National College of Art and Design

Department of Design for Body and Environment: Textile Surface

Design

What are the Current Gender Barriers Facing Women in the American

Technology Industry and How Can These Barriers Be Overcome?

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I declare that this **Critical Cultures Research Project** is all my own work and that all sources have been fully acknowledged.

Signed:

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Date: 31 January 2022

Acknowledgements

I would like to thank my thesis supervisor Liza Foley for her invaluable

guidance and support throughout the year. I would also like to thank my

family Patrick, Regina, Maria and Hannah for the constant encouragement

and for proofreading this thesis. I would like to give a special thanks to my

brother Vincent, for the endless discussions and for challenging me to

elevate this thesis, even when the challenge was unwarranted.

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Introduction

Over the past three decades, technology related jobs in the United States have grown on average ten times faster than that of all other industry fields. However, there is a major discrepancy between the number of women employed in the technology industry and the growth in the number of jobs being created in it.(Accenture and Girls Who Code, 2020, p. 6). Considering this, this thesis will explore the gender barriers currently facing women employed in the American technology industry which cause this discrepancy and whether or not these barriers can be overcome. It aims to show that despite there being current legislation in place designed to protect the rights of female employees and the instrumental role women have played in the advancements of technology leading up to the 1980s, today's women have been overlooked when it comes to equal treatment and opportunity within the technology industry. It also seeks to demonstrate the many which accrue to gender (and racially) diverse technology companies. This thesis will also explore how such diversification can be achieved.

The thesis utilises a wide range of secondary sources. Anna Weiner's memoir *Uncanny Valley* (2020) gave a personal narrative to the other vital secondary sources that were consulted while writing this thesis. Weiner's memoir thereby provided a unique insight into the everyday experience of a woman working in the modern-day U.S. technology industry. The sources consulted include government publications, books, reports, podcasts, articles, academic reviews, magazines, company websites, surveys and

other data. Several research methods were employed throughout this thesis, including critical analysis, secondary data analysis and case study approaches. All of the aforesaid have been used to support the conclusions of this thesis.

There are three distinct chapters within this thesis. Chapter one outlines the emergence of working women into the U.S. economy, in four distinct phases (Goldin, 2006, p.1) and how this emergence led to the implementation of legislation to protect workers rights, in which said legislations has had a notable effect on the treatment of women in the workplace. Chapter one also briefly sheds light on the pioneering women in technology pre-dating the 1980s and how their contributions helped propel America's technological advancements. Chapter two examines the peculiar decline of American womens' interest and participation in the field of technology after the 1980s and seeks to identify the potential cause of this decline. It also examines the influence this decline had on shaping today's American technology industry. Chapter two in addition undertakes an in-depth analysis of data that reflects the current experience, treatment and barriers facing women employed within the industry. The statistics outlined in Chapter two detailing the lack of representation of women in the American technology industry and the resulting gender barriers thereby created prompt the question as to whether it is possible to overcome these barriers. Consideration is also given as to whether the effort needed from companies within the industry to address these issues is truly beneficial for companies in terms of their financial and innovative gain. Following on from this, Chapter three will analyze the

benefits of gender diversity within the industry and initiatives such as the

National Center of Women and Information Technology, which promote and

work towards tackling the problem. Consideration is also given to the

question as to what the development of a diverse company looks like in

practice through a study of the technology company Asana.

This thesis also touches on elements of race when discussing American

legislation, pioneering women in technology and the lack of diversity within

the industry. However, due to time constraints and word restrictions, this

aspect was not fully explored.

Chapter 1

In order to fully understand the current gender inequalities that women face inside American technology companies, it is necessary to look to the past and reflect on the events, legislation and people that have shaped the modern day technology industry. For this reason, this thesis will begin by examining the emergence of women in the American economy, the current employment legislation that is in place to protect female workers and ethnic minority groups, and lastly to look at the often overlooked or often forgotten female figures of the past that have helped shape the American technology economy into what it is today.

It is stated by the American economic historian and labour economist, Claudia Goldin (2006, p.1), that the true prominent emergence of women in the United States economy only began to be seen in the late 19th century. From this point on, Goldin states that the emergence of working women can be divided into four distinct phases. The first three phases can be considered 'evolutionary' while the final stage is considered 'revolutionary'.

1.1 The Evolutionary Phase I

The first evolution phase according to Goldin (2006, p.3) dates back to the turn of the 19th century and continues into the 1920s. At this time, the women that participated in the U.S. workforce were usually young, uneducated and unmarried, working as laundresses or piece workers in

manufacturing and typically, once married these women would exit the workforce (Yellen, 2020). Traditionally these women were paid far less than men, even in cases where they performed the same job. At this time, there was little to no governmental protections for the rights of working women as the constitutional law known as 'dual federalism' was in place, meaning that the employer-employee relationship was solely in the control of each individual state and the Federal government could not intervene (Mettler,1994, p.638). Consequently, workers unions, the most prominent being the American Federation of Labour, were averted from seeking adequate working standards through legislative means, in the fear of the state taking complete control over unions. Instead, these unions used bargaining to gain improvements in their workplace; however these unions did little or nothing for working women as the organisation rarely crossed the line of occupational segregation. This is when we begin to see some of the earliest disparities begin to appear in the American workforce as the American Federation of Labour set out to protect the rights of skilled workers who typically tended to be white males (Mettler, 1994, p.639).

