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Faculty of Business Economics

Master of Management

Master's thesis

Gender bias in advice taking and decision making during the idea generation stage of an innovation process

Marie Véronique D Creemers
Eléonore Van de Weyer

Thesis presented in fulfillment of the requirements for the degree of Master of Management, specialization Strategy and Innovation Management

SUPERVISOR :
Prof. dr. Bart LETEN

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Covid-19 disclaimer

This master thesis was written during the COVID-19 crisis in 2020-2021. This global health crisis might have had an impact on the (writing) process, the research activities and the research results that are at the basis of this thesis. There was an impact on

- the experiment;
- the data collection.

More details about the implications of Covid-19 on this research can be found in the 'limitations and further research' part of this thesis.

Preface

To obtain the title of Master in Innovation and Strategy Management from Hasselt University, it is required to write a scientific paper addressing a topic related to our specialization. This dissertation addresses the topic "Gender bias in advice taking and decision making during the idea generation phase of an innovation process". It was written collaboratively by Marie Creemers and Eleonore Van de Weyer. We both worked on each part consecutively.

We would like to thank our promoter, Prof. Dr. Bart Leten, for his most helpful guidance. As neither of us had ever carried out a real-life experiment before, his clear answers to our questions and the support we received have been extremely appreciated. Above this, we are grateful for all the participants that were willing to give us some of their time and enthusiasm to participate in our experiment. Without them, we could not have found the interesting results that are reported in this research.

We look back on this experience with gratitude and meaningfulness, as we both feel that we grew as researchers as a result of this conduct. We hope you enjoy this reading.

Summary

Innovation remains important to ensure a company's future relevance, and with it comes an interesting yet often difficult process. An innovation process is an uncertain activity, so having a good decision making process is key. A good decision making process can increase the accuracy, but also the quality of a decision. This could be crucial to the possible outcome of an innovation process. Yet, decisions are rarely made in isolation. Often, a decision maker depends on advice to sharpen their judgement. If and how this advice is even used by the decision maker, relies upon several elements that may influence the outcome of a decision.

Amongst these elements is gender bias. In this research we questioned whether gender has an influence on decision making and advice taking. We conducted an experiment where we aimed to find out if the advice given by women is discounted more than advice given by men. The participants were given an idea generation challenge, after which the participants from other groups could give advice to the ideas. We asked the participants to make a top 5 and rank these ideas according to their personal judgment. Within our set up, the advice was given in the form of endorsements. In randomly assigned treatment and control groups, we then purposely withheld information that gave away the gender of the advisor. We measured if and how these endorsements had an effect on idea selection. Based on our hypothesis, we expected to find that the idea selectors gave less weight to female endorsements than to male endorsements.

Thanks to data collected during the experiment, we focused our analysis on two dependent variables: ideas selection and ideas ranking. First, we analyzed whether female endorsements influence the selection of ideas. Since the participants were asked to make a top 5, we could check which ideas were selected. For the control group, both the number of male endorsements and female endorsements are significant on idea selection. Moreover, these effects are similar which is coherent since the control groups were not aware of the gender of endorsers. Regarding the treatment group, we found that both the number of male endorsements and female endorsements are significant on idea selection. However, in contradiction to what we expect to find, the treatment group results show that the number of female endorsements have a greater positive effect than the number of male endorsements on idea selection. This translates into a greater likelihood of an idea being selected if it received female endorsements. Furthermore, for the treatment group, we find that an idea was more likely to be selected by a participant if this idea was generated by that participant themselves.

Secondly, we analyzed more in detail whether female endorsements influence the ranking of ideas. Based on the top 5 we received from our participants, 5 results were possible for the analysis: a particular idea is not chosen in the top 5, an idea is ranked lowest, an idea is ranked second lowest, an idea is ranked third highest, an idea is ranked second highest and an idea is ranked highest. We regressed the ranking of chosen ideas against our focal independent variables, which are the number of female endorsements and the number of male endorsements. According to this result, we find that the total number of endorsements is predictive of an idea being categorized as the highest ranked idea in a top 5 of a participant, in comparison to being predictive of an idea being categorized as one of the lower ranked ideas in the top 5. For the treatment group, both the number of male endorsements as well as the number of female endorsements are significant. We observe that there is a positive relationship of both male as well as female

endorsements on the likelihood of ranking an idea as the highest ranked idea. However, the number of female endorsements has a greater positive relationship to the ranking of the ideas since the coefficient of the number of female endorsements is larger than the coefficient of the number of male endorsements. Finally, unlike the control group, in the treatment group we see that when an idea was made by another participant the likelihood that this idea will be ranked as the highest ranked idea will drastically decrease.

These findings show that, in general, the ideas that were endorsed were chosen more often. However, it cannot be said that ideas which have received the approval of men specifically are favored as hypothesized. More so, the results of this research show that, within the framework of our experiment, the endorsements given by women are not more discounted than the endorsements given by the men. This allows us to reject our hypothesis. The findings show that for idea selection, the participants were more inclined to give more weight to endorsements given by women than endorsements given by men. The same observation was made for the ranking of the ideas. Indeed, ideas that did receive female endorsements had a higher likelihood ending up being ranked higher in the top 5 than ideas that received male endorsements. To sum up, we can conclude that for our experiment, the participants did not give less weight or importance to advice given by women.

This study was conducted during the Covid-19 pandemic. This naturally brought some challenges to overcome. Due to Covid-19 restrictions in Belgium, the experiment had to take place in an online setting. Normally, we would have invited the participants to join us in real life. Therefore, communication was more difficult, as most participants did not feel incentivized to turn on their camera or talk with their fellow group members. On top of this, technical issues are generally harder to overcome in an online setting. If a participant had technical issues, such as for example an unstable WIFI-connection, this could more easily lead to exclusion from the experiment. Nonetheless, conducting experiments online also has its advantages. No physical arrangements, such as securing a venue or providing material, need to be made. Moreover, the participants are able to participate in the experiment from the comfort of their own home. This leads to less geographical restrictions, so a larger pool of potential participants can be attained.

Lastly, only a limited number of individuals participated within the setup of our experiment. It is noteworthy here that some of the participants within their respective groups knew each other personally before the experiment. This could have made them more inclined to choose each other's ideas instead of going for ideas by participants they did not know, regardless of whether that idea received endorsements. To generalize the findings, the experiment would have to be done again with a larger as well as a more diverse group. In this case, most of the participants had the Belgian nationality or are currently living in Belgium. Based on the EU gender equality index, Belgium scored 71.9%, where 100% would mean full equality between men and women on all fronts. Besides this, international campaigns and general awareness regarding gender equality could be a reason that individuals nowadays are less inclined to take gender into consideration when following advice and making decisions.

Key words: decision making, advice, gender, idea creation process, field experiment

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CHAPTER 1. Introduction

Innovation has often been called one of the foundations or cornerstones of society, assuring among more economic growth and creating opportunities for the future of a company (Henderson, 2017; Purcell, 2019; Snyder, 2019). Words like 'new', 'invention' or 'state-of-the-art' might come to mind, but there is not simply one definition for 'innovation'. Innovation can mean different things to different people and is very context-specific. Kylliäinen (2019) describes how innovation affects economic growth: if an innovation is successful this "increases productivity and generates greater output with the same input". As for individual companies, innovation often ensures their future. The sentence "adapt or die" is a universal truth for companies all over the world according to Purcell (2019). Gaining a competitive advantage on competitors might be one of the most obvious reasons for businesses to innovate. By staying up-to-date with their customer's needs and wants, companies can keep assuring their relevance for the customer through their innovations – be it by inventing new products or upgrading their existing products or services (Kylliäinen, 2019). Even though innovation can happen spontaneously, it is often the result of R&D. Thanks to the wide-spread availability of knowledge, innovation is not only about basic research anymore, but rather about combining the right pieces of information (Nieminen, 2020). Innovation is considered as a difficult activity because of its quite prominent level of uncertainty, the high costs linked to research and development and finally, its potential problems of appropriability.

