Copenhagen Business School

Nudging to foster sustainable innovation within organizations: An exploratory theoretical/empirical study

Master Thesis

MSc in Finance & Strategic Management

MSocSc in Organizational Innovation and Entrepreneurship

Date of submission:

15 June 2020

Supervisor:

Lucia Reisch

Numbers of characters (including spaces): 194 965

Number of pages: 95

Students:

Sandro Daniele (124608)

Frida Lindqvist (125283)

Abstract

Organizations face a rapidly changing environment demanding innovation during a climate crisis, accompanied with related policy changes and an ongoing transition towards an economy where sustainability is imperative. Thus, organizations need to be able to innovate taking social, economic and environmental sustainability into account, and to make use of opportunities associated with this transition. Cognitive and behavioral factors can both inhibit organizations from making this shift and facilitate it. Behavioral interventions such as nudging could be a relevant tool, but the literature on nudging within an organizational context is scarce, especially in regard to fostering sustainability, innovation and sustainable innovation. The objective of this thesis is to develop insights on how organizations could use nudging to foster sustainable innovation and provide a basis for further research and practical experimentation by organizations. The main research question "*How can organizations use nudging to foster sustainable innovation?"* is divided into two sub-research questions: 1. *What cognitive and behavioral biases are the main obstacles to sustainable innovation in organizations? 2. What nudges can be used to address these biases in an organization?*. Our research is based on a critical realist philosophy and we adopt an exploratory theoretical/empirical literature-based research strategy with an abductive approach.. We conduct a multi-method qualitative study, including expert interviews, literature research and a qualitative questionnaire. The primary and secondary data is interpreted through a theoretical lens – through biases identified in literature as obstacles to sustainable innovation (sub-research question 1) and through nudge taxonomies (sub-research question 2). The primary data for both sub-research questions are separately subjected to a thematic analysis with a predominantly inductive approach. Primary and secondary data comparison is also part of the analysis, to highlight similarities and differences. Ultimately, we develop a hypothetical conceptual model where we visually map biases inhibiting sustainable innovation and appropriate nudges for addressing these. To answer the *"how"* of our main research question, we suggest an approach for organizations, emphasizing the need to understand the problem before implementing any nudge as a one-size-fits-all solution. In conclusion, this approach together with the hypothetical conceptual model provide a theoretically and empirically informed contribution to the aforementioned research gap. It creates a basis for further research and practical experimentation by organizations aiming to foster innovation that is sustainable for people, planet and profit.

Acknowledgments

We want to thank our supervisor Lucia Reisch for her guidance and for supporting us in our application for the submission deadline extension which enabled us to complete our thesis in a satisfactory manner.

Furthermore, we would like to express our deepest appreciation to our interviewees Raphaël Smals, Simon Locke, Linda Lindberg, Tommy Lindström, Samuel Salzer and Natalia Gómez Sicard for their valuable contribution to this thesis. Considering the global pandemic, we are especially grateful that they took the time to participate in this study.

In our process, we reached out to behavioral consultancies and got a response from Scott Young from BVA Group who kindly provided us with Singler's (2018) book *Nudge management* which was an important contribution to our literature research. Furthermore, he connected us to his colleague Anne Charon who we would also like to thank for providing us with relevant literature.

Finally, we want to extend our gratitude to our friends and family who have supported us in various ways during our master thesis process. In particular, we want to thank Jessica Johansson for being so generous with her experience in qualitative research by reading and commenting on our work.

Table of contents

1 Introduction

1.1 Background and problem introduction

The present-day business climate is characterized by a rapidly changing environment, in which organizations need to innovate in order to survive. In addition, supposedly irrelevant factors, named SIFs by Richard Thaler in his book “Misbehaving” (2015), have contributed to distort people’s perception of the planet over time. In the corporate environment, profit has long ruled above all and we are now facing a climate crisis with planetary resources running out. With this situation, we are not only risking natural disasters destroying homes and lives, extinction of species and the future of coming generations and now even our own. In addition, the climate crisis poses a threat in terms of geopolitical issues since the scarcity of resources increase the competition for their use. The many negative consequences of the climate crisis have resulted in a growing number of policies and higher demands for sustainable business practices from customers and employees. These types of measures and market demand development will increasingly affect organizations. Thus, organizations need to ensure that they innovate while taking sustainability into account, in terms of people, profit and planet. Not only necessities, both sustainability and innovation harbors valuable business opportunities. The market opportunities linked to the UN Sustainable Development Goals are estimated to be at least $12 trillion a year by 2030 (Better Business, Better World report, 2017). There are already many examples of how businesses are transforming their processes to attempt at capturing the value associated with this ongoing development. Fashion brands such as Patagonia, who has produced recycled polyester from plastic soda bottles since 1993, are now seeing an increasing number of industry followers. For example, the fashion company Diesel recently launched their “For Responsible Living” strategy, including the improvement of reuse and recycling rates across their operations and reducing their water footprint. A growing number of businesses are developing circular business practices, challenging the linear economy paradigm of take-make-dispose. Many companies struggle to innovate, although they know that it is imperative to their survival. Similarly, it is not news to businesses that there are effects of climate change to which they need to adapt and that there is financial value to be captured within sustainability or with innovating to develop sustainable solutions in the forms of processes, products or services. So,

why do organizations struggle with this when they know it is in their best interest? There are several challenges to the transition into a sustainable economy and changing people's behavior is one of them. One issue with human behavior is that we as people are biased by nature, which influences our cognition, our behavior and our decision-making. Since organizations are entities made up of people, any biases held by people within it will impact the organization. Organizations need to address behavior challenges in order to survive and thrive in the near and long-term future. In order to foster sustainable innovation, organizations need to address any cognitive and behavioral biases inhibiting this development.

1.2 Topic

Our topic for this thesis is nudging for sustainable innovation in organizations. On a more detailed level, we will investigate how nudging can be used to address cognitive and behavioral biases that hinder sustainable innovation. Our use of the term "*sustainable innovation*" refers to the process where sustainability considerations, in terms of people, profit and planet, are systematically integrated into the process of creating and implementing new ideas, methods, products or services related to a company's core business (Boons et al., 2013; Charter et al., 2008; Charter and Clark, 2007). In short, sustainable innovation is innovation where sustainability is integrated into the innovation process. Even though sustainable innovation can be pursued through several different paths, given the increasing value that behavioral insights are receiving within organizations (Christensen, 2019), we strongly believe this approach has great potential. Incorporating behavioral insights, specifically nudges, has opened the doors for organizations to a new management style: Nudge Management (Ebert & Freibichler, 2017). This new management style fully embraces nudging, by leveraging some defining characteristics of nudges, i.e. the fact that they are not intrusive as they do not force employees into making extensive changes to their working habits, and that they are easily scalable (Ebert & Freibichler, 2017).

To explore how behavioral insights are to be used to foster sustainable innovation, we therefore firstly identified the cognitive and behavioral biases affecting innovation and sustainability separately, and then focused on the overlapping ones, which are those affecting both. In light of our adopted definition of sustainable innovation, we make the assumption that biases that

affect both sustainability and innovation affect sustainable innovation. Secondly, we then proceeded into investigating what nudges can be used to address those biases.

1.3 Research objective

To develop insights on how organizations could use nudging to foster sustainable innovation and provide a basis for further research and practical experimentation by organizations aiming to foster innovation that is sustainable for people, planet and profit.

1.4 Research question

The main research question that this thesis will attempt to answer is the following:

How can organizations use nudging to foster sustainable innovation?

In order to answer the main research question, we formed two sub-research questions which are listed below. We will elaborate on the development of these sub-research questions in the methodology chapter.

1. *What cognitive and behavioral biases are the main obstacles to sustainable innovation in organizations?*

2. *What nudges can be used to address these biases in an organization?*

2 Literature review

The goal of this section is to set the scene with relevant theories for our research, and to identify the research gap that we intend to fill. To begin with, we introduce the concept of sustainable innovation, followed by the innovation and sustainability theories instrumental as an appropriate theoretical background and starting point to answering our research question. Afterwards, behavioral economics is introduced, followed by an explanation of cognitive and behavioral biases. Finally, we explain nudge theory together with presenting research on nudge management, nudge management in relation to sustainable innovation, types of nudges and relevant nudge taxonomies used in this thesis.

2.1 The field of sustainable innovation

Over the past decade, the field of studying sustainable innovation has grown exponentially, which has improved our comprehension of the topic. Yet, the theoretical consensus on sustainable innovation is, according to many scholars, still missing in the literature (Adams et al., 2012; Boons and Lüdeke- Freund, 2013; Schiederig et al., 2012; Trifilova et al., 2013). A multitude of words have been used interchangeably with the term 'sustainable innovation'; eco-innovation, eco-friendly innovation, environmental innovation, environmentally sustainable innovation, green innovation, innovation driven by sustainability, innovation enhancing sustainability, innovation based on sustainability, and innovation geared towards sustainability (Adams et al., 2012; Arnold and Hockerts, 2011; Hansen et al., 2009). Sustainable innovation is discussed in relation to these terminologies, yet, it is argued that it goes beyond eco-innovation or green innovation because sustainable innovation integrates the social element (Boons et al., 2013; Schiederig et al., 2012). Specifically, Charter et al. (2007;2008) establish the following definition of sustainable innovation:

"Sustainable innovation is a process where sustainability considerations (environmental, social, and financial) are integrated into company systems from idea generation through to

research and development (R&D) and commercialization. This applies to products, services and technologies, as well as to new business and organizational models"
(Charter et al., 2008; Charter and Clark, 2007)

Clearly, sustainable innovation comprises much more than just mere attitude, as entailed in the quote. It comprises the embracing of sustainable practice throughout the organizational core strategy and operation.

Studies have focused primarily on the benefits that sustainable innovation can deliver, such as cost savings, new business opportunities, improved brand awareness and competitive advantages (Ketata, 2015; Nidumolu, 2009). However, sustainable innovation does not often result in immediate financial benefits, but its payoffs are usually realized in the long-term. Sustainable innovation is set to be more costly than the traditional kind of innovation, because it frequently requires investment in new technologies, beyond the current technical capabilities of an organization (Ketata, 2015). These factors combined, leave a lot of room for cognitive and behavioral biases to hinder sustainable innovation. These biases can be harmful both at an individual level (Kahneman, 2013), as well as within groups (Sunstein & Hastie,2015). For the purpose of this thesis, it is important to include and analyze biases in both cases.

2.2 Sustainability theory

In this thesis, the concept of sustainability addresses the role of organizations and their opportunities of sustainably conducting their core business processes. There is no one theory dominating the field, and there is a pluralism of terms applied in research and practice (Van Marrewijk, 2003). However, corporate sustainability, corporate social responsibility, corporate citizenship, triple bottom line, and business ethics are the most frequently cited and used terms found in the literature. According to Wempe and Kaptein (2002) corporate sustainability (CS) is the umbrella concept of the above-mentioned terms and corporate social responsibility (CSR) is a particular sub-element of it. In the next two paragraphs two of the most prominent and relevant (for our thesis) theories regarding sustainability will be outlined. Namely the triple bottom line theory and the shared value theory.

2.2.1 The Triple Bottom Line

People, planet and profit comprises the 3 Ps, and represent the three pillars of any sustainability project (Figure 1). Said Ps are often considered to be cornerstones of sustainability work. The triple bottom line is a well-established description of corporate sustainability in both academia and business practice, as it evaluates corporate sustainability considering people, profit and planet (Archel, 2008; Fauzi, 2010).

The Triple Bottom Line is illustrated by these pillars. Munashinge (1992) presented three factors in the triple bottom line - the pillars of a sustainability project: economic performance, environmental performance and social performance.

To properly grasp the triple bottom line concept, it follows a brief description of each one of those pillars.

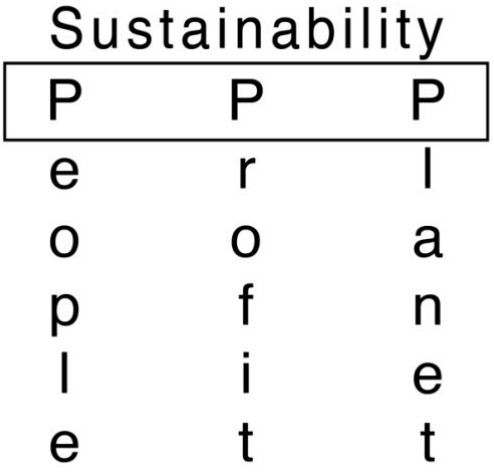


Figure 1 (Source: created by the authors)

2.2.1.1 Economic performance

Economic sustainability can be described as the optimization of the stream of revenue while maintaining the stock of assets generating minimum income, and ideally increasing the stock. This is related to ensuring effective and optimal use of scarce resources. Nonetheless, it is difficult to decide what assets to preserve (natural, manufactured and human capital) and how to assess these assets (especially environmental resources) in each specific case. Using a resource beyond irreversibility might lead to uncertainty and potential catastrophic eventualities (Munashinge, 1992).

2.2.1.2 Environmental performance

Biological protection is essential to the health of biological and physical systems at local and global levels. The primary issue is biological diversity but all elements of the ecosystem, such as man-made environments including cities, should be included in the understanding of which structures to preserve. There is no optimal fixed condition to hold the systems in; the goal is rather to maintain the system's flexibility and dynamic potential to adjust. Ensuring therefore that the two systems coexist without compromising each other.

2.2.1.3 Social performance

Social performance entails that organizations need to conduct their operations in a socially responsible manner. In a global context, sustainability aims at maintaining the stability of social and cultural structures. Stability can be accomplished by ensuring equality, both within generations (e.g. poverty eradication) and between generations (including future generations' rights). To maintain this stability, it is important to learn about the sustainable practices of less dominant cultures and support cultural diversity in the world. The general principle of sustainability applied to the business environment is implied when considering corporate sustainability, corporate social responsibility or the triple bottom line are somewhat more concrete concepts that can be applied to an organization in a realistic way.

In order to explain the corporate sustainability at a more comprehensive level and understand the potential implication of cognitive and behavioral biases, an understanding of it with the aid of the different dimensions is needed. The three most frequently listed dimensions are social, environmental and economic - dimensions, which are defined together as the triple bottom line, or the popular 'three Ps' (People, Planet, Profit) (Archel et al., 2008; Fauzi et al., 2010). Aside from these three, however, the consideration of all related stakeholders in each area of dimension is crucially important. However, it is a complex topic and a difficult question to address. Therefore, stakeholders can and should be involved in the process of planning and implementing strategies (Albareda, 2007). Sometimes, the most visible and direct stakeholders may be identified by a business, but the measurement of effects on indirect or distant stakeholders is anything but trivial. The concept of time also plays an important role, as

corporate sustainability is intended to point out the importance of contemplating long-term consequences of current behavior in the corporate world. However, said corporate behavior is typically very short-term focused, making time important (Lozano, 2012). Finally, an emerging dimension to corporate sustainability are numbers. In order to make a case for it, businesses need to calculate their performances and results (Freidberg, 2013). Through KPIs, certifications and standards, corporations have been going after quantifiable eco-efficiency (Freidberg, 2013). It is again vital for the purpose of our thesis, to fully understand the different dimensions in which sustainability operates. This step is indeed necessary, to then understand what obstacles are in its way and consequently how to relieve them.

2.2.2 Shared value theory

Porter and Kramer (2011) introduced the concept of Shared Value. They identified that there is a widespread concern that business is a primary contributor to social, environmental and economic issues, and that corporations are prospering at the expense of society. The view on creating value is limited, as financial optimization is focused only in a short-term dimension, and the most significant consumer demands and factors that drive long-term performance appear to be lacking. Companies seem to ignore their customers' well-being, the exhaustion of essential resources for their business, as well as the feasibility of their main suppliers and the economic misery of the community they work and/or sell in (Porter and Kramer ,2011). Sustainability work has previously often been perceived as either a threat to the organization's bottom line or something that can improve the company's image, both to customers and employees at best. Shared value is a term that implies generating economic value in a way that, by addressing its needs and challenges, often generates value for society, which refers to the relation between social and economic development. It is not about sharing the produced value but about widening the pool of economic and social capital. Every company requires a prosperous community, not only to sell its goods or services but also to provide them with workers, raw materials, expertise, infrastructure and other public assets (Porter and Kramer, 2011).

2.3 Innovation theory

Our use of the term innovation is based on the definition by Damanpour (1991) and the OECD guidelines (OECD, 2019). Damanpour (1991) defines innovation as "the generation, development, and adoption of novel ideas" (Damanpour, 1991; p. 556). There are four types of innovation stated by OECD's guidelines for the collection and interpretation of innovation data: product innovations, process innovations, organizational innovations and marketing innovations. Innovation can be incremental or radical (OECD, 2019). Incremental innovation is the improvement of any of the subjects to the four types of innovation, while radical innovation calls for the outcome to be something completely new to the organization, as well as to the world (Schumpeter, 1942). Ramirez and Arvidsson (2014) refer to radical innovation as the type of breakthroughs "that aim to change the game" (Ramirez and Arvidsson, 2014; p.381). In this thesis, we will not take into consideration the distinction between incremental and radical innovation since we do not deem it to be relevant for the topic. We are investigating the cognitive biases that inhibit innovation and thus, we are interested in innovation as a whole rather than a specific type of innovation. In this thesis, the term *innovation* refers to the process of creating and implementing new ideas, methods, products or services.

2.3.1 Organizational ambidexterity

The tension between flexibility and efficiency, often described as a dilemma of exploitation vs. exploration is widely covered in literature on innovation management. Exploitation and exploration foster different organizational capabilities, where exploitation fosters efficiency and exploration fosters flexibility, which is key for innovation and sustained success. The empirical evidence for this organizational ambidexterity (Duncan, 1976; March, 1991) being linked to better performance is robust across numerous studies according to O'Reilly and Tushman (2013). The authors note that this robustness holds in spite of these studies using different measurements of the ambidexterity, different levels of analysis and various outcome variables (O'Reilly and Tushman, 2013). Summarizing the empirical findings on the topic, O'Reilly and Tushman (2013) state that the literature suggests that ambidextrous management typically has a positive effect on performance in environments characterized by uncertainty in

terms of market development and technology. Thus, to successfully manage organizational ambidexterity is of an increasingly higher importance in the globalized and competitive business environment that organizations face today. However, managing ambidexterity is not a simple task. Managers have to ensure fit of strategy, products and services to current market conditions as well as prepare for a fit with future market conditions (Tushman and O'Reilly, 1996).

2.3.2 Dynamic capability theory

According to Dynamic capability theory, some firms thrive in changing environments since they have the ability to change their resources (Teece, Pisano, and Shuen, 1997; Eisenhardt and Martin, 2000). In the dynamic capability theory, there are various modes of resource alteration that can be employed to purposefully adapt an organization base or resources to a changing environment: leveraging existing resources, creating new resources, accessing external resources and releasing resources.

2.4 Behavioral economics

The theory of neoclassical economy has been dominant in research and on the incumbent market. It is based on the assumption of participating actors being fully rational and egoistic human beings, namely *Homo Economicus,* or *Econ*. The Econ always evaluates advantages and disadvantages and is able to make choices to achieve maximum gain, no matter the context (Sunstein and Thaler, 2008). One of the first steps towards a view from a standpoint of cognitive factors and decision-making playing a part, was taken by Herbert Simon (1955, 1957. Indeed, Simon's (1955, 1957) principle of bounded rationality is based on the idea that the observable truth of an individual's decision-making is constrained by limited information and cognitive capacity due to time constraints, resources, energy and memory, resulting in non-optimal outcomes that may breach invariant preferences (Simon, 1955, 1957; Mullainathan and Thaler, 2000; Kahneman and Tversky, 1974).

Kahneman and Tversky (1974) draw on this bounded rationality theory, to add two core ideas of intuition and knowledge availability in cognitive processes. Judgment and decisions can be made by intuitive, quick, automatic, gut-driven *System 1* thinking, versus *System 2* thinking which is slower, more logical, more deliberate, more effort-driven (Kahneman, 2003) and closer to the neoclassical idea of the Econ. The use of automatic, quicker system 1 thinking fuels the need for simpler and quicker access to knowledge, and due to patterns, and frequency of usage, some beliefs are considered more available than others. Individuals' desire for efficiency by using System 1 thinking, along with the fact that an individual's judgement and decision-making is often being restricted by limited knowledge and cognitive capacity, contributes to coping mechanisms being used to more effectively access information (Kahneman, 2003).

2.4.1 System 1 and System 2

System 1 acts in an automatic and quick way, and although it is fast and effortless, the outcomes of this decision mechanism are heavily affected by a great number of cognitive biases. On the other hand, where a matter requires more computing power, the human mind switches to a slower, more deliberate and structured thinking performed by System 2. (Kahneman, 2011).
System 1 and System 2 do not exist as standalone entities: Kahneman's (2011) present the realization that they constantly interact with each other. Essentially, System 1 quickly and constantly comes up with short-term predictions and judgments that are usually quite accurate, even though they are affected by many biases. System 2 is then in charge of checking whether those judgments are correct (Kahneman, 2011).The homo economicus described in neoclassical economic theories can be identified as an individual exclusively acting under System 2 (Thaler, 2015). However, the slow and thoughtful thinking performed by System 2 is often compromised by the quick and biased thinking performed by System 1. Even though System 2 leads to more accurate and reliable outcomes, it also requires more energy. Engaging System 2 is often associated with the phrase "pay attention" (Kahneman, 2011), but since individuals' attention is known to be limited, System 1 will be favored in most situations. Ultimately, both System 1 and System 2 are designed to perform at their best in specific situations. In order to deeply understand their pitfalls and the complicated relationship between the two, this thesis will analyze System 1 and System 2 separately.