1.11 Evolutionary Phase II

Phase II spans from the 1930s to the 1950s (2006,p4). At this time, the first real development of workers rights appeared with the introduction of the Fair Labour Standards Act of 1938. The composing of the bill had two main aims. The first was to abolish child labour and to place a floor on wages and a ceiling over working hours, while the second goal of the legislation was to reduce overtime working hours, which in turn would force employers to hire

more staff and ultimately create new jobs across the country. After much deliberation the bill was finally passed in June 1938 and established a 25 cent minimum-wage, a 44-hour work week and set the general age of workforce at 16 years of age (Ruby and Eisenbrey, 2013).

1.12 The Evolutionary Phase III

Phase III of the evolution stage from the 1950s-1970s, Goldin coins as the 'roots of the revolution' (2006, p.6). In 1963 President John F. Kennedy signed into law the Equal Pay Act. The Equal Pay Act enforced the law that employers must provide equal pay for equal work, forbidding employers from paying men and women different wages or benefits for doing a job that requires the same level of skill, effort and responsibility which are performed under similar working conditions. The law also enabled employees who believed they were being discriminated against to file a complaint with the Equal Employment Opportunity Commission or alternatively, file a lawsuit against their employer and take them to court (History, 2017).

Despite the Equal Pay Act of 1963 being a major step forward for workers rights, it did not have the same major positive impact on the rights of African-American women or other women of different racial groups, in the same way it did for white women. It was not until a year later, in 1964 with the continuous rise of protests in African-American communities and John F. Kennedy's championing of civil rights legislation, that the American government began to critically address the issue regarding racial discrimination in the workplace with the construction of a Civil Rights Act.

The first draft of the bill that was presented to the House of Representatives initially only included protection against racial inequality, however, it was later suggested to add the provision of gender-based equality. The proposal of making sex based discrimination illegal within the workplace resultantly meant that any form of sexual harassment within the work place would also be deemed as illegal, as sexual harassment was grouped under the term of sex discrimination. The Civil Rights Act was finally signed in July 1964 and protected the rights of women and racial minorities in the workplace (Hanges, 2013, p.388).

1.13 The Revolutionary Phase IV

These new legislations put in place during the third phase paved the way for what was to come next in the final and revolutionary phase of the emergence of women in the American economy. This phase began in the late 1970s and continues today and made major headway for women's working rights as a number of bills were passed that specifically impacted women rights in the workforce (Goldin, 2006, p.8).

One of the key bills was the Pregnancy Discrimination Act of 1978. Despite Title VII of the Civil Rights Act (CRA) explicitly preventing employers from discriminating based on sex, there were two cases in the Supreme Court in 1974 that saw companies withhold insurance policy coverage in the case of pregnancy and were condemned to not be in violation of Title VII (Spiggle, 2019). As a result, the Pregnancy Discrimination Act was put in place to amend the shortcomings of the CRA of 1964. The terms outlined by this legislation advised that employers must also allow pregnant workers to fulfill

their duties in the workplace as they wish until they are no longer able to perform their tasks. Although a set annual leave amount was not outlined in the PDA, employers were required to leave open the said position of the pregnant employee (Mukhopadhyay, 2012, p.1).

A subsequent bill that supported the rights of employees and which particularly improved the working conditions for female employees was The Family and Medical Leave Act of 1993. This bill was signed into law by President Bill Clinton and as stated by Gerstel and McGonagle, the the central provisions of this bill were to;

> Guarantee that people employed for more than 12 months (or 1,250 hours) in companies with at least 50 employees within 75 miles of their work site can take up to 12 weeks unpaid leave per year. Without losing their jobs, these workers can take that leave to care for newborn or newly adopted children, for seriously ill spouses, children, or parents, or to recover from their own serious health conditions, including pregnancy (Gerstel and McGonagle,1999, p.511).

This new law was a major step forward for women's rights in the workplace, as similar to the PDA, it improved the working conditions for pregnant women and new mothers, providing them with the time to care for their children.

1.2 Female Technology Pioneers

Having established the emergence of women into the U.S. economy, this chapter will now move to discuss specific female coders, computers and mathematicians and reflect on how the work of these women played an enormous role in the advancement in technology throughout the U.S.

Grace Hopper, still to this day, is one of the most prominent and recognised female figures in the computing industry during the 1960s and 70s (YaleNews, 2017). As well as being an admiral in the United States Navy, Hopper's most recognised accomplishment was in 1952, becoming the third programmer of the world's first Automatic Sequence Controlled Calculator, what later came to be known as a computer (Beyer, 2009, p.36). Hopper pioneered the idea of automatic programming and in 1956 went on to develop a computer data processing program that used word-based languages instead of mathematical symbols. Hopper and her team's discovery opened up a whole new realm of possibility in the technology industry as it made computers accessible to people without an engineering math background (Yale University, n.d).