These factors increase the importance of having a good decision making process. The decision making process usually involves multiple individuals, with the decision maker often relying on advisors to help make their decisions (Tost et al., 2012). Innovation is a process where decisions often have larger rather than smaller consequences if the wrong decision is made, so a solid understanding of the elements influencing decision making could improve the quality of a decision. However, research does suggest a gender gap still exists here (Ritter-Hayashi et al., 2012; Trivedi & Sakha, 2019), which could possibly have a negative effect on the decision outcome. In 2020, roughly 1 out of 3 managers in the EU were female (Eurostat, 2020), while studies suggest that gender diversity within a management team has a positive impact on innovation performance (Ruiz-Jiménez et al., 2016). Moreover, male and female managers have both repeatedly been characterized within stereotypical roles, which could potentially shape the decision maker's perception when deciding if and how to use advise (Ribeiro et al., 2019). Thus, the following question can be raised: how does gender influence the decision making process in an idea generation environment?

To examine this question, we conducted a field experiment to analyze how idea selection is affected by advice in the form of endorsements, where we focused on the gender of the advisor as the main dependent variable. Research shows that men and women make decisions differently: women are generally assumed to process all the information available to them – even so if this additional information directs them to an unfavorable decision, while men are generally engaged in selective information processing – selecting information beneficial to their decision (Villanueva-Moya & Expósito, 2021). Therefore, we tried to keep the advice giving as simple as possible, so the participants were not required to conduct extensive internal reasoning, but could base their decisions on the straightforward and unambiguous information exposed to them. The participants were asked to complete an idea challenge in small groups, after which they were instructed to make a top 5 of the generated ideas within their own group. After this, the participants were

instructed to give advice in the form of endorsements to the ideas of another group. These endorsements took the form of colored stickers. The participants could give out colored stickers to any number of ideas they found interesting and impactful. While the control group used the same color of stickers to give out endorsements, the treatment group knew that the color of the sticker they used was indicative for their gender. The participants then returned to their respective idea board, where the endorsements given by the other group were now visible. They were then again asked to make a new top 5 considering the endorsed ideas. This subtle manipulation allowed us to examine if and how these participants were influenced by the gender of the advisors.

We are interested to find out whether supportive advice is utilized or discounted depending on the gender of the advisor within idea selection. More in detail, we investigate if this potential gender bias has any influence on the ranking of the idea challenges. Our research intends to add to the existing literature regarding gender in decision making and advice taking by offering a potential answer to the question whether female advice in the form of endorsements is more often discounted than advice given by men.

CHAPTER 2. Literature review and hypothesis

2.1 Decision making through advice taking

Decision makers often do not have all the relevant information to make an informed decision about something, as the significant insights might not be directly available to them. This is where advice taking comes in as a piece of the puzzle in the concept of decision making. People who have to make a decision often rely on advice to make decisions, be it small or big ones. Decision makers thus don't make decisions in isolation.

But why do decision makers generally search for or listen to advice? Harvey and Fischer (1997) suggest multiple justifications for advice taking. First of all, the decision maker could simply be reluctant to discard freely given advice because of social pressure. However, context plays a role here and even though there might be social pressure to not completely reject advice, the weight that is given to advice can vary depending on the situation. Secondly, decision makers may use advice to improve the quality of their decision. Lastly, taking advice could be related to the sense of sharing responsibility for a made decision. The consequences if the decision results in a loss are no longer tied to only the decision maker, but partly include the advice-givers as well.

In many decision and advice experiments, data is gathered through a Judge-Advisor System (Bonaccio & Dalal, 2006). In such a setting, the participants are assigned a random role in the experiment, being either the judge or the advisor. The judge is the one who makes the end decision, and the advisor is the one offering the advice to the judge. Different variables can be manipulated here, as there are many things that can have an impact on the way people give but also use advice.

2.1.1 Advice utilization and discounting

How and to which extent advice is used by the decision maker, is called advice utilization (Bonaccio & Dalal, 2006). Schrah et al. (2006) argue that there are multiple elements that can influence to which extent a decision maker decides to use the given advice. They suggest 4 criteria that need to be met for advice utilization: the decision maker is motivated to make a good decision, the decision maker supposes that their own knowledge and expertise is insufficient to make the decision, the decision maker believes that the advisor has a high motivation to help them make a good decision and lastly, the decision maker believes that the advisor's knowledge and expertise are good.

Advice discounting, in contrast to advice utilization, refers to the length and depth to which the decision maker does not use the advice of the advisor (Bonaccio & Dalal, 2006). Even though studies have shown that advice can improve the outcome accuracy of a decision, decision makers often don't contribute enough importance to the advice they receive (Yaniv & Kleinberger, 2000; Yaniv & Choshen-Hillel, 2011; Wang & Du, 2018).

According to Yaniv (2004a, 2004b), advice discounting happens partly because the decision maker is privy to their own reasoning for leaning towards one opinion or the other about a decision, while they have very little information about the internal reasoning of the advisor. This could make it more difficult for the decision maker to give the same weight to their own opinion and the advice. This leads Yaniv & Kleinberger (2000) to argue that when there is a discrepancy in the personal opinion of the decision maker and the given advice, the decision maker gravitates towards discounting the given advice.

2.1.2 Elements that influence how we utilize or discount advice

Harries and Harvey (2000) stated that people judge advice in a subjective and an objective way. The weight that these judgments can have is linked to the degree of self-insight. In the case that subjective weight, which is related to feelings, tends to be similar to objective weight, which is related to facts, it means that people must possess cognitive ability to evaluate their own judgments. Additionally, before making their judgements, people make implicit subjective assessments of the quality of the information available to them. According to Harries and Harvey (2000), these assessments have two ways of use. One the one hand, people will explicitly express their judgment of the information and the importance of having different sources. One the other hand, the assessment will add to the weight of subjective judgment. The magnitude of the impact of advice depends on people's sensitivity to new information, and this sensitivity can also vary depending on situational and personal variables (Harvey & Fischer, 1997). For example, when people receive advice, their perception of that advice may be influenced by their own knowledge or beliefs about advisors. Based on the results of their study, Harvey and Fischer (1997) stated that judges improve their judgment by taking into account the advice of those who they consider they have more expertise.

Connected to this is the concept of anticipated regret in decision making. Regret is the feeling of "what is with what might have been and is accompanied by a feeling that one should have known better" (Tzini & Jain, 2017, p. 75). The regret theory suggests that decision makers will try to minimize their future regret: they are regret averse and will evaluate alternatives to avoid feeling regretful after making their decision. Literature makes a difference between outcome regret and process regret. Outcome regret refers to the evaluation and comparison between possible results of a decision, while process regret indicates how the decision was made. For example, when a decision maker managed a careless decision making process, the anticipated regret was perceived to be bigger than when the decision maker followed a careful decision process. (Tzini & Jain, 2017)

Regret, however, is not the only emotion that could potentially have an effect on advice utilization or discounting. According to Gino & Schweitzer (2008), emotions can have an influence on taking advice from three perspectives: either the emotions that the decision maker feels can be related to the advice-giver, the emotion can be triggered by the decision itself or the decision maker is biased by previous experiences with advice taking. In their experiment, Gino & Schweitzer (2008) test the effects of emotions such as gratitude, anger and trust on advice taking. When compared with judges in a neutral state, gratitude enlarged the probability of judges taking advice, while anger did the opposite – it made the judges more opposed to taking and using advice. If there was trust between the advisor and the judge, this mediated the advice taking process and encouraged the judge to rely on the given advice.