2.4.1.1 System 1

System 1 is characterized by being an automatic, unconscious, fast and effortless system that cannot be turned off (Kahneman, 2011). It constantly analyzes the environment, looking for familiar situations and previously known models, to identify potential threats and opportunities and thereafter draw quick judgments to steer us in the right direction. The decision-making situation just described is conducted in an involuntary way. "You cannot refrain from understanding simple sentences in your own language or from orienting to a loud unexpected sound, nor can you prevent yourself from knowing that 2 + 2 = 4 or from thinking of Paris when the capital of France is mentioned" (Kahneman, 2011, p. 24). In terms of mental resources, namely attention, its control is shared by the two systems: System 1 is always first in line to respond to outside stimulus, and thereafter it engages the voluntary System 2. However, since attention is a scarce resource, operating through System 1 is often the most efficient way to go: 45% of the decisions we make are performed by System 1 (Singler, 2018). Although these decisions are very "attention-efficient", they are also affected by many biases, resulting in mistakes and other undesired outcomes.

2.4.1.2 System 2

System 2 is a slow, deliberate and conscious decision-making mechanism that requires thought and effort (Kahneman, 2011). As previously mentioned, it has two main tasks: to monitor System 1 and to perform deliberate and effortful assignments. Therefore, System 2 leans towards being rational and thoughtful, but that comes at a cost. Indeed, operating System 2 requires a lot of resources, both mental and physical. This ultimately means that it is not feasible to tackle all our daily challenges with System 2; firstly because of the limited resources of our brain and secondly because of the time it would take us to process all the relevant information and to evaluate all the possible outcomes (Simon, 1947, 1955)

2.5 Cognitive and behavioral biases

Cognitive biases refer to people's assessments being systematically skewed away from an objective perception of information (Johnson, Blumstein, Fowler & Haselton, 2013). Cognitive biases result from biological constraints of the human brain and evolutionary imperfect design, e.g. in modern life it might be more harmful than useful that our brain immediately insists that we get ready to run at the sight of a spider, but our ancestors survived because of this fight-or-flight reflex. Closely related to cognitive biases is *behavioral biases,* which refers to how humans behave and make decisions in a way that is characterized by bounded rationality (Simon, 1947, 1955).

2.6 Nudge theory

The concept of nudging comes from nudge theory, pioneered by Thaler and Sunstein (2008). Nudging is a tool aimed at influencing people's behavior, taking into account how people make decisions. Using nudging to affect decisions involves designing decision settings in various ways with the intention of improving people's behaviors. It does not interfere with the free will of individuals, or use financial incentives (Sunstein and Thaler, 2008). Nudging can extend the decision toolbox, and behavioral science can be used to improve the decision tools that we already have. Our understanding of what constitutes a nudge is based on the following definition:

"Any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates." (Thaler and Sunstein, 2008, p.6)

Based on this definition by the field's pioneers Thaler and Sunstein, Reisch (2019) provides a slightly more elaborated and, in our opinion, more pedagogical definition of a nudge. For this thesis, we will refer to Reisch (2019) definition of a nudge, stating that it is:

"A feature of the social environment that affects people's choices without imposing coercion or any kind of material incentive (choice architecture) liberty-preserving approaches or stimuli that steer people in particular directions, but that also allow them to go their own way." (Reisch, 2019)

Nudging is based on the concept of Libertarian Paternalism. Although the concept may seem contradictory, as Thaler and Sunstein suggest, when correctly interpreted, it becomes clear that the two concepts can cohabit perfectly (Sunstein and Thaler, 2008). The libertarian element of the concept is the preserving of freedom of choice for individuals, who should be able to reject unwelcome nudging attempts if they wish to do so. The paternalistic aspect instead resides in the argument that it is reasonable to influence the actions of the individuals if it is in their own best interest. An example could be nudge people with the goal of making their life easier, better and healthier (Sunstein and Thaler, 2008).

Nudging is not only perceived favorably, and their implementation calls for ethical considerations. A common critique of nudging is that it manipulates people's decisions instead of upholding people's freedom of choice (Goodwin, 2012; Hansen & Jespersen, 2013). Instead of preserving individuals' choices and freedom, Hertwig (2006) argues that it exploits individual vulnerabilities to achieve a purpose, and moreover people are unaware of when they are subject to nudges. Hertwig (2016) also argues against the notion that people are too lazy to think about themselves, implied by nudging. He claims that, in the case of nudging employed by a government, people should be careful in believing naively that the state is always behaving in favor of its residents. However, the above concerns can be overcome by avoiding manipulation regarding nudging and its target by keeping a transparent and open approach and by establishing clear directions for it (Sunstein, 2016). Individuals' views on nudges rely on whether they are viewed as well-motivated and go accordingly with certain desires and beliefs that concern them (Reisch & Sunstein, 2019). In conclusion, an ethical, transparent approach to nudging is necessary if appropriate stakeholders are to build trust (Reisch, 2017). When people believe in a nudge's validity, and believe it favors most people's interests and desires, they are prone to support it. Policymakers should therefore conclude that contrary to academic or public critique, there is less opposition from individuals who explicitly represent them (Reisch, 2017).

2.6.1Nudge taxonomies

In this thesis, selected taxonomies of nudges are used as a lens for interpretation and analysis in the literature research and in the thematic analysis. The selected taxonomies are the ten most important nudges outlined by Sunstein (2014), who is one of the pioneers of nudge theory, and a list of 93 evidence-based behavior change techniques (BCT's or nudges) (Marsden, 2016) from the BCT taxonomy version 1 (BCTTv1) (Michie et al., 2013). The BCT taxonomy has been developed over the course of three years by 400 international behavior change experts, experienced in investigating, designing, and/or implementing behavior change interventions.

A behavior change technique (BCT) is defined as "an observable, replicable, and irreducible component of an intervention designed to alter or redirect causal processes that regulate behavior; that is, a technique is proposed to be an "active ingredient" (e.g., feedback, self-monitoring, and reinforcement)" (Michie et al., 2013, p. 82), and the employed definition of a nudge in this thesis is "A feature of the social environment that affects people's choices without imposing coercion or any kind of material incentive (choice architecture) liberty-preserving approaches or stimuli that steer people in particular directions, but that also allow them to go their own way." (Reisch, 2019). Comparing Michie et. al's (2013) definition of a BCT with Reisch's (2019) definition of a nudge employed in this thesis, we conclude that the similarities and overlaps between BCT's and nudge's justifies an interchangeable use of the terms for the purpose of our exploratory research objective: *To develop insights on how organizations could use nudging to foster sustainable innovation and provide a basis for further research and practical experimentation by organizations aiming to foster innovation that is sustainable for people, planet and profit.* The choice to equate the terms BCT and nudges for our study can be further justified by the interchangeable use of the terms employed by psychologists in practice (Marsden, 2016). This being said, we note Vlaev et al's (2016) distinction between BCT's and nudges, stating that nudges are a type of BCT "that target the automatic decision processes" (Vlaev et al., 2016, p. 12). However, even though Vlaev et. al (2016) underline the focus of automatic process and "minimal conscious engagement" (Vlaev et. al, 2016, p. 6) in nudge theory, the authors also use a definition of nudges that doesn't exclude conscious, reflective processes and which also admits the physical as well as social dimensions of decision

environments. All things considered, the nudges we have derived from our interviews and our literature research are aligned with the definition of a nudge employed in this thesis.

2.6.2 Nudge Management

Until now, most research and implementation of nudging has been conducted in public policy matters or in marketing and sales, directed towards consumers. However, in recent years, behavioral insights have received an increasing amount of attention in the organizational context (Christensen, 2019). Specifically, the use of nudges has been employed as a tool to improve management inside organizations, leading to coining a new term: "Nudge Management" (Ebert & Freibichler, 2017). Ebert & Freibichler's (2017) paper explores how to increase knowledge worker productivity by drawing on behavioral and psychological studies and indeed by employing nudges. An example of this might be the use of defaults nudge, to improve meeting efficiency: the typical meeting usually lasts 60 minutes, if the default option were 30 minutes instead, could easily reduce meeting times by 5%, resulting in substantial costs reduction, specifically in big organizations (Ebert & Freibichler, 2017).
However, even though an increased adoption of Nudge Management among business professionals, (Güntner, Smith, Sperling, Dickson, 2018) there is still a prominent research gap, on how it can be instrumental to foster specific goals or specific behaviors, for instance sustainable innovation. Overall, in regard to nudge management, there currently seems to be a lot more use of nudges in practice than there is knowledge about it in research.

2.6.3 Nudge management and sustainable innovation

The literature on nudge management and sustainable innovation is scarce and scattered. In the initial semi-systematic search for our main research question, no relevant paper on nudging for sustainable innovation within an organizational context were found. This further highlights the gap in the literature that this thesis intends to fill. The papers that we did find in our systematic search on the topic concern nudging for health in the workplace (Chauhan, 2019; Srivastava, 2012; Van der Meiden et. al, 2019), gender diversity and gender equality (Atal et. al, 2019; Mantashian et al., 2019; Correll, 2017) and environmental sustainability (Baranova et. al, 2017; Wong-Parodi et. al, 2019; Ferrari et. al, 2019; Rosenkranz et. al, 2017; Chakravarty and Mishra,

2019). Additionally, nudging for innovation (Potts & Morrison, 2009; Anthony et. al, 2019; Erkut, 2016; Rigtering et. al, 2018) and more specifically for creativity (Leegard, 2019), ideation for sustainable business model innovation (Haag and Urban, 2019) and for effectuation skill development (Holtel and Heinen-Konschak, 2019). Interestingly enough, all of these papers are rather recent in time, confirming our notion that we are dealing with an emerging field. There is a lot of room left for exploring the topic.

In regard to relevant grey literature, BVA Group is a prominent behavioral consultancy and their CEO Eric Singler has written a book about nudging in an organizational context called "Nudge management" (Singler, 2018) and it actually touches on the use of nudging for both sustainability and innovation. However, the main focus of the book is on nudging for productivity, health and happiness in the workplace and the contribution regarding sustainability and innovation is surface-level and marginal. Porsche Consulting (2018) also published a report on generating an innovative atmosphere with the help of nudging.

2.6.4 Nudges fostering sustainability or innovation

Without specifying what biases are at play, Rigtering et. al (2018) studies how managerial framing affects intrapreneurship and finds that both framing and default can be effective nudges in increasing employee participation in intrapreneurial ideation. The authors compared the effects from automatically registering employees to an intrapreneurship challenge within an international consulting firm, compared to letting employees opt-in through self-registration. When using the opt-out default, the number of proposals submitted increased without reducing the quality of ideas. Rigtering et. al (2018) also find that by providing employees with examples of ideas, they saw a reduction in the novelty of ideas and the overall number of idea submissions. However, the usefulness of ideas turned out to be higher when examples were provided.

In their report on how to create an innovative working atmosphere Porsche Consulting (2018), presents the current working atmosphere as a risk to innovation. To redesign the working atmosphere towards fostering corporate innovation, Porsche Consulting (2018) suggests a number of nudges: the automatic suggestion of "walking meetings" in the digital calendars of

employees to improve systematic decision-making, creating a default of no notifications on electronic devices to improve focus, publishing employees' to-do lists to enforce a social norms nudge, encouraging interaction between different divisions through common employee areas (e.g. cafés) to improve teamwork and trust, replacing audio conferences with video conferences to untap the value of nonverbal communication, increase boldness and risk-taking through replacing sitting meetings with standing ones since standing up is a power pose, increasing diversity in perspectives through altering the physical office environment such as scents or equipment found in meeting rooms and nudging for mental breaks through scheduling 45-minute meetings instead of hour-long meetings. Potts and Morrison (2009) suggest a voucher program including creative and non-creative firms in order to "nudge" innovation, but do not propose any specific nudges. They base their work on listing common biases in human choice based on the work of Thaler and Sunstein (2008), but do not elaborate on which biases are more or less relevant as innovation inhibitors.

When it comes to sustainability in the people aspect, gender equality is a relevant issue. Mantashian et al. (2019) discuss the use of nudges to foster gender equality in the workplace. They state the gender equality issue of a US tech company, where staff performance got linked to gender stereotypes during the annual review, with 14% of women being criticized for being too aggressive and 8% of men were criticized for being "too soft". By implementing an employee scorecard specifically focusing on work performance and business impact, these numbers dropped to 0% and 1% respectively in a year. This was a type of re-framing of the evaluation, leaving the individual out of the discussion and focusing on the task and business impact (Correll, 2017). Another example of framing to foster gender equality is the re-framing the question of availability for global mobility, opening employees up to a wider range of higher-order positions (Mantashian et al., 2019). Mantashian et. al (2019) state an example where re-framing this type of question showed an increase in 25% of women declaring that they were available for global positions.

Holtel and Heinen-Konschak (2019) match nudging interventions against effectuation principles, with the purpose of helping project managers root effectuation skills in their team(s). These principles are a way to uncertainty, which is relevant to the innovation process. Based on the literature on nudge theory and the two taxonomies of nudges employed in this thesis,

we identify and interpret the nudges proposed by Holtel and Heinen-Konschak (2019) as *incentive (outcome), use of social norms, defaults, salience of consequences* and *pre-commitment strategies.*

Innovation: Framing (Rigtering et. al, 2018); defaults, use of social norms (Rigtering et. al, 2018; Porsche Consulting, 2018; Holtel and Heinen-Konschak, 2019) incentive (outcome), salience of consequences and pre-commitment strategies *(*Holtel and Heinen-Konschak, 2019)
Sustainability: Framing (Mantashian et al., 2019; Corell, 2017)

Overview of type of nudges identified as fostering sustainability and innovation respectively

Among all these papers, they deal with either sustainability or innovation. None of the research we found suggest or investigate what types of nudges could be used by organizations to foster sustainable innovation, and this additionally highlights the research gap that we attempt to fill.

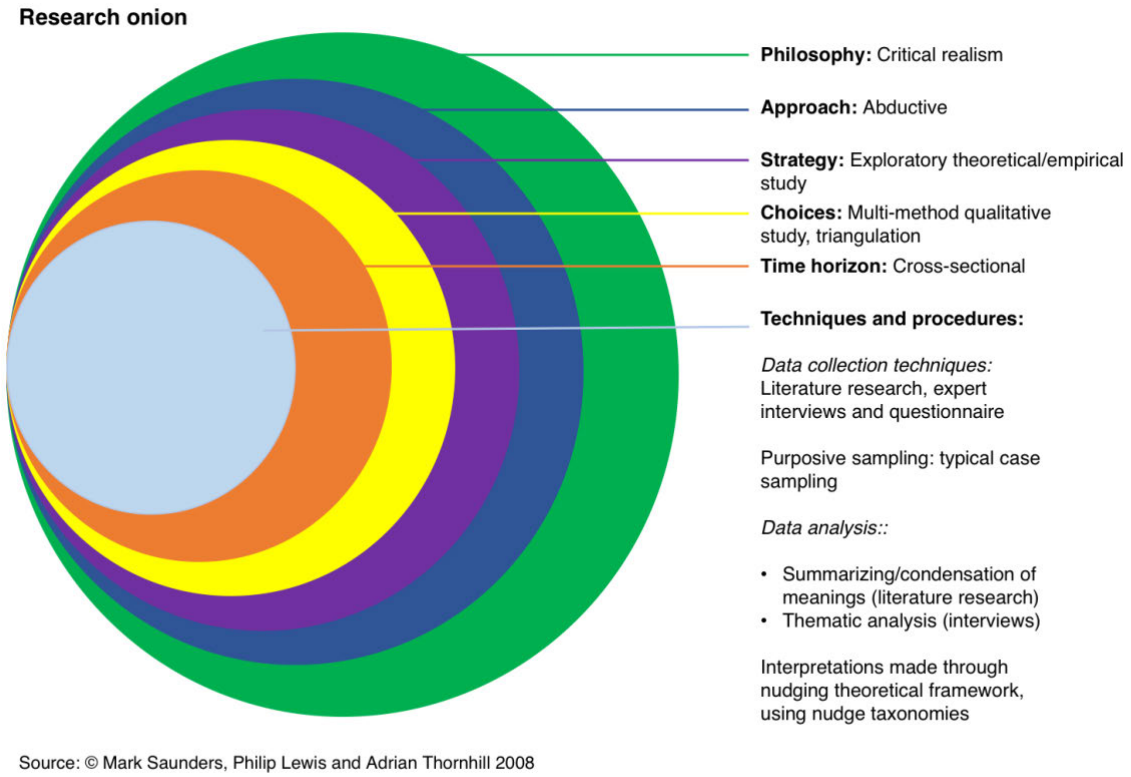
3 Methodology

To answer our main research question *"How can organizations use nudging to foster sustainable innovation?"*, we conducted exploratory research with a multi-method qualitative study. Due to scarce and scattered literature on the research topic, acknowledged through an initial protocol-driven, systematic literature search based on the main research question, we developed two research sub-questions:

1. *What cognitive and behavioral biases are the main obstacles to sustainable innovation in organizations?*

2. *What nudges can be used to address these biases in an organizational context*?

Based on these research questions, we conducted an extensive literature research and interviewed experts relevant for informing the respective questions. For sub-research question 1, we also employed a qualitative questionnaire following the literature research informing that same question. The respondents to this questionnaire were professionals with experience in fostering sustainability, innovation and/or sustainable innovation within organizations. Through our use of literature research, expert interviews and a questionnaire, we employ method triangulation. Moreover, our use of both primary and secondary data enables us to employ data triangulation.



3.1 Philosophy of science

3.1.1 Research philosophy: Ontology, epistemology and axiology

The philosophy on which we base our research is realism and, more specifically, critical realism. Our ontological view, our view of the nature of reality, is objective since we believe that reality exists in separation from human thoughts, beliefs, and knowledge of their existence. We are interested in identifying biases and nudges from the literature as they are presented, and not in understanding underlying meanings behind their existence. However, we believe that social conditioning affects how individuals interpret reality. This understanding means that our interview data is presented as interpreted by the author of the articles we review, by the respondents to our questionnaire and by our interviewee. All of this entails that we will conduct our research as critical realists. The epistemology behind our research, what we constitute as

acceptable knowledge, is that observable phenomena provide credible data and facts. In line with this epistemology, we focus on explaining the phenomena in question - biases and nudges - within a context: the organizational context. As critical realists, our position is that "what we experience are sensations…not the things directly" (Saunders et. al et. al, 2009, p. 115). We accept that biases and nudges exist independent of social actors, but that they are experienced through sensations that can deceive these actors. We argue that the social world is not static, but constantly changing. Regarding our axiological position, we realize that we are influenced - even biased - by our own experience, culture and upbringing and that this and our values will have some impact on the research we conduct. This influence plays into our interpretation of interviewee answers when we choose to interpret their descriptions of certain phenomena as certain biases or nudges if the descriptions fit the pre-defined description of these. Even though our ontological stance is that we believe there to be an objective reality, this reality cannot be directly observed and thus, we acknowledge that data is informative of reality but doesn't directly reflect it (William, 2018; Haigh et at., 2019). Followingly, there is a need for interpretation of data to access the underlying structures of it (Willig, 2012). We deem the interpretation of reality by others, presented in our data, to be acceptable knowledge. The same holds for our own interpretations of this data in the analysis.

3.1.2 Research approach

Our research is exploratory with descriptive elements. It is exploratory in the sense that it studies a relatively unstudied topic. Nieswiadomy (2008) supports the exploratory approach when an area of research is relatively unstudied. The main research question also fits the criteria of an exploratory research question, seeing that it asks "how" nudging can be used by organizations to foster sustainable innovation. This exploratory question allows us to get insights for further research and experimentation. Secondly, the sub-research questions that we form in order to answer our main research question follow a descriptive approach in the sense that it aims to answer "what is" type questions. The approach is suitable when the availability of existing information on a topic is limited, and our decision to use this approach is supported by Bickman and Rog (1998). We adopt an abductive approach for the purpose of this research. As opposed to deductive studies which either prioritize researcher- or theory-based meaning, and inductive studies prioritizing participant- or data-based meaning (Braun and Clarke,2012),

we conducted a two-legged theoretical and empirical study where both theory and practice contribute to informing our research question. We employ a back-and-forth interaction between theoretical literature and empirical (qualitative) data in our analysis which is characteristic of abductive reasoning. Our approach is aligned with how Dubois and Gadde (2002) explain abductive studies. The authors claim that "In studies relying on abduction, the original framework is successively modified, partly as a result of unanticipated empirical findings, but also of theoretical insights gained during the process. This approach creates fruitful cross-fertilization where new combinations are developed through a mixture of established theoretical models and new concepts derived from the confrontation with reality." (Dubois and Gadde, 2002, p.559). In addition, we deem an overall abductive approach to be appropriate for this thesis since it goes from data to theory (rather than the opposite) through employing a back-and-forth between theoretical and empirical data, using elements from both deductive and inductive approaches.

Our starting point has elements of a deductive approach in the sense that we tested, through the questionnaire, the hypothesis that the biases derived from our literature research (theory) are relevant in practice. Following that, we formed a priori codes based on theory, and thus employ deductive coding in the interviews informing sub-research question 1. The findings and analysis of the data collected for answering sub-research question 1 partly influence how we proceeded with part two of the data collection and the analysis. For sub-research question 2, we asked our interviewees open-ended questions on how they would use nudging to foster sustainable innovation within organizations and what nudges they would use. After asking those open and general questions, we moved onto systematically asking our interviewees open-ended questions on how they would address each of the biases which we had found to be relevant in the first part of the analysis. We coded these interviews with behavioral experts inductively, allowing the themes to emerge rather than pre-determining the codes.

3.1.3 Research strategy, choices and time horizon

Our research is a qualitative exploratory theoretical/empirical study (Ankersborg and Wrisberg, 2020). Our research inquiry is asked equally theoretically and empirically, through literature research and an interview study with qualitative semi-structured interviews. In

addition, we employ a qualitative questionnaire as a precursor to the initial interviews. Overall, our study is a multi-method qualitative study as we use more than one qualitative data collection technique and analyze our results with qualitative procedures (Tashakkori and Teddlie 2003). We employ triangulation of both data collection methods and data (Saunders et. al et. al, 2009). The choice of a qualitative approach is appropriate since we want to inform an emerging concept with the help of literature and those experiencing it in practice. This choice is supported by Vaismoradi et al. (2013) who states that "Qualitative approaches share a similar goal in that they seek to arrive at an understanding of a particular phenomenon from the perspective of those experiencing it." (Vaismoradi et al. 2013, p. 2). The use of multiple methods characterizes methodological triangulation (Saunders et. al et. al, 2009), and regarding triangulation of data; we are using two or more independent sources of data: secondary data from an extensive body of literature, and primary data from a questionnaire and from interviews. The time horizon of our research is cross-sectional, as it is a "snapshot" taken at a particular time (Saunders et. al et. al, 2009, p. 155).

