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Female entrepreneurship in tech

How a SET education relates to the decision-making process of a female entrepreneur's choice of industry

Master's thesis in School of Entrepreneurship

Supervisor: Lise Aboen

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Abstract

Despite the current focus on female inclusion and diversion in all industries, the participation rate of women in the tech industry is still low, especially within entrepreneurial activities. With female entrepreneurship research increasing over the past decades it is more focused on an individual level.

The few researches available on female entrepreneurs in the tech industry is based mostly on male-to-female comparisons focused on differences in educational experiences, entrepreneurial intentions, networks and financing. SET education is considered to be only relevant to entrepreneurial intentions and implies an expectation of the tech industry as an entrepreneur's choice.

The purpose of this research is therefore to explore *the relation between science, engineering and technology education in the decision-making process of female entrepreneur's choice of the tech industry*".

Using a qualitative method interviewing women entrepreneurial experience in Norway and Egypt with a technical background in comparison to women entrepreneurs with a nontechnical education. The interviews focused on three main topics: entrepreneurial and educational experience and character.

The findings show that two factors influence the choice of the tech industry: gender and education. By applying the effectuation and causation framework, a science, engineering and technology education plays a role in the choice of roles to take in the start-up, entrepreneurial intentions and expectations. Also interlinked with education in the choice of the tech industry are interests and lack of female mentors in the tech industry.

To conclude the research found that a female entrepreneurs decision-making process relation to the tech industry is intertwined between education and gender. The somewhat direct and somewhat indirect relation of science, engineering and technology education to entrepreneurial intentions, role in a start-up and ambition's influence is not country or culture specific but rather industry specific.

This paves the way for further research from a practical perspective for the educational institution to further look into the curriculum to improve the relation to the role women choose to play, their expectations and better understanding of the choice of industry.

Sammendrag

Preface

This paper is a master's thesis written by an Egyptian exchange master student at NTNU School of Entrepreneurship. This thesis will also be submitted to the Technische Universität Berlin as part of the double degree program Innovation Management, Entrepreneurship and Sustainability.

At the time of writing this thesis during the spring semester a global pandemic broke and most countries were on total lock-down. The goal of this thesis is to present a comparison between SET and non-SET educational backgrounds using a qualitative approach to understand the relation between education and female entrepreneurial participation in tech to be submitted during the spring semester of 2020.

The purpose of this research is to explore the relation between science, engineering and technology education in the decision-making process of female entrepreneur's choice of the tech industry.

The analysis will focus on identifying the various factors that relate an education in science, engineering and technology to the choice of the tech industry, through the application of the effectuation and causation framework.

The author would like to thank her supervisors Lise Aaboen from the Norwegian University of Science and Technology for her constant support, patience and guidance through that difficult and stressful pandemic and Lubna Rashed from the Technische Universität Berlin, for support and direction in this research.

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List of Abbreviations (or Symbols)

| | |
|------------------|---|
| SET | Science, engineering and technology |
| STEM | Science, technology, engineering and math |
| technopreneurial | Tech entrepreneur |
| ICT | Information, Communication, Technology |
| GEM Report | Global Entrepreneurship Monitor Report |

1 Introduction

Female entrepreneurship research - dating back to the 1970s - has focused in previous studies on investigating female entrepreneurs more on an individualistic level looking at a wide range of topics like: financing and investment, performance, entrepreneurial characteristics and management, and strategy. These various topics were researched separately with occasional research on the impact of one on the other, or merely investigating gender differences across all four streams and across economic differences.

Female entrepreneurs are however understudied in all other aspects and especially the different industries among which technology. With entrepreneurship being historically considered a male activity and the tech industry being male dominated, the literary research thus focused majorly on gender differences, using the male approach in the industry as a reference model to compare women to what is being referred to as the non-traditional industry. Whether using the male reference model is the correct way to define the industry, further research in alternate directions moving away from the individualistic and comparative views needs to be undertaken, creating a more holistic view of the tech industry (Brush, de Bruin, & Welter, 2009; De Bruin, Brush, & Welter, 2006, 2007).

1.1 Problem

Women in science, engineering and technology are not that common especially in developing countries where tertiary education is not even necessarily available to women. Even more seldom is finding female entrepreneurs with a technology-based venture. With gender equality and ways to increase women's contribution in all major parts of the society is currently under a focus globally, research is looking for the various challenges and changes that need to be undertaken to further foster diversity and inclusion, especially in highly male dominated industries like ICT.

Female participation in entrepreneurial activities in tech is still low despite the different policies and actions underway to increase it. Even with the number of female students increasing in SET studies, some drop out during the studies while others drop out after a while in their career in the industry. Such a phenomenon is referred to in several research as the "leaky pipeline". This leak in the pipeline among female students in SET or STEM is attributed to various issues or reasons, some of them are related to education and the educational experiences (Amelink & Creamer, 2010; Dilli & Westerhuis, 2018; Hsu, Roberts, & Eesley, 2007; Tessema Gerba, 2012), while others are attributed to gender differences and the male dominance of the industry (Aderemi, Ilori, Siyanbola, Adegbite, & Abereijo, 2008; Alakaleek & Cooper, 2018; Marvel, Lee, & Wolfe, 2015; Smith, Smits, & Hoy, 1992).

On the educational front it was demonstrated that SET students show low entrepreneurial intentions, especially female students. The various results indicated no social-cultural influence, but rather similar results in different countries, economies and cultures, examples hereof the UK, Australia, Ethiopia, US and Europe. The analysis of the global entrepreneurship monitor (GEM) report looking for differences in STEM education and their role in different entrepreneurial stages, showed that the similarity of the gender gap

in tech across Europe and US leads women not to go through all the three stages of entrepreneurial activities and are therefore less represented in that industry (Dilli & Westerhuis, 2018).

The intent among engineering undergraduate students to pursue a career in 10 years, indicated that although being satisfied with their study experience that doesn't necessarily mean pursuing a career in engineering, especially among female students. Creating however, an experience filled with care and respect, and overseeing group work would have an impact on continuing in the major and having a career in engineering (Amelink & Creamer, 2010). Another finding of the research demonstrated that having a role model in the industry to look up to plays a role in the aspiration and motivation to continue in that career. The tech industry is a male dominated industry and having a male role model to look up to pose different challenges and perspectives.

Having a career and performing in the tech industry was found to require women to adapt to their male counterparts' norms and become the so-called "honorary man", (McGowan, Cooper, & Hampton, 2013). They are also expected to prove themselves and show that they have the knowledge to gain the needed respect to operate in the industry. Women even resort at the early stages to form female-only networks up to a certain point and then have to move along to include both genders if they wish to maintain their growth (Mayer, 2008). Such necessary adaptations are part of the male dominance reasons that discourage women from choosing the tech industry.

In contrast to the "leaky pipeline" phenomenon, other women without an educational background in SET or STEM choose to participate in the tech industry (Aderemi et al., 2008; Tinkler, Whittington, Ku, & Davies, 2015). Tinkler et al. (2015) found in their investigation of venture capitals in the US decision-making process, that women having a technical education were regarded by venture capitalists as more competent by having the necessary knowledge for that specific industry compared to women without a technical background and thus had a better chance of financial support needed for venture growth. This gives them a better advantage to those with non-SET education to operate in a highly innovative sector mostly characterized as being knowledge intensive.

Given those traits and characteristics of the industry, it raises the question as how would women- who lack the educational background and knowledge of the industry- choose to operate in the tech industry, while those who do have the necessary knowledge choose to participate in a different industry. This shows a need for further investigation of both phenomena and their relation to the education as the gateway to the industry and having a career in that industry as such.

As demonstrated, the previous research either focused on the choice of education and female self-efficacy in non-traditional fields or on the relation of education to entrepreneurial intentions to help identify and promote future career opportunities for their students. Only a few research looked at the experience of engineering students at the university relation to female students having a career in the same respective industry. Researchers often consider the relation of education and entrepreneurship to be confined to the intentions as the originating point for considering it as a career option, disregarding any possible other relations that go beyond that or might play a role in the later stages of entrepreneurial activities. Hsu et al. (2007) in their analysis of the two data sets from MIT looked at how entrepreneurial intentions changed, with no cross-reference to the choice of industry either. Therefore, the later stages of entrepreneurship are often researched with the purpose of identifying gender gaps in funding and

performance in the tech industry and at which stages they are active. The only relation at later stages of entrepreneurship to education investigated how merely having a technical education affects funding, but not the SET education itself or why women without the relevant technical knowledge choose the tech industry (Tinkler et al., 2015).

With the literary research halting entrepreneurial intentions to better understand the gender gap in the tech industry, the choice of the industry needs to be considered as important as the choice of education. With education considered the foundation and source of knowledge of the tech industry, further relations beyond entrepreneurial intentions need to be researched and identified. In an industry that has similar characteristics globally, the choice of industry explains partly factors of the low participation rate of women in a tech industry.

1.2 Purpose

As pointed out in the problem, further research is required in regard to the tech industry as such. To better understand the reasons behind entrepreneur's choice of industry, how SET education plays a role in the process and choice needs to be investigated. The purpose of this research is therefore to

"explore the relation between science, engineering and technology education in the decision-making process of female entrepreneur's choice of the tech industry".

Educational institutions promote entrepreneurship as a possible career option irrespective of the field of study. This is because entrepreneurship as such is defined as capitalizing on an opportunity by starting a business, leaving it up to the entrepreneur's choice, whether through opportunity recognition or necessity, which opportunity to venture with and make money off. However, there is an implied expectation that this opportunity will relate to their field of study, the foundation of their future careers.

This exploration provides a better understanding of how having an education in science, engineering or technology relates to the opportunities female entrepreneurs choose to start-up in.

1.3 Contribution

Through the data collected from the semi-structured interviews, the analysis shows a better understanding of the complex decision-making process of female entrepreneurs and the various interlinked and interesting factors that are considered when choosing the industry. It also provides insight into the mindset and the way of thinking obtained from and the expectations of SET education and the role it plays in the experience and effects of women entrepreneurs in any industry. Consequently, this research extends the literature on the decision-making process by adding ambition as a factor, introduces new findings to the choice of tech industry and expands on research of women with a SET/STEM education. Additionally, the research will provide implications for SET or STEM educational institutions on how to cater for such factors to ultimately increase the participation rate of women in tech and further research.

1.4 Structure of the Thesis

| | |
|------------------------|--|
| Introduction: | In this chapter, the importance of the topic of this thesis and the current problem discussed in this thesis, is introduced. Additionally, some data of the female entrepreneurial scene in general, as well as in Egypt and Norway is presented. Drawing from all these various subsections the purpose, research question and contribution of this thesis were formulated. |
| Theoretical Framework: | This chapter presents the causation and effectuation decision-making framework used to govern this thesis and the respective application thereof. |
| Methodology: | The details of the qualitative approach adopted to collect the data used in this research including the design, creating the interview guide, selecting the interviewees, executing the interviews and how the analysis is performed, are described in this section. |
| Analysis: | In this chapter the data collected from the interviews is presented. Simultaneously, the framework to analyze such findings is applied and results and findings are concluded. |
| Discussion: | This chapter will start with a summary of the findings, followed by a discussion of the findings in this research compared to the literature demonstrating agreements, compliments and disagreements. |
| Conclusion: | The conclusion summarizes the findings and provides a short summary of the answer to the research question. Additionally, a subsection will highlight implications for further research |

2 Theoretical Framework

2.1 Choice of Framework

The ICT sector is characterized as an innovative sector and constant innovation of one's offering is needed to move from the startup phase to an established one and to achieve growth in future stages. (High-)innovation levels requires certain knowledge acquired through the relevant higher education and necessary resources obtained through funding, investments and networks (Alakaleek & Cooper, 2018; Kuschel, Lepeley, Espinosa, & Gutiérrez, 2017; Tinkler et al., 2015). To better understand the relation of education on women's entrepreneurial activities, their respective decision-making process needs to be taken into consideration. This research, therefore, looked at entrepreneurship and higher education as a resource to female entrepreneurs and the role it plays in their career choices, even considering entrepreneurship in the tech industry as an option.

While psychology research focuses on female self-efficacy and how women would opt for a safer and more traditional choice in education, entrepreneurial research showed that even those who have the relevant educational background might opt to venture in a different industry and that other factors play a role and impact the choice of venture like demographics (parents educational levels, siblings of opposite sex and closeness of relation)(Crawford & Crawford, 1978), reputation due to novelty in the sector, lack of work experience in executive positions in the industry and the limitations of networks (Xie & Lv, 2018). Similarities in these demographics results and reputation echo and complement the self-efficacy research leading to the educational choice (Nevill & Schlecker, 1988; Whiston, 1993).

However, research also showed that access to different entrepreneurial education and training, networking enhancements through presence at events etc. favors a technological choice for the venture likewise the several recommendations and improvement programs bridging the gender gap in the choice of education in STEM (Aderemi et al., 2008; Anna, Chandler, Jansen, & Mero, 2000; Crawford & Crawford, 1978; Martin, Wright, Beaven, & Matlay, 2015; Mayer, 2008; Whiston, 1993; Xie & Lv, 2018).

It was established that education is not only an important factor during the growth phase but also for the intention to start a business. Research showed that, albeit the recent increase in the last decade, students in science, engineering and technology entrepreneurial intention is lower than those with entrepreneurial education irrespective of gender considering the lack of courses with that scope (Hsu et al., 2007; Tessema Gerba, 2012). It was also indicated that having an education in SET doesn't necessarily dictate the industry the venture will be started in.

Following the choice of higher education, career choices are built based on character, personality preferences, what one can or cannot do, self-image and efficacy and in some cases support from those surrounding oneself.

With education considered as an additional resource in the career making process, the effectuation theory depicts the same initial elements and process as the one resorted to

for career choice. Accordingly, the same process could be applied as well to the subsequent steps. Better understanding of what happens in those subsequent steps helps identifying the impact education has on female entrepreneurial activities. Additionally, the framework as such is not gender or industry biased and therefore the research would be adopting a neutral isolated perspective without having to compare women in that industry to their male counterparts or taking them as the industry standard. The female entrepreneurs have experienced different stages and different entrepreneurial experience which can still be reflected using the effectuation framework.

2.2 Effectuation and Causation Theory

The theory of effectuation considers in contrast to the causation effect, the means as one's starting point and follows the decision-making process to setting one's new goals from there on. As shown in Fig 1, answering the question of who one is, what one knows and whom one knows, defines one's means which are used to define one's goals and what can be done. As a member of the society and not in total isolation one has to interact with those around and the society to achieve these goals and obtain their commitment. The outcome of this process is then a set of new means and goals completing the cycle. With that set of new resources obtained as an input, the whole cycle is restarted.