If either the judge or the advisor shows higher levels of confidence, then this could influence the way the decision maker utilizes or discounts advice (Bonaccio & Dalal, 2006). Confidence is the belief that one's judgement will turn out to be accurate and right. When the advisor appears confident about the advice they offer, the decision maker may feel convinced that this advisor has greater expertise and more task-related knowledge. Research has shown that decision makers utilize advice more frequently when the advisor shows higher levels of confidence than when the advisor appears less confident. On the other hand, the decision maker's confidence

also plays a role. Some literature suggests that judges can be overconfident about their own opinions, especially when they have little access to information related to the decision to be made.

Related to confidence is the subjective sense of power that a decision maker has. A sense of power is a perception: an individual believes that they have the ability to influence someone else (Anderson et al., 2012). According to the study of Tost et al. (2012), individuals are more likely to act more independently and are less likely to consider any kind of input from others when they have a greater sense of power. Because of this, a decision maker would rely much less heavily on any kind of advice, even when it comes from people with great expertise – resulting in the discounting of potentially important advice.

The complexity of a task may also influence how individuals decide to use advice. Schrah et al. (2006) hypothesize that when a task gains complexity, the chances of accuracy to make a good decision without advice decreases so the need for advice becomes bigger. The researchers tested this through an experiment, and found that decision makers were indeed better off increasingly using more advice when tasks get more difficult, compared to unadvised decision makers who were asked to make the same decisions without the option to rely on external information. Above this, Gino & Moore (2006) find that decision makers tend to undervalue advice when working on tasks they perceive to be easier. In their experiments, they also found that the opposite also held: the judges were likely to overestimate the advice they got, whether they specifically asked for it or not, if they perceived the task as difficult.

Not only the complexity of a task plays a role, but also whether the cost of advice can be considered: was the advice free or did the decision maker pay for the advice? Three experiments conducted by Gino (2008) generally show that when someone pays a cost for advice, this significantly increases the degree to which they use the idea. However, the judges did not seem to gain a significant benefit from following the costly advice more intensively. More so, the judges took their own personal opinions less into account when they paid for advice, while they weighed their opinions more when the advice was free. A similar effect is observed when looking at if the decision maker specifically asked for the advice, or if it was unsolicited. When advice was specifically requested by the decision maker, they are much more likely to follow that advice than when the advice was unsolicited (Bonaccio & Dalal, 2006).

2.2 Gender in decision making & advice taking

2.2.1 Top management teams in innovation

Innovation processes are influenced by a large set of variables and elements, such as expertise, team composition, or even gender (Carrasco, 2014; Zennouche et al., 2014). Research, however, shows that there is still a gender gap in innovation (Trivedi & Sakha, 2019). The gender gap can be defined as a "gap in any area between women and men in terms of their levels of participation, access, rights, remuneration or benefits" (European Commission, 1998). For many scholars, the innovation industry is mainly constituted by men, especially at decision posts. This perception is confirmed by Ritter-Hayashi et al. (2019). They conducted a study covering 18,547 firms in 15 developing countries and as a result only 8.7 percent of top managers are female. More specifically in Europe, statistics found by Eurostat (2020) show that in 2020, 1 out of 3 managers in the EU countries are female. This number is even less when looking at the senior manager positions in the EU: only a mere 18% or less than 1 out of 5 senior managers are women.

Ritter-Hayashi et al. (2019) found that female managers can, however, have a positive impact on the level of innovation. Regarding their estimation, a female manager could increase the likelihood of firms to innovate by 2.19 percent. Of course, the arguments in favour of the increase of female managers do not mean that male managers are less important. When men and women work together in their key positions in a company, they can create a synergy which would only be beneficial for both financial goals as well as company atmosphere (Grodzicki, 2017). In their study, Ruiz-Jiménez et al. (2016) analyzed the influence of gender diversity of the top management team on the connection between knowledge combination capability and innovation performance. They observed that the gender diversity within the top management team impacted positively the relation between knowledge combination capability and innovation performance.

Male and female managers have repeatedly been categorized within the stereotypical characteristics of gender. Where men would be seen as for example dominant and authoritative, women would be kind and supportive (Larsson & Alvinius, 2020). A significant amount of studies show that the gender of the manager can have an impact on several aspects within a company. According to Zuraik et al. (2020), gender with its opening and closing behaviour has an impact on team innovation. The opening behavior means allowing the team to propose and experiment solutions resulting from "thinking outside the box". On the opposite, the closing behavior is a strict respect for the hierarchy and the responsibilities assigned to the members of the team. Based on their study, women managers are considered by their team's members as having a less opening behavior, involving risk taking, than men. Concerning closing behavior men and women have almost equal scores. Although, female manager's closing behaviors seemed to have less impact on team innovation outcomes.

Firms may be faced with the problem of employees not wanting to share or exchange their ideas. According to Ruiz-Jiménez et al. (2016) this problem can be generated as resolved by the company itself. Indeed, managers have a significant impact by setting up a corporate culture and tools to increase the exchange of knowledge and generate innovation. Regarding this specific case, the study by Xie et al. (2018) stated that transformational leadership could have a positive impact. The transformational leaders facilitate the building of trust within a team by encouraging, inspiring, and caring for their employees towards a vision. This promotes the sharing of resources and allows employees to gain the support of their team to innovate. In addition, this feeling of support is reinforced by a transformational leader who strives for individual identification that has a positive impact on the self-confidence of employees (Xie et al., 2018). These notions of trust and self-confidence are important to create an innovative atmosphere and increase motivation.

Furthermore, the transformational leader ensures to establish a shared vision, which increases the autonomy of innovation and the degrees of cognitive innovation of the employees (Xie et al., 2018). The study of Ruiz-Jiménez & Fuentes-Fuentes (2016) shows that human abilities of managers should also be taken into account to achieve innovation performance. Managers need to create an atmosphere of trust for inspiring employees' commitment. More so, if employees feel supported by their manager, their potential for generating new ideas increases. Hence, managers are crucial to setting up a work climate which encourages exchange of knowledge and drives the development of innovative products. Ruiz-Jiménez & Fuentes-Fuentes (2016) also underlined that gender diversity within the management team increases the potential of creation of this work climate.

2.2.2 The influence of the advisor and decision maker's gender

The stereotypical assumptions about men and women carry the possibility of being highly inaccurate, but still these incorrect stereotypes can shape a person's perception. As a result, this could influence how someone takes advice or makes decisions (Ribeiro et al., 2019).

Fréchette et al. (2017) observed that in times of uncertainty, the personality traits and gender of decision makers influence the decision maker's likelihood of following advice. The researchers emphasized that the personality and gender of advisors and decision makers have an impact on advice and its treatment. Their study showed that people with high extraversion and agreeableness scores seem to take advice more often and conversely than people with a high score on open experience and conscientiousness will follow advice less often. Regarding gender, women tend to follow advice more often than men.

More so, the gender and personality of advisors correlate with advice given (Fréchette et al., 2017). For example, based on the results of their study, women seem to give the riskier option as advice more often than men, while more experienced advisors then tend to give riskier advice less often. These findings contradict a part of the economic and financial literature which states that women are more risk-averse than men (Eckel & Grossman, 2008). One reason women are assumed to be more risk averse than men, is because they assess the sum of all the available information before they make a decision. Men, on the other hand, presumably handle the available information to make an informed decision differently, as they handle this processing of information more selectively (Villanueva-Moya & Expósito, 2021). The roots of this statement come from social and psychological perception of men and women (Belghiti-Mahut et al., 2016). Men are usually considered competition lovers, in contradiction to women who are assumed to avoid challenging situations. Furthermore, men are assumed to be less affected by contextual factors than women. For Belghiti-Mahut et al. (2016), this natural risk aversion within the women can be significantly decreased by professional experience: thanks to expert know-how, a woman may increase her self-confidence to make more riskier decision that could simultaneously yield greater benefits.