3.2 Data collection techniques

3.2.1 Literature research

For answering the theoretical wondering of our research, we started out with intending to conduct a semi-systematic literature review as a research method, since our research question was broad and we wanted the contribution of the literature to be to comprehensively uncover the state of knowledge of our topic (Snyder, 2019). We created a concept map and a search strategy for our main research question and defined search strings (Appendix 1). However, in spite of iterations of the search strings, the literature findings proved very scarce and a number of relevant research papers found elsewhere couldn't be encompassed by this semi-systematic search. Due to this and the observed lack of relevant literature on the topic, we decided to conduct literature research based on our two sub-research questions in order to be able to answer our main one. Each section of the literature research is guided by the respective two sub-research questions. We searched for papers in the databases presented in the table below

and used pre-defined inclusion/exclusion criteria (Appendix 1). We also followed references found in the papers which fit these criteria.

Sources for literature research
Scientific publications Libsearch, EBSCO Business source complete, Google Scholar, ScienceDirect Grey literature: Search engines: Google, Ecosia Organizations and networks: The Behavioural insights team (BIT) OECD behavioural insights TEN European nudging network + their partners McKinsey Anne Charon and Scott Young at BVA Group

Our initial concept map and semi-systematic search strategy informed us about the lack of literature on our topic, and its scattered nature. Due to our extensive literature search and theoretical analysis, we feel confident in that although the findings may not be comprehensive, we have managed to include sufficient relevant literature for the exploratory purpose of this thesis.

The aim of our search queries was to gather the current literature related to nudge theory and nudging as a concept, within an organizational context (not nudges by organizations directed towards consumers, or external nudges targeting the organization, i.e. behavioral public policy) when nudging was the intervention or topic explored in relation to affect the organization/management/employees. Specifically, we were interested in finding literature on organizational nudging related to sustainable innovation, but we wanted to cast a wide net in order to capture the majority of literature on nudging in an organizational context. The first part of the literature research concerning sub-research question 1 helped us to develop a theoretical proposition that there are certain biases which inhibit sustainable innovation in

organizations. Based on this, we created a questionnaire and conducted follow-up semi-structured interviews testing the relevance of those biases with professionals working within the field of sustainability, innovation and/or sustainable innovation. In addition to testing our literature findings, we asked open-ended questions seeking insights not derived from the literature. Subsequently, the second part of the literature research informing sub-research question 2, was influenced by what biases were identified in the first part. The second part of the literature search was focused on literature on nudges addressing the biases found in the first part, as well as literature on nudges fostering sustainability, innovation or sustainable innovation. The second part of the literature research laid the groundwork for formatting the semi-structured interviews with nudging practitioners.

3.2.2 Expert interviews and questionnaire

In our primary data collection, we start by addressing the first sub-research question "*What cognitive and behavioral biases are the main obstacles to sustainable innovation in organizations?*" through insights from professionals who have experience being responsible for corporate sustainability, innovation or sustainable innovation. The initial insights are derived from a qualitative questionnaire, used to measure the relevance of biases as an obstacle to sustainable innovation. Relevance was assessed by if and how often the responding professionals experienced a certain bias as an obstacle to the mission of their work (fostering sustainability, innovation and/or innovation). We included questions asking the respondents about their experience with behavioral challenges and included a ranking of experienced relevance of obstacle biases based on our findings in the literature research. The questionnaire was sent to targeted respondents in our network and shared through LinkedIn in order for us to get an overview of the main behavioral obstacles to sustainability and innovation, and the intersection being sustainable innovation. For the targeted respondents sampled through purposive sampling, we then conducted semi-structured follow-up interviews to gain deeper insights and ensure a more accurate interpretation of the survey findings.

To inform the empirical wondering of our second sub-question "*What nudges can be used to address these biases in an organizational context?*", we conducted qualitative semi-structured interviews with experts experienced with implementing nudges within organizations. These

experts included professionals experienced within organizational nudging or nudge management, either as consultants or implementing nudges in their own organizations.

3.2.3 Sampling

Our purpose of our study is exploratory, with research question(s) and an objective that do not require us to make statistical inference from the sample(s). With this in mind and guided by the decision-map of Saunders et. al (2009; p. 223), we chose to use non-probability sampling techniques (Saunders et. al, 2009). More specifically, we used a type of non-probability sampling called purposive sampling. This type of sampling is appropriate when working with very small samples (Saunders et. al, 2009) and when you choose cases that are particularly informative (Neuman 2005). For sub-research questions, we used a type of purposive sampling called typical case sampling, where the focus is to choose cases that illustrate a representative profile of the population of interest. sampling method appropriate considering that the respondents of our questionnaire and interviews (informing sub-research question 1) are all professionals with high-level responsibilities within the field of sustainability, innovation and/or sustainable innovation. Furthermore, the three respondents with which we conducted follow-up interviews all confirmed that their experience had overlaps between these areas.
To generate our sample(s), we sent out personal interview requests by e-mail to targeted professionals and experts both within and outside our respective personal and professional networks. Specifying the requirements ensuring purposive sampling, we also advertised our need for respondents through our respective networks on the professional social media platform LinkedIn, and had contacts there share our post with their network. In addition, we posted in a few behavioral economics groups on LinkedIn and Facebook.

3.2.4 Data for sub-research question 1

For our analysis related to sub-research question 1, we used primary data from a qualitative questionnaire with eight respondents and semi-structured interviews with three interviewees. The eight respondents of the questionnaire were all professionals within the field of sustainability, innovation and/or sustainable innovation. These respondents were gathered through directed requests to relevant candidates identified within our joint professional

network. We followed up the questionnaire with semi-structured interviews for three of the respondents: Simon Locke (Sustainable Design Innovation Manager), Raphaël Smals (Adviser sourcing, innovation & strategy) and Linda Lindberg (Expert in international law and sustainability, previously Head of CSR). A more extensive outline of their relevant professional experience can be found here (Appendix 2). The main aim of the questionnaire was to get an indication of whether the biases we had identified in the literature review were also experienced as inhibiting sustainability, innovation or sustainable innovation in practice. The main objective of the follow-up interviews was to gain an understanding of the interviewees' experience with these biases as an issue in their work. We also asked open-ended questions in order to find out whether they would collectively bring up any other biases as main obstacles to the mission. We coded these interviews using a priori (Saunders et. al et. al, 2009), or predetermined, codes based on the biases we had identified in literature (Appendix 4). Although using predetermined codes based on theory is characteristic of a deductive approach our coding process for sub-research question 2 also inductively allowed for some emergent codes based on the interviewees' responses (Braun and Clarke, 2012).

3.2.5 Data for sub-research question 2

For our analysis related to sub-research question 2, we used primary data from semi-structured interviews with three professionals experienced in implementing nudging in organizations: Samuel Salzer (Behavioral Strategist, Author & Keynote Speaker) Natalia Gómez Sicard (MSc Student in Behavior Change vid UCL, prev. Behavioral Science Consultant) and Tommy Lindström (Leader within Behavioral Design for digital transformation, employee engagement and customer loyalty.). Their respective profiles can be found in Appendix 3.

The main aim of the interviews was to get access to their experienced reality in order to gain their direct or indirect suggestions of nudges to address the biases identified in literature, or to explicitly foster sustainable innovation in an organizational context. By indirect suggestion, we mean any described solution that we could interpret into a type of nudge outlined by Sunstein (2014) or Michie et al. (2013). During the interviews, we began by asking open-ended questions, in an attempt to minimize the framing of our interviewees when trying to investigate our main research question. Followingly, we proceeded to systematically ask these behavioral

experts about behavioral solutions and nudges to addressing the biases we had identified when researching our sub-research question 1. We then coded these interviews using emergent coding (Braun and Clarke, 2012)., meaning that the codes emerged from the data and were determined on the base of their relevance for answering the main research question *How can organizations use nudging to foster sustainable innovation?* and sub-research question 2 *What nudges can be used to address these biases (sub-research question 1) in an organizational context?*. (Appendix 4). The codes, the inclusion/exclusion criteria for the codes and the resulting coded data is presented in (Appendix 4). The coded data is presented in a table together with the interpretation of the response based on the nudge taxonomies of Sunstein (2014) and Michie et al. (2013).

3.2.6 Transcription

In order to transcribe the interviews, we used the software otter.ai and manually adjusted the interviews to make sure they were comprehensible in written form (Appendix 2). We didn't alter any content in relation to its meaning but made alterations such as spelling and removing some incoherent speech or sounds such as hesitations, false-starts or cut-offs in speech.

3.3 Data quality

Even though our sample size is small, our interviewees are experts within their field (Appendix 3). In our research, we conduct two batches of interviews with three interviewees for each of our sub-research questions. We also use eight expert respondents for our questionnaire. The sample sizes for each of these data collection methods doesn't have to be an issue, since the purpose of the study isn't to produce generalizable findings. A small sample size is acceptable for exploratory qualitative research, and in particular when the interviewees are experts in the field about which they are interviewed. An issue for data quality and validity, however, could be the subjectivity and potential bias involved in the choice of what papers to include in the literature research, and further analyzed to varying degrees and other interpretations made in our analysis. The data could also be subject to biases from the interviews, seeing that the sample

is very small. Nonetheless, we tried to reduce bias in several ways by, for example, pre-defining coding rules in the thematic analysis in which we also independently coded the interviews.

3.4 Analysis methods

In the following section, we will outline the methods used to analyze the findings from the literature research, questionnaire and expert interviews informing the respective sub-research questions.

3.4.1 Theoretical analysis: Summarizing (condensation) of meanings and interpretation with framework approach

The literature research and the theoretical analyses of its findings provide an independent contribution to our main research question. As a base for answering sub-research question 1, we draw on cognitive and behavioral threats identified in innovation theories. For sustainability, we found a comprehensive study on biases inhibiting sustainability which this section is based on. From the identified cognitive and behavioral threats, we both identify stated biases involved but also conduct interpretation based on nudge theory and the nudge taxonomies used for this thesis (Sunstein, 2014; Michie et. al, 2013; Marsden, 2016) when no bias is directly stated. In the case when a bias is explicitly stated in the theory in question, we present those findings. The degree of interpretation in the theoretical analysis is rather low, since many biases were explicitly stated in the literature research, and the interpretations we made were very straight-forward, i.e., there was often low ambiguity of what type of bias is at play. The theoretical analysis related to sub-research question 2 focuses on identifying or interpreting nudges. For the literature research, the analysis is focused on summarizing (condensation) of meanings (Saunders et. al, 2009) in the literature, with a slight degree of interpretation based on nudge theory and nudge taxonomy. We are following Saunders et. al's (2009) guidelines of "When you use any sort of documentation it is helpful to produce a summary that, in addition to providing a list of the key points it contains… how it relates to your work and why it is significant." (Saunders et. al, 2009, p. 492).

3.4.2 Empirical analysis: Thematic analysis of expert interviews

The empirical analyses provide an independent contribution to our research question. To analyze our empirical qualitative data, we employ the method of thematic analysis. Thematic analysis is mainly described as "a method for identifying, analyzing and reporting patterns (themes) within data" (Braun & Clarke, 2006, p. 79). It involves searching for and identifying common themes extending within and across interviews. We chose to employ this analysis method since it was a flexible approach that allowed us to systematically analyze the themes in our primary data as well as relate it to theory. Our use of thematic analysis also fits with a critical realist approach (Smith, 2003) where we acknowledge that our primary data is based on people's words which reflect their respective version of reality. Through a thematic analysis, we were able to produce interpretations of our interviewees' respective reality. When we conducted our thematic analyses, we used the steps outline by Braun and Clarke (2006, 2012). Our thematic analysis has characteristics from both an inductive and deductive approach, but as stated by Braun and Clarke (2012), one of these approaches tends to predominate. In our case the inductive approach is dominating for the thematic analysis since we lean slightly towards prioritizing participant- or data-based meaning in the interviews and the coding of them. Leaning more towards an inductive rather than a deductive approach in the thematic analysis is also in line with the exploratory nature of this thesis, and an experiential orientation through which we aim to capture experience of- and perspectives from participants (Braun and Clarke, 2012). An overall inductive approach to thematic analysis is also well-aligned with a critical realist approach to research where a knowable world is assumed and the experiential approach is ". . ."giving voice" to experiences and meanings of that world, as reported in the data" (Braun and Clarke, 2012, p.3). In the coding of the interviews informing sub-research question 1, the deductive element is that we mainly coded the interview transcripts with predetermined codes based on the literature. The coding of interviews informing sub-research question 2 is inductive, with codes emerging from the data. Our reasoning for these choices is in line with the objective of the respective research questions. For the interviews related to the sub-research question 1, we aim to find if our theoretical findings are confirmed in practice. On the other hand, for our interviews related to sub-research question 2, an inductive approach is suitable since the aim is to uncover new information about what nudges can be used to foster sustainable innovation and also gain knowledge informing the overall research question: *How*

can organizations use nudging to foster sustainable innovation? The data from the interviews informing sub-research question 2 is then interpreted by us within the theoretical framework of nudge theory, more specifically through the nudges defined by Sunstein (2014) and Michie et al. (2013).

3.4.3 Primary and secondary data comparison

Since we aim to build an understanding based on both theory and practice in line with our research objective *To develop insights on how organizations could use nudging to foster sustainable innovation and provide a basis for further research and practical experimentation by organizations aiming to foster innovation that is sustainable for people, planet and profit*, we deemed it relevant to include primary and secondary data comparison as an analysis method. Through comparison of findings from the literature research and findings from our primary data collection, we were able to analyze the differences and overlaps between theory and practice, providing insights to our main research question.

3.5 Delimitations

3.5.1.1 Organizational size representation

Our inquiry for the first sub-research question is informed mainly by professionals having experience of fostering sustainability, innovation and/or innovation in larger organizations. For the questionnaire as a whole, the size of the organizations in which the respondents had held this responsibility varied from 0-10 to 250+ employees. However, the respondents who we conducted follow-up interviews responded in regard to their work in organizations with 250 employees and more. This creates a delimitation of organizational size for our study, meaning that the biases found to be relevant inhibitors of sustainable innovation might only be a finding illustrative for larger organizations.

3.5.1.2 Selected nudge taxonomies

By using a framework approach for interpretation in our analysis, applying the nudge taxonomies developed by Sunstein (2014) and Michie et. al (2013), we limit the interpretation to these frameworks.

3.6 Weaknesses of methodological choices

3.6.1.1 Researcher bias

A limitation with our methods is the biases and subjectivity coming with our level of interpretation in the analysis, and the interpretation and choice of papers in our literature research. We let our research questions guide our literature research and even though we employed pre-defined inclusion/exclusion criteria, these are rather broad, and our choice of included papers is not fully objective. This is a limitation to our research and might have cost us a comprehensive overview of the field. However, we did conduct an initial semi-systematic literature search with numerous iterations of search strings, and the results were very limited. Another risk of not forming a comprehensive view of the field, can be exemplified through that we found evidence for possession bias and the endowment effect being an obstacle specific to innovation, but we didn't find any evidence of possession bias inhibiting sustainability in organizations. Due to slight overlaps in the process of rolling out the questionnaire while finishing up the literature research, the bias was actually included in our questionnaire and ended up showing some relevance to the respondents. We subsequently decided to leave it out of the study since the coherency of our approach entailed that we should only move forward with investigating the biases that had support in literature as being inhibiting to both sustainability and innovation. However, the fact that our review was non-systematic and non-comprehensive might have been a cause for not finding support for the possession bias being an obstacle to fostering sustainability in organizations. As previously stated, bias and subjectivity are also likely to play a part in other stages of the research process, such as in conducting our interviewee our interpretation of interviewee answers in the thematic analysis and from the literature research in the theoretical analysis. The critical realist approach that we

have adopted acknowledges that we can only know reality through interpretation. In line with the critical realist approach which we have adopted in this research, we realize that the influence of our own experience, culture and upbringing and values will have impact on the research we conduct.

3.6.1.2 Small sample size

For both our sub-research questions, the latter one more closely related to the main research question, we use small, purposive sampling. In total, we conducted six expert interviews where each half of these informed two separate sub-research questions. Our chosen interviews represent illustrative cases for the population of interest but the validity and reliability in generalizing our empirical findings is low. Nonetheless, for an empirical inquiry researched within an exploratory study, a small sample size is acceptable since the objective is not to make generalizations or draw statistical inference. An advantage of our sample is that it consist of experts, which improves the validity of our research.

3.7 Strengths of methodological choices

There are several strengths to our methodological choices, one being the abductive back-and-forth between theory and practice as well as the choice to adopt multiple methods. The choice of multiple methods allows for triangulation of methods and data in answering our research questions. This triangulation corroborates our research findings (Saunders et. al, 2009). Our overall research approach was flexible, which is desired for the exploratory purpose of the study. This flexibility is also reflected in the use of thematic analysis. The strength of the thematic analysis is that it permits us to identify general themes in large amounts of text and interpret the data past personal experience. Another strength is using purposive sampling for our empirical data, and having experts contribute to answering the empirical inquiries of our research. There is also methodological strength in our use of the well-researched and expert-informed nudge taxonomies (Sunstein, 2014; Michie et. al, 2013) as frameworks in the analysis. Finally, our choice of developing two sub-research questions allowed us to

circumvent the issue with a scarce body of literature on nudging within an organizational context. Through this process, our research draws from an extensive amount of literature, including well-established sustainability and innovation theories.

4 Analysis part 1

In the first part of the analysis, the first sub research question will be addressed, namely;

What cognitive and behavioral biases are the main obstacles to sustainable innovation in organizations?

4.1 Literature research and theoretical analysis

The focus of this thesis is on sustainable innovation, however, the literature on biases affecting sustainable innovation is scarce. Therefore, we start with identifying biases hindering sustainability and innovation respectively, and from that draw inference to the intersection being sustainable innovation. Once the biases affecting sustainability and innovation have been identified or interpreted and presented, biases affecting both categories will be noted.

4.1.1 Biases inhibiting sustainability

After having clarified the concept of sustainability, to pursue the goal of this thesis, the following section will focus on the biases that pose a threat to sustainability. Mazutis and Eckardt (2017) identify four categories of biases that prevent an organization from being sustainable: perception biases, optimism biases, relevance biases, and volition biases.

4.1.1.1 Perception biases

Perception biases, such as issue framing, availability bias, and heuristics, influence human vision of sustainability, and thus significantly affect the decision-making processes in organizations. In a matter like sustainability, that is quite abstract and hard to visualize and conceive, these kinds of biases have a great impact on influencing its perception. Perception biases originates from people's inability to comprehend circumstances and outcomes that they have not yet encountered, by refusing to recognize that there is an issue at all. Availability bias,

for instance, is found when a decision-maker makes a judgment on the probability that an instance will occur on the ease with which it is possible to recall similar instances or events, irrespective of the amount of times the event actually occurs (Tversky & Kahneman,1981). Decision-makers in the next years, for example, may overestimate the likelihood of another global pandemic. This also implies that people may not be adequately willing to respond to a problem such as climate change, where concrete instances related to climate can be brought to mind to support the fact that such environmental changes are actually happening. In other words, people will not be able to intervene now as to avoid potential climate-related changes in the future, near or distant, because they perceive a small likelihood to future negative climate change impact on society and businesses (which is dependent on what they have witnessed so far and how extensively the problem has been covered). Nevertheless, research has also shown that exposure to extreme climate change events and/or media portrayals of it, are correlated with a rise in the awareness that global warming is happening (Marx et al. 2007; Thaler and Sunstein, 2008), which ultimately stem in people and organization into being more active on this matter.

Moving on, framing is a bias that helps to explain how people react differently and sometimes irrationally to a problem depending on how the problem is worded or depicted. Different formulations, such as sentence structure, open or closed questions, alternative order of answer, specific terminology such as gains or losses, can generate entirely different connections, emotions, and reactions to a given subject.

Consequently, gain / loss framing is an extremely important resource in the way we as individuals approach a problem. For example, given two options “if you use energy conservation methods, you will save $350 per year; if you do not use energy conservation methods, you will lose $350 per year”, where the latter loss structure has been shown to be much more successful in shifting individual behavior, even if the actual benefits are exactly the same (Thaler and Sunstein, 2008). Trailing back to the example of climate change, framing is why the perceived economic costs of adopting anti climate change strategies weigh more than the related economic returns.

Moreover, media depictions on climate change are frequently framed as remote in time and space, unclear in terms of the extent of the impacts, ambiguous in terms of the intensity of effects, and thus the likelihood and societal opinion on the impact of climate change continues to remain elusive (Spence, 2012). Climate change is also often framed as extremely nuanced and the conversations about strategies to tackle it are frequently based on technical solutions to limit emissions, mainly in the context of political debates and activities such as climate summits. Therefore, climate change has been largely portrayed as an "engineering" issue rather than a regular business problem (Spence, 2012). Discussions on climate change are often framed in a highly statistical form, requiring a lot of effort to visualize how large and how likely the effect would be for an organization. It has been noticed that there is a fairly common environmental illiteracy in regard to environmental problems, suggesting that this makes it difficult to grasp the correlation between lowering emissions by reducing energy consumption and climate change, with the consequence that the sense of urgency and determination for the issues are reduced (Hoffman and Henn, 2008). As a result, this theoretical frame does not provoke any connections with the proximity or the extent of the impacts of climate change. Far worse, the engineering / scientific frame produces an even greater psychological gap from those actually impacted (Spence, 2012). Therefore, current framing reduces the intensity of issues such as climate change, and thus are not perceived as strategic problems that demand corporate intervention. Perception biases alone can explain the enduring trend of climate change denial that effectively prevents the rational decision-making process by refusing to recognize climate change in the first place as an imminent problem. Clearly, the ways in which problems are phrased affects individuals, as well as businesses, which is why addressing how a topic is framed, has enormous upsides in influencing how it is thought about and perceived. One interesting example is the more recent adoption by activists of the term "climate crisis" in the place of "climate change", to frame the cause as an emergency.

