“WOMEN CAN’T FIX THESE PROBLEMS ALONE. WE NEED MALE COLLEAGUES, RECRUITERS, MANAGERS, AND LEADERS, TOO.” – EXPLORING WAYS TO SUPPORT THE WOMEN IN IT

An interview study done in a Finnish IT Company

Lappeenranta–Lahti University of Technology LUT

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Anni Haaranen

Examiners: Associate Professor Jussi Kasurinen

Professor Maria Paasivaara

ABSTRACT

Lappeenranta–Lahti University of Technology LUT

LUT School of Engineering Science

Software Engineering

Anni Haaranen

“Women can’t fix these problems alone. We need men colleagues, recruiters, managers, and leaders, too” – Exploring the ways to support the women in IT

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Keywords: Gender diversity, women in STEM, gender balance, supporting women

Number of women studying and working in the STEM field is still low despite the effort to try increase the representation in various ways. Women missing in STEM professions creates a gap in expertise as half of the population is not taken equally into account in the technological professions, technology and product development and markets. This thesis focused on finding ways to support women in the IT field. It also aims to recognize the actions which have helped and supported women in the Case company to develop in their careers and what measures should still be taken. The study was conducted in a Finnish IT company as a qualitative study. 16 women with an academic degree divided in four groups were interviewed with a semi structured interview method with questions in four different categories at the Case company’s Finnish sites.

The major observations of this study were that there is still need for actions to be done to support women in IT – mentoring, sponsoring, and coaching are seen as valuable tools to support women. In addition, trainings for both women and managers would help women advance in their careers and increase their retention in the Case company; real examples and stories of women at the core of technical development and in manager positions helps set an example and inspire other women; exclusion, unaddressed misogyny, lack of support from managers and not seeing the company diversity measures implemented in day-to-day work are reasons for leaving the Case company. However, many of the women taking part in this study were happy with their career development but saw room to improve diversity in especially the leadership positions.

TIIVISTELMÄ

Lappeenrannan–Lahden teknillinen yliopisto LUT

LUT Teknis-luonnontieteellinen

Tietotekniikka

Anni Haaranen

“Naiset eivät voi ratkaista näitä ongelmia yksin. Tarvitsemme siihen myös mieskollegoita, -rekrytoijia, -esihenkilöitä sekä -johtajia – Tutkimus keinojen etsimisestä naisten tukemiseksi IT-alalla

Suomalaisessa IT-yrityksessä tehty haastattelututkimus

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Teknillistä alaa opiskelevien sekä teknillisillä aloilla työskentelevien naisten määrä on matala verrattuna miehiin, vaikka naisten määrän lisäämiseksi on tehty töitä viime vuosina erilaisin keinoin. Naisten vähäinen määrä STEM-aloilla aiheuttaa tietotaidon puuttumista teknillisiltä aloilta sekä vaikuttaa negatiivisesti teknologian ja tuotteiden kehitykseen sekä markkinointiin, kun osan populaation näkemystä ei oteta kehityksessä huomioon. Tämä tutkimus keskittyy löytämään keinoja, jotka ovat tukeneet naisia ja heidän kehitystään IT-alalla sekä Case-yrityksessä. Tutkimus tehtiin suomalaisessa IT-alan yrityksessä laadullisena tutkimuksena ja siinä haastateltiin 16:a korkeakoulutettua naista teemahaastattelua käyttäen. Osallistujat oli jaettu neljää eri kategoriaan ja käytetyn haastattelurungon kysymykset oli jaoteltu teemoittaan neljään osa-alueeseen.

Tutkimuksen tärkein havainto oli, että naisten tukemiselle IT-alalla on tarvetta. Mentorointi, sponsorointi ja valmennus nähdään hyvinä keinoina tukea naisia. Myös naisten ja esihenkilöiden kouluttaminen auttaisi naisia etenemään Case-yrityksessä. Esimerkkitarinat naisista teknisen kehityksen ytimessä sekä esihenkilön rooleissa toimivat inspiroivina esimerkkeinä alalle hakeutuville sekä alalla jo vaikuttaville naisille. Poissulkeminen, misogynia ja ennakkoasenteet, joihin ei puututa, tuen puute esihenkilöiltä sekä tasa-arvoa edistävien toimien näkymättömyys yrityksen arjessa olivat todettuja syitä lähteä Case yrityksestä. Moni tutkimukseen osallistunut nainen oli tyytyväinen uransa kehittymiseen, mutta näki tarpeen lisätä diversiteettiä vielä etenkin johtajapositioissa.

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“To achieve great things, two things are needed: a plan and not quite enough time.”- Leonard Bernstein

“Success isn’t about how much money you make. It’s about the difference you make in people’s lives” – Michelle Obama

The subject of this thesis is very important not only for the IT field and the Case company, but also for me personally: raising three daughters, I must participate in making the world just a little bit more equal. These last two years have been full, to say the least. I have been working fulltime, studying fulltime and being a mother fulltime. Thanks to remote studies and work, I have been able to do all this simultaneously. I’m proud of what I have accomplished, but the success wasn’t achieved alone.

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My spouse and daughters, the dream team, and my support in anything and everything I decide to do, you always have the will to understand and the way to help. As a repetition from my earlier thesis, this is for my daughters: you can do anything you put your mind into.

ABBREVIATIONS

Abbreviations

IT	Information technology
STEM	Science, technology, engineering, and mathematics

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Tiivistelmä

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1 Introduction

This chapter introduces the overview of the research domain, method and the key results. The aim is to explain the reasons why this study was conducted and introduce the research questions, the research problem, limitations, and the structure of the thesis i.e., the goal is to introduce what the research aims to achieve.

1.1 Objectives, background, and motivation

In 1976 admiral, computer scientist and a pioneer of computer programming Dr Grace Hopper said that “You have to plan ahead and schedule everything so it’s ready when you need it. Programming requires patience and the ability to handle detail. Women are 'naturals' at computer programming.” (Mandel, 1967.) Women have had a huge impact in the computer evolution. Thompson (2019) explains that the computational code breaking in World War II was done by women and going even further back in history to 1833, the first ever ‘coder’ was a woman, Lady Ada Lovelace. Initially, coding was considered to be “a woman’s job” as writing code was considered to be less interesting and less important, almost a menial job. Programming was one of the few so called ‘white-collar’ professions in the 60’s which accepted women and the salary was good. (Thompson, 2019.) Information technology was popular a field of technology for women to study and the percentage of women studying a bachelor’s degree in computer and information sciences in the United States rose steadily in the 70’s and 80’s, reaching its’ peak in 1984 being 37,1 % compared to 17,6 % in 2011 and 20,7 % in 2019. (NCES, 2021.)

Today the situation is different: only one woman reached the top ten tech billionaires list in 2021. She is MacKenzie Scott, the ex-wife of Jeff Bezos the founder of Amazon, the divorce settlement making her one of the richest people on earth, all the others being men and most of them had made their money being involved in IT (Cai, 2021). According to Statistics Finland (2021) in 2020, about 82 % of bachelor’s degree students (2767 men and 599 women), 80 % of master’s degree students (1817 men and 458 women) and 78 % of doctoral

students (439 men and 125 women) in the field of information technology in Finnish universities were men. (Statistics Finland, 2021.) The low number of women in the technological field is already a global issue. 29 % of people doing research and science are women. Women employ 12 % of all engineering positions and 26 % of the computing positions in the United States and the same can be seen in UK, where 15 % of employees in STEM are women and women hold only 5 % of the management roles. (Hardey 2020, 3.) In just a few decades the computer engineering field has become yet another engineering field where women are underrepresented. The subject of this study is very important and current for both the Case company and in general, to be able to support women in IT, help them advance if they want to and ensure they stay in the career path.

The objective of this research is to investigate the careers of academically educated women working currently in the Case company and those who have left the company; and explain what has inspired them to enter the technical field, stay in the Case company and in the STEM field;, find ways to support women to advance in their careers; and compare the methods used in the Case company to the methods that have been found useful by literature and research.

The following research questions were generated for this study:

How could academically educated women be supported in the Case company to advance in their careers?

a. What measures have supported women's career development in the Case company?
b. What measures have supported the success of women in STEM careers working at other companies?
c. What measures could help women enter and keep women motivated to stay in technological careers?

1.2 Conceptual framework

In recent years, there has been a lot of conversation about gender equality, diversity, and discrimination in many aspects of life, including technology and IT where women are

underrepresented. The various women in tech-movements have received a lot of social media coverage and visibility. The visibility and the normalization of women in technological profession is very important to increasing gender diversity and gender equality in and of STEM. An equal balance in IT workforce between men and women is hard to achieve in IT companies, as roughly 20 % master's students in Finland are women in the IT field (Statistics Finland, 2021). This ultimately leads to lower number of qualified woman applicants for STEM jobs and again less women in the workforce.

There are several ways to justify the need to further gender diversity in workplaces. If women are left out or undermined as technological experts, the potential of half the population is removed from solving STEM related problems which affects the development of many other fields of science too. The legislation is also siding with inclusion and diversity. The Finnish Act on Equality between Women and Men is a law that has been set

> "…to prevent discrimination based on gender, to promote equality between women and men, and thus to improve the status of women, particularly in working life. Furthermore, it is the objective of this Act to prevent discrimination based on gender identity or gender expression." (Act on Equality between Women and Men, 1986.)

Another way to justify diversity, is to look at the benefits it creates for a business. Innovation is one of the things that is known to increase in gender diverse teams through the creation of a more diverse knowledge base, wider range of experience and improvement in decision making (Ritter-Hayashi, Vermeulen and Knoben, 2019). For these reasons it is beneficial for a company to pursue a gender balanced workforce.

Some earlier stereotypes have led people to believe that women aren't as capable as men, when it comes to mathematical subjects. According to them women need more guidance and encouragement on those subjects, and don't apply to STEM professions because of that. Recent studies reveal that the differences in achievements are insignificant, and boys and girls have the same capabilities when it comes to mathematics and science and men and

women perform equally well in STEM professions. (Bystydzienski and Bird 2006, 3-4.) This leads to the conclusion that women and their capabilities are not a problem that needs to be solved as it is not an actual problem. It has been recognized that there is no need to try to change women to fit STEM, but rather adapt the science and engineering academic fields in a way that women can be fully engaged (Bystydzienski and Bird 2006, 4-5.) The attitude of not being able to enter the STEM professions may develop for women very early if the presumption is that girls and women are somehow less capable of learning mathematics or physics or to perform in STEM professions. This again influences the number of women choosing a STEM career.

Adapting the academic work fields in such a way that they are more suitable for women is important not only to get women to study the field, but also to retain those women who have chosen the STEM career path. Working conditions are an essential part of that. According to a study by Funk and Parker (2018, 6), 50% (and 19% of men) of women working in STEM jobs have experienced gender discrimination at work, 20% (and 7% of men) of women have felt that their gender has made it harder to succeed at work and 36% (and 28% of men) have experienced sexual harassment at work. In workplaces with mostly male employees the gender-based discrimination was up to 78%. 29% of women said that they were earning less than a man in the same position. (Funk and Parker 2018, 9.) Hunt's (2015, 221) study explains that in the engineering fields, women are more likely to leave their careers than men because they are dissatisfied in how much they get paid, for lacking networks and how they get promotion opportunities. Hunt doesn't find more relations in women exiting the engineering field and family-related matters than non-engineering professions and family-related matters.

1.3 Key concepts

Earlier studies have shown that there are less women in the IT and STEM fields and that there would be greater benefits from a more equal workforce. There is evidence that companies benefit from having more women in managerial positions and board rooms (Mousa, 2021; Ritter-Hayashi, Vermeulen, and Knoben, 2019; Smith, Smith, and Verner,

2006; Singh and Vinnicombe, 2004). There is also a growing need to investigate the subject from a perspective trying to uncover ways to support women in IT companies to stay in the company and advance in their careers. The Case company is interested to know how women with an academic education could be supported better. There have already been initiatives, like educational career paths and mentoring programs in the Case company to help women succeed, but the goal is to find more ways to support women in addition to these and compare the data to successful women in other companies. Qualitative research with interviews was conducted in the Case company and the answers were collected from its Finnish sites. The method was chosen to provide information about the current situation and the experiences of women working in the Case company and provide suggestions and solutions for the Case company to implement.

1.4 Structure of the thesis

This study consists of six main chapters. The first chapter of this thesis lays out the foundation for the research, introducing the basic concepts, objectives, and research questions. The second chapter presents the theoretical framework for this research, covering the differences between men and women, the legislation to prevent discrimination, women in education and workforce, diversity and equality in IT and STEM in general and general information about the Case company. Chapter three introduces the methods used to conduct this study and how the data was collected, handled, and analysed. In chapter four, the analysed results of the research are presented, and the findings introduced. Chapter five summarizes the research and presents and discusses the major observations. It gives insight to the implications and answers the research questions. The final chapter six introduces the final conclusions of the subject and study.

2 Prior research

This chapter introduces the basic concepts which are relevant for this study, such as definition of gender, gender diversity and equality in IT, STEM and in Finland, women entering and exiting technological professions, what methods have already been introduced to increase diversity in the field of STEM, and introduction of the Case company. The literature review focuses on examining the STEM and IT work field with the gender aspect considered, examining legislation and statistics in Finland and the current situation in the Case company through statistics and the measures already taken to improve women's progression.

2.1 Differences between men and women and the laws that prevent gender-based discrimination

Women's position in the Finnish society has drastically improved in the last hundred years. According to Ministry of Social Affairs and Health (2022) it has always been important to the Finnish nation be a pioneer in the field of equality and having both men and women involved in developing the society which brought wealth and prosperity. Although Finland and Finnish people have been pioneers in promoting gender equality through various actions, there is still a lot of work to be done to for example mitigate the pay cap between men and women, promote workplace diversity and equality and encourage women to study STEM professions. But are men and women so different after all and is there still a need for legislation to prevent discrimination? The basic theories (the evolutionary theories, the cognitive social learning theory, the sociocultural theory, and the expectancy-value theory) focus on the differences between men and women, but recent research shows that we are actually more alike than different. (Hyde, 2005; Hyde, 2014.) The following chapter introduces the concept of gender, the similarities and differences between men and women, and the legislation which prevents discrimination based on gender.

2.1.1 Defining gender

Different terms are often misunderstood or mixed when talking about sex of a person, sexual orientation, and gender. Gender is often mixed as a concept with sex which refers to "the different biological and physiological characteristics of males and females, such as reproductive organs, chromosomes, hormones, etc." (Council of Europe, 2022) and that is why it is important to specify the meaning of gender and mention that the concept of gender is more complicated than often portrayed. Gender has a slightly different meaning to it, depending on the organization providing it. The WHO gives the following definition:

> "Gender refers to the socially constructed characteristics of women and men – such as norms, roles and relationships of and between groups of women and men. It varies from society to society and can be changed. The concept of gender includes five important elements: relational, hierarchical, historical, contextual and institutional. While most people are born either male or female, they are taught appropriate norms and behaviours – including how they should interact with others of the same or opposite sex within households, communities and work places. "(Council of Europe, 2022.)

According to the Council of Europe (2022) The European Institute for Gender Equality has an extensive definition for gender, and it says that there are social attributes, opportunities and relationships that are learned through socialization. Gender refers to behaviour that is expected from a man or a woman in a certain situation. According to the European Institute for Gender Equality, "In most societies, there are differences and inequalities between women and men in responsibilities assigned, activities undertaken, access to and control over resources, as well as decision-making opportunities. Gender is part of the broader sociocultural context." (Council of Europe, 2022.)

Ministry of Social Affairs and Health defines gender a diverse combination of "physical, psychological and social dimensions" (Ministry of Social Affairs and Health, 2015). The

Act on Equality between Women and Men describes gender identity which is based on a person's conception on their gender that is expressed through for example behaviour, style of dressing (Ministry of Social Affairs and Health, 2015). This definition by the Finnish Ministry of Social Affairs and Health is quite exceptional, since "EU law does not provide definitions of the concepts of 'sex', 'gender' and 'transgender', and does not distinguish clearly between sex and gender. Likewise, very few countries in the European Union define the concepts of 'sex', 'gender' or 'transgender' in their legislation" Finland being an exception (European network of legal experts in gender equality and non-discrimination, 2021). In addition to men and women there are other terms used for expressing gender identities, such as transgender, agender and non-binary to mention a few.

The focus of this study is to figure out how to support employees who identify themselves as women, as that is the second largest gender group in the Case company. This study focuses on the narrow division of gender into men and women because of the Case company gender statistic and numbers and the fact that the thesis material, both collected and previously published, focuses on the differences in numbers, pay, etc. discovered between men and women. Most of the comparison material and earlier studies are conducted using the same principal of division, as every person in Finland is marked as a man or a woman in the civil registry (Ministry of Social Affairs and Health, 2015).

2.1.2 The differences and similarities between men and women

There are theories and literature that explain both the differences and similarities found when comparing men and women. The basic theories which explain the differences between men and women are the evolutionary theories, the cognitive social learning theory, the sociocultural theory, and the expectancy-value theory. Hyde (2005, 2014) explains through extensive research that the differences are not as big and many as described in earlier literature. Hyde (2014) explains that the stereotypes that are introduced through psychology influence how people behave and are often used as a reasoning in political issues.