Besides the characteristics that influence advice taking and giving, the decision maker is more often a man. Consequently, women's advice may possibly be more often overlooked. These elements have also been analyzed in other studies. In the Foss et al. (2013) study, the potential of women as innovators may be unexploited because their ideas are possibly less implemented than men's ideas. Furthermore, their study suggests that women receive less support from their peers in generating and implementing their ideas. However, within the same organizational structure and work environment there are no significant differences in the innovative behavior of men and women. Elements such as the centralization, support of colleagues and work pressure have the same effect, negative or positive, on men and women.

2.3 Conclusion & hypothesis

Innovation is generally achieved through R&D, which requires effective collaboration between team members to increase its probability of success. R&D remains a difficult activity, since it carries big risks and consequences if a wrong decision is made. Therefore, a solid decision making process is indispensable within this area. Managers play an important role in the innovation process, for example by establishing a corporate culture. This culture is particularly important for exchanging ideas, knowledge or giving advice within the team to enhance the quality of the decision making processes.

However, decision makers do not necessarily have all the information to make high quality decisions on their own. On top, they rarely make decisions in isolation (Schrah et al. 2006), as they often resort to relying on the advice of others to make decisions. Studies that researched advice and decision making show that certain elements such as among more personality, perceptions, or complexity of tasks can have an impact on the treatment of advice and its influence on the final decision (Harvey & Fischer, 1997; Gino & Schweitzer, 2008; Schrah et al. 2006; Fréchette et al., 2017). But since characteristics and context largely influence how a decision maker utilizes or discounts advice, the question rose what kind of effect an inherent feature, such as gender, might have on a decision making process.

Regarding gender, research highlights the presence of a gender gap in innovation (Trivedi & Sakha, 2019), yet studies show that both female and male managers have a positive impact on the level of innovation (Ritter-Hayashi et al. 2019). In addition, both men and women having their specificities as managers, the diversity within the group of decision makers is positively significant (Grodzicki, 2017; Ruiz-Jiménez et al., 2016). Nevertheless, Foss et al. (2013) argue that due to their low presence in decision making positions, women's advice might be less considered than men's.

For the aforementioned reasons, this research will examine what effect gender has on the advice taking & decision making in the idea generation stage of an innovation process. The following hypothesis is proposed:

H1: "Advice given by women is more discounted than advice given by men".

CHAPTER 3. Empirical study: the field experiment

3.1 Method: participants, design and procedure

Prior to the experiment, 30 potential participants were invited to participate in the experiment on 20 March 2021. These potential participants were young adults who are either following a higher education program or have followed one recently in Belgium. Eventually, 24 participants agreed to take part in the experiment. However, one participant did not show up at the start of the experiment and one participant was forced to leave the session before the experiment had started properly because of personal reasons. This left 22 (n=22) participants who actually took part in the experiment. All participants were presented with a consent form and were asked to sign this as a confirmation for their participation (see appendix A). As Corona-measures did not allow for the experiment to be conducted in person, the event took place in an online setting.

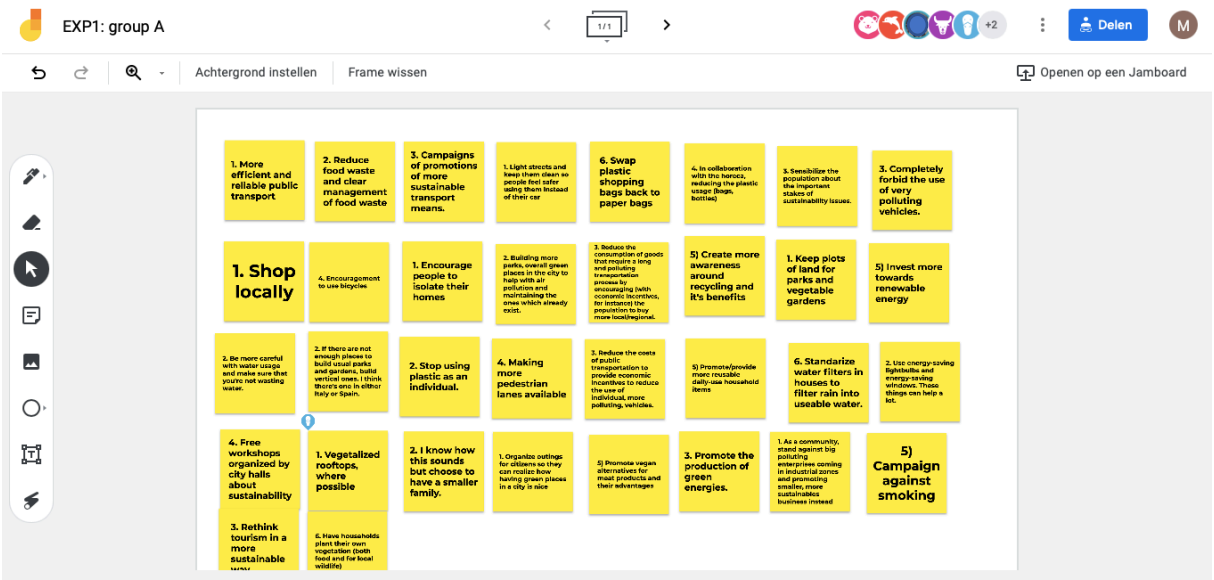
The experiment was conducted twice on 20 March 2021: once between 10:00 and 11:30, and the second time between 13:00 and 14:30. The participants were randomly split into four groups: group A, B, C and D. Groups A and B were the control group, groups C and D were the treatment group. Group A and B did the experiment between 10:00 and 11:30, group C and D participated between 13:00 and 14:30.

At the starting hour of each experiment, all the participants were instructed to join a Google Meet link which was sent to them by email one week in advance. The researchers then welcomed the participants and thanked them for their participation. The participants were informed here that they would be doing a number of small tasks in a group of 5 or 6 people. After this short introduction, the participants were asked to go to a separate Google Meet session of their own group. This Google Meet session consisted of the 6 participants and 1 of the researchers, who led the experiment.

In this separate breakout session, the participants were given a link to a Google Jamboard. The Google Jamboard functioned as the online whiteboard on which the participants were asked to work on during the experiment (see figure 1).

Figure 1

Example of the Google Jamboard of group C



Once all the participants were present in their respective Google Meet session, the researchers published the list of participants in the Google Meet chat. The participants could find their participant number in front of their name, and were asked to use this during the course of the experiment. The researchers started the experiment by inviting the group to generate as many ideas on the Jamboard as possible within 20 minutes. They were instructed to aim for a minimum of 20 ideas. To make this process more straightforward, the participants were given a challenge. They were asked to come up with ideas regarding the following topic: "How can we make cities and our daily lives in them more sustainable?". To ensure that the participants all had the same understanding of the topic, the researchers provided a definition of sustainability: "Sustainability means meeting the needs of the present without compromising the ability of future generations to meet their own needs (United Nations, 1987). In other words: how can we use our current resources responsibly so that they can support many future generations?". Additionally, the researchers encouraged participants to think outside the box to generate ideas, and it was emphasized that it was important to simply write down as many ideas as possible. To share their ideas with the group, the participants used the Google Jamboard. When a participant came up with an idea, he or she was instructed to take a yellow post-it, type their participant number and then write out the idea. This way, the researchers were able to identify which participant had come up with which idea. The researchers cautioned participants not to delete anything from the whiteboard, even if participants changed their minds about one or more of their ideas. Although the participants had to try to come up with ideas individually, the researchers mentioned that the participants were allowed to discuss the ideas with each other and explain if necessary. However, the participants worked individually on their own ideas and did not discuss any ideas.