Hopper, however, was only one among many female trailblazers of the technology industry. The 2016 book *Hidden Figures* by Katherine Margoret Lee Shetterley highlights the work of Katherine Johnson, Dorothy Vaughen and Mary Jackson, three African-American women who played a vital role in the aeronautical advancements of NASA. While also aiding in the diversification of NASA's workforce and leadership, beginning with Vaughen being hired in 1943 to Johnson's retirement in 1986 (Shetterley cited in NASA, 2017). These three women were employed as human computers in Langley Research Center in Hampton, Virginia where all of NASA's human computers were women and a large proportion of them were African-American (NASA, 2020). Johnson's most well known contribution

during her time at NASA was in 1962, when the centre was preparing for the orbital mission of John Glen, she was asked to check the orbital equations for Glen's trajectory which in short enabled the astronaut to safely complete his mission (NASA, 2017). Jackson's major accomplishment within NASA was becoming NASA's first black, female engineer (NASA, 2017) while similarly, Vaughen became NASA's first black supervisor and one of the first female supervisors (NASA, 2017), both paving the way for many more women and specifically black women, to come.

Chapter 2

It is apparent from the work done by the female coders, computers, and mathematicians discussed in chapter one, that women were a major part of the early development of the American technology industry. However, the industry saw a cataclysmic shift in the employment of women after 1984 onwards (Henn, 2014). Stemming from this, chapter two will discuss the speculated cause of the 1984 shift, the gender imbalance this shift attributed to and the resulting barriers that face female employees in today's American technology industry.

2.1 The Shift in Figures

As mentioned, America experienced a shift in the levels of interest and employment of women in technology related fields after 1984. Figure 1 (below) illustrates the steady decline in the number of women studying computer science, in the United States, at university level. It was at its peak in 1984 at approximately 37.4% and dropped down to approximately 18% in 2010 onwards.

What Happened To Women In Computer Science?

% Of Women Majors, By Field

■ Medical School ■ Law School ■ Physical Sciences ■ Computer science
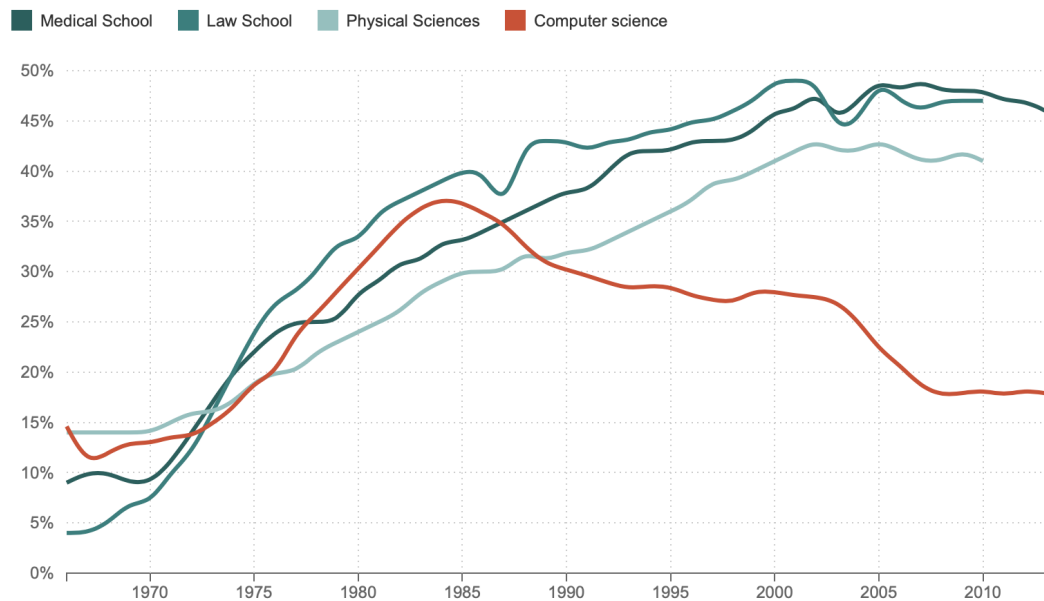
Source: National Science Foundation, American Bar Association, American Association of Medical Colleges
Credit: Quoctrung Bui/NPR

Fig.1 (Quoctrung Bui/NPR, 2014)