Instead of focusing on the differences, Hyde (2005, 581) has a hypothesis that "… males and females are similar on most, but not all, psychological variables. That is, men and women, as well as boys and girls, are more alike than they are different." To come up with the gender similarities hypothesis, Hyde (2005, 581) reviewed 46 meta-analyses and discovered that the differences between genders have been exaggerated and that the discovery has a big effect on working life and relationships and that many claims about differences are not supported by the scientific data. This hypothesis does not support the idea that there are "women's professions" and "men's professions" based on certain traits that a person has because of their gender.

The social context and roles have a big impact on gender research. Hyde (2005, 588) explains about a study done by Lightdale and Prentice in 1994 which showed that after a group of study participants were deindividuated, the outcome was that there were no big differences in aggression between men and women and comparing some variables, women appeared to be more aggressive than men. The difference in aggressiveness was not detected in the group where there were no assigned social norms. (Hyde, 2005, 588.) Hyde (2005, 589) also points out that the importance of context in research is also detectable in other similar research and "the magnitude and even the direction of gender differences depends on the context. These findings provide strong evidence against the differences model and its notions that psychological gender differences are large and stable" (Hyde, 2005, 589). There are several examples of situations where these exaggerated beliefs of differences between men and women influence areas of life, including studying, work, and relationships (Hyde, 2005, 590). The generalization of these differences becomes an issue when affecting the perception of self and development in for example work or studying, if presumptions are made based on gender.

2.1.3 Legislation to prevent discrimination and progress equality

The Government's Action Plan for Gender Equality 2020–2023 describes how the Finnish government is aiming to develop the gender equality and balance so that Finland is the leading country when it comes to gender equality (Ministry of Social Affairs and Health

2020). Women haven't always had the same opportunities as men, when it comes to work, profession, politics or even education. There have been times where women have not been allowed to study, own property or vote. Today there are laws and legislations that prevent discrimination and ensure equal rights for all people. The Finnish constitution, section 6 states that "No one shall, without an acceptable reason, be treated differently from other persons on the ground of sex, age, origin, language, religion, conviction, opinion, health, disability or other reason that concerns his or her person." (The Constitution of Finland, 1999, section 6.) In addition, the Act of Equality Between Men and Women was set by the Ministry of Social Affairs and Health in 1986 "…to prevent discrimination based on gender, to promote equality between women and men, and thus to improve the status of women, particularly in working life" (Ministry of Social Affairs and Health, Finland, 1986), providing more detailed legislation on promoting equality and diversity in working life.

The Act of Equality Between Men and Women provides guidance for working life, education and government and municipality committees, advisory boards, and bodies, setting the proportion of women and men at 40 % in the latter three. Also, in "…a company in which the Government or a municipality is the majority shareholder has an administrative board, board of directors or some other executive or administrative body consisting of elected representatives, this must comprise an equitable proportion of both women and men" (Ministry of Social Affairs and Health, Finland, 1986, section 4a). Equal education opportunities must be provided for all when it comes to "...education, training and professional development, and that teaching, research and instructional material support" (Ministry of Social Affairs and Health, Finland, 1986, section 5).

It is stated at the Act of Equality Between Men and Women that every employee must promote gender equality with the following actions:

> 1) act in such a way that job vacancies attract applications from both women and men;
>
> 2) promote the equitable recruitment of women and men in the various jobs and create for them equal opportunities for career advancement;

> 3) promote equality between women and men in the terms of employment, especially in pay;
>
> 4) develop working conditions to ensure they are suitable for both women and men;
>
> 5) facilitate the reconciliation of working life and family life for women and men by paying attention especially to working arrangements; and
>
> 6) act to prevent the occurrence of discrimination based on gender. (Ministry of Social Affairs and Health, Finland, 1986, section 6.)

These measures are followed and tracked in the workplaces (of over 30 or more employees) with a gender equality plan drafted in collaboration with "…the shop steward, the elected representative, the occupational safety and health representative or other representatives appointed by the employees" (Ministry of Social Affairs and Health, Finland, 1986, section 6a). The plan includes a description of the current situation, a pay survey, measures done to promote equality and how the previously added action have been taken in to use. The Act also prohibits discrimination based on gender, pregnancy or childbirth or based on gender identity mor expression. (Ministry of Social Affairs and Health, Finland, 1986, section 7.)

According to the Ombudsman for Equality (2022) there is an Equality Unit inside the Ministry of Social Affairs and Health in Finland that oversees the preparing of the legislation. There is also an Ombudsman for Equality (working in the Ministry of Justice) whose task is to monitor that the prohibition of discrimination is successful and oversee that the Act on Equality between Women and Men is implemented in all aspects of life. The role of an Ombudsman is to give guidance, monitor and act on gender diversity or discrimination issues. (Ombudsman for Equality, 2022.)

The EU legislation also provides directives and precedents against gender discrimination. According to European Equality Law Network (2022) there are different directives which ensure equality treatment of men and women, prohibit sex discrimination, and apply to

certain groups such as Pregnancy Directive, Parental Leave Directive and Part-time Work Directive. (European Equality Law Network, 2022.) All of these laws, acts and directives have been set to promote and uphold diversity in workplaces and in the society.

2.2 Women in education and workplaces

Finland is considered a forerunner in many aspects of life, including gender balance in education, and working life: the percentage of women taking part in the working life is quite high compared to many other European countries (Ministry of Social Affairs and Health, 2020). Education until the end of secondary degree is free and mandatory for all: there is a separate legislation to prevent discrimination and Finland is the happiest country in the world for the third time in a row based on measures of dystopia, perception of corruption, generosity, freedom of making life choices, healthy life expectancy, social support and GDP per capita (Helliwell, Haifang, Wang and Norton 2022). The following chapters explain how women and girls are represented in Finnish schools and Finnish workplaces and in the STEM careers, and what kinds of benefits do gender diversity and equality provide for working life and the whole society.

2.2.1 Girls and women in education

There are several studies suggesting that girls do better than boys in several school subjects, if differences between genders are examined (Duckworth and Seligman, 2006; Ciarrochi, Heaven and Leeson, 2008; Steinmayr and Spinath, 2008) and despite the common stereotype of boys exceeding in mathematics (Hyde, 2014) girls perform equally good in mathematics and science (Holmlund and Sund, 2008; Hyde, 2014). Instead of just gender alone "…intelligence, gender, and positive thinking each play a unique role in predicting academic performance in youth." (Ciarrochi, Heaven and Leeson, 2008).

A meta-analysis done in 1990 by Hyde (2014) with over 3 million participants showed only a slight difference in mathematical skills between men and women. The biggest difference

was seen on complex problem solving which is relevant for performing in STEM field. Recent studies show that the difference is much smaller or has even disappeared today (Hyde, 2014). Again, the context of the study has an effect on the results: the group that was told a math test was gender fair showed no differences in results between men and women and the group that was told there would be expected differences, women did worse than men (Hyde, 2005). Adults having stereotypes about mathematical skills based on gender, may result into having lower expectations and support for girls which influences the performance in math and mathematical career via lack of self-confidence and performance (Hyde, 2005). One reason for the lower numbers of women in STEM careers and worth examining, may be a result of reinforced social gender norms and stereotypes which are being enforced by surrounding parents and teachers and later in life managers and leaders of women at workplaces.

2.2.2 Women in workplace

According to the Ministry of Social Affairs and Health the percentage of women taking part in the working life in Finland is quite high compared to many other European countries. The percentage of women working (71,8 % in 2019) is almost as high as working men (73,3 % in 2019). (Ministry of Social Affairs and Health, 2020.) According to Sajavaara (2013, 4), a higher number of men are deployed if they have children and with women the situation is the opposite: women who do not have children have a higher employment rate. In Finland the difference in deployment percentage between women with and without children is 10 %. The employment rate of women with under 3-year-old children is about 50 %. (Sajavaara, 2013, 4.) The low percentage in deployment rate with mothers with small children is at least partly explained by the parental leave benefits and home child-care allowance system which are mostly used by women in Finland.

The differences in work assignments and deployment sector are some of the explaining reasons on the pay gap between men and women. Men having fulltime jobs have average monthly earnings of 3835 € and women 3226 € (Ministry of Social Affairs and Health, 2020). 82 % of men and 56 % of women work in the private sector and 76 % of the work

force in municipalities are women (Sajavaara, 2013, 7). Women are mostly employed in health care, financing, education and hotel and restaurant business. The smallest number of women are employed in construction, warehousing, IT, and manufacturing (Sajavaara, 2013,7). Women working in male dominant fields are often employed in office and administrative tasks, as men in health care and education fields are in managerial positions. Even when in managerial roles there are gender differences, women are often in the human resource roles as men are in operative management positions (Sajavaara, 2013, 7). The Finnish job markets are still fairly polarized even if there are measures such as the Act of Equality and gender quotas in workplaces. The division to "men's work" and "women's work" status stays persistently when examining the statistics study places in for example health care and engineering, despite the efforts to mitigate those differences.

There is a difference in how men and women are positioned in the workforce, for example in managerial positions. Singh and Vinnicombe (2004) explain in that in 2001 there were 12,4 % female leaders and 13 % female board members in the Fortune 500 companies as the percentage was 6,4 % leaders and 39 % for board members in the UK. It is hard for women to get the boardroom positions as men are holding the top executive positions in big companies. There is a set of organisational barriers seen in male-dominant workplaces that can be recognized preventing women to reach the managerial positions, such as absence of career development, stereotyping, gendered communication, culture, dynamics, networks (in which women are not included). (Singh and Vinnicombe, 2004, 480.)

According to Sajavaara (2013, 16), the number of women in managerial positions has increased in the past years in both private and public sectors and women in managerial positions have higher degrees than men. One third of all managerial positions in Europe are deployed by women and about 30% of listed companies have at least one woman in the executive team as the percentage in the USA is 90 % (Sajavaara, 2013, 16). The measures which enhance diversity also provide better productivity and well-being at work. Especially, in Finnish workplaces and education facilities, striving for gender balance is seen very important and this has been taken into action by supporting women to apply for managerial positions, having quotas in applicants for new positions, enabling networking and mentoring

for women as well as providing measures to combine work and family better. (Sajavaara, 2013, 16.) In Finland 37,5 % of managerial positions are deployed by women in 2020 compared to 31,4 % in 2017 (International Labour Organization (2021).

The Finnish Act of Equality Between Men and Women mandates that in workplaces with over 30 employees a separate equality plan is required (Ministry of Social Affairs and Health, Finland, 1986). 40 % of the respondents in the Finnish Equality Barometer were not aware if there was a plan in their workplace (Attila et al. 2018, 62). Hyde (2005, 590) explains that the different roles of men and women in workplaces are at least partly the result of the stereotypes related to what a woman or a man is supposed to be like according to their social gender. Research has shown that women must conduct themselves as competent to be hired, but "…may then be viewed as interpersonally deficient and uncaring and receive biased work evaluations because of their violation of the female nurturance stereotype" (Hyde, 2005, 590). According to Hyde (2005, 590) some women leaders were valuated as uncaring which was seen as a disadvantage when comparing to men leader with the same trade. Acting against the stereotype is not beneficial for a woman, when examining the evaluations.

2.2.3 Gender diversity and equality between genders in workplaces

Gender diversity referring "…to the balance between the two genders." (Ritter-Hayashi, Vermeulen and Knoben, 2019), in this context meaning men and women, is important not only for the society but also for the company aiming to achieve it. Finland is one of the leading countries in the world when it comes to gender equality (Ministry of Social Affairs and Health, 2022) and a lot of effort has been put into bettering the diversity and equality even further.

The Finnish Ministry of Social Affairs and Health has conducted a Gender Equality Barometer which "…provides information on opinions, attitudes and experiences related to gender equality in various areas of life" (Attila, Pietiläinen, Keski-Petäjä, Hokka and

Nieminen, 2018, 6) six times now, the latest one published in 2017. The barometer provides useful information of perceived equality, and the results can be compared to those received before and shows if there are changes in opinions, attitudes, or experiences. According to Atttila et al (2018, 62) 797 fulltime employees were interviewed for the Gender Equality Barometer in 2017. 38 % of the women and 48 % of the men who took part and worked in the private sector felt that the gender equality was achieved very well in their workplaces. 56 % of women working in the private sector and 71 % of women working in male-dominant workplaces felt that their gender had affected negatively on their careers. (Attila et al. 2018, 67-68.) According to Attila et al (2018, 70) 20 % of women participants had experienced their gender had negatively affected their chances in recruiting and 25 % felt their gender had negatively affected on how much they got paid, how they progressed in their careers and how they were respected as professionals.

According to Attila et al (2018, 22) about half of the men and women who participated the Equality Barometer believed that gender equality would improve in the future and 90 % of the participants believed that also men would benefit of the improved gender equality. 30 % of the women respondents assessed that their opportunities in working life were as good as men's. About 66 % of the participants felt that men were in a better position in Finnish society than women. A bigger percentage of men than women felt that there was a balance between the genders. (Attila et al. 2018, 22.) These numbers show that despite the efforts to promote gender equality in workplaces, there is still work to be done as so many women feel that their gender affects the career possibilities.

2.2.4 The benefits of more gender balanced workplaces

Why are gender balance and equality so important in workplaces? A study conducted to 960 academics in three universities in Egypt shows that "…gender diversity, diversity management and organizational inclusion are predictors of workplace happiness." (Mousa, 2021). Mousa (2021) explains that there are several things that contribute to the perceived happiness in workplaces, such as justice, communication between employees, and inclusion. A study done by Ritter-Hayashi, Vermeulen, and Knoben (2019, 12) explains that gender

diverse work environment and a woman as a manager both correlate to increase innovation in a team.

A panel-study conducted in 2500 Danish firms by Smith, Smith, and Verner (2006) indicates that women in boards and on top executive level have a very positive impact on a company's performance. Increased number of women in the workforce of a company helps the company to improve their consideration of women as a target group, due to the company's improved ability to consider female viewpoints and related markets. This also increases sensitivity and more civilized behaviours as well as the development of improved corporate governance through a different management and communication style. It also increases the interest of corporate investors towards the company and makes the company stand out as a pool of role models and mentors for girls and young women, adds on sensitivity and more civilized behaviour, adds on interest for corporate investors (Singh and Vinnicombe, 2004, 481) and act as role models and mentors for girls and younger women (Smith, Smith, and Verner, 2006).

The company image may improve through striving to gender balance by increasing its stakeholder value. There might also be a situation that the most qualified candidates are not selected, if they are selected from only one group with no gender variation. (Smith, Smith, and Verner, 2006.) Gascoigne, Griffiths, Kubalcikova, Shenai and Wright (2022) state that the more gender diverse companies are, the better they perform: as high as a 48 percent likelihood to outperform less diverse companies has been found. These positive effects to the company gross profit detected to result from the CEO being a woman with a university degree and female board members elected by the employees. (Smith, Smith, and Verner, 2006). Kim and Starks's (2016, 270) study points out that women make the corporate boards more effective by providing broader perspective and skills and the more diverse the board is, the more there is potential to increase the value of the firm. Also, an interesting finding from Liu's study ((Liu, C. 2018, 137) is that corporations with more women in boardrooms encounter less environmental lawsuits

2.3 Diversity and equality in IT and other STEM professions

As stated before, Finland is said to be a forerunner in tackling gender diversity and gender balance issues, but as Bairoh and Putila (2021, 614) say in their research it cannot be stated that there is a complete equality in Finland if women perceive that there is still belittling, harassment, lower pay grades and more barriers to get promotions in the working life. These following chapters focus on women working in STEM careers, the reasons which affect their advancement and changing careers, and the means to support them.

2.3.1 Women studying technology

According to Statistics Finland, there are more women than men starting university studies in Finland. In chart 1. there is a comparison on male and female students starting their studies in 2020 in Finnish universities. 17522 of the new students were females and 12958 men. (Statistics Finland, 2021.)

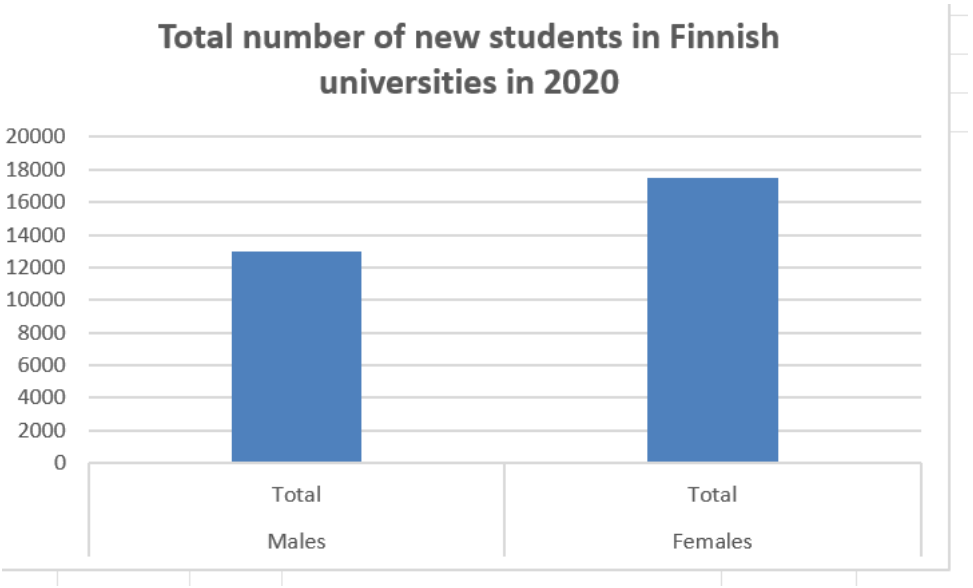

Chart 1. Total number of new students in Finnish universities in 2020 (Statistics Finland, 2021).