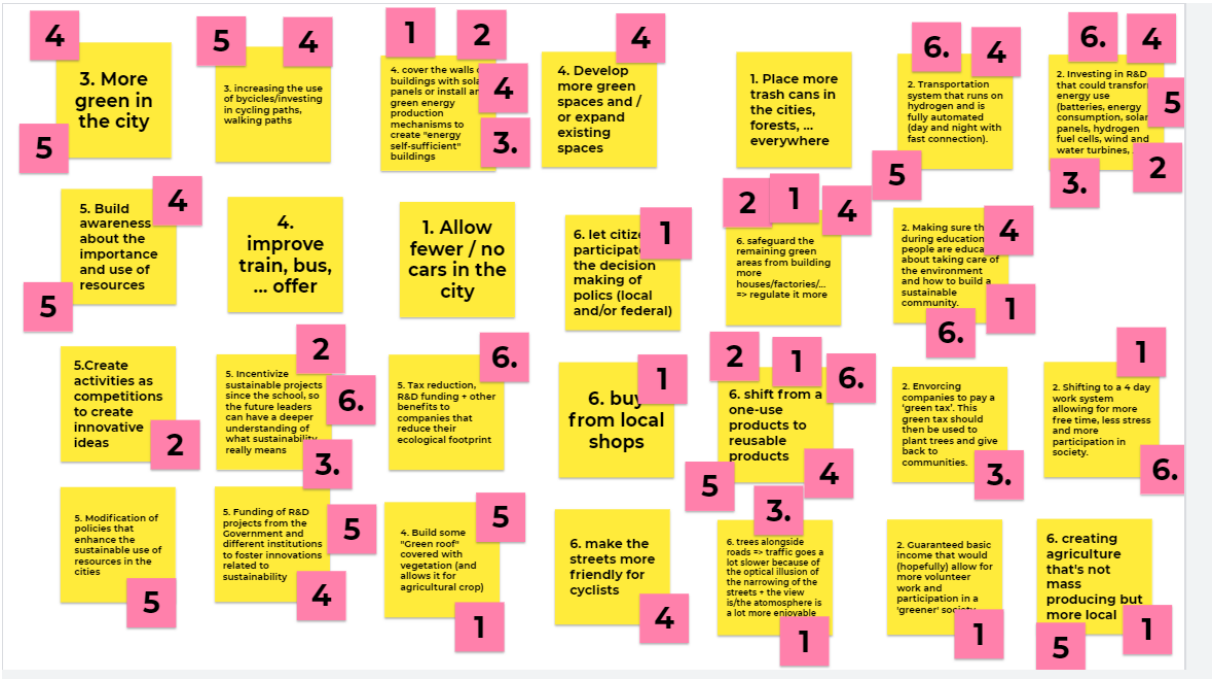
After 20 minutes of generating ideas, the group members were asked to stop generating ideas. They were then instructed to read all the ideas generated by their group and list their own personal top 5. This top 5 consisted of the 5 ideas that the participants found 'most interesting and impactful'. The highest ranked idea got a value of 1, and the lowest ranked idea got a value of 5. The participants had 10 minutes to do so. The participants sent their personal top 5 via email to the researcher's email address, which had been posted in the Google Meet chat. The participants did not have to motivate their selection. In addition, the researchers highlighted that the top 5 was private and participants were not allowed to share their top 5 with other participants.

After receiving the idea rankings via email, the researchers asked the participants to go to the other group's Jamboard. This meant that, for example, group A was instructed to have a look at the Jamboard of group B and vice versa. The hyperlink to the other Jamboard was provided by the researchers in the Google Meet chat.

The participants were informed that both groups had done the same idea generation exercise. Similar to making their top 5, they were instructed to take a look at the ideas and assign a post-it to the ideas they found 'most interesting and impactful'. In this part of the experiment, the post-it was used to represent advice, in the form of endorsements. By providing an endorsement, the participants showed their approval on the idea. There was no limit to the amount of post-its they could allocate to the ideas on the Jamboard: participants were free to choose the number of ideas they selected through post-its. For this task, all participants in the control group were instructed to use a pink post-it to give out endorsements to the ideas on the Jamboard (see figure 2).

Figure 2

Example of the Google Jamboard after the endorsement round in the control group



For the treatment group, the female participants were instructed to use a green post-it and the male participants a blue post-it (see figure 3). The researchers asked the participants to write only their participant number on the post-it and adjust the size of the post to avoid overlapping the idea. This way, the ideas were still visible to the other group members. Participants received ten minutes to do this, then were instructed to return to their own Jamboard.

Figure 3

Example of the Google Jamboard after the endorsement round in the treatment group

When the group of participants returned to their own whiteboard, the researchers asked them to study the Jamboard along with the new post-its that indicated which ideas had received endorsements from the other groups. Then the participants were instructed to make a top five again, but this time they had to take advice, in the form of endorsements, into account. As before, the participants sent their personal top 5 without justification by e-mail to the researcher's e-mail addresses. When the researchers received all the revised top 5's, they explained to the participants that the experiment was finished. They thanked the participants and mentioned that they would receive an email with more detailed information on the subject of this experiment.

3.2 The collection of data

Two data sources were used for the experiment. First, to share their ideas and endorsements online, the participants worked on a Google Jamboard. The Google Jamboard is an online whiteboard on which participants use different colored post-its for their ideas and endorsements. These Jamboards were the basis for forming a dataset for respectively the control and treatment group. For ideas, all participants, whether they were part of the control or the treatment group, used a yellow post-it (see figure 1). To give out endorsements, the participants in the control group used a pink post-it. For the treatment group, the female participants used a green post-it and the male participants used a blue post-it (see Figure 2 and Figure 3). Participants received a participant number that allowed researchers to identify the authors of ideas and endorsements. In addition, participants were explicitly instructed not to delete any information on the Jamboard. The Jamboards were downloaded twice, once before receiving endorsements and again at the end of the experiment. The researchers allocated an ID for each idea. Above this, participants had to submit their top 5 twice, before and after receiving the endorsements. The researchers received the top 5 of the participants by email.

The information from the Google Jamboards and the top 5, as well as the personal information regarding the participants, was documented in two separate datasets for the control and the treatment group. To form observations in order to study a participant's idea selection decisions, each idea from a group was combined with each participant in that specific group since they selected ideas generated within their own group. Were included in both datasets: participant ID (based on group letter and assigned number), participant gender, idea ID, gender of idea generator (via participant number), position of ideas (via Google Jamboard), total endorsements, female and male endorsements (via color and participant number), if the idea has been selected before and/or after the endorsements, the ranking of the selected ideas, if the participants have chosen their own idea and finally, the degree of relationship between the participant and the idea generator.

3.3 Measures

3.3.1 Dependent variables

As we are interested to find out whether there is some kind of gender bias in decision making and advice taking, we define 2 dependent variables that we analyze through the data we gathered during the pre- and post-check. The goal of each group was to generate at least 20 ideas and the groups in total generated 129 ideas. The participants were asked to draw up their personal top 5 at 2 different moments during the experiment: once before any endorsements were given and once after the endorsement rounds.

Idea selection. We define idea selection as the first dependent variable. This dichotomous variable takes the value of 1 if a certain idea is selected by a participant, and a 0 if the idea was not selected by the participant. This variable is based on the top 5 achieved after taking the endorsements into account, as these were visible to the participants after the endorsement round. This allows us to study what the relationship between the endorsements and the selection of ideas is.