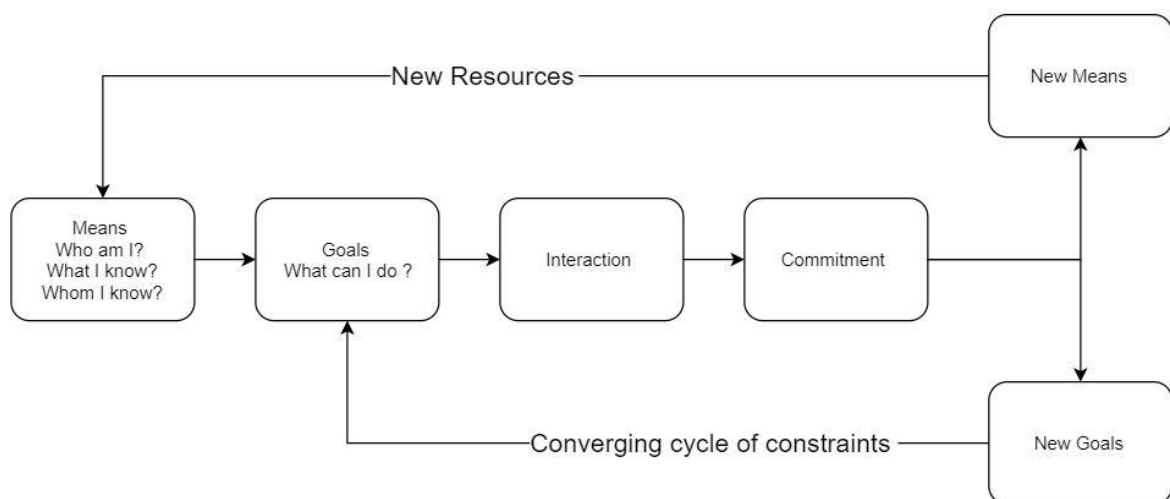


Figure 2-1 The effectuation decision-making process

In contrast, the causation theory suggests that the means and the different resources are given and accordingly one starts by analyzing them to see what can be achieved with what is given. The starting point is an assumption that certain things are given like a market or/and a need in the market. With that starting point in mind, the remaining tasks are based on further analysis of those givens and the best ultimate achievable result from it. In entrepreneurship this will be an analysis of the market, the clientele, their needs and preferences and customize the output accordingly. Both the causation and the effectuation processes are related and create together the decision-making process, where in some cases one leads to the other, they occur simultaneously, or they are used interchangeably.

2.3 Application of Framework

Using Korean firms in technology Marvel et al. (2015) investigated the entrepreneurship and innovation relationship in new ventures in regard to education, inter network ties and firm location. The results indicated that gender differences don't impact entrepreneurial activities and that education impacts mostly the innovation process which in knowledge intensive sectors is very important, crucial and dependent on deep technical knowledge. Even though education is crucial for the innovation process, Marvel et al. (2015) found that female entrepreneurs are as innovative as their male-counterparts if they have the same education, network and firm locations. The results also show that men have a higher participation rate in science, engineering and technology education in Korea than women.

Although a negative correlation between education and entrepreneurship activity in knowledge intensive sectors and growth aspirations found by Dilli and Westerhuis (2018) studying STEM education differences along with their impact on entrepreneurial activities between 19 European countries and the US, indicate similar results to Marvel et al. (2015), the study highlighted that gender differences in technical education doesn't have a direct impact on female entrepreneurship. Education itself only indicates a higher participation in the knowledge intensive and complex tech sector although not necessarily attributed to starting-up activities or growth aspirations.

Considering that most of the research is focused on an individualistic point of view, the current framework sets the requirements for starting up and growth to be: money, market and management. Brush et al. (2009) identified a need for a more generic gender-aware framework allowing for a more suitable study of all the factors of women entrepreneurial activities and accordingly included "motherhood" and "meso/macro environment" as measures to the current framework.

With that framework in mind motherhood became one of the factors that was researched investigating female entrepreneurs in technology. An international investigation of the decision of becoming a mother and starting-up, pinpointed two types of women in the tech industry: 1) those who started up before they had any children and thus postponed the decision to become a mother focusing on their business until reaching a steady state and 2) those who started-up after they had children to have more time and flexibility to care for their children despite the added stress (Kuschel, 2019). Other factors were gender differences in those male dominated industries comparing females' approach and strategy in terms of network creation, establishing their own identity in the industry and motivation and intention behind the decision to establish a business. Where women found to be more necessity driven while their male counterparts are more driven by opportunity recognition (Dautzenberg, 2012; Hampton, McGowan, McGowan, & Cooper, 2011; Kuschel et al., 2017)

In order to apply the framework to the research and the research question, all the different elements considered as part of one's means, the input to the effectuation process, were taken into account as a part of this research and were broken down into different more focused elements. The subsequent stages of the framework commitment and network were considered as one black box that belongs together and were called Effect/experience. This black box was not considered in full details in this research as it

has no direct relevance to the research question. Since the initial point is identifying one's means, the research started with the same and took into consideration the outcome of the experience afterwards on the process, defining questions and subtopics that helped identify the underlying aspects representing each point as shown in Fig.2-2.

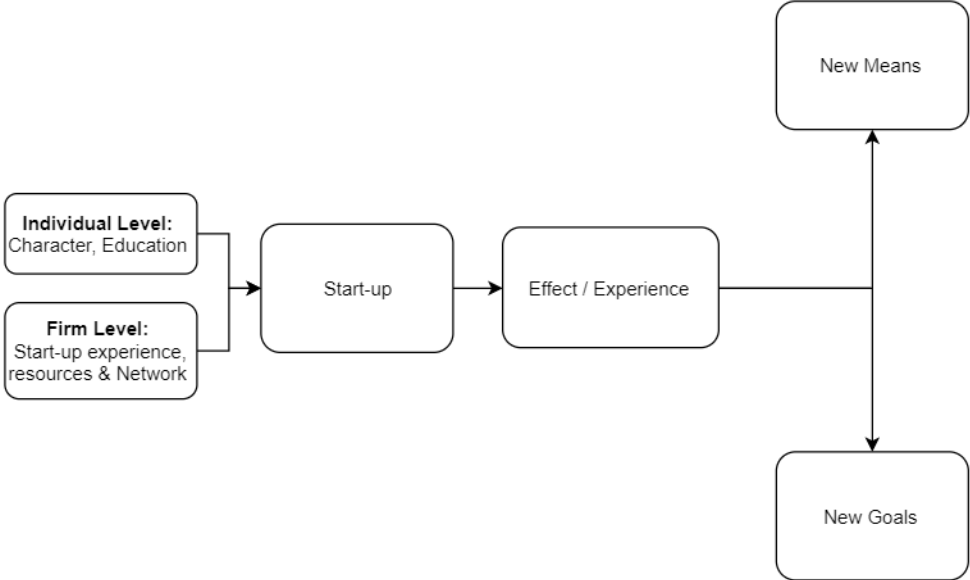


Figure 2-2 The effectuation decision-making process applied

The application of the framework and the process to achieve the purpose depends on the definition of what each of the phases entails. The definitions used in this research are as follows:

Means: To be defined using three questions as indicated by Sarasvathy (2001): “Who I am”, “What I know” and “Whom I know”. Each of these questions can be answered on three different levels: 1. Individual Level, 2. Firm Level and 3. Economic Level.

Starting off the first sub-question “*who I am*” investigates at individual level characteristic traits, education and skills, and on a firm level the tangible resources and the demographics of the economy.

Previous research provided further insights into the challenges posed by the gender in such a male-dominated field and how governments can intervene to support female entrepreneurs in that regard.

It is suggested that gender becomes a challenge in the early stages of the funding or for growth purposes, as without the proper network females are regarded as less innovative and less trustworthy. Not only is gender considered a factor for investment but also education acts as a factor in the decision-making process of venture capitalists as found by Tinkler et al. (2015). Venture capitalists find women with a technical education have a certain knowledge curve from their background, which makes their innovative process more reliable than women without that technical background.

Additionally, network creation has an impact on investment and finances and how the gender could pose some challenges in terms of discrimination (Alakaleek & Cooper, 2018; Demartini, 2018; Hampton et al., 2011; Kuschel et al., 2017; Martin et al., 2015; Marvel et al., 2015).

"*What I know*" primarily focused on the individual level on the educational background, the reasons for choosing such a background and skills. Also, the different experiences as a knowledge gaining process and the related learning outcome from: 1) their entrepreneurial experience (at what stage was the involvement, what role was played and if it ended or still ongoing), 2) working experiences, 3) the industry and 4) if the experience encompasses various industries and the impression of each industry.

On a firm level, on the other hand, the intangible resources available, employee skills and abilities, while the technology defined the economic level. Adopting a similar approach to their male counterparts, women are automatically eliminating the gender gaps as they realize the need to adopt the same behavior irrespective of whether that would have been their go to choice, if they did not have to keep up with such a male dominated sector. This also became evident in the research's realization where only female networks do not contribute to further growth or success of the established venture or business, compared to having only male networks in tech that contribute to further success and growth.

"*Whom do I know*" answers the individual's social network, the firm's organizational resources and their compositions in terms of gender and role and the economic socio-political institutions.

Research identified that in the technology sector networks are indispensable, irrelevant of the gender and the venture size or phase. Research identified that it is evident that networks act as a base for innovation and ease access to various types of resources. The study of male and female networks, investigating the differences in the creation process and if there is a need to amend the university curriculum or adopt a different way of networking, indicates that in the technology sector both male and females have a wide range of networks. Females entering this field adopt their male counterparts' approach and act in a similar way to be able to sustain, further develop and establish their venture/start-up.

Alakaleek and Cooper (2018) explored how women in tech in Jordan used their networks as financial ties and how they got access to sources of funds and found that they establish financial ties and connections using formal networks and through formal events and platforms without relying on their social or other networks. Demiralp, Morrison, and Zayed (2018) identified through investigating the gaps in the innovativeness of women from STEM given the required policy recommendations that women are faced with challenges in getting access to financial networks. The research identified that building a network is not only important for growth, but also the type and quality of the network define the resources that can be obtained for further development. It is found that during the early stages female networks in tech are initially focused on family and friends, for some even only consisting of women, but changes with time to include both formal and informal networks as well as men and women. Networks could also be long or short term, depending on the expected outcome from the network. These were the results of Hampton, Cooper, and McGowan (2009) investigation of women networks in Northern Ireland in male dominated industries throughout the various stages of the entrepreneurship journey.

The Goals would look at the choice of occupation, industry, possible future plans and the reasons behind the choice.

Both **Network** and **Commitment** were looked at as an effect stage leading to New Means and New Goals.

Subsequently, **New Means and New Goals** had a closer look at how the attainment of new resources impacts the goals and/or leads to new goals and the reasons behind it. It will be depicted in identifying how the entrepreneurial experience triggers either women setting a new goal to pursue and looking for the means to achieve (causation), or reevaluating their lessons learned, knowledge they obtained and experience they had into defining all possible outcomes from this new knowledge/means (effectuation). By following one of these two processes new career choices are set and the whole process starts again from the beginning as shown in Fig 2-3.

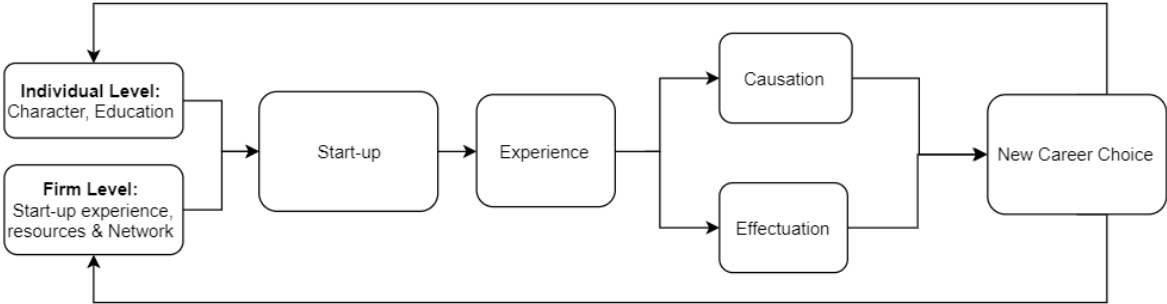


Figure 2-3 Causation-Effectuation decision-making process applied

3 Methodology

In this chapter the qualitative method used in this research is presented. The level of education and its relation to women’s entrepreneurial activities varies depending on the economy and the stage of entrepreneurial activity. Therefore; to better understand the relation and to obtain a proper overview on the entrepreneurial scene in the tech industry and its relation to education, a qualitative method was used in this research. The use of a qualitative case study enables getting a better view on certain phenomena and possibly the formulation of new theories supported by observations, knowledge and common sense.

3.1 Research Design

This research followed a qualitative methodology approach with the intention to help identify the different patterns, decisions made and answer the research question on how the educational background relates to the participation rate of female entrepreneurs in tech. Although there are four possible educational combinations available as shown in Table 3-1, this research however focused on the high-level distinction between Tech and non-tech.

| | |
|------------|------------|
| TECH/ ENT | TECH/NENT |
| NTECH/ ENT | NTECH/NENT |

Table 3-1 Possible under- and graduate educational combinations

By focusing on a higher-level distinction, this research compared the relation of different educational focus, the related entrepreneurial experience and the choice of sector. The two distinctions represent women equipped with all possible combinations of educational background and entrepreneurship as a resource.

Because of the lack of the quantifiable numbers the sampling size was limited to an evenly distributed number among all participants. The even distribution was maintained between both groups as well as both countries.

In addition, research in psychology investigating efficacy among women showed that not only the character differs but also demographics and mentors impact the decision-making process of women and the choice of education, therefore these factors were also considered in this research (Nevill & Schlecker, 1988; Whiston, 1993).

The questionnaire covered therefore several topics: entrepreneurial experience, education, and character (Appendix).

All the questions were open ended to enable follow-up questions, further dive into surprising answers and better identification of commonalities and differences without

directing the answers in a specific biased way. It also helped identify the aspiration of women in that field irrelevant to their interest in entrepreneurship or employment and whether the fact that it is a male dominated field played a role in their decision. Moreover, it determined whether there are possible suggestions to support women achieve their aspirations.

3.2 Female entrepreneurial scene

Their research indicated that another important thing to consider in the analysis is context, as defining the context defines the boundaries of the research. Different boundaries alter the results and therefore define the validity of the data and give it the intended meaning (Dubois & Gadde, 2002). In this subsection the entrepreneurial scene will be summarized with both a little introduction of how the entrepreneurial scene of both countries Norway and Egypt look like as the focus of this research.

The global entrepreneurship monitor measures various factors in different countries every year to provide a wider overview of the entrepreneurial scene globally. Some of these factors are: TEA (Total Early Activity), business establishment, reasons for business closures, start-up rate and entrepreneurial activities by gender and age. They also provide a profile for each country compared to the rest of the world and their relevant ranking. With female entrepreneurship becoming more relevant to females, the report uses in most cases gender differences as a highlight of the gap for the various activities. The data presented here is a summary of some of the important factors in the 2019 report, that aim to help best describe the entrepreneurial scenes for different stages in both countries, Norway and Egypt.