However, the percentage of women starting technology studies is a lot lower than the percentage in all the studies combined. The percentage of women students starting engineering studies in Finland is only 18% as it is 24% in Norway, 29% in Sweden and 30% in Denmark (Bairoh and Putila, 2021, 596). Chart 2 displays the number of students in information technology studies (Bachelor of Science and Master of Science) in Finnish universities in 2020. For example, in the master's studies there were 1817 male students and 458 female students (Statistics Finland, 2021).

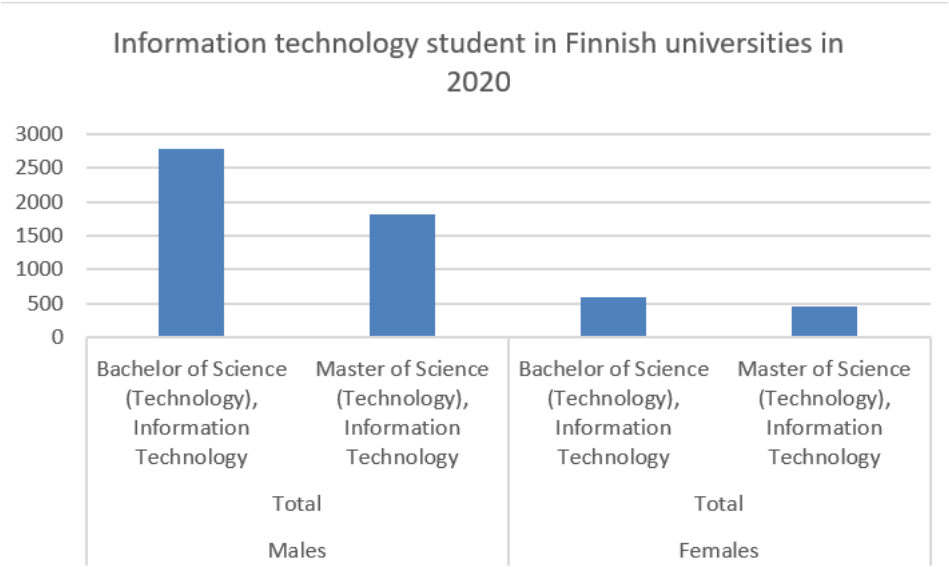

Chart 2. The number of information technology students in Finnish universities in 2020 (Statistics Finland, 2021).

There are already reasons identified why women do not seek into a technical profession. Bairoh and Putila (2021, 596) explain that the quite narrow norm of masculine culture in the technical field has been found a significant obstacle for achieving gender balance. Some trades of this culture include negative stereotypes of women and questioning the abilities and belonging to the technical field. (Bairoh and Putila, 2021, 596.) Also, the narrative of girls and women not being as good in mathematics explains some of the imbalance because it affects girls and women applying to technical studies (Hyde, 2014). The reasons that have been recognized are all such that can be influenced. Hence, there is no need to try fixing women if the reason for imbalance is somewhere else.

In 2020, about 23 % of the new bachelor's students (18,5 % in 2017) and 25 % of new master's students in the information technology studies in Finland were women. In all the new technical field students in Finland, the percentage varies about in between 11-25 % (Statistics Finland, 2021). There are several identified reasons why women do not pursue technical careers or studies, starting from the stereotypes related to girls not exceeding in mathematics, physics, and science (Nordiska Ministerrådet, 2021; Hyde 2005). Instead of challenging the gender norms and privileges in organizations and education – which actually might be the root course for the gender imbalance – a lot of effort is placed on inspiring and mentoring women to choose STEM courses and study programs (Nordiska Ministerrådet, 2021, 12) where the root cause of the gender imbalance might be originated. A study by Rosenbloom, Ash, Dupont, and Coder's (2008, 553) suggests that men and women value different things and make different career choices because of that and that there would be an uneven representation in IT workforce even if discrimination and competence were taken out of the equation. Other studies point out that making decisions about career opportunities is affected by the biases, social-structural framework and perceptions of self and others in addition to the career wishes one has (Miner, Walker, Bergman, Jean, Carter-Sowell, January and Kaunas, 2018, 281).

The Nordiska Ministerrådets study (2021, 13) explains that gender-stereotypes related to subjects like mathematics, science and technology have a bigger impact on decisions made on course and study program selection than the individual interest of a person. Studies suggest that masculinity is held as a higher value against which women are judged and the priority given to men's interpretations is seen in wide range of science, ideals inside the academic world (The Nordiska Ministerrådet (2021, 13). Attitudes towards learning and a person's self-confidence affect the achievement in subjects which have masculine roles attached to them (The Nordiska Ministerrådet (2021, 13). Teachers also have a big impact in learning outcomes. According to studies, boys are addressed more often by the teachers in STEM related classes and open-ended questions are not preferred as much as close-ended even though they support the ability to reason (The Nordiska Ministerrådet (2021, 13). According to studies, it would be more beneficial in the long run to fix the root cause of the

problem, not the women who are affected (Bystydzienski and Bird 2006; Nordiska Ministerrådet, 2021).

2.3.2 Women in STEM workforce

Women deploy about 20 % of the ICT workforce (Holth, Almasri and Gonäs, 2013, 520) and there are significant differences on how women and men are deployed in their careers after graduating from economic or technical studies. Men are more likely to be fully employed and advance to higher organizational position than women who had graduated from the same studies (Bairoh and Putila, 2021, 598). Women have difficulties in obtaining positions which match their qualification, while men get to higher positions due to gender segregation and successor selection processes. If women's competence is not fully utilized, the perceived norm of men being more skilful with computer science and technology is reinforced. (Holth, Almasri and Gonäs, 2013, 530.) The current recruiting methods might also be prohibiting women from getting into the technical positions. The recruitment based on employee reference and trying to find the best fit for the work community when recruiting for the company are in use at many IT companies (Holth, Almasri and Gonäs, 2013, 530). This is problematic as it also adds on the existing gender structures to find similar employees through mutual networks. According to the studies, women who are outnumbered by men in the ICT field experience more difficulties in acquiring a technical position and progress slower in their career compared to men. According to Gascoigne et al. (2022) in the technical field, 52 women got a promotion for every 100 men which is a big hindrance to promoting debias.

The study done by Nordiska Ministerrådet (2021, 15) recognized that technical, mathematical and science skills cannot be tied down to one gender, as they are currently done, because it affects the decisions of individuals as well as the sustainable working life. Holth, Almasri and Gonäs (2013, 351) suggest that it would be most beneficial to figure out how the ICT field could be developed and how women's potential and ability could be utilized better. Nordiska Ministerrådets study (2021, 15) explains that the traditional role of an engineer could be broadened in the education phase by emphasizing social relevance and

this requires a wide collaboration. Miner et al (2018, 285) explain that some studies have held women themselves accountable for the mistreatment they encounter in workplaces. Instead, it is a structural problem that needs to be solved by the whole society (Miner et al 2018, 285). Changing the working conditions and making the STEM field more accessible for all is a task for everyone working in the field.

2.3.3 Why women leave and stay in STEM

According to Kohut (2022) women in STEM fields have a high turnover rate and over a period of years, up to 50% of women changed to other fields of profession. Also, women are stereotypically still not seen as applicable for leadership roles. (Kohut, 2022.) According to Kohut (2022) other reasons for women not to be satisfied with their technical careers are that 66% of women don't see a clear career path forward, 39% of women see gender bias as the main reason and even a high satisfaction to work may not be enough of a motivation to continue in the technological career path.

Preston's study (2004, 70) reveals that relevant issues in STEM career development are inadequate compensation of employment, lack of opportunities, the hardships of combining work and family, and the lack of mentoring and the changes in the interest towards a field of profession. Women opt to use the three latter explanations. Especially mentoring and the lack of it for women poses a threat to decrease workforce and this should be addressed by setting up mentoring programs for women. Choosing a career in science should not mean that a person must sacrifice for example family time, but to gain a strong support professionally, possibility to develop and advance, and a good income. (Preston, 2004, 74.)

What are the ways of keeping women in technological careers? Hunt (2015) suggests that dissatisfaction of payment and promotion opportunities play an essential role in this. In secondary roles are "…working conditions, the unavailability of a job in the field, changes in professional interests, and job location" (Hunt, 2015, 221). Hunt (2015) also explains that "…a lack of mentoring and networks, or discrimination by managers and co-workers, are

the more promising of the existing explanations for excess female exits." (Hunt, 2015, 221). Based on Hunt's (2015) study there are measures which the employer can initiate to mitigate the number of women leaving, because the major reasons of leaving seem to be related to external factors that can be influenced.

Buse's, Bilimoria's and Perelli's (2013) study done in the U.S. explains that women who persist in the engineering career possess similar kinds of attributes. When interviewed, they talked about self-efficiency and motivation against the challenges, and the ability to adapt and persist despite the discrimination. Fewer children and not being married were also factors. (Buse, Bilimoria and Perelli, 2013, 149.) These studies support the assumption that the reasons for which women decide to stay in engineering or STEM professions are mostly linked personal characteristics (perseverance, motivation, adaptation to the situation) and if they decide to leave, the reasons often come from the outside (discrimination, dissatisfaction to pay, low promotion opportunities, lack of mentoring and networks and working conditions).

2.3.4 Discrimination in STEM

Discrimination and the overall culture in the technical field are one of the reasons why women decide to leave STEM professions or even choose not to study the field at all. According to a study by Funk and Parker (2018, 9) 29% of women report that they earn less than a man doing the same job, 29% of women in STEM jobs feel they are under appreciated and 18% feel like they do not get enough support from management. As many as 48% of women reported that there is sexual harassment in their male dominated STEM workplaces (Funk and Parker 2018, 13). Women in STEM professions have reported that their gender has had a negative effect in succeeding in their careers and they have experiences in having to prove themselves to gain respect (Funk and Parker 2018, 11). One of the most typical forms of discrimination in the Finnish workplaces is gender discrimination. Overall, women experience and report more discrimination than men (Bairoh and Putila, 2021, 597).

According to Bairoh and Putila (2021, 599), researchers have stated that the masculine culture based on a Caucasian hetero male, including negative stereotypes of women, and doubting the know-how are barriers to achieving gender equality in the technical field. The engineering field is based on a connection of the masculine culture and technology, which make the idea of a technically oriented woman abnormal. (Bairoh and Putila, 2021, 599.) Bairoh and Putila (2021, 607) found in their research that one obstacle for women to progress in their careers is the explanation that they lack style or attitude based on the existing culture which are based on the masculine characteristic and perceived competence, even if they possess the skills to be qualified for a promotion.

The atmosphere which is supported by the culture has been described to highlight masculinity as well as, exclude and belittle women. Women have reported that they must control how they behave and develop a strategy to fit into the culture and accept it to succeed. (Bairoh and Putila, 2021, 599.) According to a study by Sassler, Glass, Levitte and Michelmore (2017, 205) the best way to increase the number of women in the STEM workplaces is to increase the women majoring in STEM fields, by making the culture less masculine which would affect the number of women choosing and staying in STEM professions. These studies support the previously made statement that the changes in the technology field should be actively pursued by everyone working there. Changing women or individuals in general is not the answer which that helps make the field more accessible, attractive, or balanced.

2.3.5 Supporting women in IT

In recent years there have been campaigns in Finland which aim to achieve gender balance in IT studies and workforce by educating and recruiting women. According to Bairoh and Putila (2021, 596) there is some debate however if these campaigns really tackle the root causes of gender imbalance. To achieve gender balance, it requires an organizational culture which embraces diversity and recognition of the views on gender imbalance and discrimination, and there should be more open discussion about breaking the masculine norms and objection of pursuing gender equality. (Bairoh and Putila, 2021, 596.) According

to Bairoh and Putila (2021, 611) especially the people in managerial positions have the possibility to make a change to the company culture and impact the created norms, attitudes, and perceptions towards women, but the change requires modifying several layers of the company culture. There have been initiatives such as mentoring programs and supported career paths to support the women working at the Case company and in recent years, there have been a conscious decision, incentives and key performance indicators put in place to drive more effort in hiring and supporting the development and promotion of women.

The kind of support provided makes a difference. In many cases women are coached to adapt to the current situation instead of changing the surroundings that uphold the gender imbalance. (Nordiska Ministerrådet, 2021, 12.) Kohut (2022) suggests that the best way to support women in technological careers is to add visibility for women which would prevent women from leaving their positions, empower development and promotions, improve the satisfaction towards careers and help companies to develop better services and products. Kohut (2022) introduces three ways to gain more visibility for women. The first one would be to offer them a chance to obtain certified technical training to gain a reputation as an expert and to be used in work related profiles, LinkedIn etc. The second one is to add women as public advocates into technical related events. The third one is to arrange opportunities for women to meet industry experts and leaders for networking which makes women's experience visible. (Kohut, 2022.)

The employer or company can also take actions to support women by increasing their visibility and promotability. The ways to do so include examination of the company values and promotion: criteria ensuring equal access to assignments and education by clear and transparent processes and selections and creating inclusive networks, mentoring and sponsorships for women. (Correll and Mackenzie, 2016; Gascoigne et al., 2022.) According to Gascoigne et al. (2022) early promotions are essential to success and women often miss those opportunities leading up to a point where there are no women in the leadership pipeline. In addition to the methods presented above, ensuring parity in early promotions could improve women's position and advancement in technical professions.

2.4 The Case company

The Case company in this research is a Finnish IT company headquartered in Finland. The company is multinational, but this study's interviews were conducted on the Case company's Finnish sites. There have been studies and surveys about the current situation of minority groups in the Case company throughout the years and the idea arouse from the Case company's women's employee resource group together with the researcher to find answers on how to set up support for women working there. There has been regular work and effort done to improve gender equality and diversity, but there is still work to be done.

The number of women employees in the Case company is quite average compared to the official numbers of women in IT: about 23% of all Case company employees and about 20% of Finnish employees in the Case company were women in 2021. 16,5% of managerial roles and 16% of senior roles were employed by women which is less than the percentage of women in the company. 50% of women leaving the company were leaving after less than three years of employment (2021). The intercompany survey shows that there are exclusion experiences among women inside the Case company, including systemic bias, feeling of not being valued or heard, feeling of being invisible, a burden, limited, overseen or inadequate. These experiences have arisen from experiences such as being treated as a team secretary despite having the same position as the rest of the team, not being given the same opportunities as men, not being given tasks supporting career development, disrespect of women being accepted as status quo and leaders having bias by not actively engaging female employees to projects and various opportunities. (Case company internal documentation, 2021.)

When comparing year on year intercompany survey results, the average inclusion score, the belief that reported inclusion and diversity concerns are investigated properly and the belief in the impact of the company's inclusion and diversity efforts have continuously increased from year 2019 to 2021. The highest inclusion scores are achieved in the areas of respect, access to flexible working, comfort in asking for support and open engagement in one's own. Most suggested actions to improve inclusion were making the increased benefits from

inclusive behaviours more visible, making diversity more visible and mandating inclusion and diversity trainings for all. (Case company internal documentation, 2021.)

There have been actions inside the Case company to support diversity and equality such as the women's employee resource group, trainings for women leaders or emerging talents, the women hiring goals for open positions, mentoring and coaching programs and trainings for line managers to support inclusive behaviour and recruiting. In this study some of the interview questions also covered the evaluation on actions done and suggestions of actions to be done to advance women's careers in the Case company.

3 Research methodology

This chapter introduces the used research method, research questions and how the data was collected, handled, and analysed. This study was done by conducting semi-structured interviews where qualitative data was collected for the analysis.

3.1 The research method

This study was implemented as qualitative research using interviews as the method of data collection. In qualitative research most - but not necessarily all - of the collected data is qualitative (Saldana, J., 2011, 3). In qualitative research, the researcher, and her experiences play an important role on what and how the research is done. The collected experiences and knowledge cannot be considered a universal truth, as it is collected from individuals who have constructed it themselves. (Saldana, J., 2011, 22-23.) Part of a research is the context in which the research is situated (Saldana, J., 2011, 23) and articles, studies and other related materials were studied to build the context. Ethics plays an important part in qualitative research and in this thesis anonymity for both the participants and the Case company was guaranteed, by careful handling of the materials, discretion of the interviews and objectivity during the research process.

This study fits the definition of a case study as it focuses on a single unit (the Case company) for analysis. The collected material does not reflect the comparison of groups or other companies but is a valuable entity on its own. (Saldana, J., 2011, 9.) The case study offers valuable insight of and to the Case company and the means discovered in the research process could be also utilized more widely in the technology field. In this research a case study does not refer to one phenomenon or person, but includes many interviewees with variable experiences, as different interviewees and groups are compared.