There is no definitive answer as to what contributed to this dramatic fall. It is believed that one key catalyst was the arrival of computers as a commonplace, household product (Henn, 2014). At this time, computers were strongly marketed towards men and boys. Films such as *Weird Science* (1985), depicted in Figure 2 (below) which follows the story of two nerdy teenage boys who use their computer to create the perfect women in order to gain popularity, begin to enter the mainstream media. This film along with others and advertisements, began to categorise computers as boys toys (Henn, 2014).
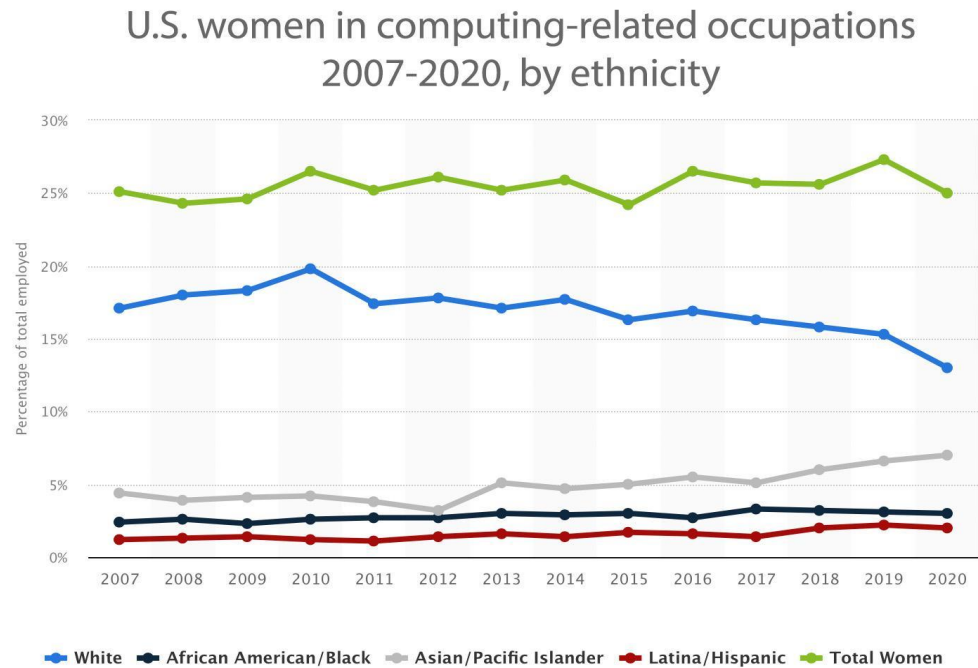
Fig.2 (Reddit, 2021)

In an NPR (Henn, 2014) interview with Patricia Ordóñez, a computer science student in John Hopkins University during the 1980s states that this categorisation began to impact women, especially, when they got to university level. Women reported feeling often excluded and behind, in comparison to their male peers, as they were less familiar with the computers which were a predominant focus within their degree (Henn, 2014). Thus, a decline in the number of women undertaking computer science degrees at university in turn results in a lack of female representation in the U.S. technology industry (Accenture and Girls Who Code, 2020, p.4).

2.2 Lack of Female Representation

Anna Wiener describes in her memoir about her experience working in a series of jobs at technology companies in Silicon Valley from 2013 to 2016; 'The company had grown to sixty employees, eight of whom were women: a decent ratio for the industry' (Wiener, 2020, p.138). Wiener's assessment of the industry may appear harsh however, it's evident that a wide gender imbalance is prevalent within the industry. For instance Figure 3 (below) graphs the percentage of women working in computing-related occupations over the course of thirteen years, from 2007-2020, and a further breakdown of the percentage of women working in these occupations according to race. As can be seen from Figure 3, as of 2020, women make up 25% of the work-force in computing related jobs, seeing a 0.1% drop in the number since 2007. These figures are incongruent considering the percentage of women that made up the total U.S. workforce increased from 46.4% in 2007 to 47% in 2020 (U.S Department of Labor, n.d.).

U.S. women in computing-related occupations 2007-2020, by ethnicity

Legend: White, African American/Black, Asian/Pacific Islander, Latina/Hispanic, Total Women

© Statista 2022

ⓘ Additional Information   Show source ⓘ

Fig.3 (Clement, 2021, cited in Statista 2022)

When it comes to race, the lack of representation is significantly lower than that of white, females. In Figure 3, there is a disproportionate difference in the number of women who identify as white that are working in computing related occupations, in comparison to any other race recorded. From 2007 to 2021 the representation of female Latina/Hispanic female workers grew by just 0.8%, for Asian/Pacific Islanders this growth was 2.6%. African American/Black women saw the smallest growth of just 0.6% while white women saw the only decline in representation, with a drop of 4.1%. This lack of representation for women and women of different racial backgrounds does not just mean a deficiency of female role models for younger generations of women hoping to enter the

workforce. The underrepresentation has a major impact on the experience of women already working in this field and is said to be a major contributing factor to barriers such as a prevalent bro culture within the workplace, gender discrimination in company culture and an unclear path forward for promotion opportunities for women within a company (TrustRadius, 2021).

2.21 Bro Culture

There is no single definition for the term 'bro culture', however, it has been described as;

A culture that prioritises young macho men with obnoxious and toxic behaviour above all else. The average 'bro' tends to be a hustling guy who places winning and success above respect for others (Benstead, 2018).

Bro culture is said to be pervasive in today's American technology industry, largely due to the lack of women in the field (Benstead, 2018). Therefore, it's no surprise that this culture is reported to be experienced more frequently by women (72%) as opposed to men (41%) according to a 2021 *Women in Tech Report* which surveyed over 450 technology professionals (66% identified as women) (TrustRadius, 2021).