The last perception bias is the status quo bias. Individuals have an undeniable preference for the status quo, meaning to keep things as they are, which is less cognitively exhausting than accepting something different. When faced with evidence about the need to change our business strategies and operations to accommodate for sustainability measures, our system 1 affects heuristics kick-in and we are inclined to overstate the risks associated with new strategies or projects and overestimate the harms these might have to our organizations, often

highlighted in terms of costs. The negative responses individuals experience towards unwelcome change are limiting our understanding of the severity of the problems and preventing the more systematic exploration of alternatives by system 2 (Kahneman, 2013). A clear example of this bias would be the resistance towards ditching paper at the workplace; even though there are some viable alternatives, people might feel emotionally attached to printing, and therefore resist the shift to the greener option. Another example is related to social sustainability in organizations. It has been shown that diversity in hiring is partly hindered by the tendency of people to hire people alike themselves (Güntner et. al 2018). One of the reasons behind this tendency is likely to be the status quo bias, where people tend to prefer what or who is familiar to them (Güntner et. al 2018).

To aggravate the negative effect of these biases, is the fact that humans are highly averse to loss, and risk. Aversion of loss or risk implies a preference to avoid an option that involves the risk of loss, instead of seeking an equivalent gain (Kahneman and Tversky, 1980). Kahneman and Tversky (1980), with very basic experiments, first demonstrated the principle. The authors gave participants the ability to play a game of heads or tails to win or lose an equal number. On average, if the chances they could win or lose were the same (50%) people refused to participate. This bias occurs because when we lose or experience the risk of losing, as the unpleasant experiences, actual or presumed, we receive are greater than the positive emotions associated with winning. The pure hope of winning a sum of money is not enough to make us consider a 50/50 risk that we will fail the same number. It is not rational from a statistical standpoint, but from a human perspective it is natural. We are more impacted by a loss than we are pleased by an equal gain. As a consequence, we prefer to reject a gamble where there is no substantially higher chance of success than the likelihood of loss (Kahneman and Tversky, 1980). This ratio was evaluated at 2.5 by Kahneman and Tversky (1980). Therefore, there must be a potential reward of 250 for accepting a potential loss of 100.

4.1.1.2 Optimism Biases

Individuals are more often than not, over optimistic about the outcome of the planned actions as well as over-confident in their abilities to cope with the probability of adverse outcomes (Kahneman, 2013). There are a variety of advantages of these optimistic attitudes, such as maintaining self-esteem and helping us stay motivated in tough moments. The drawback of

over-optimism, however, is that we can misjudge the possibility of an event, and consequently overestimate our readiness to adapt and solve any related issues, especially in the business setting. This applies to climate change as well, whereby Optimism biases may hinder organizations' ability to develop and implement a wide array of solutions, to avoid and possibly adapt to climate change.

In addition, the confirmation bias tricks us into only seeking information that reinforce our current opinions (Kahneman, 2013), leading to a phenomenon described as group polarization. In its occurrence, people tend to move towards the extremes of the opinion spectrum, leading people to take very extreme stands (Sunstein, 2014). In other words, it means that people will not distribute normally but they follow a distribution rather skewed at the two extremes.

4.1.1.3 Relevance biases

Relevance biases affect our immediate understanding (through System 1) of the value of any given product or service, which also applies to sustainability initiatives. In the following section popular cognitive biases such as anchoring, temporal and hyperbolic discounting, and query theory, will be extensively analyzed with the goal of understanding how they influence organizations' view of the future. Consequently, they largely minimize and neglect the alarming implications of not incorporating sustainable practices in their operations. Just like the aforementioned categories of biases, relevance biases tend to decrease the urgency of sustainability matters, and thereby affect their process through System 2 (Kahneman, 2013).
The role of anchors and their priming effects can be explained as our involuntary tendency to make our decisions leaning towards a predefined point, in spite of how relevant they are (Kahneman, 2013). Anchoring is a well-known psychological process with impressively strong impact on decision results and merely proposing a starting point greatly affects how we tackle a problem. This bias is extremely amplified when decision-makers fail to adjust enough (Arvai, 2012). Anchoring with insufficient adjustment plays a crucial role in influencing decisions that involve quantitative data to be assessed or integrated. Our decisions are most strongly affected by those variables that arise in the first place, and we consequently disregard those that present themselves only at a later stage of the decision-making process (Kahneman, 2013).

Considering climate change, the impact of anchors is especially tricky. Global warming reporting is often communicated to people by media, by calculating global temperature levels increasing between 2 ° C and 5 ° C. As per the extent of increases encountered by most individuals over a year's time, 2 or even 5 degrees tend to be a relatively minor rise, and therefore the severity of the effects of climate change is decreased. These low anchors directly influence us unconsciously and keep us from automatically becoming worried about the implications of the potential magnitude and severity of global warming effects (Mazutis and Eckardt, 2017).

The relevance bias group also contains hyperbolic discounting of the future,.e.g. the human propensity to overrate short-term outcomes in contrast with temporary distant ones. Climate change mitigation steps are often unappealing because they often entail drastic measures in fields, such as the strategy, operations and supply chains. This fact combined with higher costs and extra efforts lead to a compromise that some organizations are not willing to take. Additionally, such expenses will only get a return at a later stage, with drastically diminished and uncertain advantages (Weber, 2006). One factor of aversion to make the necessary long-term choices on sustainable business behavior, such as engaging in substitutes to fossil fuel, would be that the payback time is too far away. Hyperbolic and intertemporal discounting reduce the strength of climate change, and thus significantly distort the appraisal of sustainable alternatives for the organization.

Finally, query theory provides some clues into how assessments of climate change prevention and response alternatives are being affected. We find instant gratification more desirable rather than deferred gratification without taking into account potential repercussions of our present actions (Weber, 2006). Nowadays, there are only a handful of businesses that are giving up present gains for way fewer concrete objectives, such as preventing the disastrous consequences of climate change. The significant adverse implications associated with the real, present costs and compromises that organizations may have to undergo, could well motivate environmentally harmful consumer choices and behaviors. as the extent of possible climate change repercussions are uncertain, the temporal urgency is weak (Weber, 2006). Consequently, climate change interventions often fail in the cost vs benefit calculation.

4.1.1.4 Volition Biases

The last group of biases differs from the previous three, because volition biases preclude people from viewing themselves as independent actors with power over their behavior. The shortage of motivation inhibits people to think and act as a justification to not engage in cognitive processes to make pragmatic decisions and behavior to eliminate unsustainable business activities. Popular cognitive biases at work are diffusion of responsibility, obedience to authority and professional bias (Linder, 1987; Hoffman, 2005).
Researches have shown that if we assume that others cause a specific resource to become scarce, then our consumption will eventually increase because we disregard our own individual responsibility for that good (Carvalho, 2010). The matter of common goods is no news to economists, as well as to companies operating under the incorrect concept of infinite resources that generates a free-rider result. Instead, people and the planet's health and well-being are perceived as responsibility of the government, the EU, the UN or any other actor in civil society. Hence, the locus of control for sustainable business practices tends to be weakened, as it is perceived as external to the managerial jurisdiction. For instance, despite the sense of transparency and obligation, companies have very little room to raise questions about the temporal urgency or relevance of climate change (Mazutis and Eckardt, 2017).

Analogously, obedience to authority, as well as its norms and standards, functions as dependence on its representatives, with the consequence that it is left to the authorities to address the issue on their own. Business guidelines and environmental laws hold companies focused on solely regulatory compliance instead of constructive sustainability objectives. Provided that current laws are still based on maximum tolerated damages, obedience to authority stimulates our automated system 1 mechanisms via social consent to achieve these objectives. It could be seen as deviant to do anything other than what is required by the regulations (Mazutis, 2014).

Last but not least, there is also the concern that implementing more extreme sustainability policies than those put in place by the regulations, will put a business at a competitive disadvantage. Mazutis and Eckardt (2017) argue that this mindset is a professional bias of the management profession. A professional bias defines a mindset that reduces one's field of view

by focusing on a particular profession's norms. Professional business practices that blindly emphasize the shareholder maximization principle, put financial goals against social and environmental implications and reduce the perceived relevance of climate change in corporate decision-making. Consequently, professional bias will limit strategic choice regarding sustainability problems by reinforcing the misconception that industry, culture, and the ecology are not all dependent on one another (Mazutis and Eckardt, 2017). Therefore, even though sustainability has been recognized as an organizational challenge and a wide variety of strategies have been developed and considered, when it comes down to taking the actual decision, professional bias can reduce the urgency of the problem and reduce the likelihood of sustainable action.

4.1.2 Biases inhibiting innovation

4.1.2.1 Derived from the theory of organizational ambidexterity

There is an inherent contradiction of a cognitive nature between managing flexibility and efficiency at the same time. The underlying psychology of managing exploration (flexibility) and exploitation (efficiency) is characterized by the employment of competing cognitive agendas (Gilbert, 2006, Smith & Tushman, 2005). This is an organizational challenge since an organization lacking capabilities of being efficient will not survive in the short-run and one that is not flexible will not survive in the long-run. Humans need to employ knowledge structures to make sense of the world and the information presented to us (Lin and McDonough, 2014). Employing knowledge structures enables us to impose cognitive frames on our environment (Walsh, 1995). Smith and Tushman (2005) describe cognitive frames as “stable constructs that provide a lens that allows individuals to see and understand the situation” (p. 526). The decision-making and behavior of managers and employees within an organization is influenced by these cognitive frames, as well as cognitive processes (Walsh 1995). Cognitive processes can be described as routine methods of thinking about and responding to information (Weick et al. 1999). The heuristics developed in the process of sense-making provides simplifications of complex issues. These simplifications by heuristics employed in sense-making are both

essential and come with certain cognitive biases, determining the understanding of situations, decision-making and manner in which managers seek for information (Levinthal and March 1993, Walsh 1995). Why these biases are threatening to innovation in particular is because they are tilted towards exploitation and fostering efficiency to a larger extent than exploration (Smith and Tushman, 2005). Two cognitive biases that come into play are risk- and loss aversion. Investing resources in less risky existing products is favored over more expensive, risky innovation even though they are predicted to provide larger gains (Kahneman and Tversky 1979).

Another bias derived from the literature on organizational ambidexterity, posing a threat to innovation, is present bias. The notion of present bias as a threat to exploration (and consequently a threat to innovation) can be derived from the writings of Levinthal and March (1993), where they explore the limitations of organizational learning processes. The authors conclude three types of learning myopia constraining organizational intelligence, which results from commonly adopted organizational approaches to learning. The one linked to the present bias is *temporal myopia*, illustrating the tendency to prioritize the short-run over the long-run by, for instance, overinvesting in short-run projects. Secondly, *spatial myopia* is related to a self-centered/egocentric bias of favoring good outcomes in your immediate environment rather than farther away; e.g. favoring goals of your company rather than favoring society as a whole. Self-centered bias is also closely related to self-serving bias, which can be particularly destructive in situations where there are conflicts of interest (Bazerman and Watkins, 2004). This can be the case with organizational ambidexterity depending on the structural design of the organization in terms of incentives and roles. The third myopia presented by Levinthal and March (1993) is *failure myopia,* which is the tendency to favor the certainty of success over the risk of failure. Failure myopia is related to risk- and loss aversion bias.

Finally, in the quest of adjusting the balance between exploitation and exploration in the strive towards organizational ambidexterity, one needs to understand that people are biased towards consistency (Smith and Tushman, 2005). This can be related to the status quo bias (Singler, Simpson and Sunstein, n.d.). Weaved into the favorability of consistency is the epistemological belief of a unitary truth (Ford and Backoff 1988, Voorhees 1986). The concept of a unitary truth leads us to believe that faced with two opposite views, there is a conflict where one is

false and the other is true, and where which one is which needs to be resolved (Smith and Tushman, 2005).

4.1.2.2 Derived from Dynamic capability theory

In an empirical case study of the beer company Smith Corona, Daneels (2010) investigates why they ended up being liquidated in spite of employing the modes of resource alteration suggested by the dynamic capability theory. He attributes the failure to the notion of resource cognition, the element which is his contribution to the incumbent dynamic capability theory. Resource cognition is the mental map of a manager, determining whether she/he identifies the resources of the organization and how they understand the multiple modes of application of these resources (Daneels, 2010). Resource cognition can also be used to partially explain path-dependency in organizations, and the risk of ending up in a lock-in. Resource cognition particularly explains the type of lock-in that is cognitive, where managers do not even realize what they need to do to adapt to the changing environment.

4.1.2.3 In relation to Path dependency

Path-dependency is the notion that decisions in the past influence the ones made in the present, creating a self-reinforcing path of certain types of decisions being made. The path-dependency model by Sydow et. al (2009) outlines a three-phased process where an organization ends up in a state of inflexibility called a lock-in, which can be detrimental to a firm's ability to adapt to a changing environment. The three phases are, in chronological order, 'the pre-formation phase', 'the formation phase' and 'the lock-in phase'. These phases describe the process of when an organization goes from being inefficient albeit very flexible in an unpredictable situation, enjoying a vast number of available opportunities (pre-formation phase), to the final lock-in phase where the organization is set on a predictable strategic path that makes it efficient yet very inflexible. Accordingly, structure, strategies and competencies reinforced by each other. This inflexibility of the pre-formation phase is a threat to innovation, as it inhibits the ability to change - a particularly crucial ingredient in the recipe for survival and success in today's rapidly changing environment. Sydow et. al (2009) describes the different types of possible lock-ins as being resource-based, normative and/or cognitive. Due to the topic of this

thesis, we are going to focus on the type of lock-in that are cognitive. Sydow et. al (2009) states selective perception, blind spots and implicit theories amongst cognitive biases that can serve as self-reinforcing mechanisms leading to a cognitive lock-in. The psychological resistance of managers grows stronger against changing structure and strategies, as these reinforce one another (Henderson and Clark 1990, Kaplan et al. 2003, Tripsas and Gavetti 2000).

Beckman and Burton (2008) provide further evidence on path dependency through their studies on the evolution of top management teams. The authors find that the initial structures of the organization and certain conditions in the team, e.g. top manager background experience put constraints on organizational outcomes.

4.1.2.4 In relation to Inertia

Path-dependency can also be linked to the concept of inertia constraining change in organizations. Collinson and Wilson (2006) study inertia through two in-depth studies on Japanese organizations and find that part of the reasons that innovation is inhibited is that embedded routines cause inertia. They define innovation as a 'change in routine' (Collinson and Wilson, 2006, p.1364) and explain that a recombination of existing routines is often required for innovation to happen. Similarly, Tripsas and Gavetti's (2000) research inertia caused by managerial cognition. There is empirical evidence for the existence of inertial forces in established firms, making it difficult for them to adapt to changing environments. Tripsas and Gavetti (2000) attempt to understand the effect of capabilities and managerial cognition on the adaptive intelligence of firms. According to Tripsas and Gavetti, managers' view of the world has an effect on the adaptive intelligence of the organization, since the managers direct the search process for appropriate strategies and opportunities that have to occur when environments change. They illustrate organizational inertia through a case study of Polaroid, and their inability to adapt to a changing market environment, even though they had the technological and economical resources available to do so. They attribute this failure to adapt to the cognitive inertia in top management, who were unable to change their "software-oriented view" of what Polaroid was supposed to be and do. Tripsas and Gavetti (2000) also emphasize the role of hierarchy in cognitive adaptability. They state that cognitive adaptability differed across hierarchical levels, and that Polaroid could possibly have avoided inertia if the

hierarchically lower-level digital imaging managers had been allowed to implement a "hardware-oriented" model sooner. In addition, the authors state that senior management and digital imaging managers were getting different signals from the market from which it is possible to assume that availability bias played a role in the cognitive adaptability of these two groups (Mazutis and Eckardt, 2017). Add a final sentence to tie it in with path-dependency.

In the searching process for appropriate strategies and opportunities in changing environments, individuals have a tendency to stop searching for opportunities prematurely (Cohen et. al (2019)., Cohen et. al (2019) define this tendency of *satisficing* as stopping search at a "good-enough" level, where only a minimal amount of additional research is likely to have produced a significantly more attractive solution. This tendency can be connected to path-dependency, where satisficing could serve as part of the self-reinforcing dynamics. Furthermore, satisficing can cause managers to stop search processes too early and not challenge their beliefs, which could lead to organizational inertia. Cohen et. al (2019) lay out the concept of satisficing to the concept of bounded rationality (Simon, 1947, 1955; Gavetti and Levinthal, 2000), meaning that individuals do not have complete information and are not necessarily aware of where their mental maps are lacking inaccuracy. In their multiple case study on entrepreneurs in accelerators, the authors present common cognitive biases that decision-making is systematically a victim of confirmation bias, availability bias and social proof (Tversky and Kahneman, 1974; Fiske and Taylor, 1991, Rao, Greve, and Davis, 2001).

4.1.2.5 Summary of biases inhibiting innovation

Drawing from the literature on organizational ambidexterity, we conclude that risk aversion, loss aversion, present bias and status quo bias are significant biases posing a threat to exploration and, thus, to innovation. Present bias can also be referred to as *present focus bias hyperbolic discounting* or *immediacy effect (*Singler, 2018). In a report by Porsche Consulting (2018) on generating an innovative atmosphere, the immediacy effect is illustrated through the following explanation: ".. instincts cause people to act differently. People tend to assess the latest information available as being particularly important— immediacy takes precedence over importance." (Singler, 2018; p. 17). Regarding inertia in the case of Polaroid (Tripsas and Gavetti, 2000), availability bias played an important role in inhibiting innovation. Availability

bias was also part of Cohen et. al's (2019) identified biases challenging entrepreneurs setting up new ventures, along with confirmation bias and social proof. In addition to the biases found through innovation theories, Singler (2018) brings up overconfidence bias and possession bias as obstacles to innovation. He describes that when an innovative project moves forward, the inhibiting effect of the overconfidence bias can "anesthetize and cause people to see a project in an excessively positive light" (Singler, 2018; p.240). Followingly, the possession bias is the tendency of people involved with such a project getting overly attached to it. By overly attached, we refer to Singler's (2018) description of the possession bias causing individuals to resist letting go of the project even if it is clearly heading towards failure. The possession bias is also closely related to the endowment effect, where Reb and Connolly (2007) show that the latter is induced by the former. Thaler (1980) explained the endowment effect as the tendency of people demanding a lot more payment for giving up an object than what they would be willing to pay to acquire it.

4.1.3 Biases inhibiting sustainable innovation

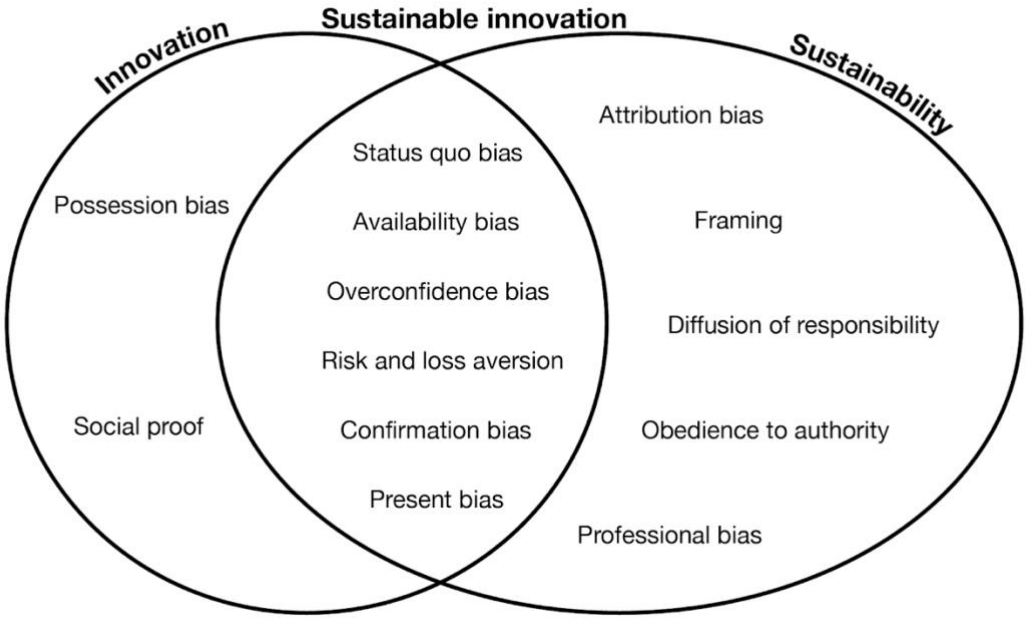


Figure 2 (Source: created by the authors)

Definitions of the biases inhibiting sustainable innovation

Bias	Definition/explanation
Present bias (closely related to present focus bias, hyperbolic discounting, immediacy effect, and query theory.)	the tendency of people to prefer getting things now rather than later, as the desired result in the future is perceived less valuable than the present one.
Status quo bias	the tendency of people's preference for things staying as they are or sticking to previously made decisions.
Risk- and loss aversion	the tendency to prefer avoiding losses to acquiring equivalent gains.
Availability bias	the tendency of people to rely on immediate examples that come to their mind, weighing judgments towards recent information, when evaluating a topic or making a decision.
Overconfidence	the tendency to systematically overestimate our knowledge, the effort we put in or our abilities.
Confirmation bias	the tendency to search for or interpret information in a way that confirms one's already held beliefs or acquired information.

(Samuelson, & Zeckhauser, 1988; Hochma, 2020)

4.2 Questionnaire analysis and thematic analysis of expert interviews

The first step to analyze the empirical findings addressing the first sub-research question, is to go through the questionnaire results, specifically the part where we asked our participants how often they experience the biases identified in the literature review.
Each and every one of those were addressed individually, in interviews with professionals working within sustainable innovation, sustainability or innovation. By getting an indication of the relevance of these biases as obstacles in practice, we analyze the results from the questionnaire. We then analyze the interviews with the help of a thematic analysis and move on to a primary and secondary data comparison between literature and interviews, in order to form a comprehensive answer to the first sub research question.