3.2 The research problem

The previous research regarding gender diversity in STEM show that there is an imbalance between genders. The data shows that less women apply to STEM studies (Statistics Finland, 2021) which partly explains the gender imbalance in numbers in those professions. There are recognized reasons on how women are treated differently inside the STEM field and there are existing attitudes towards the expected abilities that women possess (or do not possess) which affect career choices and the willingness to apply for technical studies (Hyde, 2014). There is also research data which shows that women are less likely to be fully employed and advance in their careers after graduation than men (Bairoh and Putila, 2021, 598), women's' abilities and belonging to the field is questioned (Bairoh and Putila, 2021, 596) and a study by Funk and Parker (2018, 9-11) shows that women experience discrimination in STEM professions, have less support from leaders, earn less and believe that their gender makes it harder to succeed in their careers. Several studies (Holth, Almasri and Gonäs, 2013; Nordiska Ministerrådet, 2021; Miner et al, 2018) suggest that the STEM field and the culture inside it should be modified to utilize women's potential better and get more women to study the field to enable gender balance in STEM professions.

A research problem and research question(s) examining the problem need to be clearly defined. (Walliman, 2006, 67-69). As stated in the previous chapter, there are several explanations available through literature and research on why women might not apply for technical professions and how the perceived treatment of women, attitudes and overall culture affect the progression of women and the decision to stay in the field. The specific research problem for this study emerged while discussing with the Case company representatives. There have been initiatives in the Case company to support women and in recent years lot of effort has been put in hiring more women into the workforce. The wish emerged to try to figure out if there are still other measures available to support women even better. This study focuses on uncovering the means which women employees in different phases of their careers in the Case company have found useful and supportive when advancing in their careers and which measures have helped them succeed and motivate them to stay in technological careers.

The aim is to uncover more ways to help support women in their careers and through those findings offer solutions for the Case company to utilize and take into use. The collected and processed data in this research is focused on the experiences of received support, perceptions of women's chances of progressing in the IT field and thoughts about exiting and staying in the IT field. The research questions formed to investigate the support of women in IT professions are:

How could academically educated women be supported in the Case company to advance in their careers?

a. What measures have supported women's career development in the Case company?
b. What measures have supported the success of women in STEM careers working at other companies?
c. What measures could help women enter and keep women motivated to stay in technological careers?

3.3 Data collection

The data collection for this study was conducted in the Case company's Finnish locations using Microsoft Teams tool to connect with the interviewees. The interviews were recorded, and the Teams transcription functionality was utilized to literate the material. The literation was then read and examined with the audio to ensure it matched. The participants were chosen based on a pre-assessed requirements which were divided into four different groups.

3.3.1 Semi-structured interviews

The interviewees were gathered based on the pre-assessed requirements. All the participating interviewees were women, they had an academic degree and worked or had worked before in the Case company. The following groups were formed to gather data from different kinds of situations:

1. Women who have worked in the Case company for maximum of 2-5 years

2. Women who have worked in the Case company for more than 10 years
3. Women who have left the Case company less than two years ago
4. Women in managerial positions at the Case company

All the groups included four participants. It was considered as a good number of participants to gain enough valuable data from each group and avoid any of the participants from being recognised by their answers. The initial groups were formed to gain data of the subject on a wide range, women in different positions in the Case company and with different length of a career there. The participants were invited to join as volunteers through the Case company's internal communication channel and e-mail and they were instructed to contact the researcher if interested in participating. All the participants were informed about the anonymity and other practicalities at the beginning of the interview and before the recording and transcription process. Accurate job positions, professions or other recognisable details are not published in this thesis to ensure anonymity. Comments collected during the interview might have been altered should they affect the persons anonymity as such.

The interviews were conducted individually, one-on-one with the researcher, with a recording and a transcript done. The permission to record was requested from each participant to help with the transcribing process. The interviewer has a position to pre-examine the quality of the received answers and acquire more information through specifying questions. When the interviewer and interviewee see each other, there can be gestures such as smiling and nodding to encourage the interviewee to give the response. (Walliman, 2006, 92.) The recording helps with the data transcribing process and can be reflected to check the given answers and the raw data ensures that the researcher has done an unbiased interpretation. (Walliman, 2006, 93-94.) The raw data was carefully stored by the researcher as it contains sensitive data to be enclosed.

The interview questions were prepared beforehand and delivered to the participants before the scheduled interview meeting to help ease the interview situation. All the questions in a semi-structured interview were designed in a way that they are connected to the research and

the phenomenon that is being studied (Galletta and Cross, 2013, 45). It is important for the interviewer to pay attention to the interviewees story and react to it, but not interrupt their answer. A deeper meaning in the narrative can be found in further inquiries. (Galletta and Cross, 2013, 76.) The semi-structured interview method was chosen to be used as a method, because of its flexibility and because it offers enough structure to address specific topics, but still leaves room for the interviewees to bring their unique experiences to the study (Galletta and Cross, 2013, 1). The interview questions were designed to support both open-ended and more theoretical answers. One hour of time was preserved for each interview and the average duration was 55 minutes.

The interview consisted of 18 questions divided into four different themes. The first section with six questions forms the base line for the interview and collects information about the interviewee, their education, position in the company and their experience in their IT field. The second part was about the career in IT, with questions about their career development, perception of the field and thoughts about staying and leaving the field. The third theme was career development at the Case company and perceptions of women's chances of progression in the IT field. The fourth theme was about actions needed to be done to support women, covering the attitude towards the needed support, thoughts about the actions provided by the Case company to support women and thoughts about actions to be taken to support women in the Case company and in general.

3.4 Data analysis

According to Galletta and Cross (2013, 119) the analysis of qualitative data goes along with the collection process as thematic patterns arise and are analysed during the collection. The analysis process is iterative, as the data is accessed many times to find patterns, depth and meaning. The processing starts with an analysis of a single interview and carries out to examining the similarities and patterns in all the interviews. (Galletta and Cross, 2013, 126.) Qualitative data cannot be analysed with the same kinds of mathematical methods as quantitative data. There are three activities that need to be done in a qualitative analysis: data reduction, data display and conclusions. (Walliman, 2006, 132.) In this study, the data was

collected using a recording, an automated transcription of the interview and notes made by the researcher. Data reduction was conducted after the transcription process to remove all the material not related to the interview questions, expletive words, names, and repetition, and comparing the transcription with the audio to ensure authenticity and accuracy.

The next stage of the analysis process was coding which means that the researcher finds patterns and themes of the data by grouping the coded data (Walliman, 2006, 135). The coding and grouping were done using the NVivo tool. According to Walliman (2006, 135) it is important not to attach to the found codes too tightly, because development and even rejection is a part of the research process. The grouped research data was processed and examined to find answers to the research questions. The processed data is portrayed in chapter 4.

3.5 Reliability, validity, and ethics

The chosen method helps the researcher describe the current situation based on the selected group of interviewees. The reliability of the results is based on the continuousness of the interview questions and the fact that the questions, even if it's a semi-structured interview, have been pre-pared and carefully thought through. The results are analysed carefully and through-out by the researcher to be able to present the results in a most accurate manner. According to Whittemore, Chase and Mandle (2001, 534) validation in qualitative research consists of credibility, authenticity, criticality, and integrity.

Credibility in this case is ensured by presenting the results of the interviews accurately, using direct quotes to back-up the given interpretation. Authenticity is ensured by forming various groups and ensuring there are enough participants in all of them. Criticality is taken into consideration when summarizing the results to ensure that all the aspect are considered. Integrity of the researcher is ensured by using credible, modern references to back-up the interpretations. Strengths of this research is that the subject of equality and women in IT is a very popular subject and there is a lot of research done on it. Another strength is that

equality matters affect us all and by conducting research and looking for methods to improve equality and support a minority group (women at this case) is potentially beneficial not only to the women, but for the whole company.

The weaknesses in this research are that the researcher might be biased in her opinions, as this research also concerns her as she is a woman in IT. To avoid the bias from affecting the results, a lot of theory has been researched about the subject, the history, and the present, to enable an objective presentation of the subject. Other weakness is that in this study, there is no triangulation. Meaning that there is no second manner of research done to confirm the made observations. This could be fixed by conducting a follow-up study to the same company later. Another potential weakness in this qualitative research is the size of the research material or the number of interviews conducted. There were 16 interviews conducted in this study with women in four different groups, to receive an accurate enough perception of the subject. The opinions described by the participants are subjective and based on their life experiences, education, and possible biases. There might be an assumption that the participants have somehow outstanding (negative or positive) experiences related to the subject as they have wanted to participate. Despite the described weaknesses the opinions and experiences of these women are important to be heard, as they may give an insight what could be done better in the future.

The ethics in this research is important to consider as the experiences handled are delicate, and subjective. All the interviews were conducted anonymously, only the researcher knowing the participants' identity. All the results are analysed anonymously, using coding in the subject names, like G1_1 meaning a participant in group 1, given a random number between 1-4 as an identifier. The quotes were chosen and sometimes modified to remove recognizable factors present but ensuring no change in the content or meaning from the original.

4 How to support women in IT, the result of the interviews

This chapter introduces the analysed results from the interviews conducted during the study. The results are handled utilizing the initial group selection to clarify if there are differences between the groups or the individuals inside each group. The results are handled using the initial group selection and the results are compared both inside the group of individuals and between groups, if found significant. The results are presented in this chapter using tables and summaries of the four initial interview question categories. The interview form with the categories and questions can be found at Appendix 1. The interview questions.

4.1 Basic information

As previously stated, the interview participants were searched for based on four different categorisations to obtain preparable data for the analysis. The four groups were:

1. Women who have worked in the Case company for maximum of 2-5 years
2. Women who have worked in the Case company for more than 10 years
3. Women who have left the Case company less than two years ago
4. Women in managerial positions at the Case company

The participants were found using the Case company's women's employee resource group and their contact channels such as e-mail and Case company's internal communication channel. All the participants were volunteers and consented their stories to be used anonymously as a part of this research. The interview begun with a set of questions regarding the basic information of the participant's studies, job experience and reasons for striving for a technical profession and field. Table 1 can be used to compare the answers between the interview groups. The main results are presented in table 1.

Table 1. Basic information of the participant groups

	Group 1	Group 2	Group 3	Group 4
Description	Women who have worked at the Case company for less than 5 years	Women who have worked at the Case company for more than 10 years	Women who have left the Case company	Women in upper managerial positions
Number of participants	4	4	4	4
Graduation year	Between mid-1990's to 2020's	Between mid-1990's to late 2000's	Between late 1990's to mid-2010's	Between early 1990's to mid-2010's
Field of study	Computer science, industrial engineering, electrical engineering, communications engineering	Information networks, mathematics, and information technology, Process technology, information processing science	Information technology, economics with a technical orientation, telecommunications	Information science, political science, communications engineering, automation technology
Position at the Case company	Engineering and managerial positions	Product owner, project manager, specialist, managerial position	Formerly engineering and managerial positions	Managerial positions
Other academic degrees	-	-	-	-
Experience years in IT	Between less than five and 25+ years	Between 15 to 25+ years	Between 1 to 25+ years	Between less than five to 25+ years
Experience years at Case company	Between a couple of months to almost five years	Between over 10 to 25+ years	Between 1 to about 25 years	Between less than five to 25+ years
Why technical field or studies	Interest in video games and computers A nerdy mindset Skills in math and physics Support and ambition from parents Not a conscious decision, but	Chose the studies by chance Thought about or studied another field first but decided to change The study program seemed interesting The people studying were	Being computer oriented Interest in coding Wanting to be an engineer Parental support and encouragement Interest in building things	Interest in math, physics, and computers Wanted to be an engineer Good financial opportunities and related to science By chance Not good prospects to earn

Why technical field or studies	rather drifting into the field Feeling that the field is a men's field and wanting to prove it is not Own ambition Doing well at school Good earnings because it's male dominant field Narrow employment options in other fields of interest	enthusiastic about it Mathematics was interesting and easy Information technology is sure to employ By accident Parents suggested to apply for technical studies Already worked at a technical field and decided to study a degree	Career prospects in other fields seemed uninteresting Interest for the field arouse during the studies Strong mathematical skills Parent's ambition Was suggested another field, but it seemed uninteresting No fields particularly stood out, but support from a parent convinced to apply	well and progress in a career at the previous employment Pure coincidence Influence from a close person The interest towards the field grew during the studies No plans, things just happened and led to new opportunities

As seen in Table 1. all the groups have quite similar attributes, even though the participants were selected based on differences on length of the employment and the position in the company. All the groups had at least one woman not originating from Finland. Based on the variation in graduation year (from mid-1990's to 2020's), there were women from different age groups. The educational background is quite similar between groups, as one could assume when interviewing persons from the same field and company. The biggest difference in the basic information between the groups is the number of experience years at the Case company as it is the basis of the group formation and it varied from a couple of months to 25+ years.

The most common answers for why they had chosen to study or work in a technical field was due to skills in mathematics and physics, by coincidence and due to support/ambition of their parents. Parents' support or their even slight push to choose an academic career in technology was regarded very important and positive. Fathers' support especially was considered important. Other reasons were that the earnings in the technology field are good, the field provides secure employment and the individual's interest in science/engineering/computer science. Five out of the sixteen women had received advice

to consider nursing as a career, which, some of them found even a little insulting and stereotyping.

While some of the women said, that the field of study was discovered partly by coincidence, some said that the decision was very conscious, well considered and one they strived for. One of the participants explained about her decision:

"There was no question like, I just knew I had to be an engineer somehow."

On the other hand, there were some feelings of disappointment after the studies were finished and it was time to start looking for the first position in the IT field:

"The set of skills you acquire while studying on this technical fields is demanded and really wanted, some people are not willing to recognize it and value it as it is."

4.2 Career development and perception of the IT field

The second set of questions were prepared to gather information about the participants' career development and how they had achieved their career goals if there were any, get some insight about the perception of the IT field and the Case company's impact on that perception. These questions also sought for answers about leaving the IT field and the Case company, or as in group three, the reasons behind their departure. The main results are presented in table 2.

Table 2. Career and IT field

	Group 1	Group 2	Group 3	Group 4
Description	Women who have worked at the Case company for less than 5 years	Women who have worked at the Case company for more than 10 years	Women who have left the Case company	Women in upper managerial positions
Career development	Wide range of different tasks, not so much progression in a	Studied while working, but the graduation did not change tasks	Started as a trainee and quickly got a	Some of the positions have been applied to,

Career development	sense of getting promotions Feel secure to work in a bigger company as there is always someone to ask from Career has been ascending Interest in research as well as the general work In previous company the progress was fast and ascending The technology is complex, and it takes time to get in It's hard to perceive how one can have an impact to things in the Case company	A lot of variation on tasks through-out the years If no desire to be manager, not much room to "move forward" No desire to apply for managerial roles The progress in a career is also the ability to grasp and manage big topics from end-to-end Applied to the Case because previous position was temporary A good team is essential to succeed The first position was hard to find Have been happy with the international co-operation Not a big leader, but happy with the progress Big changes in career have happened after working abroad or change of unit Development of expertise and	permanent position Hard to find the first position, it took over a year to find Feeling humble when applying for the first position as times in the industry were rough New opportunities have come around quite easily New opportunities have been offered roughly every four years I have applied for positions, and some have been suggested for me Great opportunities to function in several different positions	some have been offered Every time there has been a change in location or unit, there have been steps upwards Working abroad has made the biggest impact on career development Happy with how the career has developed Moving to new positions based on interest Rapid growth after hiring "I've had an excellent career" I've progressed several steps since starting at Case company" Currently in a position which never thought of being in

Career development		experience is also progression Being prepared to move with work has a big impact on career development Thankfulness towards the supervisor who saw the potential and gave a chance Working abroad made a big impact		
Career goals	Wanted to do cool things Ambitious towards progression The global way of working is interesting Very motivated to learn more Learning at work is supported and there is time given to grasp new tasks Goals were clear until graduation, but no goals now Wanting to get more responsibility and earn more Continuing (project)	Intuitive mindset, no clear goals Current goal could be to broaden the horizon and expertise Learning drives forward To work has never been number one priority More progression, less time outside of work. No interest in losing the time outside of work A smaller company could offer different opportunities Not going to sacrifice	Experiences of not being valued in the past and now trying to find an employer that values and recognizes talent Humble mindset during studies Noticing very early on the strengths and recognizing the potential to grow Confidence and ability to take on bigger roles have grown throughout the career No particular dream profession as a child and no detailed plans Both vertical and horizontal development	With growth goals and thoughts have changed over the years No career goals, development has been interest driven Being very ambitious has driven forward Who knows what would have happened if there were set goals Ambition drives to learn more and develop to new roles No plans, more aspirations on meeting new people Being visible to be considered to new opportunities