The first stage of entrepreneurship starts with entrepreneurial intentions. The GEM report for 2019 highlighted that on the one hand TEA rates increase globally with the level of education for both genders, but on the other hand it is noticed that graduate education for women lowers TEA in comparison to men. The exception is sub-Saharan Africa where women with graduate education are 30% more active in start-ups than men (Bosma et al., 2020).

Most of the women's TEA lies in retail at 53.4%, where they would operate in health, government, education and social services. Out of these women, the least participation lies in high-income countries. Men's participation rate in retail in comparison lies at 43.5 %, while their likelihood to participate in agriculture, mining and ICT is twice as high as women. The largest gender gap lies in these sectors accordingly, where 16 countries reported no women in the ICT sector at all (Bosma et al., 2020).

The ICT sector is characterized as being a knowledge intensive and innovative sector. Innovation is observed to increase with the economic level and is estimated to lie between 20-30% in low-income and high-income countries respectively. Women are less likely to report that they are innovative than men by 30%. In some countries however innovation levels of women are at parity or even higher (Bosma et al., 2020). The fact that women are less likely to consider their business not to be innovative, could lead them to perceive that lack of innovation as a reason not to be active in such a sector given the traits it's notorious for, accordingly. This in turn could be the explanation for why the 16 countries don't have women participating in this industry.

An additional motivation to start-up is the perception of having a venture as a career. It is found that in 15 countries both men and women find being an entrepreneur is prestigious and a high-status career option. In low-income countries the consideration is higher at 70.6% than in high-income countries 58.8% (Bosma et al., 2020).

Moving forward from the early activity to actually starting up, it is found that the fear of failure doesn't deter 67.9% of women compared to men being at 72.3%, but the middle-income countries have the biggest gap between men and women with a 9% difference (Bosma et al., 2020).

For the next stage of entrepreneurial activities, it was perceived that in high-income countries it is a little bit unlikely for women to perceive opportunities if they are satisfied with their career and their life, like in Europe. However, in all other regions 63% female entrepreneurs perceive opportunities, which is within five points of their male counterparts except in Europe (Bosma et al., 2020).

In Europe, North America and Sub-Saharan Africa both genders at parity consider themselves having the right skills to start a business, where in other regions women are at 79.5% compared to 84.2% of men (Bosma et al., 2020).

Globally, women and men are equally positive that entrepreneurship is a good career, both with rates of about 62%. Gender parity is strikingly consistent across regions and income levels. And both genders are almost likely 62% to 67% to know other entrepreneurs except for Latin America and MENA (Bosma et al., 2020).

3.2.1 Norway's entrepreneurial scene

Norway is a high-income country, that shows a strong entrepreneurial environment and a generally egalitarian economy and society. Despite that, the early TEA rate of women in Norway is still much lower than men. In order to increase women's entrepreneurship rate, the government launched a program accordingly focusing on different policies including "industrial policy, family policy, education and social policy" (Bosma et al., 2020)..

Despite the fact that women constitute almost half of the employed population, only 25% of the entrepreneurs are women. The analysis of the transition from employment to becoming an entrepreneur using the Norwegian registry data didn't provide any clear reasoning as to why that is, but was able to exclude the family and household as a reason (Raknerud & Rønsen, 2014). The Norwegian results in GEM indicate that there is a general perception among women that despite their high education, of not being able to and do not have the necessary skills to start their own business. (Bosma et al., 2020). In their comparison of Norway, Russia and Ukraine looking at the motivation to become an entrepreneur, Solesvik, Iakovleva, and Trifilova (2019) also found that in Norway women are rather driven by social and community based needs than other fields. Figure 3-1 demonstrates that even with a parity in STEM education only 14% were in the process of establishing a STEM company in 2016.

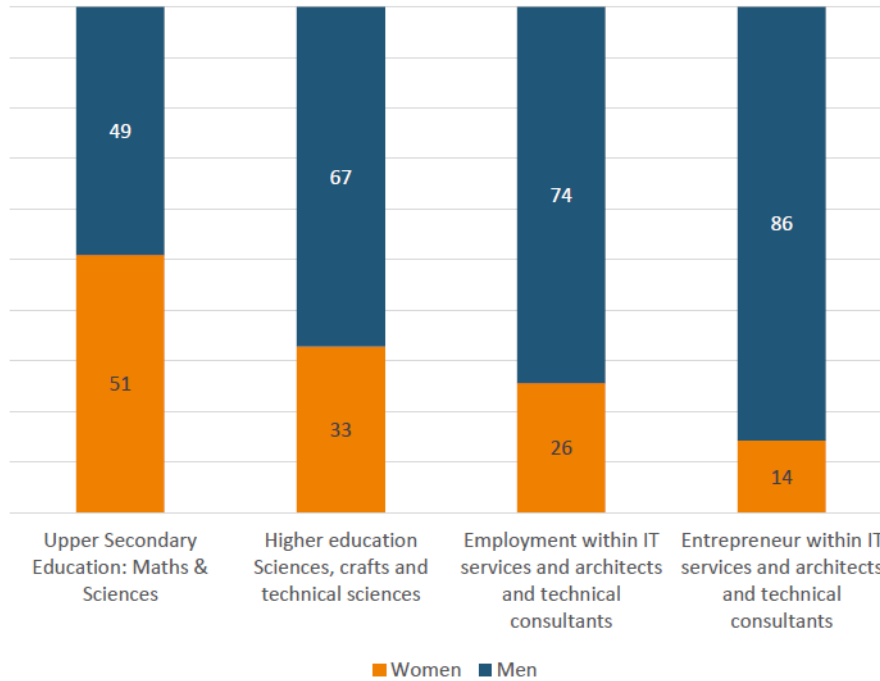


Figure 3-1 Proportion of women in the process of establishing a STEM company in 2016 (Menon Economics 2016)

3.2.2 Egypt's entrepreneurial scene

On the contrary, Egypt is a low-to – middle income developing country. Higher education in Egypt is also not a necessity leading to a not so strong entrepreneurship environment. With a still developing economy and a high unemployment rate, the working environment is not ideal, leaving a huge room for necessity entrepreneurship. (Bosma et al., 2020).

Women's entrepreneurial intentions in Egypt are at 57.7% Egypt is among six countries alongside, where men are slightly less likely to perceive opportunities than women. This shows that the female entrepreneurial environment is not only necessity based (Bosma et al., 2020).

In contrast to entrepreneurial intentions, women's nascent activities are at a much lower rate than men, creating the largest nascent activity gap in Egypt. Consequently, a similarly large gap is found in business ownership in Egypt, Iran and the UAE ranging from 79% to 86% (Bosma et al., 2020).

3.3 Data Acquisition

In this subchapter the process and the approach for collecting the data used in this research will be presented. First, the criteria for the interviewee selection and how they were contacted, then how the interviews were executed will be presented.

3.3.1 Interviewee Selection

The first step for the data collection was to identify the different interviewees that fit the two groups tech and non-tech in Norway and Egypt. While choosing to have the interviews with female entrepreneurs in Norway and in Egypt, the primary intention of this research was not to compare each country to the other in the respective category

but rather focus on the collective outcome of both countries. Including Egypt not as a basis for comparison but as a member, gives the exploration a more elaborative and distinctive result. In addition to myself being Egyptian giving me the advantage of knowing the social context and the language. The contrast of having such a different economic, cultural and educational systems perspective, enables the distinction between what is tech industry specific and what is not. Common findings among female entrepreneurs indicate a strong direct relation to the tech industry. For example, in Norway it is widely common to have a master’s degree as a continuation of your studies before you start working and a shorter educational programs, while in Egypt it is less common to pursue a master’s degree, you spend five years to receive a bachelor in Engineering and it is more common to start working right after completing the bachelor. On the one hand, the first group included female entrepreneurs with a technical education. On the other hand, the second group included female entrepreneurs that have a non-technical or non-entrepreneurial bachelor where some in both groups had a postgraduate education in entrepreneurship or something similar like MBA. All the interviewees were chosen based on recommendations from the thesis supervisor and personal networks that fitted these criteria.

All women were chosen to belong to a certain age group and have graduated within the last few years (two to five). The intention is to capture entrepreneurs at a time close to their education experience so it is still in their memory and can provide a better overview of the relation to education. Additionally, it provided a more relevant view of that relation considering it is based on recent experience where the educational curriculum or institutional offering haven’t undergone a major change.

The conducted interviews therefore included eight women with entrepreneurial experience representing the following two groups (Table 3-2):

| | |
|------|----------|
| TECH | Non-Tech |
| 4 | 4 |

Table 3-2 Number of Interviewees/ Interviewee Group

Not all interviewees were currently still active as entrepreneurs but still had a valid entrepreneurial experience to be included in the research. Table 3-3 shows the list of entrepreneurs, their educational background, chosen industry, and duration of entrepreneurial experience.

| Alias | Education | Postgraduate | Industry | Experience |
|--------|------------------------|------------------|-------------------|------------|
| Carol | Mechanical Eng. | Entrepreneurship | Agriculture, Food | 1 year |
| Julia | Nanotechnology | Entrepreneurship | Agriculture | 7 months |
| Judy | Mechatronics | | Education | 2 years |
| Esther | Computer Eng. | | Food | 8 months |
| Jane | Comparative Literature | Entrepreneurship | Clean Technology | 3 months |
| Julie | Innovation Management | | Consumer | 2 years |
| Brigit | Business and economics | Entrepreneurship | Fashion | 3 years |
| Sarah | Drama | Entrepreneurship | Tech | 1.5 years |

Table 3-3 Interviewee List

3.3.2 Interview Execution

To perform any interviews and start the data collection process, an interview guide is required for the semi-structured interviews defining the questions and how the interviews will be conducted. The guide allowed for a similar uniform interviewing experience, same flow of information, further expansion of the questions if needed and setting similar expectations among the interviewees.

3.3.2.1 The interview Guide

The interview guide was developed using mostly open questions and covered three broad topics: 1) entrepreneurial experience, 2) education and 3) character. These topics provide a threefold exploration of the entrepreneur's participation in the tech industry and the relation thereof to education. Firstly, the entrepreneurial experience provided women's perspective of entrepreneurship and provided an overview on their experience with that career choice. Secondly, to better understand the relation of entrepreneurship to education, their experience and their educational background needed to be covered as well. While both education and entrepreneurship are personal choices that highly relate to one's later career, a little bit of the person needed to be explored as well.

Open-ended questions were chosen to allow the female entrepreneurs to tell stories based on their own choice and experience, enabling further insight in the decision-making process and to avoid leading the interviewee's answer. The questions were formulated in such a way that triggers a storytelling form using syntax like: "Can you describe how...", "How did that make you feel..." or "Can you tell about a time when...". The final interview guide (see Appendix) was constructed over several runs. An initial interview guide was created and was used for a pilot study with six female entrepreneurs with different educational backgrounds, covering all four possible educational combinations highlighted in table 3-1. With the new criteria for the research and the adjustments made to the implementation of the framework the interview guide was adopted to include questions related to firm level, education and character in that order specifically. This particular order was chosen to make the interviewee feel more comfortable and open up gradually. By first focusing on the professional level the start-up gave the interviewee a sense of easiness as they are simply stating their experience, followed by a slightly more personal level their educational experience preparing them for the last but not least the most open and uncomfortable part talking about themselves and describing their personal character. Accordingly covering all three topics from the effectuation and causation process.

Additional reruns of the interview guide were performed with the supervisor to make sure almost all questions are open-ended and are explicitly and implicitly targeting the decision-making process. Only one interview guide was used for both interviewee groups mentioned in section 3.2.1. The reason therefore is that in order to answer this research's question "*How does the science, engineering and technology education relate to the decision-making process of female entrepreneur's choice of the tech industry*" both groups had to answer the same set of questions ensuring that the answers provided are not biased, not country focused and provided a more focused view on the tech industry.

3.3.2.2 Conducting the interviews

To schedule the interviews several tools were used including face to face communication, emails, Facebook messenger and WhatsApp. After the candidates agreed to be part of

the process an invite was sent with the agreed date and time using either an email, a skype or zoom. The interviews were conducted mostly via skype or zoom and only two were face to face. The initial preference for interviews was face to face but due to the fact that the entrepreneurs were in various countries and travelling all over wasn't feasible due to the global lockdown caused by the COVID-19 pandemic, skype for business/zoom were chosen as alternative tools. Zoom and skype were chosen as they provide both video and voice options, were widely used by a lot of people and have a recording option. The three face to face interviews were conducted during the pilot study at NTNU's premises in Trondheim in the available meeting rooms of the department prior to the lockdown of the University. Having these face-to-face interviews provided more room for reactional observations like facial expressions and body languages in general. While the video option was chosen for the skype/zoom interviews, the overall impression was that a certain familiarity, rapport and comfort obtained through physical non-virtual interviews was missing, which lead some of the interviewees to be less descriptive and less open. Although meeting at the university for the face to face interviews gave it a formal setting, the virtual interviews had a cozier/ homey and informal vibe making them more of a friendly discussion. Even if in some cases there were some connectivity issues.

The conducted semi-structured interviews lasted from thirty minutes to one hour irrespective of the media used. People are in general more confident in their own mother tongue and therefore end up being more descriptive and talkative. Therefore, interviews with Egyptian entrepreneurs were conducted in Arabic although all of them could speak perfect English. Unfortunately, I don't speak Norwegian and had to conduct the interviews in Norway in English. All the interviews were recorded either using skype recordings or using Microsoft Windows voice recorder for future reference, documentation purposes and ensured a smoother flow of the interview not having to halt to ensure all the details were captured in my notes. These recordings were then transcribed afterwards in word files having all the answers written corresponding to the relevant question preparing for a data analysis example given see Table 2. Accordingly, this made sure that all answers are mapped to the correct question and that the analysis won't have any gaps.

Additionally, during the interviews high level notes were taken for the various answers in case the recordings didn't work and were written in the questionnaire file as well, keeping a separate file for each interviewee. This enabled follow-up questions without having to ask the interviewee to have to repeat their answer. This gave a sense of attentiveness and eased the process of identifying further clarifications necessary in general or of surprise findings if any. Once asked in one interview it also led to asking similar questions in the other interviews.

3.4 Data Analysis

As mentioned by Gioia, Corley, and Hamilton (2013) analyzing while still conducting interviews is not efficient and doesn't provide proper results as the interview guides keep changing, making the results biased and might result in leading questions instead. Thus, all interviews were conducted first before proceeding with any of the analysis. The data analysis process will include the three sequential steps highlighted in MILES and HUBERMAN (1984): data reduction, data display and conclusion. Accordingly, in preparation for the data reduction process all data collected from all the semi-structured interviews in this thesis were first reviewed by the interviewees themselves, transcribed

and saved in separate documents, one for each interviewee. Each document was then given an encoded title to maintain anonymity and safeguard personal data of the interviewee. All these documents were then uploaded in NVivo to use as a tool for further analysis later.