4.2.1 Analysis of questionnaire findings

We rolled out a questionnaire (Appendix 5) and got responses from eight professionals working within the sustainability, innovation or sustainable innovation. The eight respondents all hold positions in which they are responsible for sustainability/and or innovation-related work in their own organization or through being a consultant for other organizations. The goal of conducting this questionnaire was to assess whether findings of the biases identified in the theoretical analysis findings as threatening to sustainable innovation, was reflected in practice. In the questionnaire, we also asked questions to get an indication of the experienced existence and severity of people's behavior as a challenge to their work. Following the questionnaire, we conducted semi-structured interviews where we asked our interviewees about their experience and real-life examples with the selected biases. From the interviewees' responses, we weighted how prominent each bias has been in their profession. When interpreting the responses, we also consider the context in which they were provided. In order to reduce our own biases in the interpretation of the codes, each of us interpreted them independently and then consolidated our findings.

4.2.1.1 Relevance of behavior as a challenge to sustainable innovation

When presented with a multiple-choice question about the main struggles of accomplishing the goal of fostering sustainable innovation, 75% of the respondents chose the alternative "People's behavior". The other choices were "Bureaucracy", "Resources" and "Regulation". In addition, 75% of the respondents agreed with the statement "It is a significant challenge" or "Yes, it is a very difficult challenge" when asked "Is it a challenge to get people within your organization to change their behavior in order to comply with initiatives that support the mission of your work?". These results support the relevance of investigating behavioral challenges to fostering sustainable innovation in organizations.

4.2.1.2 Biases relevance

Through the questionnaire, the respondents reflect the literature review findings and that can be appreciated from the table (figure 3). Indeed, they have been asked how often in their role of fostering sustainable innovation, sustainability or innovation, they have experienced the biases identified as relevant in the literature.

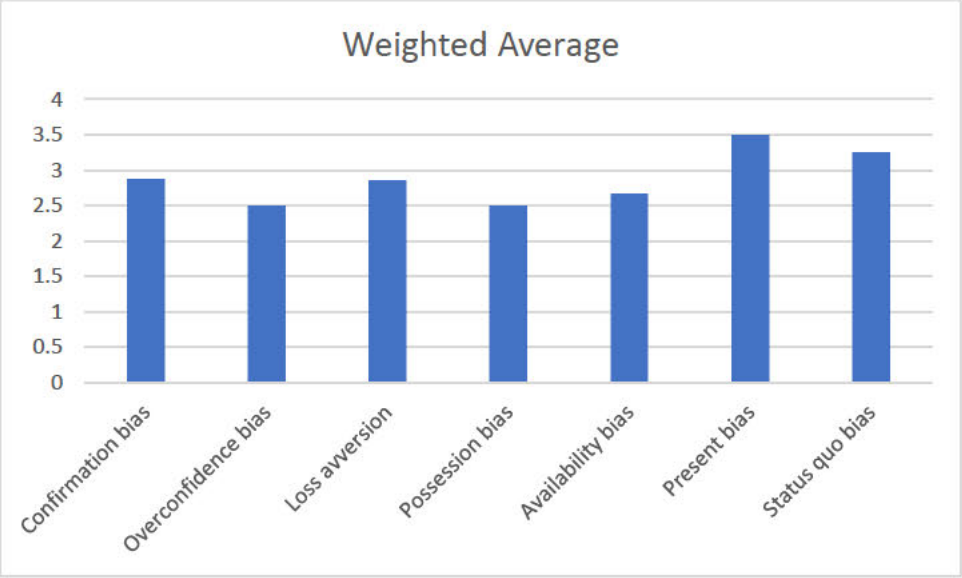


Figure 3

Where on the y-axis 0 means never and 4 means always, it can be seen that all the biases have been identified as obstacles to sustainable innovation. Particularly the present bias is recognized as the most common bias. The possession bias can be seen in the graph even though we didn't find any literature support for the possession bias inhibiting sustainability in organizations. The reason for the bias being included in the above table is that there was a slight overlap in the process of rolling out the questionnaire while finishing up the literature research. Going forward, we will leave it out of the study since our approach calls for moving forward with investigating the biases that has both theoretical (literature) and empirical (questionnaire) support for being inhibiting to both sustainability and innovation.

4.2.2 Thematic analysis of interviews

In the following section the findings from the first interview are to be presented and analyzed. Specifically it will attempt at answering the first sub-research question, that is "*What cognitive and behavioral biases are the main obstacles to sustainable innovation in organizations?*". To do so, each bias will be separately analyzed: how the professionals have experienced it, with the aid of some real-life examples and if what they experience is in line with what the literature says about it, both in terms of quality and frequency.

4.2.2.1 Present bias

As anticipated, our interviews indicate that the present bias represents one of the main behavioral biases to sustainable innovation. When asked about it, the common theme that quickly emerged was a heavily imbalance towards short-term thinking. All the interviewees expressed their concern regarding the risks related to this attitude. Indeed, by seeking only instant (or quarterly) gratifications and profits, the results are that innovation and sustainability projects are often put in second place. This is ultimately due to their nature: these kinds of projects rarely stem into immediate results, as those are expected to perform with a longer time period.

The present bias has been identified both in the innovation literature, in the organizational ambidexterity theory, and in the way sustainability is perceived (Levinthal and March, 1993; Weber, 2006). During the first batch of interviews, both of these concepts emerged.

Raphaël provided us with a very significant example of the role of the present bias, in the tension between exploration and exploitation. He was working in an organization experiencing a market shift, where their present main business was rapidly shrinking - a "dead end" according to him (R. Smals, personal communication, 2020). What happened was that they ended up spending a great amount of time and resources trying to "milk" that business until the last drop instead of shifting their focus on other side businesses they had, where the prospects were much brighter. But this was found out only in retrospect, even though the manager of that company was openly pro-innovation (coming from an R&D manager position), he failed to stay true to his nature, and ultimately let the present bias guide his actions towards seeking immediate profitability (R. Smals, personal communication, 2020).

In another example provided by Linda, in the field of sustainability, highlights even more the role that the present bias plays. In her own experience she has seen sustainability projects being treated as investments, entailing that when it was time to evaluate them, the return was a very important metric to be considered (L. Lindberg, personal communication, 2020). Moreover, the managers were really concerned about the timing of the return (L. Lindberg, personal communication, 2020). Especially within sustainability, these two aspects are very difficult to both estimate and measure, making it even more long term and therefore even more susceptible to the present bias.

4.2.2.2 Status quo bias

The status quo bias is another bias that has a very prominent role in the outcome of sustainable innovations within organizations. Just like people, organizations tend to oppose change, to embrace familiarity instead. This has emerged in the interviews both around the topic of innovation, as it threatens the exploration nature of organizations, and sustainability, as businesses often get stuck with non-sustainable business practices.

Picking up from the Raphaël's example provided whilst discussing the present bias (R. Smals, personal communication, 2020), he also pointed out that the status quo has also played a significant role (R. Smals, personal communication, 2020). In the choice of sticking to the shrinking business instead of shifting to the more encouraging one, the preference for familiarity is also part of the explanation. Preference for familiarity both in terms of technology and in terms of suppliers: the aforementioned shift would have not only entailed moving on to

a different business with some other technology but would have also caused the termination of some decade-lasting relationships with some suppliers.

The resistance to change due to the status quo bias has also been recognized by Simon, with a slightly different angle. In addition to the technology and suppliers, he has also brought to our attention the fact that some industries, in his example the cosmetic industry, have well-established codes and conventions, and therefore challenging and breaking those is a very tough job (S. Locke, personal communication, 2020).

On the other hand, Raphaël has highlighted also the dual nature of this bias. During the course of his career he also consulted an organization where the status quo bias was acting in the opposite direction (R. Smals, personal communication, 2020). Innovation was deeply entrenched in this organization's culture, and in this instance the company was leaning too much towards exploration and neglecting the exploitation side. This phenomenon reached an extent to which the company was picking up so many new projects to "maintain the pace of innovation" and was not completing any.

4.2.2.3 Risk- and loss aversion

The literature has identified risk- and loss aversion as being a relevant obstacle specifically to innovation. The interviewees have clearly confirmed that.

Again, starting from Raphaël's example, it becomes clear how risk- and loss aversion contributed to the lack of innovation of the company operating in the shrinking market (R. Smals, personal communication, 2020). The potential gains coming from shifting to a more promising business were somehow evident, but partially due to this bias the managers failed to seize the opportunity and stuck to the original business.

Building on top of this, Simon highlights another crucial aspect related to innovation. When developing a new product, more often than not, to achieve the highest reward whilst undertaking the least amount of risk, the safe choice is indeed just to reiterate the already successful products (S. Locke, personal communication, 2020). And even when there is the chance to be a first mover and to be a leader in the market, innovation is once again weighted down by risk (S. Locke, personal communication, 2020). In his experience, when there was an attempt to undergo these kinds of projects, they were quickly shut down for a less risky option, with the simple question "Who else is doing this?". This, according to him, was a clear sign of

a risk-averse culture that was indeed preventing the company he is working for, to innovate and strive as much as it could be (S. Locke, personal communication, 2020).

4.2.2.4 Availability bias

The availability bias is very much present whenever a judgement is being made, in the form of overvaluing easily recallable information (Tversky & Kahneman, 1981). This phenomenon is greatly amplified in the matter of sustainable innovation, as both sustainability and innovation decisions are heavily affected by it.

The most blatant field experience of this was provided to us by Linda when she told us about a specific manager in the company she was working. What happened was that every time this person went on a trip and came across a sign of climate change, like the snow disappearing from his usual skiing destination, he would return and act like the company had to become a "green company" (L. Lindberg, personal communication, 2020). This is also a clear example of how biases can also potentially be exploited, and benefit our cause, the next section of the analysis will exhaustively consider this instance.

Moving on to the innovation side, beside a relevant example in the field of risk management, Raphaël brought to us his experience in fostering innovation inside an organization. To do so, he was pushing for the management to meet up on a weekly basis to discuss the direction in which the company was going (R. Smals, personal communication, 2020). He quickly learned that he also needed a well-defined process, as without it the meetings were driven completely by the availability bias. Indeed, the managers would get together, without a clear purpose, in Raphaël's own words "It was like meetings were a purpose in itself: you put people together and then stuff happens" (R. Smals, personal communication, 2020). They did not seem to have a concrete image of where they needed to go. What happened was that they would just let the operational matter take over the meeting, completely neglecting the company's innovation needs.

4.2.2.5 Overconfidence bias

The overconfidence bias has come up multiple times during the course of the interviews, especially on the innovation side. This has played a significant role in the aforementioned

Raphaël's example, where the company was failing to realize it was operating in a dwindling industry. The management when confronted with the harsh truth that their core business might not be the same in a few years, they would just disregard the facts and stay confident (R. Smals, personal communication, 2020). The management was completely lacking any sense of urgency (R. Smals, personal communication, 2020). Contributing to this aspect, there is also the confirmation bias, that will be talked about in the next paragraph.

In the matter of sustainability instead, what has arisen in the interviews is that the overconfidence bias often leads organizations into thinking that they are doing enough. Linda describes this phenomenon as a mere "checking the box" (L. Lindberg, personal communication, 2020), where companies do just enough to get away for it, but at the same time consider themselves in the frontline of being sustainable.

4.2.2.6 Confirmation bias

In addition to dictating how individuals and organizations interpret sustainability facts and climate change factors, the confirmation bias is also responsible for a well-known phenomenon among innovation experts: inertia and path-dependency. In organizations, this bias is furthermore amplified, and it also causes them to take extreme stands, causing groups polarization.

As mentioned in the previous paragraph, the confirmation bias contributed to keeping the management form recognizing the urgency of the situation. What happened was that the management would disregard, or not weigh in, information about the business decline, and instead emphasize in every possible way, every bit of positive or neutral news.

Alternatively, Simon described experiencing this bias as a "tire kicking exercise", similar to what you would experience when buying a used car: you would basically try to pick out all the visible faults to try to bring the price down (S. Locke, personal communication, 2020). In the organization context, the management would basically walk in every meeting and basically try to bring down the value of whatever innovation was brought to the table, bring argument to the table to reinforce their previously taken stand (S. Locke, personal communication, 2020).

In the context of sustainability instead, Linda's input shed some light on the fact that the confirmation bias can also act in a different way, compared to the aforementioned one. The individuals she was working with were affected by this bias, and were basically interpreting all

the sustainability initiatives that the firm was doing as a signal that it was doing enough, and therefore nothing else was required to be done (L. Lindberg, personal communication, 2020). Concretely people were bringing up arguments like throwing out the garbage in the right way, to feel proud and to therefore not undergo any other projects.

To summarize, it has emerged from the interviews how the biases identified during the literature research play a significant role in hindering sustainable innovation

Furthermore, our interviews supported the assumption that biases affecting sustainability and innovation respectively also influence sustainable innovation. When the interviewees were explicitly asked if they sensed a difference in biases affecting sustainability or innovation, the answers were negative. An illustrative answer is one from Raphaël, who have experience from working in both fields. He noted that to stimulate one or the other, he would use the same approach. Comparing the similarities between sustainability and innovation, he stated that both fields concern change, affects every part of the organization and can never be compartmentalized in one separate part of it. He stated that both innovation and sustainability are ". . . fairly abstract and difficult to operationalize." (R. Smals, personal communication, 2020), and elaborated as follows.

"You know, when have you innovated successfully? When have you been successfully sustainable? It's a moving target. So yeah, that's why I think they are very comparable, particularly because it's spread out throughout the organization. I think today, sustainability is very much what 50 years ago was innovation. I see a lot of parallels in the way we talk about it, the way we all want it." (R. Smals, personal communication, 2020)

5 Analysis part 2

In the second part of the analysis, the second sub research question will be addressed, that is:

What nudges can be used to address these biases in an organization?

5.1 Theoretical analysis of literature research

5.1.1 Present bias

(present focus bias, hyperbolic discounting or immediacy effect, query theory)

Nudges to address present bias: immediate feedback (priming nudge)

The present bias could be addressed through *immediate feedback* mechanisms (Mazutis and Eckhardt, 2017), such as displaying the cost of running an air-conditioner during a heatwave (Thaler and Sunstein, 2008). This type of priming nudge increases the salience of the long-term effects of keeping the air-conditioner running, in this case regarding costs. Singler's (2018) suggestion on how to deal with the negative effects of the present bias is similar; to make positive long-term consequences tangible and visible in the day-to-day. Feedback is a nudge of good use "in situations where the decision context does not provide strong signals in terms of long-term negative effects of a choice or behavior." (Network for Business Sustainability, 2012, p. 60). In this context, feedback can help address the hyperbolic discounting, which takes place when individuals are influenced by the present bias.

5.1.2 Status quo bias

Nudges to address status quo bias: defaults, commitment devices, feedback, framing/reframing

In a systematic review by the Network for Business Sustainability (2012), the authors identify decision-support techniques for sustainable decision-making in businesses. They divide the techniques into active- and passive decision-support. Nudges are included in the passive decision-support techniques identified. By passive, the authors refer to "low-stakes decisions which are small, frequent and quick decisions usually made at the individual level." (Network for Business Sustainability, 2012; p.40). The nudges brought up as supportive towards sustainable development in businesses are *defaults, commitment devices and feedback.* The passive decision-support techniques, including nudges, can be used to address numerous biases but status quo biases and (hyperbolic) discounting are specifically mentioned as targets by the Network for Business Sustainability (2012). As described in this systematic review, the defaults and commitment devices tend to be used in situations where a sustainable option is overlooked due to immediate costs, immediate negative aspects or the decision-maker's current emotional state. This situation is related to inertia and the status quo bias.

Mazutis and Eckhardt (2017) also argue for defaults as a way to combat inertia and the status quo bias, stating that they could be more carefully chosen by the organization. The authors refer to Shu and Bazerman (2012) who explore cognitive barriers to decision-making on an individual level. Shu and Bazerman emphasize the power of defaults as a nudge to address the status quo bias (Johnson and Goldstein, 2003; Madrian and Shea, 2001). They recommend organizations to use greener options as defaults to take advantage of people's preference to avoid choosing.

Harker (2017) finds that resistance to change can be counteracted through using framing as a nudge. An implicitly perceived status quo amongst employees can be overruled by an explicitly stated reference point. In her paper, the author exemplifies this with the attempt to increase the adoption rate of telework within a company. One group is presented the option of telework 1-2 days a week, together with explicit information that telework is the status quo. The control group is presented the option of telework with no additional information. The adoption rate of telework increased in the case where the choice was framed with an explicit reference point that telework was the status quo, even though traditional work was the implicitly perceived status quo amongst employees.

5.1.3 Risk- and loss aversion

Nudges: Use of social norms, Framing/re-framing

Anthony et. al (2019) identify interventions aimed at neutralizing factors that inhibit innovation in organizations. The identified "BEAN interventions" (p.94) are aimed at counteracting stifling day-to-day routines and habits that block innovation. BEAN stands for behavior enablers, artifacts and nudges. They employ a broad definition of innovation as "something different that create value" (Anthony et. al, 2019; p.94), which can pertain to anything from scientific discoveries, the development of products, as well as everyday improvements. According to the authors, BEANs should be fun, simple and trackable in order to be effective in driving innovation. Anthony et. al (2019) take the example of Spotify's "fail wall" (p. 97) as a counteracting tool to the fear of failure. Failure is conducive to innovation, so fostering a culture where failure is socially accepted is essential for innovation to happen. The authors illustrate how Spotify attempted to foster this acceptance and even glorification of failure. Through an implementation of a whiteboard dedicated to publicly celebrating failures, Spotify encouraged employees to write down failures on post-its and stick them on the wall. Fear of failure is closely related to the risk- and loss aversion bias, since taking a risk on an innovative project can come with great gains failing might cause the risk-taker to lose social status and acceptance from colleagues if failure is not socially accepted. Anthony et. al (2019) exemplification of Spotify's fail wall shows how the employment of a social norms nudges can counteract the fear of failure, through addressing the risk- and loss aversion bias. Singler (2018) also brings up the fear of failure in conjunction with risk- and loss aversion as a threat to innovation. He refers to individual's fear of failure being driven by the fear of losing self-confidence. In addition, the author highlights the importance of companies to strongly convey to their employees that failure is accepted and even celebrated, in order to address this bias. Singler (2018) takes the example of Google co-founder Larry Page nudging innovation through framing failure in a positive way by "shining a light on the person responsible" (p.235). Followingly, Singler (2018) suggests framing failure as a tool for learning and an essential part of the innovation process. In a report by the organizations Rare and The Behavioral Insights Team (2019), framing is suggested as a nudge to promote environmental conservation. They propose framing decisions by harnessing the risk- and loss aversion. For example, businesses

might be steered away from gifting wildlife products or breaching fishing regulations if they are subject to a campaign highlighting the reputation risk from offending the receiver or potential consequences of losing fishing rights.

Considering sustainable development within business, Wong-Parodi et. al (2019) study behavioral strategies for energy conservation in an organizational setting. They find that the use of social norms feedback appears to be an effective nudge "where there are neither financial savings at-stake nor intrinsic motivation to conserve." (Wong-Parodi et. Al, 2019; p.1). Participants in their study significantly reduced their energy use when their energy consumption was shared openly with peers.

5.1.4 Availability bias

Nudges to address availability bias: salience of consequences, reminders, disclosure and transparency

Thaler and Sunstein (2008) discuss how to address the availability bias in decision-making both private and public contexts, and state that nudging back judgments towards true probabilities is important. They describe related counteracting nudges as "A good way to increase people's fear of a bad outcome is to remind them of a related incident in which things went wrong; a good way to increase people's confidence is to remind them of a similar situation in which everything worked out for the best." (Thaler and Sunstein, 2008; p.26). This quote describes a use of a reminder as a nudge; a priming nudge aimed at adjusting for the downward distorted judgment already imposed by the availability bias. Related to sustainability, priming is a category of interventions within nudging that can be used to nudge employees in an organization towards more sustainable decision-making (Mazutis and Eckhardt, 2017). One example of a priming nudge brought up by the authors is to increase the salience of environment-related consequences by addressing the topics of climate change in conjunction with the occurrence of a surprising weather event. Also related to salience of consequences as a nudge, Klotz (2011) suggests that better energy decisions are made during meetings held in net-zero-energy buildings. Another type of nudge listed by Mazutis and Eckhardt (2017) as an intervention against availability bias in corporations, is disclosure requirements such as, for

example, sustainability labelling. Disclosure requirements have been shown to have a correlation with significant reductions of emissions (Thaler and Sunstein, 2008). Disclosure and transparency is a nudging tool in which information is made accessible, comprehensible and simplified (Sunstein, 2014).

5.1.5 Overconfidence bias

Nudges: disclosure and transparency (Singler, 2018)

Singler (2018) states that a limited number of indicators to assess business projects or evaluate how a firm is meeting certain goals, are essential to get clear insight and address the overconfidence bias. The implementation of such indicators is a type of disclosure and transparency nudge which displays the objective standing of a business or a project in relation to the desired goals.

5.1.6 Confirmation bias

Nudges: precommitment strategies (Singler, 2018)

System 2 can perform better if it starts to question System 1's assessment (Kahneman, 2011). Since confirmation bias is a slippery slope where the use of System 1 tends to reinforce currently held beliefs, a systematic objective assessment of new information, and consideration of alternatives, is needed to address this bias (Soll and Klayman 2004; Fung, 2013). For example, *precommitment strategies* to commit to developing a habit to question yourself, or to include a devil's advocate in organizational teams (Singler, 2018).