Bro culture can prevail within the technology industry in a variety of ways and its extremities can range, 'Sexism, misogyny, and objectification did not define the workplace-but they were everywhere' (Wiener, 2020, p.115).

This type of environment that Wiener recalls is not specific to her own experience and is exemplified in a survey conducted by *Elephant in the Valley*, which focused on 200+ women with at least 10 years of experience, holding positions of power in both start-up companies and larger companies such as *Google* and *Apple*; 66% of those surveyed felt they had been excluded from key networking opportunities because of their gender, while 90% said they had witnessed sexist behaviour at offsite/industry events and 87% have been in receipt of demeaning comments from a male colleague. 3 in 5 women reported unwanted sexual advances, with 65% of those who reported unwanted sexual advances said the advances had come from a superior, half of those receiving advances more than once (2015). This survey examines just some of the ways in which bro culture can take form and these figures highlight the impact this culture has on women in the tech industry, making it the number one cause for women leaving the technology industry (Accenture and Girls Who Code, 2020, p.16).

2.22 Gender Discrimination

Gender discrimination can be defined as; 'the act of treating a person, usually a woman, unfairly because of their sex' (Cambridge University Press, 2022). As mentioned, this is one of the most prevailing disparities facing the US technology industry today. Wiener recalls 'Everyone I knew in tech had a story, first- or secondhand,' stories of women having jobs revoked after trying to negotiate a salary or a woman being demoted after returning for maternity leave (2020, p.178). Figure 4 (below) illustrates the magnitude of gender discrimination for both men and women in accordance to a 2021 *Equality in Tech* report where over 9000 technologists in the U.S. were surveyed.

Experience of Gender Discrimination

Have you experienced gender discrimination in the workplace?

Women

26% No

57% Yes

11% Unsure

6% Prefer Not to Answer

Men

73% No

10% Unsure
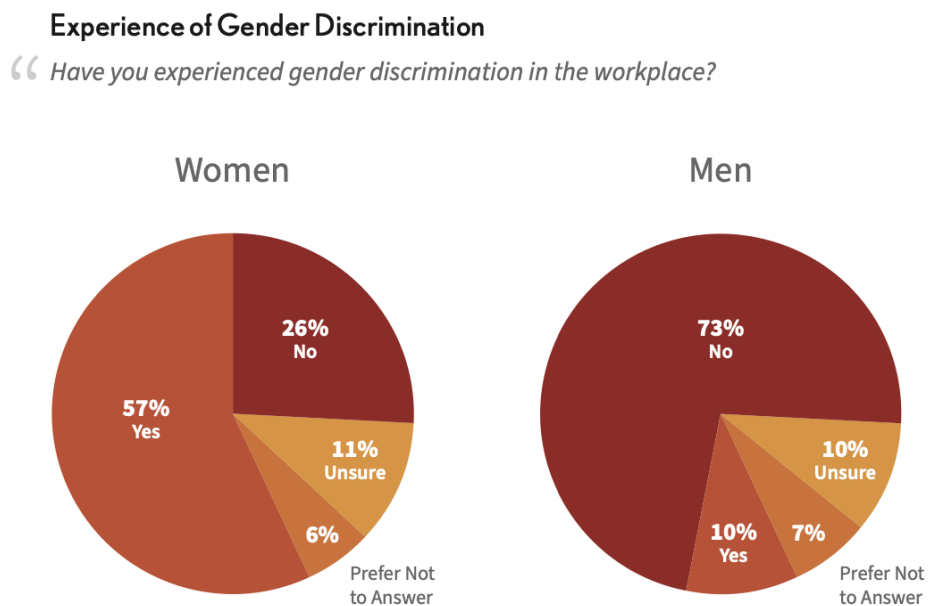
10% Yes

7% Prefer Not to Answer

Fig.4 (Dice, 2021, p.6)

From Figure 4 we can see 57% of women surveyed said that they have experienced a form of gender discrimination while just 10% of men said they have experienced the same. It is evident from the findings that gender discrimination is not confined to affecting women alone but the problem is significantly higher amongst them (Dice, 2022, p.6).

2.23 The Pay Gap

Similarly to bro culture, gender discrimination can emerge in a multitude of ways. The most common form of discrimination experienced for both men (24%) and women (53%) was experienced in relation to 'Salary and benefits' (Dice, 2022, p.7). In addition, these discrepancies differ depending on location. For example, in 2020, some of the main technology hubs across America such as Boston and Chicago saw a wage gap in favour of men at 8%, while New York and Seattle saw a gap of 7% and 6%, and the San Francisco Bay Area saw the smallest wage gap amongst these American technology hubs at 5% (Hired, 2022). Admittedly, these pay gaps may seem small in comparison to industries such as medicine which sees a gender pay gap of up to 25% in favour of men (Rotenstein and Dudley, 2019). However, for an industry like technology which is already struggling to attract female workers and retain those who are already employed, having transparent and equal pay is crucial in illustrating positive values of the industry and in turn addressing some of these challenges facing the industry (Hired, 2022).