Career goals	managerial tasks in the future The priority was to find an interesting full-time job Wanting to develop and learn Getting more responsibilities and capabilities to grow	evenings to work There could have been career planning to help progress Haven't been given the chance to progress even though received only positive feedback	Development from basic tasks to management	Worries about loss of time outside of work if progression happens No goals at the beginning of the career, just to find an entry level position Doesn't matter what the title is, just that the task is interesting
Perception of the IT field	Perception that employees stare at code from early morning to late at night At some point I thought that only way was to move forward, not to go back Challenging Tasks are divided inside the team so it's not that hard There is always support from the team Work is flexible No perceptions, just happened to enter the field The field is divided to the hot start-ups and more traditional engineering companies	Men are immediately accepted by other men, women are not No support from anyone, have to go forward alone Hard times impact the way colleagues are treated Being a woman is one reason to push one down Misogyny is still obvious in male dominant companies	Growing field with a need for skilled employees In the future more AI based solutions but now humans are required IT is more common today and not so much of a mystery as 15-20 years ago More and more women study the field today Another sector was initially suggested because of gender Rapidly developing technologies Fairly equal for men and women A lot of work done to bring	There was no initial knowledge of the field when studying Some skills have been proven more important than initially thought Fear or hesitation towards the acceptance of women Field that offers a lot of job opportunities and is driven by the technology Common perception is that everyone codes, but the tasks are very versatile

			women into leader positions Helping people through IT, not just in health care industry Endless possibilities	
Case company's effect on perception	High average age in the unit has strengthen the mental image one had before I thought it would be very hard, but I'm supported by my team and supervisor Freedom to be oneself Confidence has grown as there is more expertise The no-blame culture is very good. This doesn't take place everywhere Managers and project managers are there to help Appreciating the ability to take a sick leave if needed Disappointment in big projects ending without a notice	Project management and multicultural way of working are essential Supervisors are trained but they still prefer to hire people like themselves I'm not taken as seriously as my male colleagues Employees are trusted and there is no micro-management Not as hype and dynamic as initially thought In IT-context old fashioned	Resource challenges as in everywhere else The technology has been brought closer to people A lot of work done to bring women into the business Case company strives to further the gender balance No glass ceiling or different treatment because of gender Other companies have more benefits, and they take care of their employees better Didn't receive the necessary equipment to work at home during the Covid-19	Surprised on how many different positions there are at Case company The initial perception of Case was that there are driven and motivated employees There have been tough years with lay offs A big ship turns slow, changes take a lot of time Case company has made very positive impression because of the job opportunities The biggest leaders have the biggest impact on how the employees value their work The current discussion about my unit makes me feel very valued in my work

	Employees are valued and treated well No overtime, work is done within the scheduled workday Lot of variation in tasks			
Leaving IT	Thought about it and studied another profession Never considered leaving Have considered during tough times when workdays stretch into the night	Never considered leaving Would only change to another male-dominant field	Never considered leaving Thought about going back to previous profession The field is dynamic and creating new, no need to leave	Never considered leaving When times were really tough, have thought about leaving
Leaving the Case company	I get support in stressful situations so no need to leave It's been harder than expected to work in this position Thinking there would be more support and less decisions having to be taken alone Everyday there is something new to learn and if I get bored, I can change the team Didn't get a proper onboarding	There could be more open-minded recruiting, not always hiring the people with same background and experience At some point thought about leaving but got offered another position so stayed Have thought about it but never had the reason to leave Never got bored as tasks and people change	Talk of diversity but not seeing it in action Lack of peers, being the only woman in a team No help, no induction, no resources for remote work No change to my situation despite talking to the manager Didn't get to do the tasks hired for The company is stuck in the past Started gaining offers and	Not leaving but changing the business unit I found out my (male) colleagues get paid more for the same job position There could be "hotter" firms out there to take me The business is again in a good rise so no need to leave Never had a good enough reason to leave because Case is a good company Considered leaving because

Leaving the Case company	Colleagues' support helps to stay Interesting tasks have prevented from leaving	There has been a strong urge to leave at some point Thought that there is no career progress left There is no reason to stay: treatment and pay is worse because of gender Talking about gender equality is nothing more than trying to lift the company profile	networks outside the Case company Had an excellent offer and it was the right time to move on More work should be done to enhance the leadership culture Leading with fear needs to stop It's good to see other kinds of environments not to take things for granted Wanted to develop personally and professionally	of financial aspects When company's situation was rough thought about leaving

4.2.1 Group 1 on career and perception of IT

The participants in this group shared the perception of the field being interesting, tasks having variation and receiving a lot of support from colleagues and the supervisor. One of the participants found the support in the Case company very good compared to companies in her home country:

"In *my home country* if the person has to go through a stressful situation and then have to leave the job. The situation is different here, and I think Finland and the country norms are very good. I really like this culture at Case, no blame culture and the pressure of the managers and seniors is really nothing here."

“You can focus on your family also you can in *home country* you cannot talk about your family in the office. If it is your son is sick it is not the company's headache or manager's problem. Here if you say something they listen to you.”

There was a sense of security in working at a large company as there was always support from teammates available. On the other hand, it was not easy to find the ways to impact things in a large company. The progress in a career was perceived ascending by almost all the participants in this group but some mentioned that it was hard to know what tasks would be beneficial for future promotions, as many participants were interested in promotions and progressing in their careers.

There was discussion that the initial perception of the field was complicated and challenging but work at the Case company proved the perceptions wrong. There is always support from the colleagues and managers, the work is flexible, and everyone can be themselves:

“The employees are really valued, and the work atmosphere is really good. Everyone is motivated to get the work done during regular hours, there is not much overtime and work schedule is flexible.”

This group unanimously agreed that the Case company is an excellent place to work and the people there are supported by their team and manager. Although one of the participants had encountered hard times in the previous employment that made her tired of the field. Working at the Case company was seen interesting, offering variation in tasks, and providing a lot of chances to learn something new.

4.2.2 Group 2 on career and perception of IT

Two of the participants talked about the fact that becoming a manager or the work title changing are not the only kind of career progression, but it also means to take responsibility of bigger entities and take responsibility for a variety of tasks concerning the job. Becoming

a manager was seen as the only kind of progression from the employees' point of view. Two of the participants also mentioned that they had no interest in applying for managerial positions. One of the interviewees discussed the fact that with more responsibility comes loss of free time:

"I wouldn't want to think on my death bed that I should have worked less. The more you advance, the more you are expected to use your free time for work. "

One of the interviewees talked about wanting to progress before, but it wasn't acknowledged. She had also encountered misogyny towards her several times. There was also discussion with this group about hiring women with different kinds of educational backgrounds to ensure diversity.

"I wanted and had interest before (to advance in my career) and all the feedback I have received over the years of my work, has been positive. Somehow, I just haven't been able to progress, and I think my gender is the reason for being left out."

"Men have their own communities, and they accept each other. They don't have to ask for acceptance. As a woman, you are not invited to this community."

"There have been moments when I have not been taken seriously and I have been belittled and that blocks the career development. That is pure misogyny to be belittled, laughed at, and not believing the issues I have brought up, and which have been double checked from a male colleague."

"If we don't make sure that women make nearly 50 % of the work force, it is a loss of brain capacity. That is why we should consider hiring women from different educational backgrounds, so that the low number of women in technical education wouldn't be the issue."

This group discussed most about encountering misogynist attitudes towards them at work, being paid less than their male colleagues and having to work hard to be accepted. By some of the participants, the company's diversity acts were seen as a way to polish the company's image, but they were not reflected in everyday work. There was also discussion of hiring more women with different kinds of educational backgrounds as the education was merely

an indication of persons' ability to learn and apply the learning. This way the low number of women graduating from technical education couldn't be used as an excuse.

4.2.3 Group 3 on career and perception of IT

The participants explained that new opportunities have emerged quite easily for them, and the common perception was that the field itself is very rapidly changing, more common for women today and a way to impact society and people. The common opinion about the IT field was that the first position was somewhat hard to find, and some employers expect the impossible from the applicants, even though a person is never fully ready in the IT field:

"There are not enough people applying, but they still want the unicorns, like for entry level, they want five years of experience."

"And then I just learn, learn, learn, learn. It never stops. The learning never stops, so it's a field where you are a student forever, I think."

After getting into the field, the progression was quite fast for many of the participants. One of the participants described the progress as such:

"New opportunities have emerged quite easily. There has always been a new opportunity for me when the previous position "has been delt with"."

One of the interviewees reminded that the progress in a career is not always to become a manager, but there is both horizontal and vertical growth to obtain. There are opportunities for the Case company also to support these both.

"It's important to clarify that the only way to progress is not vertical and the horizontal development doesn't get enough attention."

There was variation on the reasons why the participants had left the Case company. One of the participants felt very undervalued and not appreciated. The induction had not been successful, and she didn't feel as a part of the team. Leaving was seen as the only option as these issues were not addressed.

“My goal has been to find companies that actually appreciate employees and value them and recognize their worth and not just you know, compensate for the hours you do and that's it.”

“I feel like all the other companies stepped up to the rough times and stepped up for their employees. While I don't feel like Case did anything for us… I feel like overall I could be using my skills somewhere else and be better paid and better appreciated.”

“I didn't get any induction. I didn't get any help, any support. I was literally just given a computer and be like, figure it out. I thought it was pandemic related, but as I grew in the team, I realized that no, I think my manager just doesn't care. “

“I have to also take care of me and my growth in the company and in my professional life. And I don't think I see it happening here. We should actually be pushing Case company towards into the future because when you compare with other companies and you can see that it's in the, you know, it's like 20 years ago, it's stuck in the past.”

The decision to leave was affected by the fact the person didn’t feel connected to the team and the increasing of diversity which is brought up in many company conversations was not visible in her everyday work.

The others described the decision to leave as an opportunity to grow, acquire more skills outside of Case and to see different ways to manage and operate.

“The Case company was an excellent employer for me, but the development process was already familiar, and it didn’t excite me that much anymore. I thought that if I wanted to develop myself professionally, I had to go elsewhere to do it.”

It was also discussed how the perception towards the work changes after leaving the company and some harmful ways of working have been recognized afterwards. Some instances were also described where the interviewees were not that happy with how things had progressed at work:

“In tough situations leading with fear type of mentality often kicks in and it has an effect to the employee’s commitment. If there is a meeting of a lot of people and one participant is called out to be bad at what they do or as an embarrassment to the company, it creates a

shared sense of shame towards the person saying it (because it is not ok to call out anyone in front of a crowd)”

The perception of the IT field was a common nominator for this group. The field was described as rapidly changing and attracting more women than before. There was a lot of variation between the experiences at the Case company and the reasons for leaving were based on individual experiences. Also, the treatment of women, seeing diversity happen in everyday work and development opportunities were described in very varied ways. Some described the Case company as being an attractive place to work and offering an excellent platform for the employee to strive on, others felt that the culture and habits are stuck in past and old-fashioned.

4.2.4 Group 4 on career and perception of IT

The commonalities of group 4’s comments on career planning, aspirations and development are the fact that they all describe themselves as ambitious and driven by interest and the willingness to learn new things and responsibilities. The development had been rapid, but not necessarily intentional, since all the participants told, that they didn’t have any specific career plans although they were keen to progress in their careers. Two of the participants felt that the best opportunities and progress had happened after major changes in the location of the work or by changing the business unit their work location. Some thoughts about the progression in the Case company:

“(I want to) meet people and be vocal about my work so that I'm well-known. So, if there is an opportunity, I'm considered for it ... Part of it is goals, but part is just progression.”

“It is amazing how far I’ve come since coming to Case. I have doubled my work ranking and it is a proof that the Case company is an excellent platform to grow. If you do your work well, there will always be new opportunities with more demanding tasks.”

Not many initial perceptions about the IT were introduced by group 4, but the industry was seen as very good source of employment, having versatile tasks, but being quite hard to

comprehend for someone who doesn't work there. There is work to be done to familiarize young people with the work done in IT. There were some initial thoughts about the field before entering it, but proven positively wrong:

"Women are still a minority at Case, so I was wondering if it will feel like we are left dissected or less listened to or something, but it was exactly the opposite. I felt I'm just like everyone else: respected the same way and people only care about the outcome of my work."

The Case company surprised some of the interviewees with its' versatility and opportunities to progress. The perceptions have changed throughout the years as the business prospects have varied. The leaders in highest positions hold the most power on how the employees perceive and respect the work they do.

"At the moment we have such leaders who respect the development work. They see the good we can offer to people and the society. How the strategy is portrayed and how things are communicated makes me feel more valued than ever."

Only one out of four interviewees had thought about leaving the IT field altogether. She thought of leaving during the company's tough times but decided to stay because the new field didn't seem so attracting after all. All the participants had considered leaving the Case company at some point but had eventually found more positive aspects and decided to stay. One of the participants had experienced a situation regarding pay which affected her motivation to keep working:

"At one point we had negotiations on our pay. We discussed openly about the amounts, and I found out that I was offered the smallest amount compared to my colleagues. There were no explanations other than me being a woman. The situation didn't change after negotiations. This is still the most unpleasant thing that happened to me at Case. It was unfair."

Another interviewee thought about leaving but explained the reasons to stay:

"I thought that it's a huge company with a lot of future prospects because people know me and there are so many opportunities because it's so huge. So, I wanted to stay and I'm happy I did."

The common nominator for this group regarding the progression in their careers was their ambition and the willingness to strive forward. All the participants were offered and/or suggested opportunities to advance in their careers. The field, the tasks, and opportunities of moving forward were regarded very versatile. None of the participants had considered leaving the industry but some of them had thought seeking opportunities outside the Case company.

4.3 Women's career development

The aim of this section was to learn more from the participants about the general views of women's opportunities in IT and specifically at the Case company and about how satisfied the participants were of their own career and identify the things which had supported them during their careers. The main results are presented in table 3.

Table 3. Career development

	Group 1	Group 2	Group 3	Group 4
Description	Women who have worked at the Case company for less than 5 years	Women who have worked at the Case company for more than 10 years	Women who have left the Case company	Women in upper managerial positions
Views on women's career opportunities in IT	The problem is that there are not enough woman applicants Get rid of the "men's job" and women's job" attitudes Great opportunities, especially for a proactive and ambitious woman	Unnecessarily hard work to be done to get over prejudice, glass ceilings and misogyny There are leaders with no skills or training to do the job I see no boundaries compared to men	More women are selected to positions One of the best fields for women to have the same opportunities as men Diversity questions are actively raised in boardrooms Being a woman might be a strength if	Generally, the same as men Very good once you get in, based on experience from Case company Too few women Women have to do twice the work to get the same chances Requires activity, no one

Views on women's career opportunities in IT	A woman hast to work harder to be noticed Women must learn how to speak the technical, "guys language" to gain credibility When younger I thought that gender doesn't matter, but I see that it is tougher for women As a woman I'm noticed I'm sensitive about not being seen as credible because I'm a woman	Have heard that if there are two equally strong applicants, the woman is hired Diversity strengthens the product	gender diversity is really valued I have seen men with less experienced get the position a woman was also applying for Have seen women mostly in secretary or assistant roles	is going to pick you if without it Male managers who don't hire women are rare
Views on women's opportunities at Case	The Case offers opportunities and a platform Have seen women advance if they want to No one tries to pull women down It's not quite clear how people are selected for roles None of the positions or promotions have been suggested to me Ambitious women can progress because	It's too easy to say that there are no women applicants, so one cannot hire a woman Brand improvement needed to attract women to Case It's a core value issue. There shouldn't be any leaders at Case who don't have a single woman in their team If we strictly look for people with similar background, we might lose good candidates willing and	I have received all the same opportunities as men Haven't seen any women gotten promoted, things happen slowly Easier to progress after the organization structure has changed 15 to 20 years ago the situation was much harder for women Have seen success stories during my years at Case	Male managers having a subconscious mindset which affects recruiting for example Some managers still think that men are better at this job Some managers fear that women will take maternity leave or other long absence -> company policies make it hard It has been on the limelight, maybe for next generation it will be easier

Views on women's opportunities at Case	there are so few of us Age questions are more concerning: we don't have the next generation growing Managers are employed by experience years, not competence or training I see women at project management and other management positions, and I'm encouraged	capable of learning When recruiting I've always made sure I talk to the women applicants Managers have been forced to look for women applicants Still work to be done to equalize the pay gap	The competence is what counts	Still structural aspects preventing women We are still not where we should be with diversity Good opportunities for both men and women Do women grasp existing opportunities Should attract more women to Case Women must take active steps and apply for the positions It's also ok if one doesn't want to apply for positions
Women's opportunities vs. men's at Case	It matters more what kind of a person you are, what you know and how you get on with other people It's very unclear how people are chosen for technical management roles Management roles require the ability to stand pressure	Biggest difference is to have courage to apply for the positions More encouragement to apply even if one doesn't know everything about the position Being called out in a meeting by teammates is embarrassing, doesn't happen to men	There has been effort put to get women into certain roles which is good Women quotas is not a good thing It's good that women are selected to boardrooms Before, there was a very masculine culture	To be selected, one must be the best candidate One must be active and apply for positions to move up the corporate ladder Progressing is slower for women On some level there are no women. Does management affect that?