3.4.1 Creating First and Second order Codes

In order to start the data reduction phase, the analysis and to link the reduced data to the theoretical framework, all women with a technical education interviews transcript were read once to get an overall impression and a sense of any themes or answers that stand out. Going once more through the interviewee's statements, the ones that resonated or were still in remembrance were highlighted to create the first order codes afterwards. Once all transcripts and all main statements were highlighted from all the interviews for that group, they were all listed in a separate document in NVivo for further assessment and used as pre-analysis first order codes. This list was then scanned for similar themes which were then grouped together. These statements were then given an umbrella term depending on the respective theme. The same process was reiterated twice to make sure any misalignments were covered. This resulted in an organized data structure to use as an input for the second part of the data reduction afterwards. The same approach was then followed with the second group for non-tech female entrepreneurs.

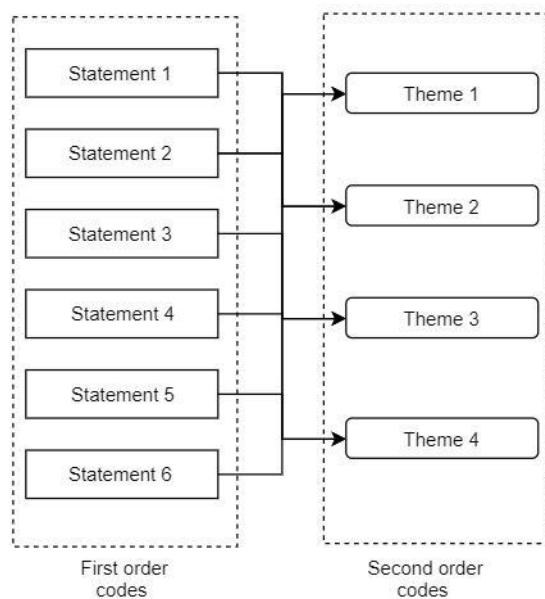


Figure 3-2 Pre-analysis data structure

Having the pre-analysis data structured as shown in Fig 3-1 eased and enabled the inclusion of various quotes in the discussion and tracing back to exact words for further analysis.

3.4.2 Data Analysis

In this section the analysis approach for this research will be described in detail. To answer the research question concerning the exploration of how science, engineering and

technology education relate to the decision-making process of female entrepreneur's choice of the tech industry, the themes that were identified and given to various statements. The analysis of the data followed an abduction approach which is a method between induction and deduction (Dubois & Gadde, 2002).

In order to combine the framework and the first and second order codes identified in the pre-analysis as mentioned previously, a systematic combining going back and forth between the reduced data and the framework as suggested by Dubois and Gadde (2002), to make sure the analysis is not forced on the framework, was used. As the first and second order codes were reduced during the pre-analysis phase, by merely and strictly looking at the transcribed data, the framework themes had no influence on the outcome. To start the analysis these second order codes were set in comparison to the themes defined by the framework: individual and firm. One of the first order codes identified was "statements representing the wants of the interviewees". This resulted in a second order code proposing expectations, when combined with the framework, it showed that it didn't answer any of the three questions in scope of the decision-making process, neither "Who I am", "What I know" nor "Whom I know". So, going back to the statements and reading them once again and in relation to the question, it was confirmed that the statements are in fact representing certain expectations they have, so both the first and second order codes remained as is and once again the three questions were probed again. However, what one wants or expects didn't match a description of oneself or what one knows or the skills one has, or even people one knows. Thus, this second order theme was not matched to any part of the framework but was not disregarded either, ensuring that not it is not part of the framework it is not relevant and important.

The remaining identified descriptions of their personal character, values, personal networks education experiences or statements on their lessons learned, roles in the venture, and the respective second order themes from the pre-analysis like education, experience, networks were then analyzed to match them in different subcategories that represent the different categories of the framework firm level or individual level.

Some themes referred to more than one level like individual and firm level and were thus included in the one where it was more referenced as input. For example, character was considered at individual level, personal networks were assigned to firm level. Some of the themes represented the decision-making process indicating female entrepreneurs resorting to the effectuation or the causation process or in some cases both. Examples given are career options from education or descriptions of the choice of industry and how they went about it. Using the second order themes these were set against the experience/ effect as the outcome from the effectuation and causation process (Sarasvathy, 2001).

This matching process resulted in character and education being matched to the individual level and resources and network matched to the firm level. The process also highlighted mismatched themes that don't fit to the T with the framework. Forcing the data to fit the framework would have limited the research affecting the results and possible conclusions drawn from the case study (Dubois & Gadde, 2002). Therefore, using the context and boundaries the themes were assessed to identify which are not relevant and can be discarded and which are vital and need to stay.

The following identified themes "Interests", "Wants" and "expectations" didn't fit in the framework because they are not answering any of the three questions mentioned by Sarasvathy (2001) either on an individual level or a firm. They were not answering any of

the questions: "Who I am" being concerned with one's characteristic traits and self-image, "What I know" which looks at education, knowledge and experience, and last but not least the "Whom I know" looking at one's professional and personal networks and mentors. However, they were found to fit a slightly different umbrella term which is ambition. Ambition is evidently driven by one's expectation of one's self which is related to one's interests and wants. Not being part of one's characteristic traits or cannot be taught but plays a role in setting one's goals, ambition defines what you want to be or become and couldn't be discarded, therefore. The framework was accordingly expanded. Other statements on view of women in the industry or teacher's involvement in the choice of education were seldom and occurred only once or twice and were therefore discarded, concluding the data reduction phase.

Once both groups' themes were separately looked at in combination with the framework, they were then displayed in a diagram as shown in Fig 4-1. This representation of the data initiated the data display phase and provided an option to compare both groups to each other. Both diagrams were then set side by side easing into the last phase of the analysis drawing conclusions. With both data representations side by side they were both ready to be compared. The initial comparison identified common themes such as and the following themes that were unique to each group: resources and funding were unique to firm level, Roles and becoming the "Honorary man" were unique to the experience. Going through the common themes' dissimilarities were identified and highlighted. Conclusions were drawn based on the identification of commonalities, dissimilarities, related sectors accordingly, reviewed literature, data boundaries and other data sources such as the entrepreneurial scene of both countries. Drawing conclusions was also a re-iterative process refining the results and identified new directions expanding the framework and the research. The literature review was only included after the analysis was made and in building the conclusion to avoid any biased or subconscious attempts to drive the analysis in a specific direction confirming or denying any of the previous research (Gioia et al., 2013).

3.5 Reflections on Methodology

In this subsection of the research I will be demonstrating reflections on the methodology and highlighting some of the limitations as part of this research.

3.5.1 Confirmability and Transferability

Transferability ensures the applicability of the research on other research in another context. This is ensured in this research by detailing as much as possible all the steps taken in this research, starting with the interview guide, the selection criteria and how the interviews were conducted. Additionally, with the research being conducted in two totally different countries from each other showing that this research can be easily transferred into another context.

Credibility of a research includes triangulation and member checks to increase the trustworthiness of the research and is therefore indicative of the validity of the research. To ensure the credibility of the research and the interviews the transcripts of the interviews were sent back to the interviewee to check it. Accordingly, all the data used and documented were validated by the data owners for any misunderstandings or any points that were misrepresented or miscommunicated in their response. Taking this step ensures also the trustworthiness of the data in this research as nothing is left to one's

own interpretations and all gaps are covered accordingly, providing a more holistic view on the industry.

Additionally, all data was reviewed by the supervisor of this research, who wasn't part of the interviews and provided feedback accordingly to the various sections that were unclear and possible misinterpretations in the interview guide as well as the results quotes and data analysis process. This led to addressing the reliability of the data.

3.5.2 Limitations

In this section the limitations and their impact on this conducted research are presented and summarized. Most of the limitations are constrained to the data collection process. All these limitations were taken into considerations in the discussion and conclusion where possible and other mitigations are highlighted in this section.

- On the one hand the interviews with Norwegian entrepreneurs were conducted in English instead of Norwegian which might have resulted in less details provided even though all interviewees showed a good command of the English language. People are usually more expressive in their mother-tongue as words come to them naturally. On the other hand, the interviews in Egypt were run in Arabic and had to be translated to English to be included in this research. The Arabic language compared to the English language is very rich in words and one can describe one thing in a lot of different ways with different meaning which makes a straightforward translation a bit challenging. This was mitigated by sending the translation to the interviewees to review it and make sure it represents their real meaning. Although the data used in both cases was in English, some of the results might have a slight deviation from the intended response given the various translations.
- The interview guide was semi-structured providing a slight chance of skipping or adding some questions throughout the interview. Questions were excluded if they didn't apply and some were added in other interviews based on the situation, descriptions or answers given. Not all questions that were omitted in one interview were also omitted in others and not all additional questions were added in other interviews as they didn't seem relevant. Such additions or omissions of questions resulted in various scope deviations, rendering some statements irrelevant or discarded as they haven't been matched or were infrequent, although they might have been relevant.
- All the female entrepreneurs interviewed were in their first stages of the entrepreneurial activities with a maximum operational period of 2 years, are relatively young and have very little to no professional experience. This excludes the later entrepreneurial stages and the relevant insight therefrom. However, they started right after obtaining their under- or graduate education and could therefore provide a more close and relevant view on the relation of education to the choice of the industry.
- Not all female entrepreneurs pursued a graduate education and those who did received an entrepreneurship master where part of the program included starting up a venture. This poses the question whether this is reflective of the purpose of the research and if it can still be considered as an education in SET and if it tilts the scale a bit towards the non-tech group.

- Due to the coronavirus SARS-COVID 19 pandemic and the global lockdown most of the interviews had to be conducted online instead of face to face and some of the entrepreneurs highlighted various concerns related to their start-up process, halting the business and could have adopted their response accordingly. Additionally, the sudden changes imposed by the pandemic, might have had some psychological factors that have directed the results in a different direction than what could have been in the usual situations. Moreover, various changes might occur as a consequence of the pandemic and might render some of the results irrelevant as educational institutions and businesses are operating differently.

4 Analysis

As described in the "Data analysis" section, a systematic combining as per Dubois and Gadde (2002) using the first and second order codes shown in Fig.4-1 with the framework. The result was then used for further analysis using the effectuation decision-making process framework. The framework uses the means as a starting point answering questions on "Who I am", "What I know" and "Whom I know" both on an individual and firm level (Sarasvathy, 2001). The analysis of the data showed that there are three main levels that are considered as part of the means at women 's disposal as an input to the decision-making process; these include: individual, firm and ambition level. These three levels are concerned with answering one, several or all of the "Who I am", "What I know", "Whom I know" (Sarasvathy, 2001) and "What I want" questions.

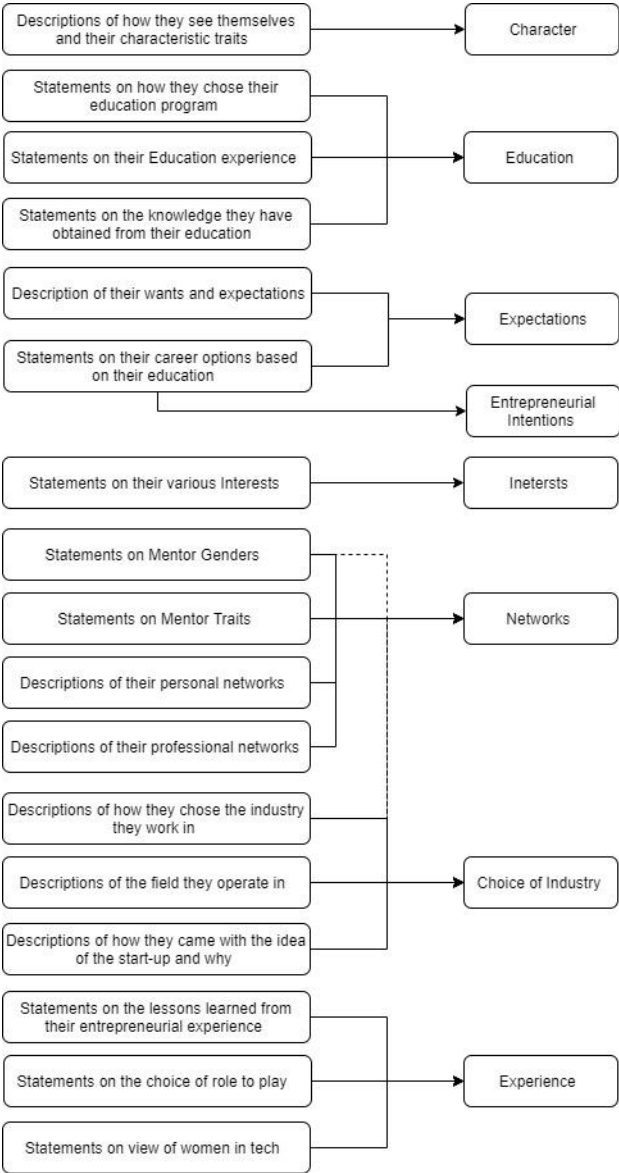


Figure 4-1 First and second order codes

On an individual level the female entrepreneurs are concerned with the character including self-image answering questions relating to “who I am” and education concerned with “what I know” and which skills do I have. The firm level is concerned with how their starting-up experience was like how they got to their resources and their networks as a starting point for their venture answering the “Whom I know” question. The third level in Sarasvathy (2001) was the economic level, which was not relevant in this research. However, the analysis identified a third level that didn’t match the other two “Ambition”. The ambition level is driven by one’s interests and one’s expectations and is thus answering the question of “What I want”.

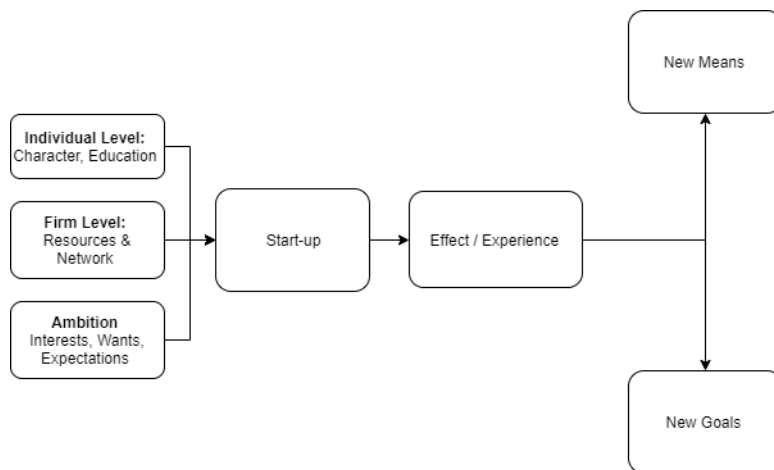


Figure 4-2 Analysis phases of the data

In the following subsections of this chapter, the analysis will go deeper in each level providing examples from the interviews for each group first and then a comparison of both groups when applicable. In three cases: becoming the “honorary man”, mentors in their professional network and resources both groups provided similar statements or descriptions thus nuances were highlighted instead.

