all levels and stages. Throughout this study, a challenge emerged as a result of there being different opinions and understandings in consideration of what type of waste was supposed to go in what bin. When asking people from different departments about where the different types of waste were supposed to be thrown, very different answers were received. It seemed as if different messages had been given to different people and that some might not have been given the updated messages from management. In this way, old and new information can turn into an open discussion where people end up drawing their conclusions as a cause of confusion and uncertainty. This can make it difficult for people to be on the same page and for the organisation to reach its goals as effectively as possible. It may also cause unnecessary confusion, which we experienced. Therefore, we suggest that BI Norwegian Business School make it a habit of sending information through all the appropriate channels such as email, newsletters, tv-screens etc., so that every time something changes, everyone at every level knows what will happen and when. In this way, everyone in the organisation can be on the same page and have the same updated and correct information.

To be specific in terms of taking action, we present the following solutions. At the start of each semester, all students and employees should receive a newsletter including information about how to source separation is important for BI as a goal and that the culture at BI clearly states that we all use some time to source separate correctly. An initiative such as this one will help BI to create a culture as well as make it clear to everyone at BI that correct source separation is expected of everyone, which will help to create a clear message and clear all doubt and misunderstandings that may still be present. The message should also be reinforced by talking about it during the tours of campus as well as showing our previously used informational slides on tv-screens or make new ones. *Social norms*

As written previously, the action of a society working together towards a common goal is more powerful than individuals working separately (Stoknes, 2015). Based on this, we believe that BI Norwegian Business School would benefit from initiating actions to create a stronger feeling of togetherness around reaching the goal of achieving a material recycling rate of 65% within 2022. When new students, especially, starts their degree at BI, they must be informed early on in the process about BI's environmental profile and what is expected of them as students. This is crucial as the business school is highly dependent on students and employees to be onboard to reach their goal of increasing the material recycling rate.

BI should make use of the information nudge and social norms nudge we created and sent on the TV- screens at BI. We believe that this is a valuable tool to reach out to new students at the beginning of each semester.
Bins

The food waste bins should be changed by taking the top off the bin so that people more easily can shove their food waste into the bin. What is important when making this change is that the bin needs to be different from the pizza bin, which is already placed at the left side in the Gastro cafeteria location. This can be done by making sure that the food waste bins stay as tall as the rest of the majority of the bins and thereby do not resemble the height of the pizza bin. Besides, the pizza bin should be made broader and change its brown edge since brown is the colour of the edge at the food waste bins. In this way, it will be easier to spot the differences between the bins and also make it easier to fit larger pizza boxes in the pizza bin. This will hopefully also resolve the problem of pizza being thrown with the pizza boxes in the bin for pizza boxes only.

Although the rest of the bins are spot on when considering bin proximity, availability and look, the signs prompting general information and social norms through framing should still be implemented until a new change process makes them unusable. What is very important is that BI needs to make sure that all of their previously used material, meaning old information that no longer is correct, have to be thrown away. If students, staff or others see any old information or hear from someone about this concern, it may confuse to emerge at BI again.

We believe that if BI follow these simple and applicable suggestions, it will help the school towards reaching their goal to achieve a material recycling rate of 65% within 2022.

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7. Appendices

7.1 Appendix A

Data collection sheet

Date: _____

Condition: _____

Experimenter/observer: _____

Location	Type of waste	Correctly source separated waste in weight	Incorrectly source separated waste in weight
Gastro	Food		
Gastro	Trash		
Gastro Cafeteria	Plastic		
Amigo kiosk	Food waste		
Amigo kiosk	Trash		
Amigo kiosk	Plastic		
Starbucks coffee shop	Food waste		
Starbucks coffee shop	Trash		
Starbucks coffee shop	Plastic		

7.2 Appendix B

	Inter Observer Agreen	nent Sheet
Date:		
Experimenter 1:		
Experimenter 2:		
Observer 1:		_
Observer 2:		_

Directions:

Observer 1 and 2:

- 1. Write down the results of correctly and incorrectly source separated waste in weight that the experimenters measure in the suited columns
- 2. Write down the results of correctly and incorrectly source separated waste in weight that you (the observer(s)) measure in the suited columns

Location	Type of waste	Experimenters: correct	Experimenters: incorrect	Observer(s): correct	Observer(s): incorrect

7.3 Appendix C

Integrity checklist sheet

Date:
Condition:
Observer:
Experimenter:

Step wer: X or 0 Ans

The observer(s) have observed that the experimenters have sorted and separated the waste in a valid way.

The observer(s) have observed that the experimenters have weighed the source separated waste in a valid way.

The observer(s) have observed that the experimenters have written the actual weighed results on the data collection sheet.

Answer of agreement with the statement = XAnswer of disagreement with the statement = 0

Number of steps performed validly by the experimenters, according to the observer(s): ______, % of steps completed in a valid way.

7.4 Appendix D

General visual prompt sign

Food waste



7.5 Appendix E

General visual prompt sign

Trash waste



7.6 Appendix F

General visual prompt sign

Plastic waste



7.7 Appendix G

Nudging by general visual prompt signs

Different ways to source separate: showed on TV-screens.

Waste



7.8 Appendix H

Food waste and trash waste



7.9 Appendix I

Food waste and clean plastic



8.0 Appendix J

Food waste and clean plastic



8.1 Appendix K

Waste trash and clean plastic waste



8.2 Appendix L

Biowaste sign

Framing by social norms sign

Separate your food waste from the container. OTHER PEOPLE AT BI DO!



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Remember to separate your food waste from the container and throw it in the bin marked food waste. Food waste from these bins is converted into biogas.

8.3 Appendix M

Framing by social norms sign

Globe sign



8.4 Appendix N

Photo of Starbucks coffee shop bins



The three signs on the left side are the general visual prompt signs and the one on the far right side is the social norms sign.

8.5 Appendix O



Photo of Amigo kiosk bins

The signs in the upper photo: the two on the left side and the one on the far right is the signs of general visual prompts, while the second one from the right side is the social norms sign. The signs in the bottom photo: the three on the right side is the signs for general visual prompts. The sign sticking to the post is the social norms sign.

8.6 Appendix P



Photo of Gastro cafeteria bins



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The upper photo: the signs standing up is the signs for general visual prompts, while the ones stuck on to the post and the wall behind the bins are social norms signs.

The photo in the middle: the signs standing up is the signs for general visual prompts, while the one sticking to the post and the one on the wall next to the bins on the right side are social norms signs.

The bottom photo: both of the signs are social norms signs stuck to the wall over the microwaves.