Women's opportunities vs. men's at Case	The chances are equal The technical task required for promotion go to the male colleagues Promotion requirements are not clear Don't know if women are treated different		Men's potential was noticed more than women's Women don't bring out their potential as boldly as men do, so it's hard to notice it	Would want to say there is no differences between the opportunities, but there are Moving towards more equal state No support for women quotas Best person needs to be selected Women leaders have takers if not appreciated at Case
A change in women's opportunities in the last five years	Women's opportunities have increased Women shouldn't get special treatment, but we need to see more women in leadership roles Male leaders should be trained not to select only their own kind	A previous manager did a lot of work for women progression The pay gap has been addressed Events that target women and aim to support them	Have not seen much change Managers have been trained to support diversity It has been noted on leadership team level Efforts have been made to strengthen the women potential: trainings, mentoring, support programs It's great to see a woman with competence succeed in getting a desired position	More women managers now, but the percentage is still low Actions done to better the situation A lot of sweet talk but the numbers speak for themselves Still a long way from being equal Don't know if any more women have been hired Rather not take the job at all than take it just because of being a woman

				Women may be more active than before
Women's chances in other companies			In my current company there is about 50-50 ratio between men and women The development in Case needs to be monitored so issues like leading with fear is left behind Elsewhere people are seen as an asset and strength more than in Case	
Satisfaction with career so far	Couple of things that I'm not happy with I have underestimated myself and that kept me from applying to desired positions I have always felt that I'm not paid enough Had the opportunity to choose tasks and projects Got to do cool things, but not sure if satisfied in this position	Getting opportunities even if there are still things to learn about the position Have been satisfied When children were young, the career didn't progress so much Career planning should be taught at school and supported by a mentor First ten years was just surviving and balancing between family and work Lacking the courage to leave	Happy with the progress so far Must do a lot of learning in time outside of work to meet the expectations Have gotten much more than expected Been respected as a leader and in every role Have gotten to be in many roles and learned a lot	Happy with the progress so far Have been forced to think about losing free time if taking the next step Always gotten new opportunities, to be myself, sharing the deepest company values Gratitude towards the company Case is an excellent platform for growth Sometimes being a woman is an advantage

		and change things		Supported in each step
What means have supported you in your career	Sponsors, especially male leaders Colleagues An atmosphere where one can freely discuss any worries	Mentors, especially male mentors Loyalty from people who have recruited me My own willingness to support others has helped me, too No support from men or women during my career Fellow students have given support Good managers Studying was not considered important in the childhood family	Parents, who have been supportive Good colleagues, team members Mentors	Mentoring Support from team and managers

4.3.1 Group 1 on career development

One of the problems recognized by group 1 was that there are not enough women applicants to fill the positions equally. This could be addressed by getting rid of the attitude that there are "men's jobs" and "women's jobs". There are great opportunities for proactive and ambitious women, but a woman needs to work harder to be noticed and has to learn how to speak the same language as men. Women also stand out from the crowd consisting almost solely of men. One participant said that as she was younger, she didn't think that gender mattered at all, but now she observes that the progression is tougher for women because men choose more technical tasks which seem to matter more when people are promoted:

“And after this I had a meeting with my line manager, I realized to have to choose the work which I do which will qualify me for the promotion. If there is a clear definition of what tasks are required to get done within a period of time, then you can work to achieve that.”

The Case company was seen as a great platform to grow. One participant felt that no one tries to pull women down and the participants had seen women progress if they wanted to. However, for all interviewees, it wasn’t totally clear on how people were selected to roles and no roles had been suggested for them. Also, age questions were seen more concerning as there is no new generation growing in all areas. There was some criticism of the fact that some managers are hired to the roles based on their years of experience, not due to their education or competence. Seeing women in management positions made a participant feel encouraged to progress herself.

4.3.2 Group 2 on career development

The second group expressed mixed opinions on women’s chances to progress. Some saw that there was unnecessary hard work required from women to get over the prejudice, glass ceilings and misogyny. The managers with no education or skills create a part of this issue.

“To get rid of the glass ceiling and misogyny, we need to use strength. These will go on as long as we have this generation of male managers holding the power.”

However, some women saw that there were no boundaries compared to men and if there were two equally strong applicants, the woman will be hired. It was agreed among all that diversity strengthens the product and development process and driving diversity was seen as a question of core value.

“We cannot afford to hire anymore managers who have no women in their teams or at certain positions. It is so last century. It is wrong that we have managers here with the wrong values.”

“When I recruit, I absolutely aim to have women in the process. It makes no sense not to have any women applicants to talk to.”

There was a need seen to attract more women to the Case company and consider women with different educational backgrounds, if there are technically trained women applying. Talking openly about successful women in the media was seen as a great example to normalize woman leaders and encourage those women who hesitate to apply for positions. Some felt that they haven't been supported at all during their careers and on the contrary had received negative feedback openly in meetings from colleagues:

"A woman must have a tough skin to succeed. I also thought at some point that I don't belong here and tried to hide parts of my personality."

One of the participants told that the first 10 years of her career was mostly about surviving as her children were young and the career didn't progress much at that time. Some career planning and mentoring were seen beneficial already during studies as the courage to apply for positions or to change the employer was missing. Also, support from the supervisor came up:

"I was told that everyone has these phases in life where work is not the number one priority. My supervisor didn't offer the support I needed back then."

Those who had gotten support, had received it from mentors (especially male mentors), people who had recruited them, fellow students, and good managers.

4.3.3 Group 3 on career development

There was a lot of variation within this groups' views on women's opportunities in IT. It was recognised that more women are selected to positions and that the IT field is one of the best ones for women to progress in. Diversity questions are discussed in the company leadership boardrooms and being a woman might be a strength if gender diversity is truly valued in the company.

"Sometimes it might be a benefit to be a woman, if for example a boardroom consists of mostly men, a woman might be hired to balance the diversity."

There have been success stories in the Case company and a change was acknowledged compared to how things were 15-20 years prior. On the other hand, the shared experiences where men with less experience had been recruited instead of a woman and women were seen mostly in secretarial and assistant roles.

In the last five years there has been effort put to hire more women into certain roles, but in general, women quotas were not seen as good thing. More women are selected to boardrooms and the culture is not that masculine these days. Despite the changes, women's potential is not noticed as often as men's, maybe because women do not self-promote themselves similarly as men do. One of the interviewees talked about her recruiting process to a company:

"My profile with a man's name got 20 calls for interviews, with my name none."

In the last five years there had been a change in the Case company for some and some had not noticed an improvement at all in women's opportunities to progress. Others were aware of manager trainings and the leadership taking actions on the subject. Actions have been takes, such as trainings, mentoring and support programs to find the talented women. However, leading with fear and the fact that people are not seen as an asset or strength were seen as a threat for the company and the company culture.

All the participants were happy with the progress so far in their careers. The IT field requires constant learning, even in the free time. The applicants said that they had been respected in their roles and they had learned a lot during their employment. One of the applicants told the following about the beginning of her career:

"It's been just like having been thrown into the swimming pool and seeing if you can survive. I don't think they are fields of expertise where people actually bother to teach you anything or to give you time to actually learn. They expect that you come readily studied from home, and if you don't know something in your work, you will study it after work. Requires total dedication."

And another about the progression through-out the career path:

“The career path is full of coincidences, willingness, knowhow, fortune, and misfortune. Sometimes you say yes and sometimes you say no. When I look at my own path, I feel like I have made the right decisions.”

4.3.4 Group 4 on career development

The unifying theme in this group was that all the participants were very happy with how their careers had developed so far. All of them had gotten opportunities, had gotten support from managers and colleagues, gotten promotions and chances to work in various tasks. In addition to informal support, most of them had mentors at some point in their careers. Gender was not seen as the issue in one’s own career because women are just as good at the job, but more women are still needed to the field:

“There's too few of us. Part of it is just lack of representation. You don't usually want to do something if you're going be the only one of your kind there. Maybe it's not promoted enough for younger generations or? We're doing amazing work and equally as any guy could.”

“But I've never felt I can't progress. There's been a lot more women hired because there's been a lot more people hired, so it's a lot more women around which I think is super great, but not nearly enough. So, we need to keep attracting women.”

About the selection process it was stated that the best candidate will be selected, and activity plays an important role in getting promoted. However, progressing was perceived to happen slower for women than for men. It was seen that there are still differences in opportunities, but things have improved over time. There have noticed actions and active talk of hiring more women, but there was no clear visibility if it had happened.

Views on equality and the measures were a little mixed, some thought there was still work to be done and some saw no differences in opportunities, despite the gender. They stressed that there is no chance to be hired if one doesn’t apply and that women need to be hired to

the top positions also to be the example that women can do the job just as well as men. It was also seen as important that women support and elevate each other, because of cronyism favouring men.

“We have to show and prove our worth. That is the biggest difference that we have to work twice as hard compared to men to move forward.”

“As a manager, I have also hired women. But the problem is that women don’t apply for the positions. It’s hard to hire women if there are no woman applicants.”

Women quotas raised mixed opinions. Some were totally against quotas to prevent the recruited person to be criticized of being hired because of that. On the other hand, it was important to some participants that all women are interviewed if they apply, so that the minority is also heard. In some cases, being a woman leader was seen as a positive aspect for the person in question:

“Good woman leaders leave, and they have takers. It might be even easier for a woman leader to find a new position, because companies see the value in progressing diversity and want to hire women.”

4.4 Actions to be done

The aim of this section is to figure out the means to support women in IT and identify concrete solution to the known and described issues of the previous chapter. The main results and overall comments of the research are presented in table 4.

Table 4. Actions to be done

	Group 1	Group 2	Group 3	Group 4
Description	Women who have worked at the Case company for less than 5 years	Women who have worked at the Case company for more than 10 years	Women who have left the Case company	Women in upper managerial positions
Is there a need for actions to support women in IT	It is important	Yes	Definitely. Feel like women are treated as second class citizens because they might have a baby and be absent As long as we have to make sure that there is enough diversity in certain roles, there is a need Two reasons to make noise on the subject: to encourage women to apply for bigger roles and make sure the sub-conscious ignoring of women potential disappears	Yes
Listed actions for IT	More visibility for women in IT in the media Targeted advertisement to young women Support from parents and encouragement to apply for technical job	The change needs to be done at a societal level, so it's slow Talking about misogyny and accepting that it still exists Women deserve the same kind of support as men	Women and girls to be encouraged to enter the IT field Think what motivates girls and women and "sell" the field Support from home has a big role, encouragement	The activity has come from the women themselves -> women need to apply Encouragement to apply for positions Visibility Trainings

Listed actions for IT	Encouragement to study math and physics Improving social image, that the woman in IT is a great career option Women leaders in IT can be helpful in uplifting the barriers in this field Sharing women's' successes and achievement stories socially Coding camps for children	Don't feel to be a part of the work community. Can't recommend as a workplace. Make sure that the managers have internalized the issues, so they begin to correct them More woman managers with different backgrounds Stop using terms like "soft values" because it makes them seem less valuable Gender equality training for teachers Giving time to learn new tasks	to mathematics and physics Affecting the core attitudes that for example computer and math are for all, not just for boys Educate women to support their confidence and expertise Educate managers and organizations to look beyond the traditional way of recruiting the same kind of people Transparency in salaries and recruiting processes Women being also conscious to challenge the companies promises on equality and diversity	All the woman applicants need to be interviewed Certain percentage of people in leadership teams need to be women No need to give up, even though not getting the position right away Showing how this field impacts different things The field needs to be marketed better for women and girls Society needs to enable women to work full force: home-life balance needs to be supported
Is there need for actions to support women in Case		Yes A lot has been done already	There is a need The Case is making an effort, but the pace is slow	Yes
Listed actions for Case	Support, mentoring, coaching Fixing the pay gap: same salary for same job	Networks that support progression Courage to apply for different kinds of positions and places	Encouragement, no artificial actions for diversity If the diversity is forced, the situation might	Women need to take advantage of mentoring Keeping up the supported career paths

Listed actions for Case	Managers to talk about mentoring possibilities A separate induction meeting for women only Lifting and modernizing the company profile with social media campaigns to attract younger women Interviewing the women in technical positions to normalize their work All kinds of diversity to the product development We do interesting things, but they are portrayed in a way that makes them look boring. We need to improve the company and product image Co-operation with education facilities Clarity to the recruiting process and advertisement Developing the leadership and recruiting	More support to balance work and family Having men take a bigger portion of childcare duties, so the responsibility isn't left for women alone Promoting Case and the women in the middle of technology as an example More parental leave for men so women are not blamed for being away from work Mentoring for all Meetings, activities for women to form networks and feel included	turn against women Especially in management, let's act based on the core values that the company has Leading with fear derives women away Talking about issues and trying to find solutions in a respectful manner Support, coaching and mentoring to strengthen women and remove doubt The further you go, more support and mentoring is needed for you, as the leaders' position is often very lonely Try to diversify the existing teams Give a chance to somebody you wouldn't normally hire An event to make women feel welcome at Case Meeting and getting to know the women in Case to not feel isolated	More information about the possibilities, organizations Hard to see yourself in managerial positions seven steps ahead Mentoring, coaching for every emerging woman leader Searching actively for potential leaders Training the managers to hire diversity Adding the diversity by force if there is no other way Adding more women by managers hiring more women Woman quotas in all levels Publishing research related to diversity Raising awareness to the fact that it's ok to ask for a raise or apply for a position Using a shadow method where men in higher leadership positions would have a woman

Listed actions for Case	young, active new leaders Panel discussions Teaching how to talk about the business and same language as men			shadow to learn about the work
Participation in women support groups at Case	I have participated in some activities	I have not participated If there is something for just women, some men start to complain about it It's important to hear from upper management that they appreciate equality and women's rights highly	No experience, haven't participated Probably the support will help some to be encouraged to apply for a position Have participated in different woman networks and leadership trainings The initiatives bring light to the issues at hand The given example stories are so extraordinary that it's hard to relate	Not as a participant There could be more of these events If the event is just for women, some might think it's biased against men Participated in a leadership training and made lifelong networks and friends
Other comments	Education for managers to notice the women in need for mentors or support	It's important to have leadership training for women, but it might turn them into "less valuable" if they	Achieving equality between men and women leads to balance and equality between every human being	The encouragement to STEM professions should start at high school

Other comments	The research results from these kinds of papers should be delivered to the managers The internal applicants should also be considered for the positions The recruiting processes need to be modernized Social support is the key element In the developing countries it is almost impossible for women to get into technical professions There is respect for individual culture, such as Ramadan It's shame that the image of Case is stuffy since we do very cool things	are just for women We need active men to support the cause We need to select managers who share the core values	I don't see the segregation between men and women important As long as the women leader programs are filled with participants, they are needed The current CEO in Case really drives diversity with supporting work life balance It's much easier to be a good leader at good times. An employee must be able to trust the leadership also when the times are tough Qualified women bring a unique view to the organization	I have a feeling that I should do more. Would like to have actions that work My aim is to hire qualified women from inside and outside the company Training the managers is essential because they make the decision to add on diversity Women must learn how to present themselves convincingly Every manager needs to give women applicants a chance Imposter syndrome should be recognized by everyone Higher leadership roles take a lot of free time, and many calculate if it's worth it Some women leaders have for example au pairs to help with the children Women have the chance to do an amazing career, despite a few years of maternity leave

Other comments				To get more women to the field, we need more girl interested in STEM Working together with the guidance counsellors to deliver the information

4.4.1 Group 1 on actions to be taken

Group 1 agreed that there is still work to be done to support the women in IT. It was considered important that women in technology are normalized by adding more visibility to them. There could be targeted advertisement for young women to enter the field, make the image of IT more appealing and encouragement to study mathematics and physics to obtain the skills very early on, starting from coding camps and courses for children. Sharing women's success stories and promoting women leaders would help uplift the barriers. The diversity was seen important to the business, too:

"If our workforce is homogeneous, the customers will notice it too. We need to have diversity in the product development: people of different ages, background and with various educations. I wouldn't mind having more women in my team either."

There were actions suggested to support women in the Case company also. Almost all the participants mentioned support, mentoring, and coaching. It was important for the participants to fix the pay gap and to offer a separate induction activity for women. Managers were seen as responsible for promoting mentoring possibilities and educating women to speak the business language. Diversity was seen essential for the business potential, too. By lifting and modernizing the company profile, the Case company could attract more women. Technology was considered remarkably interesting, but the image which the Case company portrayed of it is boring. The recruitment process and the job advertisement were perceived

to need a lot of modernizing. There were experiences where the applicant had to wait for a long time to hear about the decisions and the job profile was very messy and unclear:

“These qualified and potential women are very wanted in the industry. If the recruiting processes is slow or uninviting, they will choose another company.”

Group 1 also mentioned the training of the managers to better spot the support women need and offer it. Research results were seen as an important input for the managers to grasp the required activities. The Case company and Finland were seen as great opportunities for women to develop. The Case company’s public image however needed refreshing as it was seen stuffy, although the technology it produces is cool.

4.4.2 Group 2 on actions to be taken

The second group thought that it was important to support the women in IT. It was considered as important to see a change take place in a societal level, to address the misogyny, to acknowledge it and define the right actions to mitigate it.

“As long as we have men leaders with no idea about misogyny and how it affects, things don’t change. With trainings and open discussion, the received knowledge would sink into the company structures”

It’s important for the managers to understand and internalize the issues, so they can be corrected. Hiring more women managers with different backgrounds and gender equality training were seen important. Also using terms like “soft values” when talking about communication skills etc. should be stopped, as it undermines the value of people skills.

The suggested actions to be taken at Case company were the following: to build networks and offer support end encourage to apply and get to know the hiring managers. More support needs to be offered to balance work and family, especially in the leadership positions, meaning also support from the society is needed to incentivize more men to take on childcare responsibilities. It’s important to promote women who have successfully built a career within

technology, to set an example. Also, actions for improved inclusion of women within their teams must avoid them being left out which might ultimately lead to them leaving the Case company.

“Being left out as a woman still happens at Case company and we still lack equality. As new women are hired, we need to make sure they are integrated to the work community to prevent them from leaving.”

“There should be consequences for acting against company values. It is deadly for the whole organization to have people doing that in higher roles.”

4.4.3 Group 3 on actions to be taken

All the participants in this group thought that it was important to support women in IT. As long there is a need to make sure there is diversity in all the roles, the support is essential. There were two reasons identified to make noise on the subject: to encourage women to apply for bigger roles and to ensure that the sub-conscious ignoring of women potential vanished. One of them felt that women were still treated as second class citizens for being absent due to family reasons. She clarified:

“I have to plan my life according to my job changes, career decisions and thinking about my career growth and it feels like it's never a good time. I'm *over 30* years old and because of all the job changes I have had to postpone my actual life for my career growth, and that is something that I think a man never does.”