4.1 Individual Level

The individual level of the decision-making process is concerned with the entrepreneur’s characteristic traits and education as it precedes starting up and reflects on your own individual knowledge and skills. In this subsection the analysis from the character and education sections of the questionnaire are presented.

4.1.1 Character

An entrepreneur’s character and characteristic traits define their leadership style and their management approach. Not just their characteristic traits but also their values, what they believe in, their self-image and which factors are important for them. Although understanding oneself is part of the process defining one’s goals, it mostly occurs subconsciously. One is not always aware that it is part of the decision-making process and acts as a factor in it. For example, we make decisions based on what makes us happy or how a certain choice will impact our lives and us personally.

4.1.1.1 Self vision

According to Sarasvathy (2001) part of the decision-making process is answering the question “Who I am”. This includes one’s self-vision. When asked to describe themselves, participants normally found it a bit difficult to answer and ended up using a selected few

descriptive words. Women with a tech background responded then after a while with a one worded response or focused on one specific thing that presented a certain outcome or consequence like "value-driven" or "do things out of passion". During the remainder of the interview however, whenever they were answering any other situation, they always felt compelled to explain and give reasons without being asked. They always referred to their different personality traits and how these helped them at different points of their career paths either choosing the different roles or a decision they made. For example, one interviewee while mentioning the role she played in the start-up she mentioned being organized and structured, and therefore she was nominated for the CEO role "the organizational skills and the overview and I'll always know what would be the next thing in line which made it natural for me to take the role". Another one simply mentioned: "my brain works in a funny way" or "I'm a really shy person in general where I used to be, that hates small talk".

Entrepreneurs with a non-SET education found it easier to answer this question and used a line of adjectives, that they only used when asked to describe themselves "A person who is determined to get what they want" or "quite calm, not too outgoing, I'm a thinker. I enjoy my own company". Unlike women with a SET/STEM education none of them found it necessary to relate certain decisions to their skills or personality to better explain them e.g. why they took a certain role in the start-up or why they chose this idea specifically.

The SET entrepreneurs mentioned that their education enabled them to have a certain structured, systematic and logical thinking that they see themselves using every day, and evidently applied the same in their interviews. They felt a need to use the same approach when communicating, to deduce and reason their actions, the same way you have to show a proof to a mathematical equation or problem. They didn't consider it as part of their personality, since they acquired it during their education and accordingly didn't mention it when asked to describe themselves. This is also a consequence of having to prove themselves and demonstrate their ability to investors, experts or suppliers when operating in a male dominated industry making it a force of habit. Accordingly, when answering the question, they just got to the conclusion providing one word or one specific thing, the outcome of adopting a logical and systematic approach they learned to go by in their day-to-day life.

In comparison non-STEM interviewees even when describing themselves didn't use any of the adjectives like "organized", "systematic" or "logic". They focused on social, individual adjectives like "qualm" or "thinker" instead of a thought process and the outcome thereof as expressed by the SET interviewees. They are able to just use whatever comes to them off the top of their head. It is neither systemized nor didn't it have to follow a certain logic that makes it crystal clear and can be followed easily by everyone. Afterall they are just describing themselves.

4.1.1.2 Leadership style

Leadership styles differ based on the entrepreneur's character, which in turn result in different approaches, outcomes and performance. Describing the relation between their leadership style, the business model and their personality, the interviewees with a non-SET education always mentioned the rest of the team: "pushes others to keep going after the goal to finish and I just makes sure that I lead by example " or "I believe in the good in other people so I give a lot of freedom and trust to those I'm working with" taking a more broader perspective on the start-up and other people around.

Female entrepreneurs with a SET education, however, chose to look at themselves as a person and how it differed based on their own personality, a more literal interpretation of the question. When Julia focused on the role, she thought "I think I would most likely not be the CEO in a new startup. ", Esther looked at what she wants and how to get her team to want the same thing "I wanted to create something that spread joy and I try to be friends with my team and want them to feel as owners to spread the joy further" and Judy looked at her personality and how it impacted the venture "I am not good at execution, I plan a lot of things but don't execute".

The non-SET view is more of a holistic view, while the literal SET view is more a result of an expected outcome. The holistic view is also bound by a goal that is expected to be achieved or reached, therefore implies a need for an action to bring all stakeholders onboard. Thus, they used active verbs like "push", "lead" or "give" to show progression of a certain activity and link their personality to their activities as a leader. Taking a literal view, narrows their focus only to themselves analyzing what only how they see themselves in the role they play and on what they are doing right or opportunities for improvement. This perspective, even though it has some relevance to how their personality impacts their business model or leadership style, doesn't provide a complete answer. It focuses on their personality, their actions and responsibilities strictly "Who I am" without connecting it to neither others as stakeholders in the business nor defines or showcases their leadership style. The incomplete answer doesn't necessarily provide the real overview of their leadership style or how they work with the team.

4.1.2 Education

Education answers the "What I know" part of the decision-making process. Although, it is not directly connected to one's personality, on an individual level it represents skills and knowledge obtained through experience or the curriculum. The retainment and acquisition of certain knowledge, skills and experiences is subjective and differs from one person to the other and consequently is part of the individual means. In addition, the choice of education is a personal and individualistic choice.

Choosing an education in SET or STEM was indicated by all interviewees to have been based on a process of elimination. They merely chose following the same courses they liked or were interested in, in secondary education or high school. Although none of them were pressured into choosing or felt obligated to follow their parents' footsteps in some cases, they just looked at what their subject of interest was and decided to follow the same course even though they weren't sure what it entailed exactly. Two of them liked math and physics and pursued a study that has these two subjects as a focus point. For one SET student an additional reason for the specialization goes back to a magazine article she read about the field when she was younger, and she liked it. In Carol's case the program title was misleading, and it even indicated a different study than what she anticipated, causing several of the other female students in that program to drop midway. Although Carol initially wanted to be a surgeon and was persuaded otherwise by her school counselor, she enjoyed the program and didn't drop out of the program like her other classmates.

Even though they were all happy with their studies and would still choose to study a SET major all over again if they were given the choice, Julie and Esther would choose a different specialty. The reason does not lie in that they didn't like the courses but that they just think that other specialties in the same field would fit them better and some of the courses they studied are not relevant to their career choices. In the studies of

mechanical and electrical engineering, an initially male education track, female representation was between 30-10%, where Julia's new field of study nanotechnology is not considered a male field and thus were 50-50. Despite that in some fields female students were a minority they still enjoyed it and expressed a wish to work in the tech industry even if they are not doing that now.

Additionally, when asked about the role education plays in their day to day activities, they all mentioned a certain systematic and logical way of thinking but not necessarily some technical knowledge specific to their field "Problem solving approach , asking questions , I don't know exactly what it is but it is just different". During their technical education none of them had any entrepreneurial related education, yet they find that the problem-solving skills they received helped them conduct their entrepreneurial activities "if you cannot do arrange your thoughts and defining your flow you won't be able to function and my brain works in checklist and just the realization that you can only start something after another is done".

Non-SET female entrepreneurs also chose their education based on their interest. Although one had some degree of interest in mathematics, she found the SET fields to lack creativity and automatically excluded them. Another one chose to exclude them because she didn't like numbers and expected these fields to have a lot of mathematical equations, she was not willing to continue studying. Almost all of them mentioned that they haven't retained much from their education "Part of the education was useless". One even described her experience as "got a different social perspective, I thought I was exploring herself to know what I was going to do after graduation". They merely mentioned that occasionally they might recall a certain explanation provided by one of their professors that they didn't fully grasp back then but were able to comprehend it as they experience it. The exception is the two with entrepreneurship education, who stated that the program provided them with a toolkit they can use in their professional life "the general business mindset and an understanding of business".

While acquiring a systematic and logical approach is retained by women of SET/STEM, this approach is what gives these fields a reputation of lacking creativity. Accordingly, although in both groups the choice of education was based on their interests stating they were too young to choose, a certain reputation or connotations such as a "not creative" field are embedded in their subconscious. Consequently, the choice of education is implicitly related to certain social perceptions. Such perceptions led to certain universities changing the naming conventions of certain programs to avoid such connotations, like in Carol's case. Additionally, even though they all would study the same again since the choice was mainly out of interest, possibly with a few minor changes, these perceptions haven't changed.

4.2 Firm Level

In Sarasvathy (2001) framework, the means as the initial phase of the decision-making process, were split in two levels as previously mentioned. In the previous section the individual level was discussed. In this subsection two factors on a firm level are analyzed. These two factors are the resources including roles an entrepreneur chooses to take as part of the team as well as the venture and the way entrepreneurs create and manage their personal as well as professional network.

4.2.1 Resources

Entrepreneurs are constantly monitoring their resources, identifying what is missing and what they have. Resources have an impact on several processes in a venture. These include but are not limited to innovation, growth and performance. In some cases, financial resources could play a vital role in establishment of the business, especially in the early stages. That is why the questions focused on the funding as an important resource in the exploration of the entrepreneur's decisions as a resource at their disposal.

4.2.1.1 Funding

For any start-up, funding is a huge concern during the early stages. Irrespective of the entrepreneur's gender, educational background and the industry to venture in, the funding is needed to create a pilot product, get pilot customers, hire people, produce it and start operation. To obtain any funding entrepreneurs need to show that: there is a market, there is a need and that they as a team can make it.

Talking about funding both SET and non-SET entrepreneurs looked for investors or accelerator programs as a source of financing their first steps rather than resorting to family or friends to invest. Both groups preferred not to have their family invest in their ventures, except for one who mentioned it to be the absolute worst scenario.

They all mentioned a fully expected and usual experience when dealing with the investors and that all you have to be is well prepared "when meeting investors it's kind of about being as well prepared as possible and really know our stuff so we can answer the top questions in a good way". Investor's questions were mainly concerned by "the future market and kind of other contracts will look very specific to our case. And also of course how sure we are that technology will work and how well it will work". These questions show an interest merely in the outcome they are planning to invest in, which explains why none of the entrepreneurs showed any concerns with dealing with investors. In contrast to suppliers or experts - who have to deal with entrepreneurs all the time as part of their work- they focus only on the idea in a text book fashion, is there a market, how confident are they in the technology and the team and what kind of financials are needed. In one case she stated "as for the suppliers in a male dominated industry were not under the impression that I know what I am doing and can actually do it", where in another experts were the ones who doubted her "but it was not mainly the investors who have the problem it was more like groups or called grown experts that focus more on the male aspect than a human and respected my partner more."

From the various descriptions of their financing process and decisions, it is evident that when it comes to investing, gender is irrelevant and is disregarded, resulting in both groups not dwelling much on their experience with funding and not having any significant details to mention since it went as they expected or as it should be. Investors were more concerned with whether they would benefit from that investment or not. The gender behind it is of no concern to them, which in turn made the entrepreneur's choice easier. They decided to be part of an accelerator program or find investors for their start-ups a more formal platform rather than resorting to their own friends and families. They chose to trust the process without putting too much thought into it. Although in one case "Some (investors) considered us to be too young and we needed more experience to be able to estimate the market correctly. I always felt intimidated and not compelling enough for investors". She still went for it, presented her case and secured funding for her start-up despite that perception, which enforced more confidence in her. In another case her experience with investors made her confident if she would go through the entire

process once again, compared to her initial fear of investors that stopped her from starting in Dubai "I wasn't confident enough to start in Dubai and to talk to investors".

Not even the education was accounted for, considering the educational background of the same industry to operate in should be of importance in aspiring confidence. It wasn't relevant, therefore wasn't mentioned by any of the interviewees. One interviewee just mentioned that when it came to subject matter experts, she had to prove herself and her knowledge in the tech industry against her psychology major co-founder.

4.2.2 Network

"Whom I know" is essentially a person's network. One's network is important in certain decisions. Knowing whom to go to for help or support or possibly to get a better overview eases the process, as mentioned by one of the interviewees referring to her former classmates "Some of them are best friends supporting everyday life and challenges and inspire each other". For an entrepreneur network could make a difference it provides reachability to people for various purposes tangible and intangible.

Female entrepreneurs have different kinds of networks that they use differently. Their personal network consists of their family, friends and acquaintances and their professional network including investors, suppliers, customers and other entrepreneurs. All interviewees confirmed that they like to keep both networks separate and not mix them.

4.2.2.1 Personal Networks

All entrepreneurs make it a point to keep their personal network apart from their professional one, irrespective of their education. They indicated that there is no need to or benefit from mixing them. They also suggested that their personal networks give them a certain privacy and work-life balance. Considering that all interviewees have a family member or a friend that are entrepreneurs, one would assume that it should be beneficial to capitalize on their experience in the decision-making process. But women confide them into a strictly advisory role on a personal level and not a professional one. Occasionally, they might ask them to name a few contacts to initiate their professional network but choose not to have them involved or as part of their professional network "a colleague's father was working in the industry and attended events and introduced us to others". It seems that they want to prove themselves, make their decisions on their own and have their own experience. It also indicates, although not explicitly stated, that they want to do things their own way and not the same way someone else did it. They limit their family and friends to the capacity of various personal decisions related to their career, act as a personal mentor/advisor but in no relation to the details of their work, even if they work in the same industry or field. The major influence that came from having entrepreneurs in their network is that it increased their intention to become entrepreneurs, especially for those with a SET education. In one case having entrepreneurial friends changed her perspective to consider entrepreneurship as a prospective career choice and accordingly pursued a postgraduate degree in entrepreneurship "Wouldn't have started on entrepreneurship without my friends, I hadn't imagined being interested in entrepreneurship".

It is worth mentioning that all known entrepreneurs in their personal network are all male, a father or an uncle or male friends. This didn't change the influence on their entrepreneurial intentions or made a difference in considering it as a future career path. Additionally, although in their professional work they would prefer having female mentors

so they would better understand the various situations they end up in, in their personal life the gender of the mentor becomes irrelevant and most of them rely on their friends for support, advice and guidance.

Keeping their personal networks separate from their professional one, creates a safe haven for women they can resort to for support in their day-to-day decision that is not complicated or influenced by any other factors or their professional life.

4.2.2.2 Professional Networks

Entrepreneurs rely on their professional network for various resources and further growth especially in the technology industry where they are indispensable regardless of the gender, the venture size and/or phase. Networks are another means in the decision-making process that acts as the underlying base for innovation and ease access to various types of resources.