Idea ranking. The participants made a top 5 and ranked these ideas according to their personal judgement. This dependent variable takes a value from 1 to 5 according to this ranking in our dataset. This means that the idea that was ranked lowest and fifth gets a value of 1, the idea ranked fourth takes a value of 2, the idea ranked third takes a value of 3, the idea ranked second takes a value of 4, and the idea ranked highest and first takes a value of 5. If an idea was not included in the idea ranking of participants, it gets a value of zero.

3.3.2 Independent variable

Number of female endorsements. Since we are looking for evidence that may or may not confirm whether advice given by women is more expected than advice given by men, we focused on female's endorsements. Following the hypothesis, we expect to find an effect for this variable, meaning that we would have to see a negative relationship between the number of female endorsements and idea selection for the treatment group since the participants knew the gender of the advisor. More specifically, we would have to see in the results that the participants give less weight to endorsements given by women compared to the weight they give to the endorsements given by men. Additionally, we would not expect to find this negative relationship in the control group since participants did not know the gender of the advisor. Therefore, we established that the number of female endorsements is our independent variable. This variable is measured by calculating the total number of female endorsements an idea has received.

3.3.3 Control variables

For controlling the differences in the treatment and control groups, we take into account a set of variables: the idea length, the position on the whiteboard, own idea, the degree of relationship between the participant and the idea generator and gender of the idea generator.

Number of male endorsements. As we are interested in finding out whether the number of female endorsements has an effect on the idea selection and ranking of an idea, we control for the number of male endorsements. This way, we are able to investigate if there is any gender bias regarding the idea selection and ranking by the idea selectors. This variable is measured by calculating the total number of male endorsements an idea has received.

Idea length. We control the potential impact that a length of ideas can have. We define the length of the idea based on the number of words used to write the idea.

Position on the whiteboard. We take into account the position of the ideas on the whiteboard. We proceed in this way: the top left is the first quadrant, the top right is the second quadrant, the bottom left is the third quadrant and finally the bottom right is the fourth quadrant.

Own idea. When the decision makers have very little information about the internal reasoning of the advisors, which is the case in our experiment, they tend to reject the advice given (Yaniv, 2004a; Yaniv, 2004b; Yaniv & Kleinberger, 2000). Hence, we include the own idea variable

to control the possible self-selection bias. This variable takes a value one for ideas that are generated by the idea selector.

Degree of relationship between the idea selector and the idea generator. If the decision maker trusts the advisor, this relationship could influence the decision making process. When this is the case, the decision maker generally tends to follow the advice given (Gino & Schweitzer, 2008). Since some participants could know each other, we take into account the degree of relation between the idea selector and the idea generator. It takes a value one for ideas of which the idea selector knows the idea generator.

Gender of the idea generator. Since studies show that women's ideas are less implemented than men's ideas (Foss et al., 2013)**,** we include this control variable for the gender of the idea generator.

CHAPTER 4. Empirical results

4.1 Summary statistics

Although we tried to make sure the control group and the treatment group were as similar as possible in terms of characteristics, the randomization of the participants cannot ensure that the groups are perfectly similar. Through the use of T-tests, we compared the group's statistics as shown in Table 1.

Table 1

Mean results and equality of means t-test for the control and treatment group

	Sample mean		**T-test of equality of means**
	Control group	Treatment group	p-values
Participant gender	0.54	0.55	0.447
Idea creator gender	0.53	0.51	0.259
Total number of female endorsements	0.67	0.45	0.000
Total number of male endorsements	0.62	0.46	0.002
Total number of endorsements	1.28	0.92	0.000
Idea length	11.71	8.05	0.390
Position: quadrant 1	0.24	0.22	0.178
Position: quadrant 2	0.27	0.18	0.000
Position: quadrant 3	0.26	0.33	0.000
Position: quadrant 4	0.24	0.27	0.055
Own idea	0.18	0.18	0.737
Relationship degree	0.27	0.39	0.000

When comparing the means of the control and the treatment group, the groups are very similar in multiple aspects: the gender of the participants (0.54 versus 0.55), the gender of the idea generator (0.53 versus 0.51), the position on the whiteboard (0.24 versus 0.22 for quadrant 1; 0.27 versus 0.18 for quadrant 2; 0.26 versus 0.33 for quadrant 3; 0.24 versus 0.27 for quadrant 4), whether an idea was a participant's own idea (0.18 versus 0.18) and whether the participant knew the idea generator of a specific idea (0.27 versus 0.39).

We observe that for the treatment group, there are on average more male idea endorsements in the control group than in the treatment group (0.62 versus 0.46). The same is observed for the total average number of female endorsements: the ideas in the control group receive a considerably higher number of endorsements than the ideas in the treatment group (0.67

versus 0.45). This translates into a higher number of total endorsements on average for the control group compared to the treatment group (1.28 versus 0.92).

The average idea length was observed to be somewhat longer in the control group than in the treatment group (11.71 versus 8.05).

If the significance of the t-test is greater than 0.05, we must accept the null hypothesis and conclude that there is no significant difference between our two groups. We can conclude that our two groups are similar for participant gender, idea creator, idea length, position Q1, Q4 and own idea.

4.2 Analyses

4.2.1 Binary logistic regression: idea selection

In a first step, we analyzed whether female endorsements have an effect on the selection of ideas. To find evidence that would support the hypothesis, we would have to find a negative effect of the number of female endorsements on idea selection in the treatment group. We expect a similar effect of the female endorsements on idea selection for the control group, and a difference in coefficients for the treatment group. More specifically, our expectation for the treatment group is to find a lower coefficient for the total number of female endorsements than the coefficient for the total number of male endorsements.

We used a binary logistic regression to predict if an event was occurring. In this case, the prediction was that participants tend to follow the endorsements of men more than those of women. Because our dependent variable is dichotomous, a logistic regression is well-suited for this. To perform this analysis, we used the ideas that were selected after the endorsement round as the dependent variable. In addition, we chose the control variables that will help increase the accuracy of the model: idea creator gender, the share of female endorsements, the total endorsements, the length of the idea, the position of the idea, the own idea and the degree of relationship. This allowed us to identify if these variables had a causal effect on the outcomes.

As shown in Table 2 and Table 3, our model predicts that the outcome is correct 83.3% of the time with the control variables included for the control group, and 86.8% for the treatment group.

Table 2

Idea selection: classification table of the control group

			Predicted		
			Idea Selected		
	Observed		No	Yes	Percentage correct
Step 1	Idea Selected	No	270	4	98.5
		Yes	51	4	7.3
	Overall Percentage				83.3

Table 3

Idea selection: classification table of the treatment group

			Predicted		
			Idea Selected		
	Observed		No	Yes	Percentage correct
Step 1	Idea Selected	No	322	3	99.1
		Yes	47	8	14.5
	Overall Percentage				86.8

The results in Table 4 show that for the control group, both the number of female endorsements ($\beta = 0.625$, $p < 0.05$) as well as the number of male endorsements ($\beta = 0.675$, $p < 0.05$) are significant, and have a positive effect on idea selection. For the control group, we find similar coefficients within this setup. The observed effect is comparable, which can be explained by the fact that the participants were not aware of the gender of the endorser.