5.1.7 Nudges for sustainable innovation: Overview

Table 1

Bias	**Definition/explanation**	**Countering nudges**
Present bias (closely related to present focus bias, hyperbolic discounting, immediacy effect, and query theory.)	The tendency of people to prefer getting things now rather than later, as the desired result in the future is perceived less valuable than the present one.	**Immediate feedback** (Mazutis and Eckhardt, 2017; Thaler and Sunstein, 2008; Singler, 2018; Network for Business Sustainability, 2012)
Status quo bias	The tendency of people's preference for things staying as they are, or sticking to previously made decisions.	**Defaults** (Mazutis and Eckhardt, 2017; Shu and Bazerman, 2012; Johnson and Goldstein, 2003; Madrian and Shea, 2001; Network for Business Sustainability, 2012) **Feedback on outcome(s) of behavior** (Network for Business Sustainability, 2012) **Framing** (Harker, 2017) **Pre-commitment strategies** (Network for Business Sustainability, 2012)
Risk- and loss aversion	The tendency to prefer avoiding losses to acquiring equivalent gains.	**Use of social norms** (Anthony et. al, 2019; Wong-Parodi et. al 2019); **Framing** (Singler, 2018)

Availability bias	The tendency of people to rely on immediate examples that come to their mind, weighing judgments towards recent information, when evaluating a topic or making a decision.	**Salience of consequences**, **Disclosure and transparency** (Mazutis and Eckhardt, 2017); **Reminders** (Thaler and Sunstein, 2008)
Overconfidence	The tendency to systematically overestimate our knowledge, the effort we put-in or our abilities.	**Disclosure and transparency** (Singler, 2018)
Confirmation bias	The tendency to search for or interpret information in a way that confirms one's already held beliefs or acquired information	**Precommitment strategies** (Singler, 2018)

(Samuelson, & Zeckhauser, 1988; Hochma, 2020)

5.2 Thematic analysis of interviews

To address the second sub-research question, we analyze our interviewees' answers and identify nudges from their mentioned solutions to issues related to each of the previously identified biases, as well as compare these nudges with findings from our literature review. The identified nudges can be a direct recommendation of nudge or our interpreted description of their knowledge and experience of how bias-issue can be- or was resolved in their experience.

We conducted semi-structured interviews where we started by asking our interviewees open-ended questions on how to use nudging to foster sustainability, innovation or sustainable innovation respectively. Subsequently, we moved on to asking our interviewees how they would, based on their knowledge and experience, address each of the biases we identified in our literature review as obstacles to sustainable innovation.

From the interviewees' responses, we identified the nudges at play to address the bias in question, or nudges relevant for fostering sustainability, innovation or sustainable innovation. In some cases, the interviewees would outright recommend a nudge. For the most part, we interpret the interviewees' responses on solutions into nudges. When interpreting the responses, we also consider the context in which they were provided. In order to reduce our own biases in the interpretation of the codes, each of us interpreted them independently and then consolidated our findings. Description of the nudges below can be found in table 5.

Table 2

Bias	**Identified nudges at play**
Present bias	**Salience of consequences** **Use of social norms** **Prompts/cues** **Demonstration of the behavior** **Imaginary reward** **Defaults** **Disclosure and transparency** **Feedback on outcome(s) of behavior** **Immediate feedback**
Status quo bias	**Disclosure and transparency** **Framing/reframing** **Imaginary reward***)* **Use of social norms** **Restructuring the social environment**
Risk- and loss aversion	**Future punishment** **Anticipated regret** **Social support (unspecified)** **Social support (practical)** **Social support (emotional)** **Use of social norms** **Comparative imagining of future outcomes** **Framing/reframing**

	Identity associated with changed behavior
Availability bias	**Restructuring the social environment** **Exposure** **Precommitment strategies**
Overconfidence bias	**Disclosure and transparency** **Discrepancy between current behavior and goal** **Re-attribution** **Information about antecedents** **Demonstration of the behavior**
Confirmation bias	**Precommitment strategies** **Disclosure and transparency** **Exposure** **Re-attribution** **Framing/reframing**

Source: Michie et. al, 2013; Marsden, 2016; Sunstein, 2014

5.2.1Nudging to address present bias

To address present bias, the responses by our interviewees were interpreted as Salience of consequences, Use of social norms, Prompts/cues, Demonstration of the behavior, Imaginary reward, Defaults, Disclosure and transparency, Feedback on outcome(s) of behavior and Immediate feedback.

In our literature review, the nudge identified as relevant to address present bias was immediate feedback as a type of nudge priming through increasing the salience of long-term effects of a behavior. In the BCT taxonomy, salience of consequences is defined as a nudging intervention on its own, characterized by the use of "methods specifically designed to emphasize the consequences of performing the behavior with the aim of making them more memorable" (Marsden, 2016). Immediate feedback is one of those methods. In line with Singler's (2018) suggestion to make positive long-term consequences tangible and visible in the day-to-day in order to address the present bias, one of our interviewees suggested to move "later" to "now" to actually make people experience what that "later" would be. (T. Lindström, personal communication, 2020).

The literature states that feedback particularly is of good use “in situations where the decision context does not provide strong signals in terms of long-term negative effects of a choice or behavior” (Network for Business Sustainability, 2012, p. 60). These types of situations can be identified in our interviewees’ examples of projects stretching over a longer period of time, or deciding whether to have part of your salary put into your pension fund. The link between the literature and our practitioner’s responses was clearly reflected in the case of the former example with projects, where Samuel emphasized the importance of giving feedback to “make people feel like they’re having some form of positive things happening at the moment” (S. Salzer, personal communication, 2020). In the case of the pension fund example, the nudges defaults and disclosure and transparency become apparent as useful tools to counteract the present bias. Particularly interesting with the example described by Tommy, based on the writings of Thaler and Sunstein (2008), is the description of the tactic to let part of the salary increase go into the pension fund so that “it doesn’t hurt them (the employees)” right now. You could argue that this choice is a way of also addressing risk- and loss aversion, since it avoids giving out money and then taking it back. However, the interviewee’s answer indicating the intentional avoidance of having employees get “hurt” in the present moment is what relates it to addressing the present bias. The “hurt” in the example of pension funds is avoided through the use of the default of having a percentage of salary increases going straight to the employee’s pension fund. By also helping employees visualize what saving will result in, the nudges imaginary reward and disclosure and transparency is at play. Finally, the nudges use of social norms, prompts/cues and demonstration of the behavior is interpreted from Tommy’s example of avoiding the procrastination of booking a trip together with others. Present bias can be addressed by introducing social or environmental stimulus to cue the behavior of actually making the booking. In his example, the prompt/cue is the intentional meeting up with those involved in the future trip in the present or as soon as possible. By everyone, or most of the people, in the group booking his or her ticket at that time, the individual is subject to influence of social norms. The nudge called demonstration of the behavior is used by those in the group who then books his or her own ticket in front of the others, encouraging them to imitate the same behavior.

5.2.2 Nudging to address status quo bias

To address status quo bias, the responses by our interviewees were interpreted as disclosure and transparency, framing/reframing, imaginary reward, use of social norms and restructuring the social environment.

In the literature, the nudges identified as relevant to address the status quo bias were defaults, commitment devices (e.g. precommitment strategies), feedback and framing/reframing. The only nudge overlapping between the literature and our interviews, was framing/reframing. Harker's (2017) case shows that resistance to change was more effectively combatted through explicitly stating that the desired behavior (telework) was the status quo than through the alternative of presenting the option of the behavior without making that explicit statement. In an example of framing from our interviewees, the framing concerned the suggestion to employees to start considering their work in terms of problems rather than seeing their work through the lens of their specific professional role. This conducive reduced attachment between the individual and his or her role was facilitated by restructuring the social environment. In her work with an insurance company, Natalia facilitated cooperative work by creating multidisciplinary groups where the focus was framed from the different roles of the participants to what problem they had in front of them. Our interviewee Samuel meant that status quo bias is closely linked to the challenge of forming habits and suggested use of social proof nudges if generating change is a challenge merely because of people preferring familiarity. Another interesting observation from our interviews was the perspective of Tommy, taking the approach that people actually are often not resistant to change, but that they actually want to change if they see that there is something in it for them. He emphasized the importance of understanding what holds people back from changing and what drives people. He also states that there are various emotional drivers involved in why it can be hard for people to change, and these drivers can be very complicated to completely understand. This underlines an important aspect of the implementation of nudges. It is a tool, and not an all-encompassing solution. A nudge will not help management of an organization to better understand their employees on the level of what drives them emotionally.

5.2.3 Nudging to address risk- and loss aversion

When asked about how to use nudging to address risk- and loss aversion, our interviewees brought up solutions related to the nudging interventions *anticipated regret* and *future*

punishment, use of social norms, framing/reframing and *identity associated with changed behavior*. Additional nudges interpreted from the responses to how to address risk- and loss aversion was *social support (unspecified), social support (emotional)* and *social support (practical).*

In the literature, the nudges uncovered as relevant to address risk- and loss aversion were use of social norms and framing/reframing. Singler (2018) and Anthony et. al (2019) suggest risk- and loss aversion be counteracted by reframing failure as something to be celebrated and accepted, either by a Spotify-like "fail wall" (Anthony et. al, 2019, p. 97), or by publicly glorifying people who fail and framing failure as a tool for learning (Singler, 2018). Our interviewees' approach to address risk- and loss aversion was instead to leverage risk- and loss aversion and to use fear of failure or loss as a driving force for change.

"*What I do is that I developed a very, very strong loss aversion when I sell solutions to companies… When I talk about a problem with a CEO for example, and that CEO says that "yes I agree with you that the Danish market is up this much, and it's great how can we fetch this opportunity". Then I slowly try to turn him round around and make the person see that it's not an opportunity, it's a risk of losing an opportunity. Because it's much stronger to make people feel that they're losing something there.*" (T. Lindström, personal communication, 2020)

In the scenario illustrated by this quote, our interviewee induces the CEOs expectations of future regret about not taking part of the benefits of a positive market development. The same interviewee also specifically commented on how loss aversion could be powerful to address in order to foster environmental sustainability.

"*If we talk about the environment, I think it's perfect to address loss aversion. We are losing the beautiful environment that we were born in, or that we used to have. . ."* (T. Lindström, personal communication, 2020)

This quote on addressing loss aversion illustrates the nudge of future punishment, where fear is aroused with the threat of unwanted behavior leading to the removal of the reward of being able to experience beautiful nature. The interview described that the effect of describing what would be lost in these terms is strong. The powerful effect could be strengthened by the

emotional aspect of appealing to the fear of losing the beauty of nature that many people have been growing up with and have a relationship with. This tactic is aligned with the framing by harnessing the risk- and loss aversion, suggested in the report by the Rare and The Behavioral Insights Team (2019). The report showcases an example of nudging where reputation risk or risk of having rights removed is highlighted in a campaign as a way to steer businesses a certain way. In this case, the fear of a business would be the failure of losing a good reputation. Another of our interviewees gave an example of a solution leveraging risk- and loss aversion by involving the nudges of anticipated regret and future punishment. When describing her work with an insurance company in Colombia, helping them to create more cooperative type of working, our interviewee said the following regarding the solution for them to overcome risk- and loss aversion.

"*. . . when they saw that other companies that had more innovative ways of doing things and like, going up in sales, they just saw that the need was created. They just felt that they needed to do it."* (N.G. Sicard, personal communication, 2020)

As in the study of Wong-Parodi et. al (2019), where information regarding energy consumption information at work was openly shared among colleagues, sales revenue is also public information peer companies can take part of. However, a difference between this example and the study of Wong-Parodi et. al (2019) is that the financial incentive is clear in the case of the interviewee's example above, while the study showed that energy savings were achieved without financial incentives. Within the example showcased in the quote about the insurance company, the relevance of nudging by the use of social norms is also emphasized. This nudge suggestion is aligned with the literature. Another issue with the risk- and loss aversion in the case of the Colombian insurance company, was that it was a company with strong associations to tradition. In Colombia, tradition is very important, and it was part of the company's brand value amongst consumers and potential employees. By changing their way of working, the company risked losing this association with tradition and potentially also losing brand value, consumers and employees. So, the way risk- and loss aversion was addressed in this case can be translated into the nudges of *framing/re-framing* and *Identity associated with changed behavior*.

"*. . . for them having these types of traditional associations and familiarity was very important. And so proposing this different type of way of working, it demanded a different way to define themselves.*" (N.G. Sicard, personal communication, 2020)

The company needed to construct a new identity since their incumbent one was strongly defined by tradition. Framing/reframing was then the tool to help re-frame the management's and employees' view of the company and how things should be done. The need for this re-framing can be illustrated by the quote below.

"*. . . once you propose a different way of work, actually, you're also proposing a different way to see things and to break tradition a little bit to get rid of tradition a little bit.*" (N.G. Sicard, personal communication, 2020)

Finally, when answering how to address risk- and loss aversion, Samuel emphasized the importance of instilling trust in people and helping people manage the inherent uncertainty of risk- and loss aversion being present in peoples' minds.

"*One of the hardest things when you try to do innovation is dealing with uncertainty in some ways in terms of being open to being wrong and having bad ideas, and all those things have a lot of trust.*" (S. Salzer, personal communication, 2020)

The nudges at play, interpreted from Samuel's answer on how to address the risk- and loss aversion, was social support (unspecified, emotional and practical).

5.2.4 Nudging to address availability bias

When we asked our interviewees about how to address availability bias, only one of them mentioned solutions to this and recognized that it was a big issue for innovation processes. Amongst the other two, Tommy stated that he hadn't experienced availability bias as a problem for organizations while Natalia recognized that it was an issue. The solutions brought forward by Samuel were interpreted as the nudges *restructuring the social environment, exposure* and *precommitment strategies.*

In the literature, the nudges identified as relevant to address the availability bias as a problem in organizations were salience of consequences, reminders and disclosure and transparency. Samuel proposed regularly gathering multidisciplinary groups of people with different backgrounds and everyday contexts as a way to address the availability bias, since people in those groups are likely to be subject to different availability biases. Furthermore, by making this a common occurrence and to have different people mixed up every time, both the nudge of restructuring the social environment and exposure will be employed. The former nudge is the changing of the social environment to, in this case, avoid judgments made in a group of people with similar availability biases. This means that any distortion of judgments imposed by the availability bias (Thaler and Sunstein, 2008) could be adjusted within groups because of the diverse composition of individuals. Compared to the literature, the answer from our interviewee suggests that the adjustment of judgment is made in-between individuals and not within the cognitive landscape of the individual him/herself as in the case with reminders (Thaler and Sunstein, 2008). The latter one is characterized by people systematically being confronted with any potentially feared stimulus (e.g. being uncomfortable when people disagree with your view) and hopefully develop an increased openness to new perspectives.
Another nudge interpreted from our interviewee's response is precommitment strategies. This type of nudge was interpreted from Samuel's quote below regarding the innovation process and, more specifically, idea generation.

"*It is really important as well to like to manage the innovation process in a way where one person is not really going to directly influence too many people in the beginning. So it's really good to have some like silent brainstorming, for example, where everyone writes down ideas, and then you first share them with small groups and then maybe afterwards, share them with the bigger groups, and so on so that you try to avoid one person setting kind of a very clear thing to think about, and then everyone's gonna think about that.*"

5.2.5 Nudging to address overconfidence bias

To address the overconfidence bias, the responses by our interviewees were interpreted as disclosure and transparency, discrepancy between current behavior and goal, re-attribution, information about antecedents and demonstration of the behavior.

In the literature, the nudges identified as relevant to address the overconfidence bias were disclosure and transparency. Singler's (2018) recommends counteracting this bias through the implementation of a limited number of indicators to regularly monitor and evaluate how a firm is meeting its desired goals. This disclosure and transparency nudge displays the firm's standing in an objective manner and is aligned with the nudge interpreted from our interviewee Tommy's approach to addressing this bias.

"*When I talk to, for example, a management team or an HR department, they usually say that they got it all under control…. What I do is start to ask questions and peel off a layer of, what you would say, not that effective decisions. Or just address the unanswered questions. I think that's the way of doing it. In the end, they understand that we have a problem.*" (T. Lindström, personal communication, 2020)

The above quote exemplifies a way of using disclosure and transparency as a nudge, not through monitoring or directly providing or showing alignment with result indicators but instead creating awareness through asking questions. Even though Tommy comes into the situation, perhaps immediately identifying that the overconfidence bias is an issue, the nudge of disclosure and transparency implemented in this way allows the management or HR team to realize it for themselves. This practice of drawing attention to the discrepancy between current behavior and set goals also illustrates the nudge discrepancy between current behavior and goal. In the process of doing this, Tommy also employs the nudge of re-attribution, meaning that he elicits the perceived causes of the current behavior(s) within the organization and suggests alternative explanations to the management team.

"*I might say that it takes up to a couple of months to reach a vision and common core values that actually drive behavior towards our common goal. It takes a long time, you don't do that at a half-day kickoff. I think that knowledge can fight that bias, to show people that they don't really understand...*"

From Tommy providing this alternative explanation, we also interpret that the nudge information about antecedents is at play since what he does is to provide the organization with information about certain factors (situations, events, emotions, cognitions) that will predict the

resulting performance of behavior. From our interview with Natalia, the nudge of demonstration of behavior was interpreted as relevant. When her client company tried to encourage more cooperative work, the success was partly contributed to the fact that people in the marketing department were open to this new way of working and started using it. They were able to recognize that their own judgment was sometimes limited and welcomed opinions from employees with other specializations.

"*Statisticians and mathematicians were kind of like that. Like they have the numbers so they knew more*" (N.G. Sicard, personal communication, 2020)

As illustrated in this quote, other departments than the marketing one were more resistant to adopting the new way of working and seemingly more affected by the overconfidence bias. However, this resistance could be loosened up, and the bias addressed, by the marketing department leading by example and demonstrating the desired behavior.

5.2.6 Nudging to address confirmation bias

To address the confirmation bias, the responses by our interviewees were interpreted as precommitment strategies, disclosure and transparency, exposure, framing/reframing and re-attribution.

In the literature, the nudge identified as relevant to address the confirmation bias was precommitment strategies. Singler (2018) suggests the development of a habit to question yourself and to include a devil's advocate in organizational teams. Tommy's example that relate to precommitment strategies within organizations is illustrated below.

"*. . . management teams tend to develop the same view of the organizations . . . One way to handle this, is that everyone has to put down on a paper, their view of a particular issue, or anything, before the meeting. That's where you will get away from, at least from some confirmation bias, from other people in the same room."* (T. Lindström, personal communication, 2020)

Committing to a view before a meeting, which is then put down on paper for the team to go through together, allows for employing systematic objective assessment of new information and consideration of the alternatives (Soll and Klayman 2004; Fung, 2013). In addition to precommitment strategies, our interviews responses regarding confirmation bias revealed the relevance of the nudges disclosure and transparency, exposure, framing/reframing and re-attribution.

". . . they were aware of the gaps that they had. And therefore, they looked for different explanations for different topics, even though it was like it showed the opposite of what they thought in the first place, and actually that was understood as a positive thing because they were more excited to learn than to confirm, and I think that that kind of mindset helped them a lot." (N.G. Sicard, personal communication, 2020)

In this example, precommitment strategies are at play as well since the organization Natalia worked with had intentionally decided to look for explanations and information contradicting their own views. On top of that, being aware of the gaps that they had played a role and this awareness could be achieved through the use of disclosure and transparency. Furthermore, a reason the confirmation bias can be so strong is that it feels good to have your thoughts, opinions and views confirmed (Sunstein and Thaler, 2008). Thus, there is very often some level of fear or discomfort involved when trying to counteract it and expose yourself to information contradicting your own views. In the case of Natalia's client company, they reduced the effect of this feared stimulus by the use of the nudge exposure. Exposure essentially means the systematic confrontation with a feared stimulus, which in turn reduces its effect in a later encounter. Re-attribution was at play in the sense that the organization decided to elicit their perceived causes or explanations of certain behaviors, and then suggested different explanations to themselves by first searching for them. Finally, we interpreted framing/reframing from the fact that the organization managed to develop a mindset of viewing contradiction to their views as learning and something positive as opposed to being wrong and other negative attributes.

6 Summary of analysis findings

6.1 Analysis findings

All biases identified in the semi-systematic literature review were confirmed to be relevant inhibitors of fostering sustainability, innovation and/or sustainable innovation within organizations, by eight professional respondents. Present bias was the most often experienced bias, and status quo the second most frequently experienced one. In the responses to the questionnaire, the professionals also confirmed that behavioral challenges are relevant obstacles to fostering sustainable innovation within an organizational context. 75% of the respondents even deemed it to be a significant, or very difficult, challenge.

Overall, all the nudges identified in our literature review as helpful for fostering sustainable innovation, either directly or through the proxy of addressing (a) certain bias (es) were reflected in our interpretations of our interviewees' responses listed in the BCT taxonomy (Michie et al., 2013) and by Sunstein (2014). There were overlaps between findings from the literature review and the interviews for almost each bias, meaning that one or more types of nudges were suggested as a way to address the same bias (illustrated as a colored line in the visual mapping (Figure 4) of findings above). The only exception was for the availability bias where literature suggests the use of priming w. salience and disclosure and transparency while our expert interviews instead suggest the nudges restructuring the social environment, exposure and precommitment strategies. We were able to identify a greater number of nudges when interpreting our interviews than in our literature review.

From our interviews with behavioral practitioners, we found that their way of conducting work differs from the more structural and anatomical way of addressing biases seen in the literature and, followingly, our literature review (Table 4). In practice, experts seemingly don't take the approach of addressing specific biases in their work. Our nudging interviewees were also adamant about the fact that nudging is just one of the tools in their toolbox and never a "one-size-fits-all" solution. Their main recommendation for the use of nudging in an organizational context, was to make sure you understand the particular problem before designing any type of

behavioral solution to address it. They also emphasized the need of rewarding behavioral outcomes, and forming and reversing habits, since behaviors need to be reinforced in order to achieve long-term change. The nudges we interpreted from their general recommendation on reinforcing behavior can be seen in the table below (Table 3).