All entrepreneurs have agreed in their interviews that before they started their venture, they didn't have any contacts in the respective industry they were planning on operating in "The initial contacts were made during the feasibility studies and were with a few of the Agri industry and attended events, conferences which were not that many and so they all know each other and introduced us to more in the network". Although they are aware that having the right network helps in getting access to various resources like employees, this was not considered a showstopper for the entrepreneurs or even a partial factor in their choice of industry, venture or business model. Considering the existence of a network irrelevant is in contradiction to both causation and effectuation decision-making processes where one of the factors you look at are means and network "in that industry the clean tech I'm working on like building up my network in that industry so that's part of the process reaching out get introductions."

In male dominated industries the majority of the suppliers, employees and investors are male, this posed for some of them some difficulties. These difficulties reside in having to prove themselves to the supplier, initially adding unnecessary delays to the process, unless there are male co-founders in the team. However, once you have established a reputation in that market the process gets easier and you are able to add more people to your network "I'm older and wiser and I have a bigger network and more experience". Accordingly, this makes the entrepreneurs network mainly of men, as the various industries are mostly male dominated.

4.3 Ambition

While the individual level answers the questions of "Who I am" and "What I know", and the firm level answers mostly the "Whom I know" question of the means, the analysis showed that there is another level of means that is considered in the process "What I want". In all our daily activities we always look at what we want in both the personal and the professional life. In entrepreneurship this question refers to the entrepreneur's ambition. Ambition is an important driver in the setting of goals. Although it might be considered an individual thing and should fall under the individual level, it doesn't really describe you as a person and it is not really something you know as a skill or knowledge acquired. Thus, it is looked at separately from both the individual and firm level.

Ambition was found in the analysis to be defined as a result of one's expectations and interests together. The reason both go together is because expectation is indirectly to the individual and interests although being personal and subjective, it is also indirectly

related to the firm. Accordingly, an entrepreneur's ambition is decided based on both as an individual and as a party in a venture. In this subchapter, both expectations and interests as a part of means will be presented.

4.3.1 Expectations

Female students in SET or STEM have certain expectations of what they want to do as part of their career. All of them expressed that they don't want to be an engineer or just an engineer. They imply that being an engineer doesn't really feel exciting or is just not that fulfilling for them. What they really want is to contribute in a pretty impactful way and want to make a difference when it comes to their career in technology "I imagine life and developing new products, new materials, new chemicals, that kids cure cancer or do something fantastic.". With this expectation that they keep looking for a purpose or some sense of purpose "but more like it should mean something for someone, I think..... but the thing you do should have a meaning for someone other than yourself." and only want to be part of the technology if they can achieve that. Their career expectations after their studies are not clear and they don't know what they want to do. They just know that they don't want to be "just an engineer". Having all that knowledge they received at university they consider it as one of their resources that they can do a lot with, but they still haven't set a goal for yet, which matches their expectations. They also find that they are expected to prove their knowledge compared to both tech and non-tech men.

In contrast female students in non-SET or non-STEM are aware that they cannot change the world or cure cancer. Even if they are looking to make an impact as well, they know it will be a minimal one and that it is fine to start small and take it from there. In one of the universities they had a project that expected them to start a venture with a two-digit budget. Having to constraint their expectations to meet that requirement, made her set her goals a bit more realistically and consider ventures with a much lower budget and focus "influencing the Egyptian economy and is breaking it down into baby steps". Unlike the tech industry which requires high budgeted ventures, long time for testing and product development. Additionally, women of non-SET consider the technology SET studies as a non-creative industry and not a possible career path.

All the interviewees didn't have much expectations related to their careers during the education process as they were really young and didn't think about it : "I was exploring myself to know what I am going to do after graduation" and another one stated "I've not I'm not that kind of person worrying and about the long-term future and it's not so important for me to have like a long-term plan", however some of them with non-SET background had a chance as part of the education process to venture or write a business plan. Participating in such activities made them realize that they don't have to be ready or have all the skills to start-up and just do it. Even after working for a few years in various positions and far from her educational background, Jane's expectations of, and interest in venturing, made her quit her job and join the accelerator program where she met the team she is currently working with "I'm kind of more flexible and like to go with the opportunities that arises."

Although the educational experience, for both SET and non-SET, doesn't define much what to expect as a career, it has a partial influence on their expectations. Expectations doesn't mean having well defined career choices, but rather a certain prospect of an outcome. For SET students it eliminates certain career prospects and for non-SET the practical entrepreneurial experience tunes their expectations towards a more achievable scope. Having a practical experience in entrepreneurship even on such a small scale is

what sets expectations, therefore the lack of such experience or setting expectations thereof results in different expectations. The SET entrepreneurs link those expectations to the knowledge they acquired and set them at the most achievable outcome from their perspective. It is driven by what they want to achieve and the impact they want to have on the world, as they know what their abilities are and what they can do.

4.3.2 Interests

Having to choose your university education at such a young age is always based on what it is you are interested in and rarely about what your career in ten years will look like. Having various interests change with time, the process exercising those interests and growing older. When you grow older your interests change depending on the various situations and experiences you go through.

Therefore, at such a young age the interviewee's choice of education was mainly based on the subjects they had at school or articles and videos they saw and raised their interest. In only one case a teacher's involvement led to the choice of education, which she later felt forced into.

On the one hand those who were interested in science subjects joined SET or STEM education similar to the statement: "I learned about physics ,chemistry materials mathematics and I found all of them very interesting." or "I always liked science and oh during elementary school and math and that was like the three courses." . There exists a connotation that it is essential to be good at math to pursue any of the science studies, since mathematics is called the mother of all sciences. Based merely on their interests SET entrepreneurs enjoyed their study as mentioned and would choose to have a career later in the industry as it still interests them. Interests could also change after graduation like one interviewee stated "Comes from my personality to be innovative and creative and felt that working in a company would limit my creativity and my ideas and thought" led her to become an entrepreneur to satisfy that interest that having her own start-up would give her the freedom to be as creative as possible.

On the other hand, those interested in anything else other than science and mathematics chose to pursue a non-SET major. As the name the creative arts suggests, arts, literature and acting have a certain connotation that creativity lies only in these fields while the rest is not. This created a certain notion that science majors are not creative and are therefore not the best choice for those looking for or are interested in creative arts like drama or acting. Post their education their interests define other aspects in their career like the venture they establish or are involved in starting "my co-founder and CTO had kind of been working on this for a long while. And asked me to join and I was very interested in his project. So, I decided to try and yeah, it was a good match."

Since parents are only involved in their daughter's choice of education by giving them their full support, it is their interests and such connotations that define the choice of education. As interests change in the future it becomes clear that those with a SET education even if they have other interests the SET fields still interest them, and they would like to come back to them, supporting the fact that they all enjoyed their education and their interests influenced by connotations or not were real.

Most of the women had various working experience in big companies that weren't a good match to their interest and decided to become part of a start-up that serves their interest. For example, an interest in food or running a restaurant where they had no

experience in this industry before or any knowledge, contradicting that such lack of means won't hinder their goal or interest.

4.4 Start-up experience

Sarasvathy (2001) suggested that means are the starting point of the effectuation decision-making process that leads to defining goals. In the previous subchapter the three levels of means used by female entrepreneurs the individual, firm and ambition level which led to the goal: entrepreneurship. The goal to become an entrepreneur is embedded in the decisions taken during the starting-up process. The starting-up experience starts with the intention to become an entrepreneur, choosing the industry to operate in and choosing the role to play in the start-up. In this subsection the process that led to these three choices and decisions will be presented.

4.4.1 Entrepreneurial Intention

In order to become an entrepreneur, one needs to see owning a business in the future, which defines your entrepreneurial intentions. Educational institutions measure it using student's consideration of entrepreneurship as a possible career option. This prospect to become an entrepreneur is an essential part of the goal of starting-up and is therefore considered as part of the process at this stage.

SET entrepreneurs indicated a low entrepreneurial intention in general based only on their SET education. Their intention increased either through a graduate program or having part of their personal network who are entrepreneurs whether it is family members or friends. Julia chose to have postgraduate degree in entrepreneurship because of her two friends who were entrepreneurs "I had a few very close friends were kind of entrepreneurial and one of them actually attended the school of entrepreneurship before me and from those two I got more the interest for entrepreneurship and I saw that well actually one way of having this impact on society that I really want to have is by creating new companies or at least learn how to create new companies.". Judy also had an uncle who is an entrepreneur which raised her interest in the accelerator program advertised for by the university. During the duration of the program she met various entrepreneurs, some from Silicon Valley which was an eye opener for her towards entrepreneurship "and made me realize a lot. I never thought I was ready, I was passionate and didn't consider whether I was ready or not, I just did it".

To the contrary, non-SET entrepreneurs showed a higher entrepreneurial intention. A possible reason for that being the practical experience they get during their educational curriculum or through various introductions to different programs. In one program the entrepreneur continued working on a start-up that began as a low budget project during their senior year at college "Since we started as a university project we thought why not continue....and found a lot of demand during that bazaar and then started to look into different material". Having had several years of success they are working on growing it further, even though they were tasked to do it. At some point she even considered the idea to be stupid. This practice made her more interested in continuing to pursue this opportunity and consider starting-up a new venture once she finds the right opportunity.

Although entrepreneurial intentions increase for SET students by having other entrepreneurs among their personal networks, they do not have to be in the same industry. Carol benefited from having someone in her personal network in the same industry she worked in. All the other entrepreneurs and her own first experience didn't have a prior professional network or contacts in the various industries, they ended up

venturing in them. They all didn't see this as a showstopper or didn't even consider it and worked on developing their own network in each of the various industries by asking around and taking part in the different networking events "you just start looking in the market and then start getting to know the lingo and the supplier you are comfortable with". Esther had no contacts at all in that industry, but she was driven by having other entrepreneurs as friends "From my previous jobs, I found that there is a company in Egypt that helps you get a chef. I need the customer to enjoy their experience and I hired the workers based on that. And if you get one good person and set a reputation on being a good employer you get the rest". Additionally, enforcing or tasking venture simulation projects on students has proven to increase entrepreneurial intentions and opens the prospect of entrepreneurship as a career option, especially among SET students. Building up on that simulation after graduation is irrelevant compared to the demonstration that it is in fact a career option and the practice makes students grasp the concept behind it better.

4.4.2 Choice of Industry

While having entrepreneurs in one's personal network relates to entrepreneurial intentions, the industry entrepreneurs operate in is a result of interests and expectations. Being an entrepreneur doesn't directly relate to your education but rather to the opportunity you will identify and work with. An entrepreneur doesn't necessarily have to operate in the same industry as their education, non-SET women operate in the tech industry and SET- women operate in non-tech industry. Thus, as long as the (founding-) team has the necessary knowledge among them and expertise to develop their product "how do they fit in this kind of segment and business or do they have the capability to actually make this happen", the industry is irrelevant. The analysis showed that the main driver for the choice of industry is interests and expectations.

None of the SET entrepreneurs interviewed operated in a SET sector or ICT. Esther developed an interest in the food industry even though her work experience and education had nothing to do with the food industry. Even after gaining a lot of experience in the tech industry, because of her interest in the food industry she chose to venture in that industry. All entrepreneurs with a tech education don't just want to be engineers but would rather want to use their knowledge in venturing with an opportunity that would be beneficial to the world or people around them. In another case an entrepreneur chose to leave the tech industry as she considered the development process to be taking a lot of time until they are in full production. This is another factor making participation in the tech industry a little harder. The industry is knowledge intensive and highly innovative, which doesn't allow for fast results to be seen of the development or the expected outcome. Compared to their expectation of fulfilling a purpose or having a certain value, makes them only willing to enter the industry in case they have the right idea and/or can have the needed patience to see it through and would make the wait worth their while.

Women with non-SET education set their expectations from their venture differently and are therefore willing to venture in any industry that will to some extent satisfy even a small part of their interests and creates a good match within the team. For example one of the interviewees with a non-tech background is operating in the tech industry because it matches her sustainability interest, gives her an international exposure and the team was a good fit "my co-founder and CTO had kind of been working on this for a long while.

And asked me to join and I was very interested in his project. So, I decided to try and yeah, it was a good match.”.

Although both groups highlighted that their choice of the industry was mainly based on what they are interested in, excluding the ICT industry was rather based on women of SET expectations. As mentioned before, all entrepreneurs chose their education based on their interests and they all enjoyed it among them those with a SET education. Given that they have enjoyed their education having new interests, doesn't mean that they have lost their interest in the fields of their study. All SET entrepreneurs mentioned that they are still interested in ICT, which is contingent on them being able to meet their expectations. Non-SET entrepreneurs are not deterred by any expectations of the tech industry and have no problem taking part in the industry as long as they have an interest in the same. Vice versa, SET entrepreneurs have no expectations of other industries and therefore have no problem to venture in them even if they have little knowledge about.

The choice of industry is directly related to interests and an indirect relation to expectations. Expectations can prevent an entrepreneur from being part of a certain industry even if one is interested in.

4.4.3 Choice of Role

Throughout the interviews, the discussions around character and personal traits led to the role each co-founder played in their start-up or venture. Based on their personality traits and their own vision of themselves, each one of them looked at the different skills she has and accordingly best made the choice of the role, irrespective of their educational background.

While women with a SET or STEM education preferred taking a strategic, customer focused or operational approach, women with other educational backgrounds haven't expressed any objections to being the CEO even if they lacked the experience and skills for it. It is not due to those with a SET education lacking confidence but rather a preference. Julia for instance was nominated by her co-founders to take the CEO role because of her organizational and visionary skills “so I was the CEO in the company among the four of us and this was something we weren't sure of from the beginning.... But I had more of the organizational skills and the overview, and I'll always know what the next thing in line would be which made it natural for me to take a role while the others were better on approach decline, for example. So, I think that was more of a result of my personality than my skills and background.”. Carol on the other hand had chosen to have the CEO experience in the food industry rather than the tech industry since she had someone from her personal network to refer to who had that experience in that industry.

Women with a non-SET education aspire or have no problem of being the CEO of the startups or take any other role as a matter of fact. One of the interviewees didn't mind even being the CTO of the start-up although she had no technical background and didn't understand the technology being developed. Although later she chose to leave the role as it became too technical for her, she still thought initially she would be able to handle it.

The role to play in a start-up could be vital to the experience. Evidently as the industry is irrelevant to the educational background, the role you play doesn't depend on knowledge but rather skills and preferences. Becoming an entrepreneur doesn't mean one has to be the CEO. Founding a start-up and being part of the founding team is what makes one an entrepreneur. Looking at the various skills SET-entrepreneurs have acquired through

their education makes them prefer other roles than that of the CEO. While non-SET education imbeds a certain business mindset that directs the entrepreneurs to prefer the CEO role.

