Gender equality as a driver for economic gains in the technology sector.

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Abstract

Bridging the gender gap has been well-researched in mainstream workforce industries such as health, retail, telecommunications and education. The science, technology, engineering and mathematics (STEM) sectors have been particularly short on research addressing gender equality and whether gender equality could be a driver for economic gains, particularly in the technology sector. The technology sector still faces significant challenges regarding gender equality and opportunities for women representation in leadership. Women participation in the labour force in developing countries is still under-researched, and women are underrepresented in the technology sector. Research pertaining to whether gender equality could result in economic gains in the technology sector and the drivers for this are still limited.

Through this qualitative study, semi-structured interviews were conducted with 12 participants in the technology sector to obtain their views or insights on whether gender equality can be a driver for economic gains in the technology sector. Their perspectives were analysed through a lens of the relationship between gender and employment opportunities for women, gender mainstreaming efforts and how these can drive supply side benefits and assist in the implementation of enabling ICT policies, a systems thinking and contextual psychology perspective to implement gender equality at the macro, meso and micro levels; and whether “doing and undoing gender” are some strategies firms use to drive gender equality.

The study found that there does seem to be an inverse relationship between gender and employment opportunities for women in the technology sector. The use of enabling policies for gender equality exists at the macro level but is still lacking at the meso and micro levels, especially within the technology sector. A systems thinking approach that addresses a “whole of society” paradigm as far as practical implementation of gender equality issues is required. Doing and undoing gender is used to drive gender equality issues and middle managers also play a part in it. This study contributes to the literature by combining the gender equality drivers, economic growth and technology sectoral outcomes into a single study. As a result, a framework is proposed that identifies the key levers of addressing gender equality at all levels.

Keywords

Gender equality; economic gains; technology sector; *gender mainstreaming; doing and undoing gender*

Plagiarism Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Fundiswa Mhlongo

4 November 2024

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“Gender equality is more than a goal in itself. It is a precondition for meeting the challenge of reducing poverty, promoting sustainable development and building good governance.” – Kofi Annan (Former Secretary-General of the United Nations)

1. Introduction to the Research Problem

Sustainable development is a phenomenon that most countries across the globe are grappling with, particularly in the wake of the interconnected nature of the business world. Former Secretary-General of the United Nations - Kofi Annan, quoted the above during his tenure as Secretary-General in a bid to drive efforts from the United Nations' Sustainable Development Goals (SDGs) to drive gender equality, sustainable development and to ensure that women are at the forefront of these often-competing phenomena, particularly within the technology sector. The United Nations SDG 5 aims to “achieve gender equality and empower all women and girls” (United Nations, n.d.). Target 5.5 advocates for the full participation of women and advocates for equal opportunities for leadership at all levels (United Nations, n.d.). Target 5(b) specifically aims to improve the use of enabling technology, specifically information and communication technology (ICT), to promote women empowerment (United Nations, n.d.). To this end, gender equality through women's access to education, participation in the labour market and particularly participation in the technology sector, and the view of whether this could drive economic gains within the sector is the focus of this research study.

1.1. Background: gender equality as a global phenomenon for economic development

It has been well-documented that there is a wide gender gap within the science, technology, engineering and mathematics (STEM) workforce globally (Hebl & King, 2019). In addition, many countries in the Western context and some developing countries have done significant work in bridging the gender gap within other workforce sectors such as health, retail, telecommunications and education. Despite these efforts, there is still a huge gap in women's representation within the technology sector (Saifuddin et al., 2022). Furthermore, there has been evidence to suggest that gender inclusion can result in significant improvements in economic growth and welfare (World Economic Forum, n.d.). The educational and economic empowerment of women has led to women pursuing university qualifications within the computer sciences and information technology (CSIT) areas. The past gender disparities in income levels, education, labour supply to market and child care have been cited as barriers to gender equality (Santos & Klasen, 2021).