2.24 The Lack of Promotional Opportunities

Another common form of gender discrimination experienced by women is the U.S technology industry is in terms of barriers to promotional opportunities. A 2021 report which surveyed 300 women, 149 men and 7 people who identified as non-binary, working at a variety of levels in the technology industry, from entry level to CEO or founder, found that;

> Women in tech are four times more likely than men to see gender bias as an obstacle to promotion. Nearly 2 in 5 women felt that their gender was a barrier to being considered for their next promotion (TrustRadius, 2021).

This lack of representation of women in leadership positions is exemplified in Figure 5 (below), which compares the representation of women as part of the total workforce, to the percentage of women at executive level jobs in America's leading technology companies.
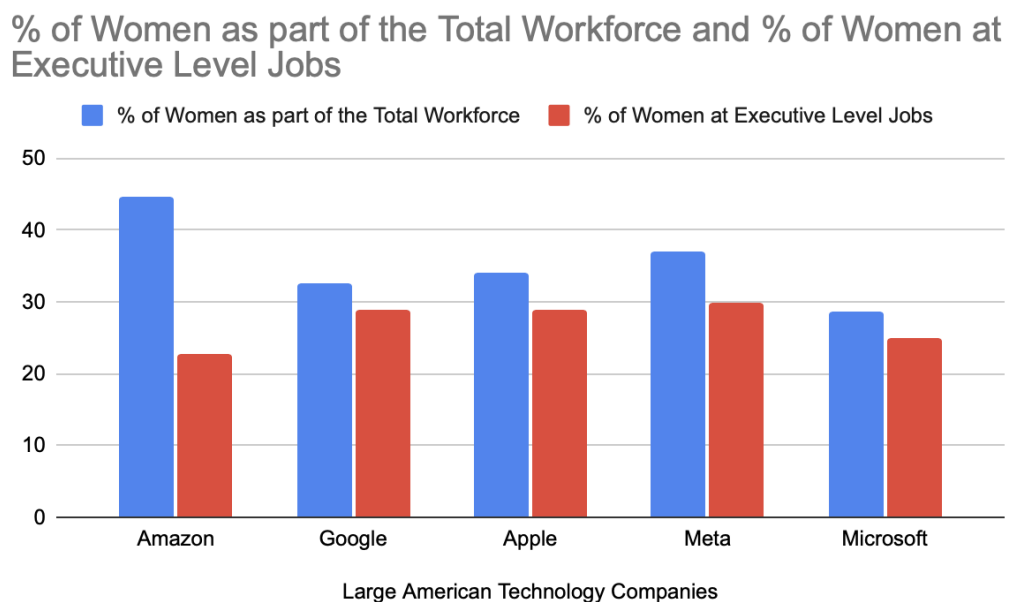

Fig.5 (Author's Own, 2022 (Data Retrieved from, Companies Diversity and Inclusion Reports)

2.25 The Retention Problem

It is evident that the barriers mentioned above are having serious impacts on the female employees working within the U.S. technology industry. A 2019 study found that women in technological roles leave their job at a 45% higher rate than men in the same field. The study also found that 50% of women in technological roles leave their job by age 35 as opposed to 20% in other jobs (Accenture and Girls Who Code, 2020, p.4). In addition, considering that computing roles in the U.S. have grown 10 times faster over the last thirty years, than the average growth of any other industry, this retention rate for females is fueling the lack of diversity within the technology industry (Accenture and Girls Who Code, 2020, p.6).

Chapter 3

From studying the statistics of lack of representation of women in the American technology industry and resulting barriers this gender imbalance has created, it is possible to wonder if this challenge is too great to overcome and in addition whether the effort needed from companies within the industry to address these issues is truly beneficial for companies in terms of their financial. Therefore, chapter three will analyse the importance of diversity within a technology company, organisations that promote and work towards tackling the problem of lack of gender diversity and finally what the development of a gender diverse company looks like in practice.

3.1 The Benefits of Gender Diversity

A report conducted by Morgan Stanley (2017), which studied 1,600 companies across all sectors of industries, found that all companies with a diverse workforce attain 'stronger fundamentals and better risk-adjusted performance.' In addition, it found that technology companies have the most to gain from a gender diverse workforce. Of the 108 technology companies surveyed, over a five-year period, the companies with the highest rates of gender diversity had annual returns 5.4% greater than less gender diverse companies. The annual returns of companies that were categorised as highly gender diverse in other industries also saw an increase of their annual returns, however this increase was not as high as that of technology companies. According to the study, not only do companies with a gender

balanced workforce see an increase in returns but they see greater innovation and a higher rate of employee retention.