The actions that were listed by group three were to encourage girls and women to enter the IT field by thinking of ways to “sell” the field to them and affect the core beliefs studying mathematics, physics and computer sciences is for everyone, not just for boys and men. Educating women to boost their self-confidence and expertise and the managers to look beyond traditional ways of recruiting the same kinds of people was seen important as was the transparency is salaries and the recruiting process. It was seen important for women to be conscious of the company’s promises on equality and diversity and challenge the actions if needed.

“I ask about it in every interview and I think people should also start forcing companies to talk more about that. Like what do you do and what are your policies towards this to ensure quality and inclusion and diversity in your company? And you can see if they are actually doing something or not.”

“The leadership culture is essential. Creating credibility and the fact that you can trust the talked measures of respect, being valued, values and procedures, so that you are not let down.”

The actions suggested to the Case company were to introduce real, not artificial actions: make the management act based on the company values, avoid leading with fear as that drives women away, support, coach, mentor, diversify existing teams, give an opportunity to someone that normally wouldn’t be hired to that position and events making women feel welcome and not isolated at Case. One of the participants pointed out that the further you go in your career, the lonelier the position and decision-making become:

“A leaders’ job is very lonely and there are only a few things and decisions that can be discussed with anyone else. You get less and less feedback because everyone thinks you don’t need it.”

“If you make the effort to choose a woman, slowly the field will change, and it will feel more equal. Because I didn't feel like I belonged there, it cost me dearly and I had to leave the company.”

The woman support groups were seen useful, although all had not taken part in their activities. Those who had, felt that they had gained access to networks and friendships and the initiatives bring light to the issues at hand. One of the participants told, that the example stories shared are so extraordinary that it is hard to relate to them:

“I've gone to so many presentations where this person from whatever team in the Case company is talking about their success story and then I don't relate to that. I'm going to persist on this and I'm going to keep trying. But at the same time, I think there are people who are very successful anyway. They are really motivated and persistent and determined and strong willed and all of that. They are so good and so exceptional which is hard to ignore. But what

about me, a normal person? Introducing normal people, not just like they're super genius masterminds that I cannot relate to. I don't want to be thinking it would be so nice to be her. I would be thinking like, that could be me."

Other comments provided on the subject were that achieving equality between men and women means equality further down the line between every human being. The current CEO of Case company was seen to drive diversity with different support methods and goals on hiring women. This was seen as essential for the success in diversification of the workforce. They also reminded that it is easy to be a good leader during good times, but employees must be able to trust the in leadership when times get tough and trust that there will be no unnecessary punishments for the employees. Qualified women bring value and unique views into an organization:

"I admire women who have created a successful career and gotten to a position of trust, and I hope there were more women like this. It's good for the companies and for Finland."

4.4.4 Group 4 on actions to be taken

All of the participants agreed that there is still work to be done to support women in IT and also in the Case company. This group emphasized the women's own activity and the encouragement needed to apply for the roles and become more visible. Through trainings women could learn to present themselves convincingly. Some of the participants talked about how important it is to interview all the woman applicants and make sure that they know not to give up, even if the first application process is not successful. Some suggested that if nothing else works, there needs to be a certain percentage of women hired on every level, especially on the leadership levels. There was some discussion that the field should be marketed better, and the society should support the work-life balance even better.

Suggested actions for the Case company were the following: taking advantage of mentoring, continuing the supported career path programs, educating women of their possibilities, offering mentoring or coaching to potential (women) leaders, searching actively for potential

leaders, training managers to hire more diversly, using force (quotas) to add diversity, publishing research related to diversity to point out the issues and potential solutions and using shadowing as a method to show that leadership work is not so difficult to be grasped.

“It would be great to organize shadowing of a leadership team, so that every male leader would have a shadow to observe the work and recognize that it’s not an impossible task to do.”

“But women cannot fix these problems alone. We need men colleagues, recruiters, managers, and leaders too.”

Some had taken part in the women’s employee resource group activities and hoped that there could be more events like that at Case. Although there was a remark that actions for only women could be seen biased against men. The ones that had taken part in trainings, events, and such, had gained lifelong networks and friends.

In their other remarks, this group pointed out that the real work of getting more women into this field, needs to start by offering the encouragement latest in the high school. The study counsellors could be the people to be contacted for creation of more collaboration. Training the managers was seen essential because they are the ones who can concretely affect diversity. The female managers in this group felt that there could be more that they could do. One of them said that she always aims to hire qualified women from inside and outside the company. The imposter syndrome was recognized by some women and women were encouraged to learn how to present themselves convincingly. On the other hand, higher leadership roles were not perceived as attractive, as it would mean losing free time. Some leaders were known to use au pairs to take care of their children. In the end, women have time to build an amazing career, despite a few years on maternity leave.

4.5 The collected codes and main categories

The main categories and the codes forming them are introduced in table 5. The main categories and the opinions of each group are presented in the chapter 4.6.

Table 5. Codes and the main categories they form

Codes	Main Category
Core values	Actions to be done at Case
Female examples	
Employer image	
Mentoring, coaching, sponsoring	
Pay gaps	
Promotions	
Trainings	
Recruiting	
Education	Actions to be done in General
Motivation	
Pay	
Promoting math, physics, and computer	
Societal changes	
Women's chances in IT	
Discrimination	Problems in IT
Inequality	
Misogyny	
Problems in Case	
Women quotas	Women quotas
Support groups	Supporting women
Support	
Support groups in Case	
Supporting women	
Women's chances in Case	
Leaving the Case	Perception of Case and IT workforce
Women vs. men	
Perception of IT	
Position in work life	
Entering the field	
Inspirations	
Motivation	
Career aspirations	
Career development	

4.6 The main category items in group level

Table 6. Summary of opinions of the main categories by group relevant to answering the research questions

Main Category	Group 1	Group 2	Group 3	Group 4
Description	Women who have worked at the Case company for less than 5 years	Women who have worked at the Case company for more than 10 years	Women who have left the Case company	Women in upper managerial positions
Actions to be done at Case company	Support, mentoring, coaching Fixing the pay gap: same salary for same job Managers to talk about mentoring possibilities A separate induction meeting for women only Lifting and modernizing the company profile with social media campaigns to attract younger women Interviewing the women in technical positions to normalize their work All kinds of diversity to product development	Networks which support progression Courage to apply for different kinds of positions and places More support to balance work and family Having men take a bigger part of childcare duties, so the responsibility isn't left for women alone Promoting Case and the women in technological career as an example More parental leave for men so women are not blamed for being away from work Mentoring for all	Encouragement, no artificial actions for diversity If the diversity is forced, the situation might turn against women Especially in management, let's act based on the core values that the company has Leading with fear drives women away Talking about issues and trying to find solutions in a respectful manner Support, coaching and mentoring to strengthen women and remove doubt	Women need to take advantage of mentoring Keeping up the supported career paths More information about the possibilities, organizations Hard to see yourself in managerial positions seven steps ahead Mentoring, coaching for every emerging woman leader Searching actively for potential leaders Training managers to hire diversity Adding diversity by force if there is no other way

Actions to be done at Case company	We do interesting things, but they are portrayed in ways that make them look boring. We need to improve the company and product image Co-operation with education facilities Clarity to the recruitment process and advertisement Developing the leadership and hiring young, active new leaders Panel discussions Teaching how to talk about the business and the same language as men	Meetings, activities for women to form networks and feel included	The farther you progress, the more support is needed as the leader's position is often very lonely Make an effort to diversify the existing teams Give a chance to somebody you wouldn't normally hire An induction evet to make women feel welcome at Case company Meeting and getting to know the women in Case company so they do not feel isolated	Adding more women by managers hiring more women Woman quotas on all levels Publishing research related to diversity Raising awareness for the fact that it's ok to ask for a raise in salary or apply for a position Using a shadowing method where men in higher leadership positions would have a woman shadow to learn about the work
Actions to be done in general	Normalizing women in tech by making them more visible. Targeted advertisement for young women to enter the field, make the image of IT more appealing and encourage them to study mathematics and physics Coding camps and courses for children.	It's too easy to say that there are no women applicants, so we cannot hire a woman Employer image renewal needed to attract women to Case It's a core value issue. There shouldn't be any more leaders at Case who don't have a single woman in their team	Women and girls to be encouraged to enter the IT field Think what motivates girls and women and "sell" the field Support from home has a big role, encouragement to mathematics and physics Affecting the core attitudes that such as	The activity has to come from the women themselves -> women need to apply Encouragement to apply for positions Visibility Trainings All the women applicants need to be interviewed

Actions to be done in general	Sharing women's success stories and hiring/promoting woman leaders The diversity seen as important for the business	If we strictly look for people with similar background, we might lose good candidates willing and capable of learning When recruiting I've always made sure I talk to the woman applicants Managers have been forced to look for woman applicants Still work to be done to equalize the pay gap	"computer and math are for all, not just for boys" Strengthen women and their confidence and expertise Educate managers and organizations to look beyond the traditional way of recruiting the same kind of people Transparency in salaries and recruiting processes Women should challenge companies on their promises on equality and diversity	Certain percentage of people in leadership teams need to be women No need to give up, even though not getting the position right away Showing what this field can make an impact on The field needs to be marketed better Society needs to enable women to work full force: work-life balance needs to be supported
Supporting women	Action needed by the case company to offer more opportunities for women and a platform for them to progress Have seen women advance if they want to No one tries to pull women down It's not quite clear how people are selected for roles No positions or promotions have	It's too easy to say that there are no women applicants, so cannot hire a woman There needs to be employer image improvement done to attract women to Case It's a core value issue. There shouldn't be any more leaders at Case who don't have a single woman in their team	More women are selected to positions One of the best fields for women to have the same opportunities as men Diversity questions are actively raised in boardrooms Being a woman might be a strength if gender diversity is really valued	Generally, the same as men Very good once you get in, based on experience from Case company Too few women Women must do twice the work to get the same chances Requires conscious action, no one is going to pick you without it

Supporting women	been suggested for me Ambitious women can progress because there are so few of us Age questions are more concerning: we don't have the next generation growing Managers are employed by years of experience, not competence or education I see women at project management and other management positions, and I'm encouraged	If we strictly look for people with similar background, we might lose good candidates willing and capable of learning When recruiting I've always made sure I talk to the woman applicants Managers have been forced to look for woman applicants Still work to be done to equalize the pay gap	I have seen less experienced men get the position a woman was also applying for Have seen women mostly in secretary or assistant roles	Male managers who don't hire women are rare
Perception of Case and IT workforce	Perception that employees stare at code from 8-16 At some point I thought that only way was to move forward, not to go back Challenging Tasks are divided inside the team so it's not that hard There is always support from the team Work is flexible	Men are at once accepted by other men, women are not No support from anyone, must go forward alone Hard times affect how colleagues are treated Being a woman is one reason to put one down Misogyny is still obvious in male dominant companies	Growing field with a need for skilled employees In the future more AI based solution but now humans are needed IT is more common today and not so much of a mystery as 15-20 years ago More and more women study the field today Other sector was initially suggested	There was no initial knowledge of the field when studying Some skills proved more important than initially thought Fear or hesitation towards the acceptance of women Field that offers a lot of job opportunities and is driven by the technology

Perception of Case and IT workforce	No perceptions, just happened to enter the field The field is divided to the hot start-ups and more traditional engineering companies High average age at the unit has strengthened the mental image of the company I had before I thought it would be very hard, but I'm supported by my team and supervisor Freedom to be oneself Confidence has grown as there is more expertise The no-blame culture is very good. This doesn't take place everywhere Managers and project managers are there to help Appreciating the ability to take a sick leave if needed Disappointment in big projects ending without a notice Employees are valued and treated well	Project management and multicultural way of working are essential Supervisors are trained but they still prefer to hire people like themselves I'm not taken as seriously as my male colleagues Employees are trusted and there is no micro-management Not as hype and dynamic as initially thought In IT context old-fashioned	because of gender Rapidly developing technologies Fairly equal for men and women A lot of work done to bring women into leader positions People can be helped with IT, not only in the health care industry Endless possibilities Talk of diversity but not seeing it in action Lack of peers, being the only woman in a team No help, no induction, no resources for remote work No change to situation despite talking to the manager Didn't get to do the tasks hired for The company is stuck in the past Started gaining offers and networks outside the Case company	Common perception is that everyone codes, but the tasks are very versatile Surprised on how many different positions there are at Case The initial perception of Case was that the employees are driven and motivated There have been tough years with lay offs A big ship turns slow, changes take a lot of time Case company has made a very positive impact because of the job opportunities The biggest leaders have the biggest impact on how the employees value their work With current communication I feel most valued in my work

Perception of Case and IT workforce	No overtime, work is done within the scheduled workday Lot of variation in tasks		Had an excellent offer and it was the right time to move on More work should be done to enhance the leadership culture Leading with fear needs to stop It's good to see other kinds of environments not to take things for granted Wanted to develop personally and professionally	

5 Summary and implications

The summary chapter summarizes the analysed results from chapter 4 and introduces the main results of the research gathered in main categories, the major observations, discussing those through literature and answering the pre-set research questions. The answers are based on the subjective experiences and opinions of the respondents. The findings of this study are compared to existing literature and earlier studies. The sub-questions are answered first, forming the final answer for the main research question.

5.1 Answering the research questions

The research questions were defined in the beginning of the research:

How could academically educated women be supported in the Case company to advance in their careers?

a. What measures have supported women's career development in the Case company?
b. What measures have supported the success of women in STEM careers working at other companies?
c. What measures could help women enter and keep women motivated to stay in technological careers?

5.1.1 What measures have supported women's career development in the Case company?

This sub-question was examined in the interview as a direct question but also as a side product of some other questions. The analysed answers for support related questions can be found in table 3 and table 4. Almost all the participants felt that they had received support through-out their careers from someone, and all the participants were in general happy with how their careers had progressed so far. There were no major differences in what kind of

support and from where the participants had received, when comparing the groups to each other. The manager group (4) talked most about being offered a mentor and an active mentorship at some point in their careers. Some participants found it important that the mentors were men, as progressing in the technical field required skills commonly associated to male behaviour (talking like a man, acting like a male leader). Also, sponsors and coaches were mentioned by the participants as a form of received support during their career.

Other measures mentioned in this research were, colleagues, the general atmosphere at Case company and in Finland: loyalty of the people who had hired them into Case company, fellow students, team members, colleagues, and spouses/families/parents. Groups targeted for networking women were seen important. Some participants mentioned the measures already done at Case company, such as women's employee resource groups, trainings, programs for women's career development, being given an opportunity to attend job interviews and the common aspiration to get more women into certain units and job levels. Most of the aspects preventing them from getting the desired promotion were seen either internal (not having the courage to apply, underestimation, self-doubt, family aspects, loosing time off from work) or managerial related (manager not seeing the need of support/ambition/know-how, favouring male-colleagues, having sub-conscious bias and/or misogyny), trainings were held in a high value both for the women and for the managers.

The final measure which was seen essential for women's career progression was the support received from the society and the employer, especially regarding child-care. Women in the manager positions reminded of the fact that with bigger responsibilities and higher job positions the loss of time off from work and chance to be with the family or take care of young children or elderly must be considered. Even when there is quite a comprehensive childcare system in Finland, there is still school children's summer vacation and evenings to think about. It was also seen important that there were measures done to equalize childcare leaves, so that women were not discriminated based on having children and being absent.

5.1.2 What measures have supported the success of women in STEM careers working at other companies?

There were four participants in this study, who no longer worked at the Case company. The results for this research question are found in table 2. Half of the participants described their experiences and working at the Case company with very positive notes. The IT field was described very equal and offering great opportunities for women by some of the interviewees, but it was also recognized that there is still a lot of work to be done to add women into manager positions. The Case company was seen as a platform for growth, a global company with human resource challenges as everywhere else and with real actions and willingness to further gender balance. Some of the participants felt that there is no glass ceiling and they themselves had received great opportunities, support and trainings while working at Case.

Some of the participants who had left the company, felt that they had never been fully integrated to the team they worked in, their manager had not given them a proper induction. They felt like they were left alone or hadn't found co-workers to interact with, or that the tasks given to them were not the ones they were hired to do. Some felt that other companies offer better benefits for their employees and take better care of them.

The measures of support they had received described by the group 3 were very similar to those described at other companies. Some of the participants currently worked at companies with a more balanced gender diversity than at Case or with a lower number of employees which meant that the measures to support women were on a different scale than at Case.

5.1.3 What measures could help women enter and keep women motivated to stay in technological careers?

The answer for this question was discussed in several different parts of the interview. The participants talked about their own career aspirations and why they had decided to study the

technical field and many of them had ideas on how to get more girls and women study the field. Some of the participants had considered leaving the IT field but hadn't acted on that consideration. The reasons for entering the field were various and there were no clear differences between the four groups. Many of the women mentioned skills and interest in computer science, mathematics and physics, parental support and just picking the field by coincidence. The last reason was mentioned in all the research groups.