4.5 Effect / Experience

When starting a venture, each has a different experience depending on the various factors that play a role such as market, location, founding team and many others. Moreover, each experience and lessons learned out of this experience would still be different every time you choose to venture out an idea. These experiences and lessons learned are the next step after setting the goal. It is the stage of the process where you identify new means and goals based on your experience and what you have learned. Things you would change or do differently if you were given the chance to start again, not out of regret but rather as development opportunities and new perspectives "I love being an entrepreneur, ideally I want to continue as an entrepreneur". During the interview the entrepreneurs were asked about the different experiences in their start-ups and what they would change if they start all over again. The various experiences would be explained in this chapter, highlighting differences if they exist among SET and non-SET entrepreneurs.

4.5.1 "Honorary Man"

In their experience in starting-up irrespective of the country, the interviewees all highlighted that operating in a male dominated industry makes female entrepreneurs need to change the way they do things or act differently than their true selves to get what they want. Most of the interviewed entrepreneurs regardless of their education or nationality mentioned that they had to act "tough", "assertive" or had to back up their status with knowledge to be heard or taken seriously when they operate in male dominated industries. This trait is only visible or utilized only when needed and is not something they do on a day to day basis. While Jane mentioned she had to do that when negotiating with various investors in clean tech "I think I'm a lot tougher business-wise than on a personal level. Or I can just be perceived that way at least", Esther felt the need to do so with the suppliers in the food industry "Being a female to suppliers is unappreciated and when you show them you are affirmative and you are tough, they just need to get how things are done."

Having to become an "honorary Man" or change the way they are to fit in or get what they want in a male dominated industry and activity, all of them irrespective of their education would prefer having a female mentor in their professional network who would understand situations such as these, that men don't experience or think about and would therefore act as better guidance to them. This is not only having to assume certain traits that they would normally not show in their day to day, but for example the impact of motherhood on them and how it needs to be considered in the negotiations. Although men also think it is important to have their paternity leave and include it as a factor, it was the female co-founder that brought it up and thought of. The gender of their personal mentors didn't play any factor and didn't matter as these are situations anyone could go through.

4.5.2 Roles

The founding team is considered one of the success factors of any start-up. The success lies in how well the team works together which relies on having each play the right roles and accordingly complement each other to make a whole body to run the venture. The

obvious choice is to assign the various roles based on the different competences, abilities and skills.

4.5.2.1 Entrepreneurs with a SET education

In all the interviews female entrepreneurs with a SET or STEM education prefer not to take the role of the CEO unless they absolutely have to in case of solo entrepreneur or none of the founding team would be capable of taking on this role "I think I would most likely not be the CEO in a new startup". Following up on these statements they suggested that they prefer a more strategic or rather an operational role. It is not due to lack of confidence as they are ready to step up to the task if need be, but rather a preference and could find themselves more to the requirements and responsibilities of such roles "she belongs more to coming up with solutions to problems in general" or possibly "I think a chief of staff as CEO or it should be basically anything as long as the team is working well.". They also stated that they would consider it in the future if they would join another venture after they have gained some experience from their current experience. None of the interviewees would consider taking up the CTO role even if they have the technical knowledge for it. They are expecting a specific outcome of their role that lies beyond just wanting to have a career of just being engineers but would rather use this knowledge to serve the community and satisfy a bigger purpose. The logical or systematic thinking they are utilizing out of their education in combination with their various personality and traits they are more inclined to look for the strategic or visionary roles where they can apply that knowledge, rather than the CEO role that would require a risky split of a second decision. Even the one who wanted to be the CEO she mentioned she is not good at execution or following through, but she is good at: "puts a lot of plans and imaginations and then doesn't execute them, and delegates a lot,.". She also mentioned that if she would start it all over again, she would prefer to have working experiences before she starts her own venture to have practical experience, where she did this before. Considering the low number of women playing this role or having such a work experience as CTO or CEO, women would have to rely on themselves to get this practical experience as they apply it to their own venture.

In addition to wanting to have female mentors in their professional network as mentioned before, women in SET want their mentor to have more experience than they do and have played the role they need to refer to them about. Finding a woman in the tech industry that has various experiences and has experience playing the CEO role for a tech venture is difficult, as women don't stay that long in the tech industry to reach such positions. Entrepreneurship as such has been considered for a very long time a male activity. While this is slowly changing in all other industries, the tech industry is still considered male dominated and a male field. Thus, finding women with the necessary experiences that could guide them through their own experiences, makes them settle for the next best thing or simply might just discourage them to play that role in that industry.

4.5.2.2 Entrepreneurs with a non-tech education

Women with a non-set education had no preference of the role they played in the venture. Almost all of them aspired to be the CEO of their venture/start-up. Although similar to SET-women they thought it requires fast decision-making capabilities, they still thought they wanted to do it and to be a great CEO all you need is to have grit and persistence. None of the interviewees mentioned needing work experience or that they would change much if they would do it again. They also rarely indicated, compared to

women of SET, any specifics out of their education that they use in their day to day or in their work. One only mentioned that her work helps her understand her theoretical education better, but it is not something that she notices very often. As such they seem to rely more on trial-and-error and don't mind trying the role of the CEO without experience or without specifically mentioning the need for a mentor who has such an experience. There is also the difference that it is a bit easier to imagine finding women CEOs when one is not looking at the tech industry as such or it is not in the back of your mind.

4.6 Answering the research question

In this subsection the results of applying the effectuation and causation framework answers the research question "how *science, engineering and technology education relates to the decision-making process of female entrepreneur's choice of the tech industry*" is described.

The effectuation and causation process highlighted three questions on an individual level and a firm level that define the decision-making process "Who I am", "What I know" and "Who I know". From the pre-analysis, it became clear that there is a fourth category that appeared to play an equally important part and needed to be included as another factor in the decision-making process which was ambition. It became clear from the findings afterwards that ambition encompasses a certain want or expectations and one's interest. Findings show that answering the question of what I want is an integral part of the career choices that one makes. Interests play on the other hand a vital role in the choice of education and in some cases later in their career choices regarding the industry to be part of. Women with a non-SET education participate in the tech industry driven by their interest for example in sustainability and women with SET education participate in other industries because of their interest and stay away from industries because of various expectations they have of the respective industries or of themselves if they operate in it.

The findings show that tertiary education irrespective of the country, has some direct and some indirect relation in the decision-making process. On the one hand education relates directly to entrepreneurial intentions and although not explicitly mentioned relates to the role women choose to play in the start-up or venture. Women of SET or STEM education showed low entrepreneurial intentions when envisioning their future during their educational experience. However, those that have family or friends that are entrepreneurs "Who I know" or pursued a post-graduate education in entrepreneurship, indicated interest in becoming entrepreneurs.

Tertiary education in SET or STEM also provides one with a certain toolkit that accompanies them in their lives and day-to-day. This toolkit of strategic, logical and systematic thinking drives parts of their day-to-day activities and their decision-making process ("What I know") including the role they would play in the start-up /founding team. Education defines therefore the role they ought to play and what suits them and their skills best. In addition to education, deciding on a role to play is related to certain expectations -also driven by education- and self-image ("Who I am").

Findings also show that education plays a role on the expectation women have of themselves as well as what they should do with their education. They consider their education to have empowered them with knowledge "What I know" they should use in a

specific way and incorporate it in a certain purpose that has an impact on those around them and not themselves directly.

While this research explored the relation of the educational background to female entrepreneur's participation rate in tech without a specific focus on gender or gender differences, findings show that being a woman plays a major difference in their professional network and the mentor requirements women have.

The exploration of the relation of education to the participation rate found therefore that both gender and education relate to the participation rate of the entrepreneurs in the tech industry. Gender plays a role in the requirements entrepreneurs look for in a professional mentor. Education on the other hand relates to ambition. Ambition's two-fold tiers expectations and interest are decisive factors into the choice of industry. Thus, education related indirectly through ambition and directly through entrepreneurial intentions to the participation rate of women in the tech industry.

5 Discussion

In this chapter the contribution of this research to the existing literature will be presented and how the different entrepreneurial experiences relate to either gender or education.

During the data collection phase of this research eight female entrepreneurs from Egypt and Norway were interviewed, focusing on three categories: 1. Firm experience, education and character. These categories were chosen to explore the research question *"How does science, engineering and technology education relate to the decision-making process of female entrepreneur's choice of the tech industry"*. The findings based on the effectuation and causation decision-making framework highlighted various outcomes during different stages of the entrepreneurial experience. For instance, it highlighted how important it is to consider expectations and interests as two additional factors to the decision-making process. The analysis showed that these expectations and interests are somewhat related to the entrepreneur's education, but directly relates to the industry they choose to operate in and the roles they take in the venture. The educational background and personal networks also indicated a certain relation to entrepreneurial intentions. The interviewees also highlighted various situations where their gender plays a more dominant role to their entrepreneurial experience like with creating and dealing with professional networks.

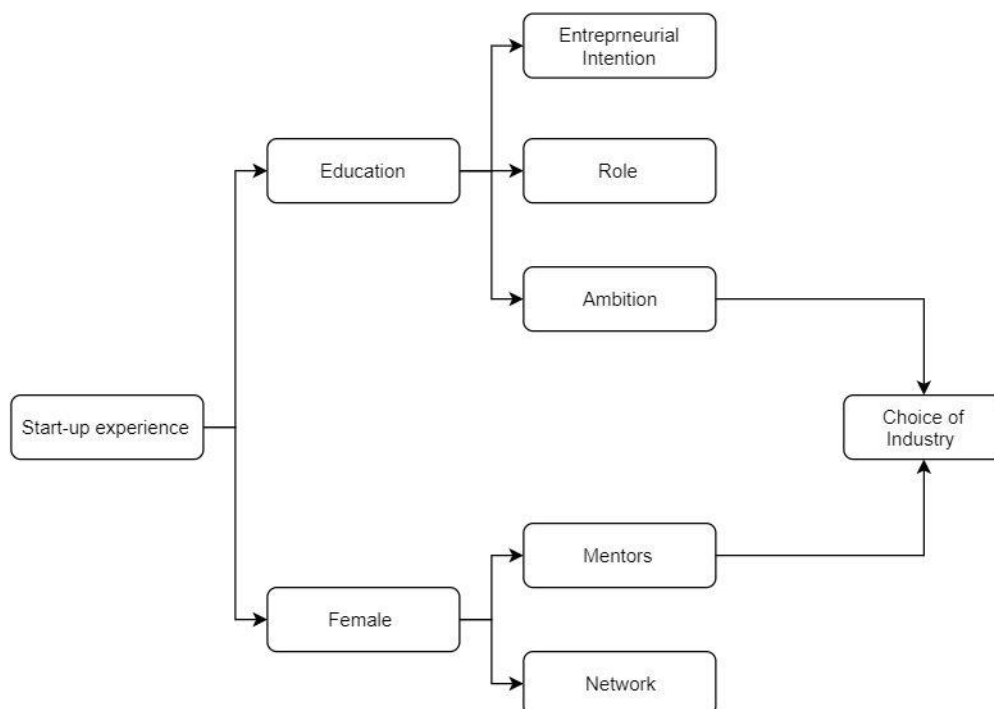


Figure 5-1 Relation of gender and education to the choice of industry

5.1 Why is Ambition important ?

It is widely indicated in most research that most women with a technical background don't continue their career in the tech industry after they graduate, therefore have a lower participation rate in tech. This phenomenon is also called "leaky pipeline".

Due to their lack of prior entrepreneurial skills, considering entrepreneurship is a male activity and their individual networks, women are less likely to engage in all 3 stages of entrepreneurship. This was demonstrated in Dilli and Westerhuis (2018) highlighting the differences of the STEM educational system in 19 European countries and the US in respect to three stages of entrepreneurial activities. However, such findings didn't explain why women with a non-SET education participate in the tech industry even if they don't have any work experience in the industry either.

In this research women with a SET or STEM education highlighted certain expectations from their education and capabilities. This is embodied in their ambition and how they envisioned their future to be. These expectations make them feel pressured to achieve something with their knowledge that would have a huge impact, therefore refuse the idea of just being an engineer and want more. Research has shown that the effectuation and causation decision-making process answers three main questions: "Who I am", "What I know" and "Who I know", both on an individual and firm level (Sarasvathy, 2001). In agreement to the literature, all these three questions do play a vital role in the process of starting-up. However, even if these seem to be valid for established firms and for starting-up as means, they do not define the career choice as such or represent such expectations stated by women of SET. Accordingly, it is important to expand the decision-making process to include one's ambition as it plays a major role and is as important as all other three questions mentioned in Sarasvathy (2001).

This thesis contributes therefore, to the framework by defining a fourth question "What I want" as an additional important factor representing one's ambition. Ambition is therefore split into expectations from one's education, the startup's outcome and the time to achieve it in. The former represents one's interests and how they impact various choices and goals you set acting as a vital part of the process.

Additionally, the interviewees mentioned that they prefer female mentors to better understand the gender specific issues they go through and expect their mentor to have experience in the role they need to. Even though it wasn't stated or suggested to be a necessity, it was highlighted as nice to have. It was also indicated in one of the programs that the male students thought that their female colleagues were as good and have a lot of knowledge as they do. This is contradicting Amelink and Creamer (2010) highlighting that the absence of female role models in the industry and educational system is also part of the reasons why women don't participate or feel interested, respected enough or that the industry is prestigious enough in having their career in engineering. Therefore, capitalizing on their ambition would increase the number of role models and use the perception further that they are respected enough in the industry.

5.2 Choice of Industry

The choice of industry doesn't depend only on education but mostly on expectations and interests. In the analysis of this research it was shown that females of SET or STEM background don't necessarily choose to operate in the tech industry, while entrepreneurs of non-SET or STEM could end up operating in the tech industry.

The analysis showed that when it comes to the choice of industry interests plays an integral role. This has been discussed in Aderemi et al. (2008), comparing the choice and performance of women entrepreneurs in Nigeria, where entrepreneurs were operating in different industries non-related to their education specifically. This research doesn't just agree with Aderemi et al. (2008) and Tinkler et al. (2015), it expands on that research by showing the decision-making process and the reason behind the choice of industry, which was not part of the research. In this research entrepreneurs stated that the reason behind their choice of industry regardless of their education to be their current interests. Choosing the industry merely based on interest, explains how entrepreneurs without the relevant education take part in a certain industry.

All STEM interviewees mentioned that they would want to work in the tech industry one day, even if they haven't started in the tech industry. On the one hand, this adds to the literature that even when women are currently not participating in the industry, their interest in the industry is still there and expect it to be part of their distant future. On the other hand it also contradicts Dilli and Westerhuis (2018) findings of a negative correlation between education and entrepreneurship activity in knowledge intensive sectors and growth aspirations found by studying STEM education differences between 19 European countries and the US and the impact of those differences on entrepreneurial activities.