Table 3

Nudging interventions derived from general recommendations
Problem Solving – *Analyze, or prompt the person to analyze, factors influencing the behavior and generate or select strategies that include overcoming barriers and/or increasing facilitator* **Habit formation** – *Prompt rehearsal and repetition of the behavior in the same context repeatedly so that the context elicits the behavior* **Habit reversal** – *Prompt rehearsal and repetition of an alternative behavior to replace an unwanted habitual behavior* **Reward (outcome)** – *Arrange for the delivery of a reward if and only if there has been effort and/or progress in achieving the behavioral outcome (includes 'Positive reinforcement')*

Table 4

Bias	**Nudges derived from literature**	**Nudges derived from interviews**
Present bias	Immediate feedback	Salience of consequences Use of social norms Prompts/cues Demonstration of the behavior – Imaginary reward Defaults Disclosure and transparency Feedback on outcome(s) of behavior – Immediate feedback
Status quo bias	Defaults	Disclosure and transparency

	Feedback on outcome(s) of behavior Framing Pre-commitment strategies	Framing/reframing Imaginary reward Use of social norms Restructuring the social environment
Risk- and loss aversion	Use of social norms Framing/re-framing	Future punishment Anticipated regret Social support (unspecified) Social support (practical) Social support (emotional) Use of social norms Comparative imagining of future outcomes Framing/reframing Identity associated with changed behavior
Availability bias	Salience of consequences, Disclosure and transparency Reminders	Restructuring the social environment Exposure Precommitment strategies
Overconfidence	Disclosure and transparency	Disclosure and transparency Discrepancy between current behavior and goal Re-attribution Information about antecedents Demonstration of the behavior
Confirmation bias	Precommitment strategies	Precommitment strategies Disclosure and transparency Exposure Re-attribution Framing/reframing

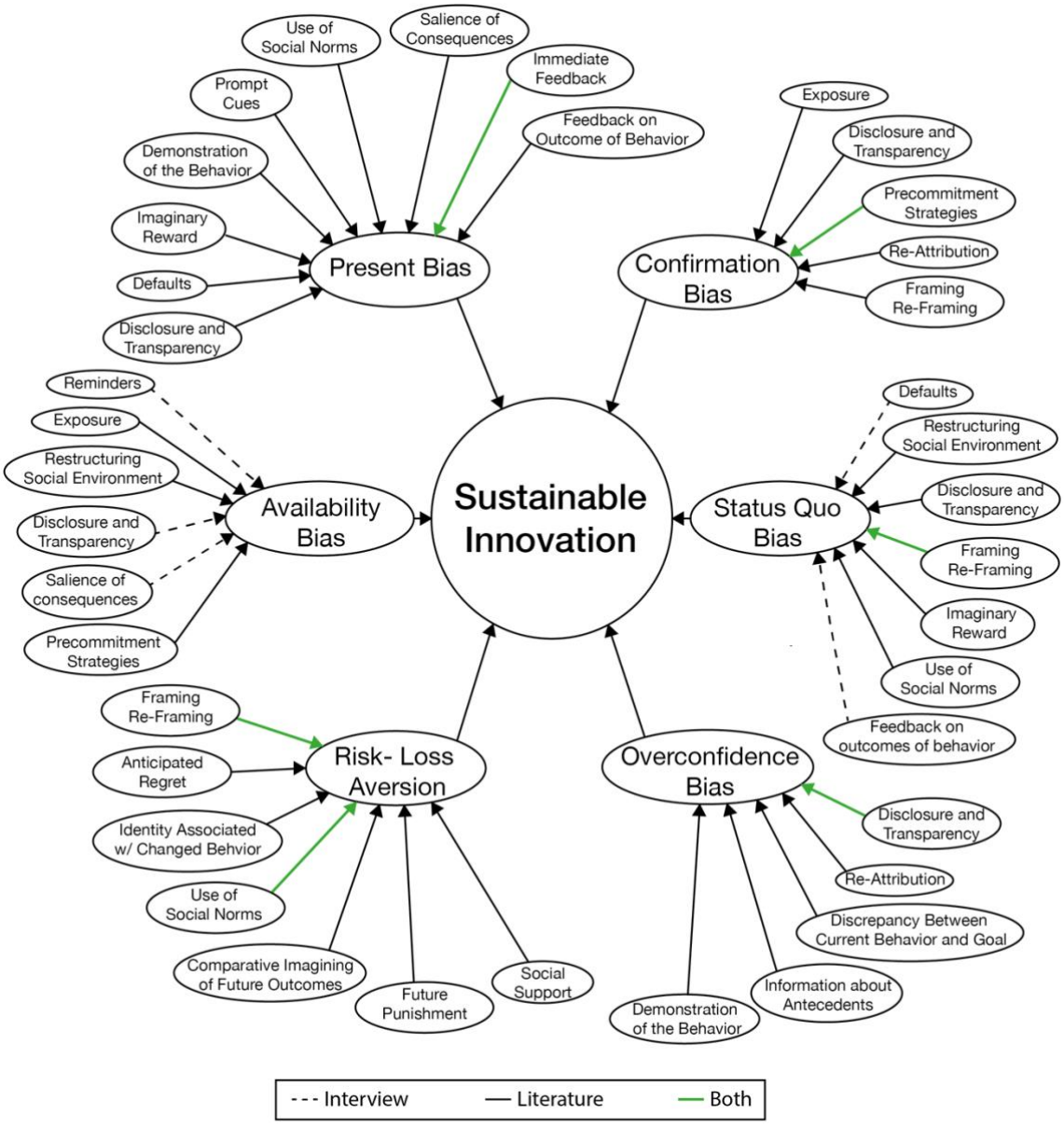


Figure 4 (Source: created by the authors)

Hypothetical conceptual model: Organizational nudging approach for sustainable innovation

In the table and figure above, we outline the biases that our research shows inhibit sustainable innovation, together with appropriate nudges to address these biases. The arrows link each nudge with the bias that is being addressed, and moving towards the center of the map, each bias is connected to sustainable innovation. This map is built on knowledge from both theory and practice: the solid line indicates it comes from the literature, the dashed line indicates it comes from the interviews and the green line indicates instead knowledge overlapping between the literature and the interviews. Below,

in table 5, there is a description of each nudge and what biases our study shows it could be helpful in addressing.

6.2 Describing the nudges

Table 5

Anticipated regret	"Induce or raise awareness of expectations of future regret about performance of the unwanted behavior." (Marsden, 2016;, para. 12)
Comparative imagining of future outcomes	"Prompt or advise the imagining and comparing of future outcomes of changed versus unchanged behavior." (Marsden, 2016;, para. 16)
Defaults	Introduce pre-set courses of action that take effect if nothing is specified by the decision maker.
Demonstration of the behavior	"Provide an observable sample of the performance of the behavior, directly in person or indirectly e.g. via film, pictures, for the person to aspire to or imitate." (Marsden, 2016; para. 13)
Disclosure and transparency	Disclose behavior outcomes and make them transparent by e.g. visualization.
Discrepancy between current behavior and goal	"Draw attention to discrepancies between a person's current behavior (in and the person's previously set goals." (Marsden, 2016; para. 8)
Exposure	"Provide systematic confrontation with a feared stimulus to reduce the response to a later encounter." (Marsden, 2016; para. 14)
Feedback on outcome(s) of behavior	"Monitor and provide feedback on the outcome of performance of the behavior." (Marsden, 2016; para. 9)
Framing/reframing	"Suggest the deliberate adoption of a perspective or new perspective on behavior (e.g. its purpose) in order to change cognitions or emotions about

	performing the behavior (includes 'Cognitive structuring')." (Marsden, 2016; para. 20)
Future punishment	"Inform that future punishment or removal of reward will be a consequence of performance of an unwanted behavior (may include fear arousal) (includes 'Threat')." (Marsden, 2016; para. 17)
Identity associated with changed behavior	"Advise the person to construct a new self- identity as someone who 'used to engage with the unwanted behavior'." (Marsden, 2016; para. 20)
Imaginary reward	"Advise to imagine performing the wanted behavior in a real-life situation followed by imagining a pleasant consequence (includes 'Covert conditioning')." (Marsden, 2016; para. 23)
Immediate feedback	Provide immediate feedback to a certain behavior.
Information about antecedents	"Provide information about antecedents (e.g. social and environmental situations and events, emotions, cognitions) that reliably predict performance of the behavior." (Marsden, 2016; para. 11)
Pre-commitment strategies	(Have) people commit to a certain course of action.
Prompts/cues	"Introduce or define environmental or social stimulus with the purpose of prompting or cueing the behavior." (Marsden, 2016; para. 14)
Re-attribution	"Elicit perceived causes of behavior and suggest alternative explanations." (Marsden, 2016; para. 11)
Reminders	Provide a reminder to perform the behavior.
Restructuring the social environment	"Change, or advise to change the social environment in order to facilitate performance of the wanted behavior or create barriers to the unwanted behavior ((other than prompts/cues, rewards and punishments." (Marsden, 2016; para. 19)
Salience of consequences	"Use methods specifically designed to emphasize the consequences of performing the behaviur with the aim of making them more memorable." (Marsden, 2016; para. 12)

Social support (emotional)	"Advise on, arrange, or provide emotional social support for performance of the behavior." (Marsden, 2016; para. 10)
Social support (practical)	"Advise on, arrange, or provide practical help for performance of the behavior." (Marsden, 2016; para. 10)
Social support (unspecified)	"Advise on, arrange or provide social support or non- contingent praise or reward for performance of the behavior." (Marsden, 2016; para. 10)
Use of social norms	Emphasize what most people do.

Sources: Marsden (2016); Sunstein (2014)

7 Discussion

Previous research has shown that nudging can be an effective tool to change peoples' behavior, without limiting their freedom of choice (Thaler and Sunstein, 2008). Nudges has mostly been researched and implemented in the public sphere or targeting consumers. However, the use of nudging for organizational purposes has grown increasingly popular in recent years, both in practice and in academic literature. This is reflected in the research by Ebert & Freibichler (2017) who showed that "nudge management" can be used to improve organizational productivity and in research on organizational nudging used to foster employee health (Chauhan, 2019; Srivastava, 2012; Van der Meiden et. al, 2019), gender diversity and gender equality (Atal et. al, 2019; Mantashian et al., 2019; Correll, 2017) and environmentally sustainable behavior (Baranova et. al, 2017; Wong-Parodi et. al, 2019; Ferrari et. al, 2019; Rosenkranz et. al, 2017; Chakravarty and Mishra, 2019). There is also some research on organizational nudging for innovation (Potts & Morrison, 2009; Anthony et. al, 2019; Erkut, 2016; Rigtering et. al, 2018), for creativity (Leegard, 2019), ideation for sustainable business model innovation (Haag and Urban, 2019) and for effectuation skill development (Holtel and Heinen-Konschak, 2019). Grey literature such as Singler's book on nudge management (2018) and the report on innovative atmosphere by Porsche Consulting (2018) further adds to the body of literature on organization nudging. However, the literature on nudging in an organizational context is still relatively scarce, and especially lacking in knowledge about how nudging can be used by organizations to foster sustainable innovation. We wanted to contribute to filling this knowledge gap.

7.1 Assessing the validity of our findings

We managed to achieve our research objective of gaining a better understanding of how organizations could use nudging to foster sustainable innovation, by identifying the main biases that inhibit sustainable innovation, the nudges that are could be used to address them and letting theory and practice provide us with further valuable insights for nudging within an organizational context. Drawing on the strengths and weaknesses of our methodological choice already discussed in the method chapter, we will discuss the validity of our findings. We used

a questionnaire to measure the relevance of biases as an obstacle to sustainable innovation. Relevance was assessed by if and how often the responding professionals experienced the proposed bias as an obstacle to the mission of their work (fostering sustainability, innovation and/or innovation). Our interviews regarding biases was conducted in order to further investigate the relevance of the biases as a threat to sustainable innovation and to test how the biases proposed by theory fit with the interviewees' real-life descriptions of the behavioural issues they had experienced. Finally, from the interviews, we wanted to find out whether the inference we had made from the intersection between sustainability and innovation to sustainable innovation was arguably justifiable for the purpose of this thesis. In our interviews informing the second sub-research question, we aimed to gain insights on organizational nudging from experts, and to find what nudges could be suitable to foster sustainable innovation. By conducting a thematic analysis of these interviews, we were able to reveal themes in the data and interpret the answers with the lens of valid nudge taxonomies (Sunstein, 2014; Michie et. al, 2013). Our literature research informing both sub-research questions, was conducted and analyzed in order to answer our research question from a theoretical perspective. Overall, our data collection methods measured what we intended them to measure. Thus, in terms of internal validity, we deem our findings to be valid since our data collection methods measured what they were intended to measure. In terms of content validity, we also believe that our questions used in the questionnaire and the interviews provide adequate coverage in informing our research question(s). However, we cannot ensure predictive validity, due to our small sample and lack of experimentation and research conducted on each of the nudges that we identified in this study. In regard to construct validity, the degree to which we can confidently make inferences from this study is relatively low since our sample is small and we subjectively conduct interpretation at several stages in the paper. However, the fact that our sample consist of experts within their fields increases this type of validity of our findings. Additionally, so does the fact that we employ triangulation of both data and methods. Using two or more independent sources of data (triangulation) further improves the validity of our findings (Saunders et. al et al., 2009). We recognize that our topic was broad and that our results are not conclusive. However, both of these characteristics are acceptable and even normal for qualitative exploratory studies. It lays the groundwork for further experimentation and explanatory work.

7.2 Addressing specific biases and limitations with nudging

To address specific biases was somewhat critiqued by our interviewees with experience in nudging implementation, with the main argument that this is not how they approach their work. The interviewees highlighted that their work usually is more focused on developing a clear idea of a problem, and not consciously based on identifying and addressing specific biases at a time. Tommy stated that ". . . you can't start to address all biases just randomly because there are so many biases that you can address. So, you need to have some idea of what this specific problem is of that particular person or group of people . . . I think that the scientists are finding new biases all the time in their research. So, the number of biases may not be infinite, but it's quite great that number so that's why it doesn't help if you just randomly try to apply them. Because there are so many." Samuel took the example of the overconfidence bias and says that ". . . what was interesting was like people can also be under confident, right? You can both overcome them and then you can be opposite. You'd have some people saying, like," I would never be able to do this" So that's why it's interesting." (S. Salzer, personal communication, 2020). Indeed, these are interesting insights and further urges anyone attempting to work with behavioral interventions to ensure they try to understand the targeted problems case-by-case.

Even though our interviewees critiqued the approach of addressing specific biases, they often described certain biases at play when talking about nudging. For example, Samuel talked about nudging for idea generation and explained how people often get over-attached to ideas, which is in line with Singler's (2018) explanation of the over-attachment to projects generated by the possession bias. Samuel emphasized the importance of separating people from ideas in the beginning of the process in order to avoid this over-attachment and related irrational subjectivity. So, even though our interviewees critiqued the approach of addressing specific biases, this is a clear case when the described problem and related solution aimed at fostering innovation illustrated a specific bias at play: the possession bias. They emphasized the importance of thoroughly understanding the problem before jumping on to a solution when working with behavioral issues. They recognize nudging as one of the tools available in their work, but that it is never a "one-size-fits-all" solution to any problem or in any situation. When

Tommy talked about the way some behavioral consultancies work to implement nudging in organizations ". . .It's starting on the wrong end. They start with a solution. They start with, we can help you with nudging." (T. Lindström, personal communication, 2020). He also states that the power of a nudge is determined by the situation and problem that one implements it in and for. Furthermore, Samuel explains that he doesn't ". . . really think about nudges" in his work (S. Salzer, personal communication, 2020). All the interviews also expressed a concern for nudging only influencing temporary behavior change, and emphasized the importance of reinforcing behavior and creating habits in order to create long-term change.

In light of this criticism, we argue that certain biases are more relevant in certain contexts than in others. We don't claim our findings of biases inhibiting sustainable innovation to be exhaustive, but we do claim that we have valid grounds for stating that they are relevant obstacles to sustainable innovation. Addressing specific biases was a way for us to circumvent the lack of literature on nudges fostering sustainable innovation and to be able to answer our research question. We also drew the biases from established innovation theories and previous research on biases inhibiting sustainability. Overall, we believe the main takeaway from the interview critique of addressing specific biases and recommendations regarding nudge implementation, is for implementors to adopt a mindset which aims to thoroughly understand a behavioral issue and then ways to address it, rather than targeting specific biases or believing a nudge can be a "one size fits all" solution.

7.3 Addressing effects of scarce and scattered literature

Seeing that the literature on biases and nudging is so vast and scattered across different fields and in grey literature, we cannot ensure that our literature research is comprehensive. Several factors could be attributed to why we identified more nudges through our interviews than in our literature research. One reason could be the lack of literature of nudging within an organizational context, and even a greater lack of literature context-relevant to nudging for sustainable innovation. Another is the scattered nature of the literature due to the fact that nudging is a concept that is closely related to the field of psychology and has been researched embedded in various disciplines such as public health and public policy. For our sub-research question 2, we only looked at papers who specifically employed nudge theory, and there are

likely other papers where nudge-like interventions have been explored but which we didn't access in our search.

We recognize that our subjectivity and potential biases might have affected the literature research, interpretation and analysis. However, for our semi-systematic review we followed a structured process and used inclusion/exclusion criteria. In our thematic analysis, we coded the interviews independently and proceeded with independent interpretations in line with our adopted nudge taxonomies. With these means, we limited the influence of our personal values and biases. Subsequently, another limitation of our work is the small sample but the fact that we used purposive sampling and interviewed experts weighs up for this limitation. Additionally, our ability to find interviews was restricted by the currently ongoing global pandemic.

7.4 The global pandemic of Covid-19

The period of writing our thesis was definitely affected by extenuating circumstances with the global pandemic of Covid-19. We started out with a completely different approach than the one we ended up doing. From the start of the year, we had been in touch with a contact at an organization in Italy in order to conduct in-depth interviews and potentially some small-scale experiment. When the global pandemic hit, especially early on and very forceful in Italy, things understandably was put on hold at once and communication halted. This forced us to immediately redesign our approach and find new interviewees for our study, which was not a simple task in the current global climate.

7.5 Further research

We highly encourage further research and experimentation on the topic of nudging within organizations/organizational nudging/nudge management. For example, we would like to suggest inquiries into the (relative) effectiveness of certain nudges, challenges in implementing them for sustainable innovation, and research into the effects on long-term behavior in an organizational context. Ethics of nudging is also an important consideration when

implementing nudging, so we would suggest this factor to be included in research more closely related to implementation of nudges within an organizational context. Additionally, in regard to the biases identified as obstacles to sustainable innovation, there is value in researching if this holds true for smaller organizations, since one delimitation of our methodological choices was that the respondents we interviewed for sub-research question 1 were from larger organizations. Additionally, we would also suggest this study be complemented with further research employing a larger sample size in order to enable statistical inference and generalizability. Since sustainable innovation is a broad topic, we would also propose experiments with a clear focus under this umbrella term. The more studies out there, the better chance for enabling future systematic reviews of evidence on the topic. We used the type of nudges listed by Sunstein (2014) and Michie et. al (2013) in our research, and we propose that any research building on ours do the same, for comparison reasons. This would be helpful in order to ensure comprehensive studies on nudging interventions, and to facilitate the evaluation of the state of knowledge.

8 Conclusion

We conducted this research in order to explore how organizations can use nudging to foster sustainable innovation. Our research objective was to develop insights on how organizations could use nudging to foster sustainable innovation and provide a basis for further research and practical experimentation by organizations aiming to foster innovation that is sustainable for people, planet and profit. We managed to achieve this objective, through providing a hypothetical conceptual model based on theory and expert knowledge from practitioners. It outlines the findings of appropriate nudges to foster sustainable innovation in organizations, through addressing biases that inhibit it. These findings are presented visually (Figure 4). As revealed by its name, the model is hypothetical and needs testing in further research to ensure predictive- and construct validity and reliability on top of internal- and content validity. However, the triangulation employed by using different data and methods as well as the purposive sampling are factors that improve the validity and reliability of our findings.

So, to answer our research question, *how can organizations use nudging to foster sustainable innovation?,* this research suggests the following approach:

1. Start from scratch by making an attempt to thoroughly understand the cognitive and behavioral issues inhibiting sustainable innovation in the organization. Identify any biases at play.

2. After having identified the relevant issues and related biases, compare them with the biases identified in our hypothetical model and see if they align or help explain the experienced issue.

3. If the biases identified within the organization align with any of the biases presented in the hypothetical model, use guides for nudge implementation (OECD 2019, Singler, 2018) to experiment with implementing one or more of the nudges suggested to address them.

At the heart of this process is the notion that cognition and behavior is complex, thus, understanding the problem at hand is of great importance. As our expert interviews informed us, no nudge is a one-size-fits-all, and there are ethical considerations to take into account when implementing nudging. Our hypothetical model serves as one of many relevant tools for organizations setting out to foster sustainable innovation.

In line with our research objective, we have provided a basis for further research and for practical experimentation by organizations aiming to foster innovation that is sustainable for people, planet and profit. When implementing nudges in organizations, it is important that practitioners focus on behavioral problem-solving rather than test any of our suggested nudges without understanding the issue that they are dealing with. If they can see problems related to the biases we present in this thesis, we have provided them with theory- and practice-informed ideas of potentially helpful nudges to address these. In addition, to reinforcing behavior is critical in order to foster long-term change of behavior, which we indeed hope would be the aspiration of organizations aiming to foster sustainable innovation. The most important limitation of our study is the small empirical sample size and the scarcity and scattered nature of literature on the topic. These limitations limit the inference that can be drawn from the study overall and from the small empirical sample size, and our literature research has potentially left out relevant research. Ironically, our own biases is another important limitation of the study. We made interpretations we have made in several stages of the study, and our subjectivity has influenced the analysis and the literature research. However, we deemed this approach practically necessary due to the scarcity and scattered nature of the research on the topic. The biased influence of researchers' experiences and values impacting the research is also accepted in the critical realist approach (Saunders et. al, 2009, p.119). In addition, the interpretations we made were based on pre-defines definitions and taxonomies of biases or nudges and in line with the philosophy of critical realism, we deem the interpretation of reality by others, presented in our data, to be acceptable knowledge. The same holds for our own interpretations of this data in the analysis.