Gender equality within the technology sector has been researched on opposite ends of the continuum. On the one hand, gender equality and women's persistence in the technology sector within Western contexts are declining, and women are leaving these technology careers, while in non-Western contexts countries such as South Asia and other developing countries, women are actively pursuing technology professions (Saifuddin et al., 2022). Part of the strategies women employ in technology careers in often patriarchal societies is "doing and undoing gender" to persist in this male-dominated industry (Saifuddin et al., 2022, p. 3). "Doing gender" is perceived as the acceptable gender-specific behaviours that women have to align to, to be considered "feminine" and in conformity with societal norms (Saifuddin et al., 2022). The opposite of this is "undoing gender", which requires women to abandon "gender-congruent behaviours" so they can fit in within the male-dominated technology professions they choose to pursue (Saifuddin et al., 2022, p. 3). Striking a balance is therefore crucial in how women persist in the technology professions they pursue and still maintain the strong familial support which drives their success.

1.1.1. The drivers of economic growth in the technology sector

The services sector contributes "about 65% to GDP, 63% of employment and 74% of capital formation in South Africa" (Trade and Industrial Policy Strategies, n.d.). These numbers are similar to those of other developing countries, such as India, with a 56.9% contribution to GDP in 2012-2013 (Dutta Gupta et al., 2015). Some of the reasons cited as contributors to the growth in the services sector were the high-income elasticity of demand, the use of services as input for other sectors and the rise in exports (Dutta Gupta et al., 2015). At the same time, factors emanating from the supply side, such as policy changes, have also led to service sector growth (Dutta Gupta et al., 2015). Skills development, improvements in infrastructure and competitive costs among the developing country workforce have driven growth in the IT industry (Dutta Gupta et al., 2015). Technology innovations – which drive the technology exports of an economy and are dependent on the diffusion of innovation – are critical for economic development (Hooks et al., 2022). Women's high educational attainment in technology qualifications and improved access to healthcare are considered critical input drivers into women's ability to join the workforce, thereby improving women's economic empowerment (Santos & Klasen, 2021).

1.1.2. Understanding gender disparities in the technology sector

Gender equality impacts all areas of society and business, and firms no longer consider it a corporate social responsibility (CSR) (Bloomberg Gender-Equality Index, 2022). Instead, adequate reporting on gender equality, inclusion and diversity has become the central focus of most firms' environmental, social and governance (ESG) practices (Bloomberg Gender-Equality Index, 2022). This has been most noted in the male-dominated mining sector, where firms in this sector are driving women's representation at all levels, albeit still very slowly. “Gender mainstreaming” is a concept where firms drive all focus to the gender equality goal and make it central to all socio-economic activities (Vyas-Doorgapersad, 2018). These activities include policy development, research, dialogue, legislation, resource allocation and planning, implementation and monitoring programmes and projects, and are considered drivers for gender equality (Vyas-Doorgapersad, 2018).

Research in the fields of education and healthcare has matured as mainstream topics while emerging topics such as female entrepreneurship and gender equality in the technological change era still require in-depth focus (Belingheri et al., 2021). Other evidence indicates that “only 23% (56 000 out of 236 000) of technology jobs are held by women”, and this number is slow to rise despite women's high educational attainment in the STEM sector (Women in Tech ZA, n.d.). This gender gap is attributed to the ”double jeopardy impact where women belonging to two social groups that are devalued” are deemed unfit for cognitively demanding jobs (Hebl & King, 2019, p. 2).

Furthermore, the injustices of the past during the Apartheid era of 1948 to 1990 marginalised women where they were only permitted employment in specific “feminine” jobs such as nursing, secretarial work and teaching. Women of colour were only allowed to attain an education up to matriculation and could not go to university to further their studies. In some cultures, girls were not permitted to receive an education beyond grade 5. Arranged marriages, as a result, were prevalent as a woman's purity was determined by her non-involvement with unfamilial men and how she carried herself in public spaces (Saifuddin et al., 2022). This further translated into the woman's family honour or social status, where the male representatives of her family represented her. These patriarchal societies still exist in some parts of the world and have driven how families groom their girls and women, which then dictated to an extent, the sort of careers or employment they were permitted to pursue.