Dynamic innovation is a critical factor for a technology company's competitiveness. Research by the University of Castilla la Mancha found that gender balance within technology companies is a key component in maximizing this innovation (Díaz-García, González-Moreno and Sáez-Martínez, 2013, cited in Plataforma SINC, 2014). The research was gathered from the Technological Innovation Panel along with a study focusing on 4,227 companies in both the industrial (83%) and service (17%) sectors. The research concluded that gender balance within a team sees a significant increase in radical innovation. Cristina Díaz García, one of the key researchers also notes that 'the results point to the need to recognise and value gender diversity, which could, in turn, make an organisation more able to attract and retain key staff'

García's statement is echoed in a report conducted by Accenture and Girls Who Code. By segmenting the 250 technology companies surveyed into 20% of the top 'more-inclusive' companies and 20% of the bottom 'less inclusive' (Accenture and Girls Who Code, 2019, p.32), they found that if every company had a diverse and inclusive workforce like the top 20% companies, the rate at which female employees left technology companies could drop by 70% (Accenture and Girls Who Code, 2019, p.22).

3.2 The National Center for Women and Technology

Many organisations have been set up to guide companies and promote and provide training in relation to creating a more inclusive environment. One of the first organisations established in this field was the National Center for Women and Information Technology (NCWIT) (White, 2019).

The NCWIT is a non-profit organisation, chartered by the National Science Foundation and their aim is to -

> Increase the influential and meaningful participation of girls and women — at the intersections of race/ethnicity, class, age, gender identity, sexual orientation, disability status, and other historically marginalized identities — in the field of computing (NCWIT, n.d.).

The NCWIT, carries out their work by providing a variety of free online resources and tutorials, on how companies and institutions can instill a more gender inclusive framework in the field of technology. More in depth training in regards to gender diversification can be accessed through paid membership programs (NCWIT, 2022). For the purpose of this thesis, there will be a particular focus on the guidance and training that can be redeemed through the NCWIT's paid membership programs.

3.21 K-12

NCWIT divides its programs into tiers in order to achieve its goal. The first is its *K-12* program which focuses on engaging and encouraging young girls at secondary level of education to develop an interest in technology (NCWIT, 2022). One of the key ways NCWIT tries to achieve this is by providing staff and faculty in member education establishments with the information and training necessary to guide these students into the field of technology. This training and information are provided through programs such as Counsellors for Computing which is designed to educate and provide secondary level career guidance counselors who will be provided with national data on higher level education courses and careers in technology (NCWIT, n.d.).

NCWIT also set up an award scheme, Aspirations in Computing (AiC), which seeks to honour female, secondary level students who excel in computing. This award involves scholarships, internships and professional opportunities to encourage these students to pursue a career in computing (NCWIT, n.d.). According to NCWIT '90 percent of past AiC award winners hold a college major or minor in a science, technology engineering, or mathematics (STEM) field' (NCWIT, n.d.).

3.22 Post-secondary

NCWIT's second tier of programs is post-secondary. This tier looks at providing mentorship and guidance to students and staff at university or college level education. This guidance is provided through programs such as the Academic Alliance (AA) (NCWIT, n.d.). The AA looks at guiding faculty,

staff and administration at post-secondary institutions to establish curriculum that avoids, where possible, any form of gender-bias and to ensure the inclusion of all students regardless of gender or race. Over 600 institutions across the U.S. participate, including some of the most highly regarded universities for technology in America, such as Massachusetts Institute of Technology (MIT) and Stanford University (NCWIT, 2022). Member institutes of the AA are also eligible to be awarded funding for initiatives under the NCWIT Seed Fund which provides funding to U.S. institutions that have plans to develop and launch initiatives that aim to recruit and retain women in computing (NCWIT, n.d.). An example of the types of initiatives that have been funded was Columbia University's Artemis *Project.* This project entails a summer computer science program for 20, ninth grade girls attending local schools. The course is taught by some of Columbia's female, computer science and engineering coordinators (Columbia, n.d). NCWIT invited an external evaluator, Dr. Elizabeth Litzler of the University of Washington's Center for Workforce Development, to measure the true impact of these educational resources and training and the awards such as the NCWIT Seed Fund (McGrath Cohoon, 2011). From her research she has found -

> That the majority of NCWIT AA members improved women's share of enrollment by an average of three or four percent during a time when the national average enrollment of women in computing declined (Cohoon, 2011).

This means that there is a positive correlation between the members of AA and the enrollment of women in undergraduate computing programs.

3.23 Workforce

The final tier of the NCWIT membership program is the *Workforce Program* (NCWIT, n.d.). This program includes the NCWIT Workforce Alliance which comprises approximately 30 of the technology industries leading companies, such as Google, Intel and Avaya. The NCWIT works alongside these companies to guide and challenge them to be exemplary leaders in the American technology industry by addressing their potential shortcomings when it comes to the hiring, promotion and retention of female employees (McGrath Cohoon, 2011). Member companies are encouraged to engage and learn from reports conducted by the *NCWIT* (McGrath Cohoon, 2011). Some of these reports include *Women in IT: The Facts*, which provide company leaders an insight into where gender barriers may exist within their own company and how they can address these problems (Ashcraft, McLain, Eger 2016).