Many of the women mentioned that it is important to advertise the importance of mathematics, physics, and computer sciences very early on. The general attitudes towards girls and math were seen as a one factor why women more often choose another career. There was discussion that there should be more encouragement for girls to study mathematics and stick with it even if it feels difficult. There could be more co-operation between the study counsellors and IT companies to bring the IT field closer to the young students

Other reasons mentioned the willingness to become an engineer, ambition, good financial opportunities, great employment opportunities, good opportunities to progress and narrow opportunities in other interesting fields. There was a discussion about the fact that not many people know the variety of tasks available in IT or the opportunities to progress. It was mentioned that working in the IT field is also a great way to do good as many of the technology being developed is related to meaningful development where the technology has been brought closer to people. This was seen as an essential way to promote the field for women, as many women want to see the bigger purpose of their work.

Recruiting processes and (subconscious) biases or misogyny were mentioned regarding women entering and exiting the field. Some of the recruiting advertisement was seen uninteresting and too technical and the recruiting processes slow. The interviewees suggested that there could be more "blind hiring" where the name of the applicant is removed from the application, the advertisement could be made more appealing and many of the participants saw that choosing to interview all the woman candidates was a good progress.

5.1.4 How could academically educated women be supported in the Case company to advance in their careers?

Based on the sub-questions answered before the main research question “how could academically educated women be supported in the Case company to advance in their careers?”, there are ways to support women to advance in their careers at the Case company. The proposed methods of supporting women that appeared in this study were various and consisted of societal, company cultural, managerial, and individual measures. Societal support was mentioned when talking about childcare and other burdens of care-taking that often falls on women (taking care of elderly parents, home care of kids and elderly, meta work concerning planning the weekly home and work activities of family members etc.). When considering higher company positions, losing time outside of work was seen as a concern because there was childcare and family to consider. The participants in this study talked about support for childcare when in challenging positions at the company or in case of child sickness. The fact that the amount of parental leave for men is increased at the Case company, was seen beneficial as women would no longer be a target of pregnancy-based discrimination as men would be absent because of a child also.

As mentioned before, there were experiences shared in this study of the Case company culture which some women had found exclusive, discriminative, or biased against women. Some of the participants felt that there were measures to be done to address and change the company culture. The measures included adding diversity by simply hiring more women in different positions, training the employees and managers to promote diversity and recognize sub-conscious biases and misogyny and offering more company induced support systems such as support groups, trainings for women and offering mentoring more widely to women in different positions. Women quotas raised mixed opinions amongst the participants, but almost all the participants agreed that it was essential to give women the voice during recruiting processes and interview all the woman applicants if possible. It was seen as important that all the Case company employees act as advocates for diversity, as women alone shouldn’t and cannot be in charge of promoting equality.

5.2 Major observations based on the analysis

Some major observations were made based on the results of this research:

1. **There is a clear need to support women to enter and advance in IT related professions in general and at the Case company.** All the participants of this study more or less agreed that activities are needed to be to support the women in the IT field. Many of the participants agreed that women need more encouragement to apply for positions, some said that there as sub-conscious biases and misogyny affecting women's possibilities to progress. Many of the participants said that women's chances to progress are as good as men or even better, because if there are two equally strong participants, the woman is hired. Both vertical and horizontal progress were seen valuable, and support was needed for both.

2. **Mentoring, sponsoring, and coaching are seen as valuable tools to support women.** Mentoring, sponsoring and/or coaching in some form was mentioned by almost all the participants. Many of them had been offered mentoring or had actively applied for a mentor. Some mentioned that the mentor must be a man, since working in a male dominant field. Mentoring was seen as one of the most effective ways to receive advice on how to plan a career. It was seen important that mentoring would be available for all women in some extend and this way it would be easier to have a mentor.

3. **Trainings for both women and managers would help women advance in their careers and stay in the Case company.** Trainings for both women and managers were mentioned by almost all the participants as a way to help women advance in their careers. Women were seen to need support, encouragement and taught how to "speak like men" in the business. Managers were seen to need education on diversity issues, leading women, act without prejudice, learning how to lead without causing fear and hiring other than their own kind.

4. **Real examples and stories of women at the core of technical development and manager positions help set an example and inspire other women.** Real life examples and stories of women who had progressed in their career and how they handle their current position were seen very important. Especially, women in technical roles, were seen essential to bring forward. It was seen important for many of the participants to convey the message to young women considering their field of study, that women are just as capable at technical

careers as men. It was also seen important that females are portrayed in technical roles in the media and that the image for example of a woman coder is just as important as a man coder.

5. **Exclusion, unaddressed misogyny, lack of support from the manager and not seeing the company diversity measures implemented in day-to-day work are reasons for leaving the Case company.** Some of the participants mentioned that the Case company doesn't have a very fresh nor attractive image in the eyes of the applicants, even if the technology and the products were seen interesting. There were reasons related to the company culture which drive women to apply positions elsewhere. The cultural reasons were described to be team related or management, not so much a bigger issue related. However, many interviewees mentioned that they had never met such issues at work which would also suggest that these issues are discovered in certain teams or areas within the company.

6. **Many of the women taking part in this study were happy with their career development but saw room for improving diversity, especially in the leadership positions.** Almost all the participants were happy with how their careers had progressed and almost all had received support from someone during their careers. Improvement of diversity was seen essential mostly because there is a need to get more women into IT field to diversify the product development and the teams inside the Case company. There was also the presumption that women were not as often selected to leadership positions.

5.3 Implications and discussion

Women are underrepresented in the IT field even though there is evidence that a more diverse work force is beneficial for a business. In 2020, bout 23 % of new bachelor's students (18,5 % in 2017) and 25 % of new master's students in the information technology studies in Finland were women (Statistics Finland, 2021) and women deploy about 20 % of the ICT workforce (Holth, Almasri and Gonäs, 2013, 520). Studies have recognized different reasons why women don't pursuit careers in STEM, such as stereotypes related to girls not exceeding in mathematics, physics, and science (Nordiska Ministerrådet, 2021; Hyde 2005), negative association of the technical field which make women question their abilities and belonging to the field (Bairoh and Putila, 2021, 596) and the narrow masculine culture in the technical

field which is an obstacle when trying to achieve gender balance (Bairoh and Putila, 2021, 596).

Almost all the participants of this study agreed that there is a need for the activities to support the women in IT field. Diversity was seen as a positive aspect and some of the participants spoke about not feeling included in their current homogenous team. Similar results have been found in earlier questionnaires (Case company internal documentation, 2021.) Striving for gender balance in the technical field brings benefits for the companies, employees, and the society. Inclusion is one of the things affecting perceived happiness at workplaces (Mousa, 2021), while a gender diverse work environment and a woman as a manager support team innovation (Ritter-Hayashi, Vermeulen and Knoben, 2019, 12), and women in boards and top executive level have a very positive impact on the company performance (Smith, Smith, and Verner, 2006). Adding women workforce to a company helps bring their own viewpoint to product and related markets so that they can be more easily considered as a target group, and it increases the development in corporate governance (through a different management and communication style), as well as adds on sensitivity and more civilized behaviour and adds on interest for corporate investors (Singh and Vinnicombe, 2004, 481). The research has also found that gender diverse companies are more likely to outperform (Gascoigne et al., 2022) others, companies with a woman CEO with a university degree are likely to get a positive gross profit (Smith, Smith, and Verner, 2006) and a diverse board increases company value (Kim and Starks, 2016, 270).

In 2022, about 23% of all Case company employees and about 21% of Finnish employees in the Case company were women in 2021. 16.5% of managerial roles and 16% of senior roles were employed by women (Case company internal documentation, 2021). Many of the participants in this study talked about the fact that having more woman leaders would be desirable. Based on the results of this research and the number of woman leaders in the Case company, there is still room to improve the gender balance.

There are significant differences on how women and men are deployed in their careers after graduating from economic or technical studies. Men are more likely to be fully employed

and advance to higher organizational position than women who had graduated from the same studies (Bairoh and Putila, 2021, 598), while women report that they earn less for the same job (Funk and Parker 2018, 9) and that their gender has had a negative effect in succeeding in their careers and they have experiences in having to prove themselves to gain respect (Funk and Parker 2018, 11). A masculine culture with negative stereotypes of women and doubting their abilities is a barrier for achieving gender equality (Bairoh and Putila, 2021, 599). Many of the participants in this study agreed that women need more encouragement to apply for positions, some said that there are sub-conscious biases and misogyny affecting women's possibilities to progress. Some of them had also had similar experiences described above. Trainings for women could very well be justified with the fact that coping in the technical field requires the ability to adapt and persist despite challenges and discrimination (Buse, Bilimoria and Perelli, 2013).

Mentoring, sponsoring, coaching, and training

Mentoring, sponsoring, and coaching were seen as the most effective ways of supporting women's careers in the Case company and in the IT field in general. In this study and earlier studies, women have reported that they must control how they behave and have a strategy to fit into the culture and accept it to succeed (Bairoh and Putila, 2021, 599). Some women in this study reported similar experiences of, having to prove themselves more because of their gender and learn to act as one of the guys. However, fixing the women or individuals may not be the best way to do this, but rather changing the culture by increasing the number of women in the field (Sassler, Glass, Levitte and Michelmore, 2017, 205). Mentoring and other forms of it offer support for an individual to succeed in their career, but it also adds visibility and promotability through inclusive networks, mentors, and sponsors (Correll and Mackenzie, 2016; Gascoigne et al., 2022). Measures provided early in a career, support women to the pipeline towards leadership with early promotions (Gascoigne et al., 2022).

Based on Hunt's (2015) study there are measures which the employer can initiate to mitigate the number of women leaving, because the major reasons of leaving seem to be related to external factors that can be influenced. Studies support the assumption that reasons women decide to stay in engineering or STEM professions are mostly personal characteristics

(perseverance, motivation, adaptation to the situation) (Buse, Bilimoria and Perelli, 2013) and if they decide to leave, the reasons often come from the outside (discrimination, dissatisfaction to pay, low promotion opportunities, lack of mentoring and networks and working conditions) (Hunt, 2015). Women in this study talked about their inner characteristics and learned manners of succeeding in a male dominant field and about the outside reasons that in some cases had led to leaving the company. There is a possibility to affect both with trainings, mentoring, sponsoring, coaching, support groups, diversifying through hiring, removing gender pay gaps and offering equal promotion opportunities.

Real examples and stories of women

Changing the traditional role and stereotype of an engineer could help change the current culture in the technological field and help attract more women into the field. By emphasizing social relevance, the perception of the role could change (Nordiska Ministerrådet, 2021, 15). Women lacking the current masculine characteristics currently desired to get promoted can cost a promotion even if the woman candidate is otherwise skilled (Bairoh and Putila, 2021, 607). It is also important to normalize the idea of a technically oriented woman (Bairoh and Putila, 2021, 599). Examples on how this could be achieved according to this research was to hire women into the visible positions in technological companies and giving visibility to those women already working at the heart of the technical development. Adding women to the workforce of a company is essential to have role models and mentors for girls and women (Smith, Smith, and Verner, 2006). The media, television and movies portraying the engineer characters as women was seen important as was the reputation of the field and studies being portrayed in an appealing manner for all. The discussion related to role models at this research emphasized the importance of realistic and relatable role models and stories, not necessarily the extraordinary success stories which are not that relatable or achievable.

Exclusion, unaddressed misogyny, and lack of support from manager

Different kinds of discrimination, exclusion and biases were discussed and encountered by some of the participants in this study. One of the most typical forms of discrimination in Finnish workplaces is gender discrimination. Overall, women experience and report more discrimination than men (Bairoh and Putila, 2021, 597). Some women report earning less,

feeling underappreciated and not getting enough support from their manager (Funk and Parker, 2018, 9). Similar experiences were reported by some women in this research. There was also discussion of biased recruiting, feelings of exclusion and misogynist behaviour from managers and teammates. According to Funk and Parker (2018, 11) women in STEM report that their gender has negatively affected their success in their careers, and they have experiences in having to prove themselves to gain respect.

According to a study by Sassler, Glass, Levitte and Michelmore (2017, 205) the best way to increase the number of women in the STEM workplaces is to increase the women majoring in STEM fields, by making the culture less masculine which would affect the number of women choosing and staying in STEM professions. These studies support the previously made statement that the changes in the technology field should be actively pursued by everyone working there. Fixing women or individuals in general is not the answer to make the field more accessible, tolerable, or balanced.

6 Conclusions and limitations

In recent years, there has been a lot of conversation about gender equality, diversity, and discrimination in technology and IT where women are underrepresented in numbers. This means that there is still work to be done to achieve an equal balance in IT workforce between men and women. There are several ways to justify the need to further gender diversity in workplaces. If women are left out or undermined as technological experts, half of the population is taken away their potential to solve STEM related problems which affects the development of many other fields of science and innovation. These are the things that are known to increase in gender diverse teams: by creating a more diverse knowledge base, wider range of experience and improvement in decision making (Ritter-Hayashi, Vermeulen and Knoben, 2019). The legislation is also siding with inclusion and diversity.

The topic of this research is important not only for the industry in question but also for the women working there currently, girls and women aspiring to the IT field and for the Case company in question to have effective and corrective actions. The objective of this research was to investigate the careers of technically trained women in the Case company and women who had left the Case company to explain what has inspired them to stay in the Case company and in the STEM field, find ways to support women more to advance in their careers and compare the methods used in the Case company to the methods that have been found useful by literature and research. The aim was to produce valuable information for the company to use when planning future actions on increasing diversity, equality, and inclusion in the workplaces.

The research was conducted in a Finnish large-scale IT company as a semi-structured interview, using pre-defined groups to sort out the interviewees and to compare the results between the groups. Due to limitations in time for this study, there were four interviewees selected per each group to ensure enough qualitative data and experiences but also to ensure anonymity. The specimen for this study was quite narrow, especially in group three as there were only four participants who had left the Case company. This resulted in a limited answer

for sub-question 2 but literature and earlier research was used to fulfil the gap. Even if the groups were small, there was a lot of valuable information available through the stories. It's important to give the voice and listen to the story even of that one mistreated person who has left the company or field, to be able to take actions to prevent it in the future.

The results of this study show that there is still work to be done to promote diversity, equality, and inclusion at the IT field in general and at the Case company. There were many suggestions offered by the participants through experience and innovation. The actions varied from individual support to societal and cultural changes which would enable the full potential of women to work in more demanding roles in male-dominant fields. There were also valuable experiences shared of studying and working on the field. This study was able to fulfil the goal of investigating the reasons behind the decisions to leave the Case company, what measures have supported women working in the Case company and what measures could still be implemented to offer further support. One limitation to this research was the lack of triangulation, while the conducted interview results were not confirmed using a survey or another method. This could be the subject of a follow-up research including the triangulation aspect, as well as wider research on the topic of experiences of women in other companies. Also, the societal aspects brought up in this research affecting career decisions including stereotypes of women not being as good at math as men and the perception of men’s and women’s jobs when selecting a profession would be interesting to research more.

Based on the results of this study, the suggestions would be to continue offering trainings, development programs and leaderships tracks for women and expanding the target group of mentorships from the current one. The women’s resource group was also found meaningful and the activities inclusive so the activities should be carried out also in the future.

It is also essential that the company culture and the culture inside the teams are addressed with a low threshold by everyone if there are indications of exclusion, bias, or misogyny. The persons in manager positions should be educated more on how to act beyond their bias to strengthen diversity and to carry out the management according to company values even in tough times. Another suggestion is that all the persons belonging in minority groups who

have decided to leave the company should be interviewed to find out the reasons behind leaving and actions should be planned according to those reasons.

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Appendix 1. The Interview questions

Basic information

1. Interview details

Date:

Place:

Interviewer:

Interview started:

Interview ended:

2. Respondent

Name (coded):

Company (the Case/other):

Position in the Case company:

3. What is your degree and what year did you graduate to your current profession?

4. How did you decide to study the field?

5. Do you have any other degrees, besides the technical degree?
    a. What/which degree(s)?
    b. What made you decide to study another degree?

6. How long have you worked in the IT field?
    a. How long have you worked in the Case company?
    b. Have you worked in other IT companies? For how long?

Career and the IT field

7. How would you describe your career development after graduation?

8. How have your career goals developed after graduation?

9. Describe how has your perception of the IT field changed?
    a. How has the Case company affected the perception?

10. Have you ever considered leaving the IT field?
    a. Why did you consider leaving?
    b. What prevented you from leaving?

11. Have you ever considered leaving the Case company?
    a. Why did you consider leaving?
    b. What prevented you from leaving?

Women's career development

12. How would you describe your views on women's career opportunities in the IT industry?

13. How would you describe the career opportunities (advancement, promotions etc.) of women at the Case company?
    13.1 Do you see a difference in comparison to men's opportunities? What difference?
    13.2 Have you seen a change in women's opportunities during the last five years?
    13.3 How about other companies you have experience about?

14. What actions have motivated/supported you in your career?
15. Have you been happy with your career development so far? Why? If not, what would you want to be different?

Action to be done

16. Is there a need for actions to be done, to improve women's chances at advancing on their careers in IT?
    15.1 Please, list up to 3 actions you would like to be done to improve women's chances on promotions and advancing on their careers.

17. Is there a need for actions to be done, to improve women's chances at advancing on their careers at the Case company?
    16.1 Please, list up to 3 actions you would like to be done at the Case company to improve women's chances on promotions and advancing on their careers.

18. Have you participated in any actions at the Case company which support women in IT?
    17.1 What kind of actions were they?
    17.2 Did you find them helpful? How?

19. Is there something else you would like to say on say about gender balance or supporting women's career in IT/STEM? Would you like to add or complement the answer in some of the questions?