Table 4

Idea selection: Binary logistic regression for the control group

	B	S.E.	Sig.
Idea creator gender	-0.234	0.406	0.565
Total number of female endorsements	0.625	0.205	0.002
Total number of male endorsements	0.675	0.205	0.001
Idea length	0.023	0.024	0.340
Position: quadrant 1	-0.153	0.507	0.763
Position: quadrant 2	-0.114	0.448	0.799
Position: quadrant 3	-0.890	0.506	0.078
Own idea	-0.366	0.575	0.525
Relationship degree	0.595	0.492	0.226
Constant	-2.644	0.568	<0.001

For the treatment group, the number of male endorsements ($\beta = 0.565$, $p = <0.05$) and the number of female endorsements ($\beta = 0.917$, $p = <0.05$), are also significant.as shown in Table 5. For the treatment group, as well as the control group, there is a positive predictive relationship between the focal variables and the likelihood that an observation will fall into the target group, which would be the case when a specific idea was chosen in the top 5 of the participants. However, in contradiction to what we expect to find, the treatment group results show that the number of

female endorsements have a greater positive effect than the number of male endorsements on idea selection.

For the treatment group, the results in Table 5 show that a significant predictor for idea selection is when an idea was generated by the participant themselves. In other words: the effect of one's own ideas on idea selection. The coefficient shows a positive correlation (β= 1.636, p <0.001). We find that an idea was more likely to be chosen by a participant if this idea was generated by that participant themselves.

Table 5

Idea selection: Binary logistic regression for the treatment group

	B	S.E.	Sig.
Idea creator gender	-0.044	0.355	0.902
Total number of female endorsements	0.917	0.294	0.002
Total number of male endorsements	0.565	0.231	0.015
Idea length	0.028	0.020	0.166
Position: quadrant 1	0.348	0.479	0.469
Position: quadrant 2	0.557	0.502	0.268
Position: quadrant 3	0.208	0.443	0.639
Own idea	1.636	0.452	<0.001
Relationship degree	0.167	0.432	0.669
Constant	-3.574	0.574	<0.001

4.2.2 Ordered probit regression: idea ranking

In a second step, we analyzed whether female endorsements influence the ranking of ideas. To support the hypothesis, we would have to find a negative effect of the number of female endorsements on the ranking of ideas in the treatment group. Since the participants in the control group did not know the gender of the endorsers, we would expect a similar effect of female and male endorsements on the ranking of ideas. However, for the treatment group, we would expect a difference in the coefficients. Specifically, our expectation for the treatment group is to find a lower coefficient for the total number of female endorsements than the coefficient for the total number of male endorsements.

We used ordered probit regression because it allows us to keep the order of responses, since we have an ordinal dependent variable for this analysis: the ranking of the top 5 of the participants. In this case, 5 possible outcomes were possible for the analysis of the top 5 after the endorsements: a particular idea is not chosen in the top 5, an idea is ranked lowest, an idea is ranked second lowest, an idea is ranked third highest, an idea is ranked second highest and an idea is ranked highest. We regress the ranking of the chosen ideas against our focal independent variables, which are the number of female endorsements and the number of male endorsements.

For the control group, we find a similar and significant coefficient for the number of male

endorsements (β = 0.345, p < 0.05) and the number of female endorsements (β = 0.313, p < 0.05) as reported in Table 6. This would be expected, because the participants in the control group were not aware of the gender of the endorser. This result suggests that the likelihood of ranking an idea as the highest choice has a positive relationship with the number of male and female endorsements that an idea receives. This means that the total number of endorsements is predictive of an idea being categorized as the highest ranked idea in a top 5 of a participant, in comparison to being predictive of an idea being categorized as one of the lower ranked ideas in the top 5.

Table 6

Idea ranking: ordered probit regression for the control group

		B	S.E.	Sig.
Treshold	Ranking = 0	1.661	0.499	<0.001
	Ranking = 1	1.827	0.500	<0.001
	Ranking = 2	2.025	0.502	<0.001
	Ranking = 3	2.271	0.506	<0.001
	Ranking = 4	2.640	0.516	<0.001
Location	Total number of female endorsements	0.313	0.099	0.002
	Total number of male endorsements	0.345	0.108	0.001
	Idea length	0.015	0.013	0.250
	Idea creator gender = 0	0.029	0.170	0.864
	Idea creator gender = 1	0[a]	.	.
	Position: quadrant 1 = 0	-0.54	0.242	0.824
	Position: quadrant 1 = 1	0[a]	.	.
	Position: quadrant 2 = 0	-0.058	0.231	0.803
	Position: quadrant 2 = 1	0[a]	.	.
	Position: quadrant 3 = 0	0.341	0.249	0.171
	Position: quadrant 3 = 1	0[a]	.	.
	Own idea = 0	0.037	0.309	0.905
	Own idea = 1	0[a]	.	.
	Relationship degree = 0	-0.307	0.271	0.259
	Relationship degree = 1	0[a]	.	.

For the treatment group, both the number of male endorsements (β = 0.331, p < 0.05) as well as the number of female endorsements (β = 0.468, p < 0.05) are significant as reported in Table 7. As the coefficient of the number of female endorsements is larger than the coefficient of

the number of male endorsements, this suggests that the number of female endorsements has a greater positive relationship to the ranking of the ideas. There is a positive relationship of both male as well as female endorsements on the likelihood of ranking an idea as the highest idea in the ranking.

Furthermore, we see that the control variable own idea for the treatment group has a negative, significant relationship with ranking an idea as the highest ranked idea ($\beta = -0.777$, $p < 0.05$). In the results, it shows that when an idea was made by another participant - so when it wasn't the participant's own idea - the likelihood that this idea will be ranked as the highest ranked idea will drastically decrease.

Table 7

Idea ranking: ordered probit regression for the treatment group

		B	S.E.	Sig.
Treshold	Ranking = 0	0.515	0.491	0.295
	Ranking = 1	0.672	0.492	0.172
	Ranking = 2	0.858	0.493	0.082
	Ranking = 3	1.100	0.495	0.026
	Ranking = 4	1.465	0.501	0.003
Location	Total number of female endorsements	0.468	0.153	0.002
	Total number of male endorsements	0.331	0.120	0.006
	Idea length	0.013	0.011	0.215
	Idea creator gender = 0	-0.021	0.183	0.907
	Idea creator gender = 1	0[a]	.	.
	Position: quadrant 1 = 0	-0.077	0.254	0.762
	Position: quadrant 1 = 1	0[a]	.	.
	Position: quadrant 2 = 0	-0.341	0.256	0.183
	Position: quadrant 2 = 1	0[a]	.	.
	Position: quadrant 3 = 0	-0.114	0.229	0.620
	Position: quadrant 3 = 1	0[a]	.	.
	Own idea = 0	-0.777	0.236	<0.001
	Own idea = 1	0[a]	.	.
	Relationship degree = 0	-0.145	0.215	0.500
	Relationship degree = 1	0[a]	.	.

4.2.3 Chi-square test

Based on the binary logistic analysis regarding idea selection and the ordered probit analysis regarding idea ranking, we conclude that we can reject our hypothesis based on the fact that the coefficients we find are overall larger in the treatment group compared to the control group. However, to test whether there is a significant difference between the control and treatment group, we performed an additional chi-square test. A chi-square test helps to compare categorical variables, thus allowing us to determine whether the coefficient for female endorsements is significantly different in the control group from the coefficient for female endorsements in the treatment group. If we find a significant difference, we can conclude that the coefficient is indeed larger:

- H0: female coefficient of the treatment group = female coefficient of the control group;
- H1: female coefficient of the treatment group > female coefficient of the control group.

For our dependent variable idea selection, we calculated the following, based on the coefficients shown in Table 4 and Table 5:

$$X^2 = (0.917 - 0.625)^2 / [(0.294)^2 + (0.205)^2]$$

The result of this calculation is not statistically significant ($p = 0.415$). Thus, the coefficients for the treatment group and the control group are not statistically different which leads us to conclude that they are similar. In this case, we can still reject our hypothesis as we have initially predicted a bias regarding female endorsements: we expected a smaller coefficient for female endorsements in the treatment group when compared to the control group.