3.3 Asana

Asana, is an online content management system for workplaces, founded in 2008 by Justin Rosenstein and Dustin Moskovitz. (Weir, 2021). The company was voted ninth in the 'Fortune Best Workplaces for Women 2021' for small and medium businesses (Fortune, 2022). This award is conducted by anonymously surveying over 5.6 million U.S. employees, across all fields of work and investigating the considered companies workforce composition in terms of gender, then ranking these companies in relation to the results (Fortune, 2022). It is evident as to why Asana was a recipient of this award, considering that 42% of Asana's total U.S. workforce identify as female

(Asana, 2022), which is marginally higher than the national average (25%) of women in computing related roles (Clement, 2021). The number of women in managerial positions at Asana (41%) is also considerably high for the industry (Asana, 2022). Asana achieves this standard of gender diversity through its strategy of 'build,' 'recruit' and' thrive' (Asana, 2022).

3.31 Build

Asana implements its 'build' strategy in a number of ways. One is through mandatory harassment, bias and inclusive training. In addition, like many companies, Asana took the Glassdoor Equal Pay Pledge, an initiative by Glassdoor to encourage companies to commit to bridging their gender wage gap (Glassdoor Team, 2020). Moreover, Asana set up a compensation team and a pay equity study to prevent inequitable policies on the basis of gender or race and these pay policies are reviewed twice annually by an external body to (Asana, 2022).

3.32 Recruit

Asana casts a wide net when it comes to their recruiting process, with a particular focus on reaching out to underrepresented groups (Asana, 2022). One way in which Asana tries to ensure this diversification when it comes to recruiting is through their Inclusivity, Diversity, and Equity for Asana Leadership (IDEAL) interviewing policy. This policy ensures that when recruiting for a leadership role, at least one non-male and one person considered to be from an underrepresented group, must be considered for the position (Asana, 2022). AsanaUp, the company's apprenticeship

program, attempts to diversify its recruiting process. This program focuses on training people with a non-traditional background in technology and providing them with mentorship that aids them with upskilling and creating a career path for software engineer roles at Asana (Joel, 2020).

3.33 Thrive

Asana has evidently established an infrastructure that creates a more inclusive and diverse workforce but to maintain this type of workplace culture Asana has put in place a Diversity, Inclusion and Belonging Council, which hold quarterly meetings with staff that allow them to address any issues or concerns they may have in relation to the company culture (Asana 2022). Asana has also established a women's ERG, AsanaWomen (Cole, 2017). ERGs refers to voluntary, employee-led groups that 'foster a diverse, inclusive workplace aligned with organizational mission, values, goals, business practices, and objectives' (Catalyst, 2022). *Asana*'s own AsanaWomen ERG holds monthly discussions and invites leading female figures in the industry to speak to the group (Cole, 2017).

Conclusion

The underlying questions addressed in this thesis is what are the current gender barriers facing women in the American technology industry and how can these barriers be overcome. A conclusive answer to this question is that the most prominent gender barriers facing women in the American technology industry are bro culture and gender discrimination against women in the form of salaries and promotional opportunities. These barriers stem from the underlying problem of a lack of female representation in today's technology industry. It has been demonstrated through the efforts made by the technology company Asana (studied in Chapter three) that it is possible to establish an infrastructure that upholds a high standard of gender diversity within a successful technology company in the United States.

There were several limitations encountered, due to both time and word constraints, during the process of writing this thesis which should be considered. The first constraint was in relation to the lack of time available to foster a personal connection and network with both men and women currently employed in the American technology industry. With time permitting, these people could have been interviewed or surveyed to gain a firsthand account of their experience working in the industry. As previously outlined in the introduction of this thesis, due to both the time and word constraints, it was not possible to conduct an in-depth analysis of how the gender barriers (outlined in Chapter two) affected women according to race. Nor was it possible to fully analyse the effects of the efforts of the National Center of Women in Technology and Asana to diminish racial disparity. It

should be noted that the treatment of women within the industry can vary considerably when race is taken into account. However, for the purpose of this thesis, most of the information examined classified women as one single group, regardless of their race.

Chapter one discussed the emergence of women into the U.S. economy and the following policies put in place to protect those women employed, while also acknowledging that women, up until the 1980s, played a major role in the technological advancements in the U.S. Chapter two examines the decline of women in the field of technology, along with the potential cause of this decline. Chapter two also analysis how the lack of representation of women in technology has been a catalyst for forming the current barriers facing women in today's technology industry, which in turn is causing a retention problem of female employees. Chapter three studies the benefits of implementing gender equality within the technology industry, and how organisations such as National Center for Women and Information Technology can help companies and institutes encourage and cultivate a gender balance. In addition, Chapter three, illustrates what gender diversity within an American technology company looks like in practice through the case study of Asana, which is a company dedicated to ensuring the inclusion and diversification of their team.

With this information provided it should be acknowledged that the efforts outlined in Chapters one and three, give the American technology industry at least the minimal framework to develop a better foundation for overcoming the gender barriers as outlined in Chapter two. A conscious, industry effort is evidently needed to achieve gender equality. Chapter three argues that it is in the interest of both employers and employees that these efforts are made because gender diversity within a technology company is not only ethically moral but it drives dynamic innovation, better risk-adjusted performance and stronger financial fundamentals all of which are vital characteristics of a competitive technology company.

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