The findings also show that the reason behind not choosing the tech industry right after graduation is based on the entrepreneur's expectations. Although Amelink and Creamer (2010) research agrees with the "leaky pipeline" phenomenon similar to this analysis, the reasoning from the interviews in this research however is different. Their analysis showed in researching female students in engineering that receiving the degree doesn't necessarily mean women will continue to have a career in engineering due to individual relationships built at the institution and the cultural norms thereof. In this research, entrepreneurs indicated that they really had a good educational experience and that they would do it all over again. However, their education made them set certain expectations of being active in the tech industry, if they are to have a career in it. The findings show that they would willingly wait until they have the right purpose to do so. Thus the decreased likelihood is not based on their educational experience or relationships within the institutions as suggested by Amelink and Creamer (2010). Marvel et al. (2015) highlighted that the technical education itself only indicates a higher participation in the knowledge intensive and complex tech sector not necessarily attributed to starting-up activities or growth aspirations. To the contrary the interviewees in this research showed that the STEM entrepreneurs aspire to have a purposeful and a high impact venture, suggesting that they don't just have intentions to participate in the industry but also have growth aspirations for when they start their venture in the tech industry.

5.3 Entrepreneurial Intentions

Part of the purpose of this research is exploring the relation between STEM education and women entrepreneurs decision-making process to be in the tech industry, where the very first step is entrepreneurial intentions. The analysis of the decision-making process when it comes to entrepreneurial intentions, showed that students of STEM don't see entrepreneurship as a career option, highlighting a low entrepreneurial intention. All STEM interviewees indicated that having entrepreneurs as members of their friends and family is what made them pursue entrepreneurship either directly, encouraging their

participation in a postgraduate education on entrepreneurship or working with entrepreneurs. This agrees with the look at education as not only an important factor during the growth phase but also for the intention to start a business. Research looked at students in science, engineering and technology and investigated how their entrepreneurial intention is lower than those with entrepreneurial education irrespective of gender even though it has been rising over the last decade, considering the lack of courses with that scope (Hsu et al., 2007; Tessema Gerba, 2012). In their research Tessema Gerba (2012) showed that having entrepreneurial friends or family members increased the entrepreneurial intentions among engineering students. Both Tessema Gerba (2012) and Hsu et al. (2007) agree that female engineering students have lower entrepreneurial intentions compared to male students, where one researched engineering students compared to business students in Ethiopia and the other analyzed two data sets of MIT students over seven decades, respectively. Both research as well as this one, were performed in relation to various countries; this is therefore not a cultural thing, leaving the question of whether it is an educational thing as all three research have different educational systems. One might argue that the institutions offer different educational systems and structures, and therefore cannot be an educational thing and that the reason lies elsewhere. However, the content is similar and comparative to some marginal differences. Moreover, the undergraduate students haven't had any experiences in the industry to be able to develop any intentions, therefore it can only be related to the education system.

5.4 Roles

The role one plays in a venture is mostly an overlooked part of the decision-making process. Even though during the interviews the question wasn't explicitly asked as to which role they took in the start-up, it was mentioned by every single interviewee. The analysis showed that especially STEM entrepreneurs used the role they played as part of explaining and describing their own characters. The effectuation and causation decision-making process starts with the means, that leads to interactions, commitments and then goals and so on and so forth. This process doesn't consider the roles one plays in any of those stages or how to best choose that role. Having the right team to make it is an important part in every venture, this includes not just having compatible personalities, but also that each takes over the right role that best fits their own character and abilities. Thus, a founding team can have the right members, but the wrong roles would end up not functioning as it should. In this research as mentioned those with STEM / SET education irrespective of the educational institution and country, prefer to play a strategic or operational role, rather than the CEO or the CTO.

While it seems like there is no relation to education, the analysis showed that indeed it does have something to do with education. It became clear that a certain thinking process learned during their education that they apply in their day-to-day activities and attributed to being part of their skills that fit these roles. There is very little literature focusing on the choice of roles in the tech industry. Amelink and Creamer (2010) in their research on the experience of female engineering students showed that the lack of role models in the industry plays a role in the long-term participation of engineering students both male and female in the industry. For female students though the lack of female role models in the industry might become a discouraging factor and diminishes the attractiveness of the industry. While this is not a direct analysis or investigation of the roles women play in the industry, it highlights that having women playing different roles in the industry is important and requires further investigation. In addition to the findings

from this analysis showing that the role is related to education from a different angle that leads to having different role models that potentially could act like mentors in the industry accordingly. This concludes to the need of further research in that aspect and to expand further on it.

5.5 Networks

Through the interviews almost all women entrepreneurs wanted to start a venture that had an impact on society or economy and make a difference, irrespective of the country. Moreover, most of the women mentioned that at some point they had to assert themselves and be "tough" to prove themselves worthy and get things done. This is in agreement with the various literature showing female entrepreneurs in male dominated industries having to become the so called "honorary man" to be able to succeed (Martin et al., 2015)

This was also indicated in their choice to have a professional mentor of the same gender as they would understand better the problems they are facing and would thus have the needed experience how to overcome these gender specific problems and fix them.

The findings agreed with Alakaleek and Cooper (2018) exploration of how women in tech in Jordan used their networks as financial ties and how they got access to sources of funds, found that they establish financial ties using formal networks and establish connections through formal events and platforms and not relying on their social or other networks. All entrepreneurs agreed and confirmed that they didn't initially have any networks and had to build them up from scratch using professional platforms; examples given accelerators "have their network and from being part of the program it exposed them to the entrepreneurial scene,....." and rely on their professional networks. The result also disagrees with the various other research (Alakaleek & Cooper, 2018; Demartini, 2018; Hampton et al., 2011; Kuschel et al., 2017; Martin et al., 2015; Marvel et al., 2015) that indicated that women refer first to their own family and friends for funding. The findings also disagree with the suggestion that women try to create initial networks during the early stages consisting only of women. All entrepreneurs indicated that their networks are gender neutral and they don't look at gender as a specific thing or a factor for consideration. This is also neither a cultural or an educational thing, as all interviewees both in Norway and Egypt, as well as those of SET and non-SET all agreed on the same thing.

6 Conclusion

Throughout this thesis, the methodology and the framework were developed and defined to fulfill the purpose of exploring the research question of this thesis, which is concerned with *"How does science, engineering and technology education relate to the decision-making process of female entrepreneur's choice of the tech industry"*.

Using a semi structured interviewing approach to data collections and a modified effectuation and causation framework for the analysis, the findings came to show that the choice of industry is influenced by ambition and availability of mentors/role models in the industry. These two factors were found to have a three-fold relation to the individual, education and being a woman. All of these three factors are intertwined in direct and indirect ways in the decision-making process when it comes to career. Education has a higher impact - than merely on entrepreneurial intentions - on the role in the venture, ambition, entrepreneurial intentions. The gender of the entrepreneur played a more dominant role in relation to mentors and to network.

Education has a direct relation to entrepreneurial intentions and to graduates expectations. Women of STEM have specific expectations of themselves and their work to be purposeful and have an impact, which they have no intention to compromise in, if they are to participate in the industry. SET students developed during their education a systematic and logical way of thinking that they apply in their day to day and their decision-making process. This way of thinking was shown to influence the choice of role to play in the venture and lead to conclude that education has an indirect relation to the choice of roles women choose to play in a venture.

Being a woman in a male dominated industry poses some gender-based challenges. This was made clear in the network creation process and having professional mentors. Female entrepreneurs have to become tough and change their nature in business settings to be able to achieve what they want, be heard and respected. They also prefer to have a female mentor in their profession who had more experience than they did, as they would be able to relate to the problems that their male counterparts don't consider or even understand. With the female participation rate being low as it is, having women mentors with more experience poses a challenge in the tech industry.

Therefore, as the choice of industry relates to ambition and mentors, not just partly explains why there are interindustry participation and why women of SET would choose a different industry instead and also possible relations to the "leaky pipeline". The participation rate in the industry is based on women entrepreneurs to choose to venture in that industry. Their contingent purposeful participation in the industry, along with women's interests and the availability of more experienced female mentors are the main factors that relate to the choice of industry. They have different weights depending on the educational background but are still all considered a factor.

Interviewees from the SET/STEM interviewees showed similar results in both countries, concluding that there are no rooted cultural relations to the choice of industry or specific educational institutions characteristics. Norway and Egypt are two different cultures and have two different education systems and institutions, having similar results means that the roots are in the industry itself. The tech industry is characterized as male-dominated,

knowledge intensive and highly innovative. With the current globalization that is taking place these traits of the industry, expand in all countries and dictate content of the education and the expectations thereof and institutions over the world try to adapt to these expectations. The education system focuses on the technical content and a specific way of mindset that is retained with the students for the rest of their lives and very little on any entrepreneurial education, although it is considered a career option.

The research contributed to the literature shedding light on the industry from two countries perspectives. The findings take the literature one step further towards research on the tech industry and pave the road for further research and investigations including further exploration of the expectations of SET / STEM graduates, the choice of industry and its various traits and how the decision-making process relates to the choice of role to play in a co-founding team.

This research identified that women of SET education have different expectations if they are to participate in the tech industry as a new insight on the choice of industry. This contingency was found to act as a deterrent for women's choice and needs to be better understood and explored further to identify the antecedents thereof to be able to address it and increase the participation rate in the industry.

Additionally, the research expanded the literature by showing that even indirectly, education relates to the choice of role to take as part of a founding team. The choice of role impacts the availability of female entrepreneurs in the industry to act as mentors for other women. Therefore, it is important to further explore the role choices in the tech industry and how they relate further to education and if some educational changes can increase the participation rate in the tech industry.

6.1 Implications and further research

In this subsection practical and future research implications from the findings of this research will be highlighted. Practical implications will discuss implications to potential female entrepreneurs and educational institutes and future research implications addressing gaps in choice of industry, expectations and ambition and in choice of roles in the industry in a co-founding team.

6.1.1 Practical Implication for educational institutes

As mentioned in this research education has an interlinked relation to the participation rate in the tech industry. While the industry has specific traits that provide directions that the various education institutes all over the world try to adapt to, to prepare them to participate in the industry accordingly. The findings in this research implicate for educational institutes:

First education relates to entrepreneurial intentions as shown in many researches, which shows that the educational curriculum needs to have a closer look at. Irrespective of the system, there is a low entrepreneurial intention among engineering students, while simply knowing an entrepreneur increases entrepreneurial intentions. This low intention could be addressed by including entrepreneurial material in the program with entrepreneurial simulation either as projects or possible participation in accelerator programs. Such simulations provide the practical and experimental approach that

complements the rest of the educational program and gives a different perspective to entrepreneurship as a career option. It will also help make the students realize that you don't have to start big, you can start small and with the growth of the venture one can grow into the initial expectations at later stages.

This mindset shows that it influences the decision-making of the choice of roles you play and thus influences the availability of mentors/role models. To increase the number of role models in the industry, educational institutions need to help students differentiate between where to apply this mindset and where not. Also, if they had to role play different roles and experience the different responsibilities, then they would have gotten the feel for it and understand better what it entails, a way of trial and error approach to build upon in the future without going through the risk.

6.1.2 Theoretical Implications and suggestions for future research

Research on education pertaining to the tech industry has been focused on gender differences and entrepreneurial intentions. As shown in the introductory chapter the research on female entrepreneurship needs to be expanded to focus more on countries and industries and less on individual and gender differences. This study has explored the decision-making process of female entrepreneur's choice of industry in relation to a SET/STEM education providing new insights and understanding of the choice of industry and role related to a SET education. Therefore, it is suggested that further research of how an education in SET/STEM relates to other entrepreneurial stages than entrepreneurial intentions is conducted. The findings indicated that aside from interests, women have highly impacting expectations from their acquired education. It would be interesting to further explore how deep and how deterring are these expectations and do women go back to the industry with these expectations or do they simply vanish.

This research additionally expanded the decision-making framework by adding the question "What I want" to "Who I am", "What I know" and "Whom I know". It is suggested to further identify the roots of this question in the decision-making process. With a lot of career options and a lot of people resorting to career changes midway. Ambitions doesn't only identify the reasons for choice of industry, but it also contradicts different researches suggesting the reason to lie elsewhere. Further understanding how one's ambition changes various decisions in the different industries and career paths. I therefore suggest further research enabling the identification if other industries and other career choices are impacted in the same way. It is also interesting to identify if the addition of the question "What I want" plays a role in other choices other than career, and if so, does other factors than interest and expectations play a role.

A less researched topic that was identified in this research and still has a far way to go is how a SET education enforces a certain thought process and how it relates to women's choice of roles in the industry. I suggest having further research to look into how the SET educational thought process influences that choice. It would be of interest to investigate whether changes to the curriculum are needed to change that impact. A deeper insight into other possible methods to encourage women to take other executive roles like CEOs and CTOs, to have female role models and mentors to help support other women in the tech industry and increase their participation rate accordingly.

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Appendix

Interview Guide

Personal Information:

- Education:
- Family:
 - Siblings and their professions
 - Do you have any family members or close friends who are entrepreneurs or have entrepreneurial experience? If yes, can you please describe a bit on the experience?

Firm Level:

- What was your primary reason for starting a business?
- When did you start operations and how did you determine you were ready for that step?
- How and why did you decide on going into that industry?
- How did you first think about the idea and why?
- Would you describe the process you went through to develop this idea?
- How did you go about financing/ funding the starting-up process? What was the initial plan for it?
- What was your experience like in dealing with investors, customers, pilot customers, suppliers and team members?
- Can you describe a little bit your professional network and how have you come into contact with people in your network and how you interact in each relationship?
- How would you describe your experience as an entrepreneur and which decisions would you change if you would do it again?
- Do you mentor professionally? In your industry? Is your mentor the same gender? Do you think that gender plays a role in that mentorship?

Education:

- Can you tell me a bit about how you went about making the decision to pursue a college education in that specific field? Which factors did you consider as part of the analysis?
- Was anyone else involved in or influential to your decision and choice?
- How did your family respond to your decision to do this study specifically?
- How was your experience during your studies and how did you imagine your career is going to be?
- How did it make you feel being a minority or a majority in your studies?
- What role does education play in your day to day activities professional and personal?
 - What was that experience like?
 - Does that happen to you often?
- What would you consider the most essential part of your education that enables you to carry out your entrepreneurial activities?
- What role does your former classmates play now and in what capacity?
- How do you feel now about your choice of education and if any what would you have changed?
- What would you consider the most important thing to be a successful entrepreneur?

Character:

- How would you describe yourself?
- What is your personality like and how does that influence your business model and leadership style?
- When making a decision in your life which factors do you consider and how does it differ from personal to professional decisions?
- Have you ever found yourself in a situation where you were considered a minority/odd man out?
- How did your entrepreneurial experience impact your career choices?
- What type of person do you have as a mentor? Same industry or different? Personal and/or Business Mentor?

Follow-up

Would it be ok for us to contact you in case of any follow-up?

Do you have any additional comments or feedback you would like to add?

Thank you so much for your valuable time and effort