For our dependent variable idea ranking, we calculated the following, based on the coefficients shown in Table 6 and Table 7:

$$X^2 = (0.468 - 0.313)^2 / [(0.153)^2 + (0.099)^2]$$

Again, we find that the result of this calculation is not significant ($p = 0.395$). There is no statistical difference between the coefficients for the treatment and control group, leading us to conclude that the results are similar. We can reject the hypothesis once more based on this result.

CHAPTER 5. Discussion and conclusion

As no decision maker has all the knowledge to make an informed decision by themselves, decision makers often rely on advice from others to help them in their judgement. It is of importance that these decisions are made with the greatest care, because in innovation settings, big decisions could potentially lead to big discoveries that may create opportunities for a company, and ensure their future (Henderson, 2017; Purcell, 2019; Snyder, 2019). While research has shown that there are many elements influencing how decision makers utilize or discount advice (Harries and Harvey, 2000; Harvey & Fischer, 1997; Tzini & Jain, 2017; Gino & Schweitzer, 2008; Bonaccio & Dalal, 2006; Tost et al. 2012; Schrah et al., 2006; Gino & Moore, 2006; Gino, 2008), there are still some largely unexplored factors that contribute to how advice is used or not used. In innovation settings, disparities between men and women still exist (Trivedi & Sakha, 2019). The stereotypical assumptions about male or female leaders may shape someone's perception, and therefore also influence how a person uses or discounts advice (Ribeiro et al., 2019). So, in this light we questioned: is advice given by women more discounted than advice by men?

We conducted an experiment with young adults who are either following an education program or have followed one recently. They were given a simple idea generation task followed by a decision making task, that gave us insight into how the participants use and/or discount advice. The participants were asked to create a top 5 out of the ideas their group came up with. They created this top 5 twice: once before any advice was given and once after the ideas received advice. This advice was given in the form of endorsements, where the participants simply had to indicate which ideas they found 'interesting and impactful', showing their approval of the idea through their endorsement. We manipulated the information about the gender of the advisors that the participants were aware of, and thus were able to analyze if and how this had an influence on their decision making process.

The findings of this research show that, within the scope of our experiment, endorsements given by women are not more discounted than endorsements given by men. We see that in general, ideas that received endorsements were chosen more often, but we do not find that ideas that received endorsement by men specifically are favored. More so, quite the opposite of what we hypothesized is true: the results show that for idea selection, the participants were more inclined to give more weight to endorsements given by women than endorsements given by men. The same was observed for the ranking of the ideas. Ideas that did receive female endorsements had a higher likelihood ending up being ranked higher in the top 5 than ideas that received male endorsements.

We can conclude that for our experiment, the participants did not give less weight or importance to advice given by women. It is noteworthy here that some of the participants within their respective groups knew each other personally before the experiment. This could have made them more inclined to choose each other's ideas instead of going for ideas by participants they did not know, regardless of whether or not that idea received endorsements. Furthermore, we only worked with groups consisting of participants that roughly fall into the same age category. Gender equality has been a present-day topic for a while now, but has never been more explored than in today's society. This might have contributed to the fact that younger generations are less inclined to give weight to making decisions based on gender – in this case whether an endorsement came from a male or female participant.

CHAPTER 6. Limitations and further research

This research was conducted during the Covid-19 pandemic. This caused some difficulties to overcome and brought about the need for a different approach. Because of Covid-19 restrictions in Belgium, the experiment could not take place in person. Where normally the participants would be present in real life, they now only participated in an online environment. This led to a number of obstacles.

First of all, communication has proven to be more challenging in an online setting. Even though the participants were explicitly told that they were allowed to discuss their ideas with the group, none of the participants engaged in conversation with any other members of the group. Of course, discussion of the ideas was not mandatory, but could have been helpful if any of the ideas were unclear or ambiguous to a participant. In addition, the bigger part of the participants did not turn on their camera and had their microphone muted. This could arguably have been an incentive for the participants to not speak out if not necessary.

Furthermore, technical issues are harder to overcome in an online setting, since this more often results in exclusion from the experiment if the problems cannot be overcome. During the experiment one participant was not able to join the experiment because of internet connection issues, and another participant had to leave the experiment before it had even started because she was interrupted by someone walking into her room. These sorts of obstacles would have been non-existent if the experiment could have taken place in a physical setting instead of an online environment.

Nevertheless, conducting experiments in an online experiment also carries a lot of advantages and opportunities for future research. Not only is conducting experiments in an online setting an efficient way to save large amounts of time, it also provides the convenience of not having to make many physical arrangements beforehand. No venue needs to be secured, no material needs to be put in order and above that: participants don't have to travel to and from the place of the experiment. Because the participants are then under less geographical restrictions, a larger pool of potential participants might be reached to take part in a research study. This could contribute to assembling a more diverse group, as well as having the opportunity to screen more potential participants that could possibly meet the requirements to participate in a study.

Within the scope of this study, only young adults who are either following a higher education or have followed one recently in Belgium were invited to participate in the experiment. To explore this subject more to be able to generalize any findings, it would be important to enlarge both the number of participants, as well as the background diversity of the participants. In addition, almost all of the participants have the Belgian nationality or have been living in Belgium for more than a year. Based on the gender equality index, Belgium obtains a score of 71.4%, where a score of 100% corresponds to full gender equality in a society. This gives Belgium the 9th place in the EU ranking. Given that the participants live in a society with a tendency to gender equality compared to some other European nations, this could be a reason to extend the scope of the experiment to participants from other countries. On top of this, younger generations nowadays might be more aware of gender equality thanks to national or international campaigns such as for example the UNESCO Youth Forum or the Council of Europe with its "Gender equality and youth" program. Moreover, gender equality has been an important topic over the past few years, making larger groups of people more aware of its importance and maybe even ignorant to any gaps that

might have existed in the past. Therefore, conducting this experiment might possibly show different results depending on the age and geographic group a participant belongs to.

On top of this, no random sampling was done so some of the participants knew each other personally before the start of the experiment. As the participants were divided into groups, they were able to see which were the preferred ideas from the other participants in their respective groups, as the voting did not happen secretly. This could lead them to vote for the same ideas that already received votes from other participants. Further research could possibly benefit from randomizing the sampling procedure to obtain a larger and more randomized sample, as well as shielding the answers from the voting rounds from the other participants in a group.

Lastly, this experiment was designed to observe how the idea selectors would react in a setting with little interference in its design. It was only mentioned to the idea selectors in the treatment group that they were obliged to use different colors of post-its to give out endorsements, and thus measuring the effect of gender bias. This way, the idea selectors were less aware of the fact that the intent of this experiment was to measure the effect of gender bias on idea selection and ranking. If in any further research this interference were to be done in a less subtle way, then this could possibly yield different results.

Nevertheless, we hope to contribute to the existing research regarding gender bias in decision making and advice taking. Although it has its limitations, this research intends to provide a basis for further research within similar settings.

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Appendices

Appendix A

Participant informed consent form

Research project: Master's Dissertation 2020-2021

I understand that the results of this experiment will be treated with strictest confidence and no findings which could identify any individual participant will be published. I understand that no individual data will be published from the study.

I also understand that my participation is voluntary; that I can choose not to participate in part or all of the project, and that I can withdraw freely at any stage of the project.

I have read the above explanatory statement, and I am willing to participate in the Master's dissertation experiment conducted by Eléonore Van de Weyer and Marie Creemers at Hasselt University, and for my data to be used in any publications arising from this research.

Name: .....

Signature: ..... Date: .....