The strengths making this study significant is that it builds on theory and practice and triangulates data and methods in order to answer the main research question. The takeaway is not only the ingredient list of relevant biases and nudges to conduct further research and

experiments on. In addition, there are plenty of insights that can be derived from our appendices. For example, it is possible for anyone to conduct their own analysis of our interviews or re-interpret our codes. As previously stated, there is a significant lack of literature on nudging within organizational context, especially in regard to sustainable innovation. Our study is unprecedented as it provides an overview of biases inhibiting sustainable innovation in an organizational context and suggest nudges to address them based on academic research and behavioral expert knowledge. Our hope is that our ingredient lists and insights can enable academic research and organizational experimentation, and further the knowledge on how to use nudging to foster sustainable innovation within an organizational context. We have presented the main findings relevant to answer our research question on "*How can organizations use nudging to foster sustainable innovation?*", and our answer to this question is two-fold. First, organizations can investigate what biases inhibit sustainable innovation in their organization. In this first step, the identification and descriptions of biases presented in this thesis as common threats to sustainable innovation can serve a supporting function. Secondly, based on what biases they recognize as obstacles within their organization, they can experiment with implementing the appropriate nudges suggested in this thesis in order to address them and foster sustainable innovation. In any type of nudge implementation, it is important to evaluate the effects. Helpful guides that organizations can use for nudge implementation include the OECD BASIC framework (OECD, 2019) and steps outlined in Nudge management (Singler, 2018).

9 Bibliography

Adams, R.J., Bessant, J., Jeanrenaud, S., Overy, P. and Denyer, D., 2012. Innovating for sustainability: a systematic review of the body of knowledge.

Albareda, L., Lozano, J. M. and Ysa, T. (2007) 'Public policies on corporate social responsibility: The role of governments in Europe', Journal of Business Ethics, 74(4), pp. 391–407. doi: 10.1007/s10551-007-9514-1.

Ankersborg, V. and Wrisberg, A. H. (2020) 'Scientific Research Based on Literature With or Without Minor Empirical Elements'. CBS.

Anthony, S. D., Cobban, P., Nair, R., & Painchaud, N. (2019). Breaking Down the Barriers to Innovation. Harvard Business Review, 97(6), 92–101. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=139017615&login.asp&site=ehost-live&scope=site

Archel, P., Fernández, M. and Larrinaga, C. (2008) 'The organizational and operational boundaries of triple bottom line reporting: A survey', Environmental Management, 41(1), pp. 106–117. doi: 10.1007/s00267-007-9029-7.

Arnold, M.G. and Hockerts, K., 2011. The greening Dutchman: Philips' process of green flagging to drive sustainable innovations. Business Strategy and the Environment, 20(6), pp.394-407.

Bazerman, M., M. Watkins. 2004. Predictable Surprises: The Disas ters You Should Have Seen and How to Prevent Them. Harvard Business School Press, Boston, MA.

Boons, F. and Lüdeke-Freund, F., 2013. Business models for sustainable innovation: state-of-the-art and steps towards a research agenda. Journal of Cleaner Production, 45, pp.9-19.

Boons, F., Montalvo, C., Quist, J., & Wagner, M. (2013). Sustainable innovation, business models and economic performance: an overview. Journal of Cleaner Production, 45, 1-8.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), APA handbooks in psychology®. APA handbook of research methods in psychology, Vol. 2. Research designs: Quantitative, qualitative, neuropsychological, and biological (p. 57–71). American Psychological Association. https://doi.org/10.1037/13620-004

Charter, M. and Clark, T., 2007. Sustainable Innovation: Key conclusions from sustainable innovation conferences 2003-2006 organised by The Centre for Sustainable Design. The Centre for Sustainable Design, University College for the Creative Arts.

Charter, M., Gray, C., Clark, T., Woolman, T., 2008. Review: the role of business in realising sustainable consumption and production. In: Tukker, A., Charter, M., Vezzoli, C., Stø, E., Andersen, M.M. (Eds.), Perspectives on Radical Changes to Sustainable Consumption and Production. System Innovation for Sustainability. Greenleaf, Sheffield, pp. 46e69.

Chataway R.(2020), The Behaviour Business. How to apply behavioural science for business success.

Christensen, K. (2019). Q&A: A cognitive scientist describes the increasing value of behavioural insights for business. Rotman Management, 99–101. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=135905691&site=ehost-live

Cohen, S. L., Bingham, C. B. and Hallen, B. L. (2019) 'The Role of Accelerator Designs in Mitigating Bounded Rationality in New Ventures', Administrative Science Quarterly, 64(4), pp. 810–854. doi: 10.1177/0001839218782131.

Collinson, S., & Wilson, D. C. (2006). Inertia in Japanese Organizations: Knowledge Management Routines and Failure to Innovate. Organization Studies, 27(9), 1359–1387.

Correll, S. J., (2017). Reducing gender biases in modern workplaces: A small wins approach to organizational change. Gender and Society, 31(6), 725-750.

Damanpour, F. (1991). Organizational innovation: a meta-analysis of effects of determinants and moderators. Academy of Management Journal, 34(3), 555–90

Daneels, 2010

Darren Good & Eric J. Michel (2013) Individual Ambidexterity: Exploring and Exploiting in Dynamic Contexts, The Journal of Psychology: Interdisciplinary and Applied, 147:5, 435-453

de Carvalho, R. G., Palma-Oliveira, J. M. and Corral-Verdugo, V. (2010) 'why do people fail to act? Situational barriers and constraints on pro-ecological behavior', Psychological Approaches to Sustainability: Current Trends in Theory, Research and Applications, (June 2014), pp. 295–316.

Dubois, A. and Gadde, L. E. (2002) 'Systematic combining: An abductive approach to case research', Journal of Business Research, 55(7), pp. 553–560. doi: 10.1016/S0148-2963(00)00195-8.

Duncan, R. (1976). The ambidextrous organization: Designing dual structures for innovation. Killman, R. H., L. R. Pondy, and D. Sleven (eds.) The Management of Organization. New York: North Holland. 167-188.

Ebert, P., & Freibichler, W. (2017). Nudge management: applying behavioural science to increase knowledge worker productivity. Journal of Organization Design, 6(1), 1–6. https://doi.org/10.1186/s41469-017-0014-1

Eisenhardt, K., Furr, N. and Bingham, C., 2010. CROSSROADS—Microfoundations of Performance: Balancing Efficiency and Flexibility in Dynamic Environments. Organization Science, 21(6), pp.1263-1273.

Eisenhardt, K.M. and Martin, J.A. (2000), Dynamic capabilities: what are they?. Strat. Mgmt. J., 21: 1105-1121.

Fauzi, H., Svensson, G. and Rahman, A. A. (2010) '"Triple bottom line" as "sustainable corporate performance": A proposition for the future', Sustainability, 2(5), pp. 1345–1360. doi: 10.3390/su2051345.

Ford, J. D., & Backoff, R. W. (1988). Organizational change in and out of dualities and paradox. In R. E. Quinn & K. S. Cameron (Eds.), Ballinger series on innovation and organizational change. Paradox and transformation: Toward a theory of change in organization and management (p. 81–121). Ballinger Publishing Co/Harper & Row Publishers.

Freidberg, S. (2013) 'Calculating sustainability in supply chain capitalism', Economy and Society. Taylor & Francis, 42(4), pp. 571–596. doi: 10.1080/03085147.2012.760349.

Fung, Kit Shan. Innovation Decision under Uncertainty; How Cognitive Biases Can Help Explain the Imbalance of Exploration and Exploitation That Leads to Singular Innovation Trajectories? (2014).

Gilbert, C. G. 2006. Change in the presence of residual fit: Can competing frames coexist? Organ. Sci. 17(1) 150–167.

Goodwin, T. (2012). Why We Should Reject "Nudge." Politics, 32(2), 85–92.

Güntner, A., Smith, M., Sperling, J., & Dickson, T. (2018). Behavioral science in business: Nudging, debiasing, and managing the irrational mind. McKinsey Insights, 1. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=133513942&site=ehost-live&scope=site

Güntner, A., Smith, M., Sperling, J., & Dickson, T. (2018). Behavioral science in business: Nudging, debiasing, and managing the irrational mind. McKinsey Insights, 1. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=133513942&site=ehost-live&scope=site

Haigh, F., Kemp, L., Bazeley, P. et al. Developing a critical realist informed framework to explain how the human rights and social determinants of health relationship works. BMC Public Health 19, 1571 (2019). https://doi.org/10.1186/s12889-019-7760-7

Hansen, E.G., Grosse-Dunker, F. and Reichwald, R., 2009. Sustainability innovation cube—a framework to evaluate sustainability-oriented innovations. International Journal of Innovation Management, 13(04), pp.683-713.

Hansen, P. G., & Jespersen, A. M. (2013). Nudge and the Manipulation of Choice. European Journal of Risk Regulation, 1, 3–28.

Henderson, R., Clark, K., 1990. Architectural innovation: the reconfiguration of existing product technologies and the failure of established firms. Administrative Science Quarterly 35, 9e30.

Hertwig, R. (2016). Damit kehrt man der Aufklärung den Rücken. Max Planck Forschung.

Hochma, T., 2020. Cognitive Biases: The Ultimate List Of Human Irrational Decisions. [online] HumanHow. Available at: <http://humanhow.com/en/list-of-cognitive-biases-with-examples/> [Accessed 21 April 2020].

Hoffman A. and Bazerman M. H., "Changing Environmental Practice: Understanding and Overcoming the Organizational and Psychological Barriers" (Ross School of Business Working Paper No. 923, 2005)

Hoffman A. and Henn R., "Overcoming the Social and Psychological Barriers to Green Building" Ross School of Business Working Paper Series, Working Paper No. 1106, 2008.

Johnson, Eric J. and Goldstein, Daniel G., Do Defaults Save Lives? (Nov 21, 2003). Science, Vol. 302, pp. 1338-1339, 2003. Available at SSRN: https://ssrn.com/abstract=1324774

Kahneman, D. (2003). A perspective on judgment and choice: mapping bounded rationality. American psychologist, 58(9), 697.

Kahneman, D. (2013). Thinking, fast and slow.

Kaplan, G., & Baron-Epel, O. (2003). What lies behind the subjective evaluation of health status?. Social Science & Medicine, 56(8), 1669-1676.

Ketata, I., Sofka, W. and Grimpe, C., 2015. The role of internal capabilities and firms' environment for sustainable innovation: evidence for Germany. R&D Management, 45(1), pp.60-75.

L. Klotz, "Cognitive Biases in Energy Decisions during the Planning, Design and Construction of Commercial Buildings in the United States: An Analytical Framework and Research Needs," Energy Efficiency, 4/2 (May 2011): 271-284.

Lin, H. and McDonough, E., 2014. Cognitive Frames, Learning Mechanisms, and Innovation Ambidexterity. Journal of Product Innovation Management, 31, pp.170-188.

Lindberg L.(April 16, 2020). Interview with Linda Lindberg, Copenhagen, Denmark.

Linder, S. H. (2020) 'On Cogency , Professional Bias , and Public Policy : An Assessment of Four Views of the Injury Problem Published by : Wiley on behalf of Milbank Memorial Fund Stable URL : https://www.jstor.org/stable/3350023 Linked references are available on JSTOR for t', 65(2), pp. 276–301.

Lindström T. (May 19, 2020). Interview with Tommy Lindström, Copenhagen, Denmark.

Locke S. (April 7, 2020). Interview with Simon Locke, Copenhagen, Denmark.

Lozano, R. (2012) 'Towards better embedding sustainability into companies' systems: An analysis of voluntary corporate initiatives', Journal of Cleaner Production. Elsevier Ltd, 25, pp. 14–26. doi: 10.1016/j.jclepro.2011.11.060.

Lubatkin M, Simsek Z, Ling Y, Veiga JF. 2006. Ambidexterity and performance in small- to medium sized firms: the pivotal role of top management team behavioral integration. Journal of Management 32(5): 646–672.

Madrian, B. C. & Shea, D. F. (2001). The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior. Quarterly Journal of Economics, 116(4), 1149-1187.

Mantashian, J., Charon, A., & Nyamayaro, E. (2019). Behavioral Science Solutions Ltd. Retrieved from http://www.behavioraleconomics.com/BEGuide2019.pdf

March, J. (1991). Exploration and exploitation in organizational learning. Organization Science, Vol. 2, No. 1, Special Issue: Organizational Learning: Papers in Honor of (and by) James G. March. (1991), pp. 71-87

Marrewijk, M. Van (2017) 'Concepts and definitions of CSR and corporate sustainability: Between agency and communion', Corporate Social Responsibility, pp. 245–255.

Marsden, P. (2016). Dr Paul Marsden – digitalwellbeing.org. Digitalwellbeing.org. Retrieved 3 June 2020, from https://digitalwellbeing.org/author/marsattacks/.

Martin, Brittany Harker. "Unsticking the Status Quo." Management Research Review 40.2 (2017): 122-41. Web. Retrieved from: https://www-emerald-com.esc-web.lib.cbs.dk:8443/insight/content/doi/10.1108/MRR-08-2015-0183/full/html

Marx, S. M. et al. (2007) 'Communication and mental processes: Experiential and analytic processing of uncertain climate information', Global Environmental Change, 17(1), pp. 47–58. doi: 10.1016/j.gloenvcha.2006.10.004.

Mazutis, D. (2014) 'Supererogation: Beyond Positive Deviance and Corporate Social Responsibility', Journal of Business Ethics, 119(4), pp. 517–528. doi: 10.1007/s10551-013-1837-5.

Mazutis, D. and Eckardt, A. (2017) Sleepwalking into Catastrophe: Cognitive Biases and Corporate Climate Change Inertia, California Management Review. doi: 10.1177/0008125617707974.

Michie S, Abraham C, Eccles MP (2011) Strengthening evaluation and implementation by specifying components of behavior change interventions: A study protocol. Implement Sci. 2011;6:10.

Michie S, Johnston M. (2011) Behavior change techniques. In: Gellman MD, Turner JR, eds. Encyclopedia of behavioral medicine. New York: Springer; 2011.

Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., & Hardeman, W. et al. (2013). The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions. Annals Of Behavioral Medicine, 46(1), 81-95

Mullainathan, S., & Thaler, R. H. (2000). Behavioral economics (No. w7948). National Bureau of Economic Research.

Munasinghe M, Environmental economics and sustainable development 1993-07 http://www.scribd.com/doc/49899344/Environmental-Economics-Sustainable- Development-Mohan-Munasinghe (2011-05-02)

Network for Business Sustainability. 2012. Decision-making for sustainability: A Systematic Review of the Body of Knowledge. Network for Business Sustainability. Retrieved from: nbs.net/knowledge. [Accessed 24 April 2020].

Neuman, W. (2005). Social research methods. Allyn and Bacon.

Nidumolu, R., Prahalad, C.K. and Rangaswami, M.R., 2009. Why sustainability is now the key driver of innovation. Harvard business review, 87(9), pp.56-64.

Nieswiadomy, R., 2008. Foundations Of Nursing Research. Upper Saddle River, N.J.: Pearson/Prentice Hall.

O'Reilly, C. and Tushman, M., 2013. Organizational Ambidexterity: Past, Present and Future. SSRN Electronic Journal,.

O'Reilly CA, Tushman M. 2008. Ambidexterity as a dynamic capability: resolving the innovator's dilemma. Research in Organizational Behavior 28: 185–206.

OECD (2019), Tools and Ethics for Applied Behavioural Insights: The BASIC Toolkit, OECD Publishing, Paris, https://doi.org/10.1787/9ea76a8f-en.

Porsche Consulting, 2018. Innovative Working Atmosphere - How Managers Succeed In Giving New Work A Nudge. [online] Porsche Consulting. Available at: <https://www.porsche-consulting.com/fileadmin/docs/04_Medien/Publikationen/TT1435_Innovative_Working_Atmosphere/180924_New_Work_Innovative_Working_Atmosphere_Nudge_Management_A_Porsche_Consulting_study__C_2018.pdf> [Accessed 2 April 2020].

Porter, M. E. and Kramer, M. R. (2011) 'HBR.ORG The Big idea Creating Shared Value how to reinvent capitalism-and unleash a wave of innovation and growth', Creating Shared Value, (February), pp. 1–17.

Potts, J. , & Morrison, K. (2009). Nudging innovation: Fifth generation innovation, behavioural constraints, and the role of creative business—considerations for the NESTA innovation vouchers pilot. London: National Endowment for Science, Technology and the Arts (NESTA). Retrieved from: https://media.nesta.org.uk/documents/nudging_innovation.pdf

Rare and The Behavioural Insights Team. (2019). Behavior Change For Nature: A Behavioral Science Toolkit for Practitioners. Arlington, VA: Rare.

Reb, J., & Connolly, T. (2007). Possession, feelings of ownership and the endowment effect. Judgment and Decision Making, 2(2), 107–114.

Reisch, L. (2019). Behavioral public policy for sustainable development - ISUP 2019. Presentation, Copenhagen Business School (MSC)

Reisch, L. A., Sunstein, C. R., & Gwozdz, W. (2017). Beyond carrots and sticks: Europeans support health nudges. Food Policy, 69, 1–10.

Rigtering, J. P. C. (Coen), Weitzel, G. U. (Utz) and Muehlfeld, K. (Katrin) (2019) 'Increasing quantity without compromising quality: How managerial framing affects intrapreneurship', *Journal of Business Venturing*, 34(2), pp. 224–241.

Rosing, Kathrin, and Hannes Zacher. "Individual Ambidexterity: The Duality of Exploration and Exploitation and Its Relationship with Innovative Performance." European Journal of Work and Organizational Psychology 26.5 (2017): 694-709. Web.

Salzer S. (May 20, 2020). Interview with Samuel Salzer, Copenhagen, Denmark.

Sarah Williams (2018) 'A Critical Realist informed Thematic Analysis : Families ' experience of the process of adjustment when a family member is in a forensic mental health hospital Sarah Williams May 2018', (May).

Schiederig, T., Tietze, F. and Herstatt, C., 2012. Green innovation in technology and innovation management–an exploratory literature review. R&D Management, 42(2), pp.180-192.

Schumpeter J. (1942), “Capitalism, Socialism, and Democracy”, Harper, New York

Shu L. and Bazerman M., “Cognitive Barriers to Environmental Action: Problems and Solutions,” in The Oxford Handbook of Business and the Natural Environment, ed. P. Bansal and A. Hoffman (Oxford: Oxford University Press, 2012): 161-176.

Sicard N.G. (May 13, 2020). Interview with Natalia Gómez Sicard, Copenhagen, Denmark.

Simon, H. A. (1955). A behavioral model of rational choice. Quarterly Journal of Economics, 69, 99–188.

Singler, E., 2018. Nudge Management. [Montreuil]: Pearson.

Singler, E., Simpson, R. and Sunstein, C., n.d. Nudge Management. [Montreuil]: Pearson.

Smäls R. (March 27, 2020). Interview with Raphaël Smals, Copenhagen, Denmark.

Smith, J. A. (Ed.). (2003). Qualitative psychology: A practical guide to research methods. Sage Publications, Inc.

Snyder, H. (2019) ‘Literature review as a research methodology: An overview and guidelines’, Journal of Business Research, 104, pp. 333–339. doi: https://doi.org/10.1016/j.jbusres.2019.07.039.

Spence A. , Poortinga W., and Pidgeon N., “The Psychological Distance of Climate Change,” Risk Analysis, 32/6 (June 2012): 957-972.

Sunstein, C. R. (2016). Fifty Shades of Manipulation. Journal of Marketing Behavior, 1(3–4), 214–244.

Sunstein, C. R. and Reisch, L. A. (2019) Trusting Nudges: Toward a Bill of Rights for Nudging.

Sunstein, C. R., & Hastie, R. (2015). Wiser: Getting beyond groupthink to make groups smarter.

Sunstein, C., 2014. Nudging: A Very Short Guide. SSRN Electronic Journal,.

Sydow, J., Schreyögg, G. and Koch, J., 2009. Organizational Path Dependence: Opening the Black Box. Academy of Management Review, 34(4), pp.689-709.

Teece, D.J., Pisano, G. and Shuen, A. (1997), Dynamic capabilities and strategic management. Strat. Mgmt. J., 18: 509-533.

Thaler, R. H. (2015). Misbehaving: The making of behavioral economics.

Thaler, R. H., & Sunstein, C. R. (2008). Nudge: Improving decisions about health, wealth, and happiness.

Trifilova, A., Bessant, J., Jia, F. and Gosling, J., 2013. Sustainability-driven innovation and the Climate Savers' programme: experience of international companies in China. Corporate

Tripsas, M. & Gavetti, G. (2000). Capabilities, cognition, and inertia: evidence from digital imaging. Strategic Management Journal, 21(10/11), 1147-1161.

Tushman, M. and O'Reilly, C., 1996. Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change. California Management Review, 38(4), pp.8-29.

Tversky A. and Kahneman D. , “The Framing of Decisions and the Psychology of Choice,” Science, New Series, 211/4481 (January 30, 1981): 453-458;

Tversky A., and Kahneman D. (1974), “Judgment under Uncertainty: Heuristics and Biases,” Science, 185, 1124-1131

Vaismoradi, M., Turunen, H. and Bondas, T. (2013), Qualitative descriptive study. Nurs Health Sci, 15: 398-405. doi:10.1111/nhs.12048

Voorhees, E. M. (1986) ‘Implementing agglomerative hierarchic clustering algorithms for use in document retrieval’, Information Processing & Management, 22(6), pp. 465–476. doi: https://doi.org/10.1016/0306-4573(86)90097-X.

Walsh, James P. "Managerial and Organizational Cognition: Notes from a Trip Down Memory Lane." Organization Science 6.3 (1995): 280-321. Web.

Weber, E. U. (2006) ‘Experience-based and description-based perceptions of long-term risk: Why global warming does not scare us (yet)’, Climatic Change, 77(1–2), pp. 103–120.

Weick, K.E., Sutcliffe, K.M., & Obstfeld, D. (1999). Organizing for high reliability: Processes of collective mindfulness.

Welbourne, T. M., Johnson, D. E., & Erez, A. (1998). The role-based performance scale: Validity analysis of a theory-based measure. Academy of Management Journal, 41, 540–555.

Wempe, J. and M. Kaptein: 2002, The Balanced Company. A Theory of Corporate Integrity (Oxford University Press).

Wong-Parodi, G., Krishnamurti, T., Gluck, J., & Agarwal, Y. (2019). Encouraging energy conservation at work: A field study testing social norm feedback and awareness of monitoring. Energy Policy, 130, 197–205. https://doi.org/10.1016/j.enpol.2019.03.028