While the gender gap is pervasive across all employment levels, it is most prevalent at senior management to executive levels, where women's representation at this level is even smaller (Bairoh, 2024). Technology companies endeavour to meet gender equality targets aimed at women's empowerment into executive-level positions, but meritocracy takes precedence when deciding whom to appoint to these levels (Bairoh, 2024). Some of the reasons cited for the sluggish women's advancement into executive-level positions are that "women struggle to establish credibility and competence as technology professionals", while the notion of "masculine privilege" has been cited for hindering women's progress in the male-dominated STEM industry (Alegria, 2019; Bairoh, 2024). Contrary views suggest that meritocracy is meant to consider the qualifications and experience of the individual and that this alone should grant them credibility in their chosen field.

1.2. Research Problem

The gender equality agenda is prevalent in mainstream topics like education (Schreiber & Zinn, 2023), health (Greene & Patton, 2020) and the mining sector (Kaggwa, 2020). Gender equality is over-represented in some sectors and underrepresented in others, particularly in the STEM industry (Parmaxi et al., 2024). The Neoclassical Growth Model outlines the three drivers for a growing economy: labour supply to market, capital and technology (Corporate Finance Institute, n.d.). The theory argues that for an economy to be productive, technological change significantly influences the overall functioning of the economy. Women's participation in the labour market significantly improves labour supply to the market, increasing technological output – an essential driver for a growing economy.

To understand this research requirement, semi-structured interviews were conducted to obtain views from both men and women within the technology sector and determine their views on gender equality issues. Open-ended questions were asked around "doing and undoing gender" and whether the gender aspect had any bearing on the technology opportunities, how recruitment or employment opportunities for women come about, whether they have work/life balance, whether their family supports their career, their motivations for taking up a career in the technology sector, questions about how being employed in the technology sector has improved or not improved their lives. The participants interviewed were from various industries, such as medical IT, telecommunications, logistics and supply chain, and banking/cybersecurity, amongst others. Purposive sampling was used to identify pre-selection criteria of participants to be interviewed. For example, the participants have to be male or female working in IT in Gauteng, have experience in IT, and be within working-life age.

1.3. Research Purpose

The overall purpose of this exploratory study is to answer the following research question:

How can gender equality be a driver for economic gains within the technology sector?

Questions related to career choice selection could be addressed to understand what motivated their career choice, whether their families support their career choice, if their job requires long hours, and how they balance work and family life. Further questions related to economic empowerment and the gender pay gap could also be addressed to understand how being employed in the technology sector improved or not improved their lives, the kind of challenges or barriers they experienced being employed in the technology sector, whether they have had to consider gender at all in their working environment, the kind of gender mainstreaming efforts within the firm, and to ascertain their views of whether gender equality could drive economic gains at a macro, meso and micro levels within the technology sector. In addition, several propositions have been made from the literature which were identified and linked to the underlying questions to obtain further insights into the concepts raised. These propositions will be assessed against the data collected and outcomes will be discussed in the findings/results and discussion sections in chapters 5 and 6 of this study.

1.4. Significance of Research for Business and Theory

South Africa celebrates initiatives such as Take-a-Girl-Child-to-Work-Day annually, which aims to foster young girls' affiliation to being participants in the labour market and the importance of meaningful work. Women's economic emancipation since the Apartheid era was a step in the right direction in improving women's empowerment through participation in the labour market. Women's role in households has changed significantly from what it used to be. This has led to women leaving technology careers due to uneven gender roles in families and society (Parmaxi et al., 2024). On the other side of the coin, women's participation in leadership positions is smaller within the technology sector (Bairoh, 2024), and this problem persists even further in terms of women in executive-level positions. Figure 1 below depicts the share of women in senior leadership positions by sector or industry from 2016 through 2024, with women in technology, information and media as the third lowest, while mainstream industries like healthcare, accommodation and education are taking the lead (WEF Global Gender Gap Report, 2024).

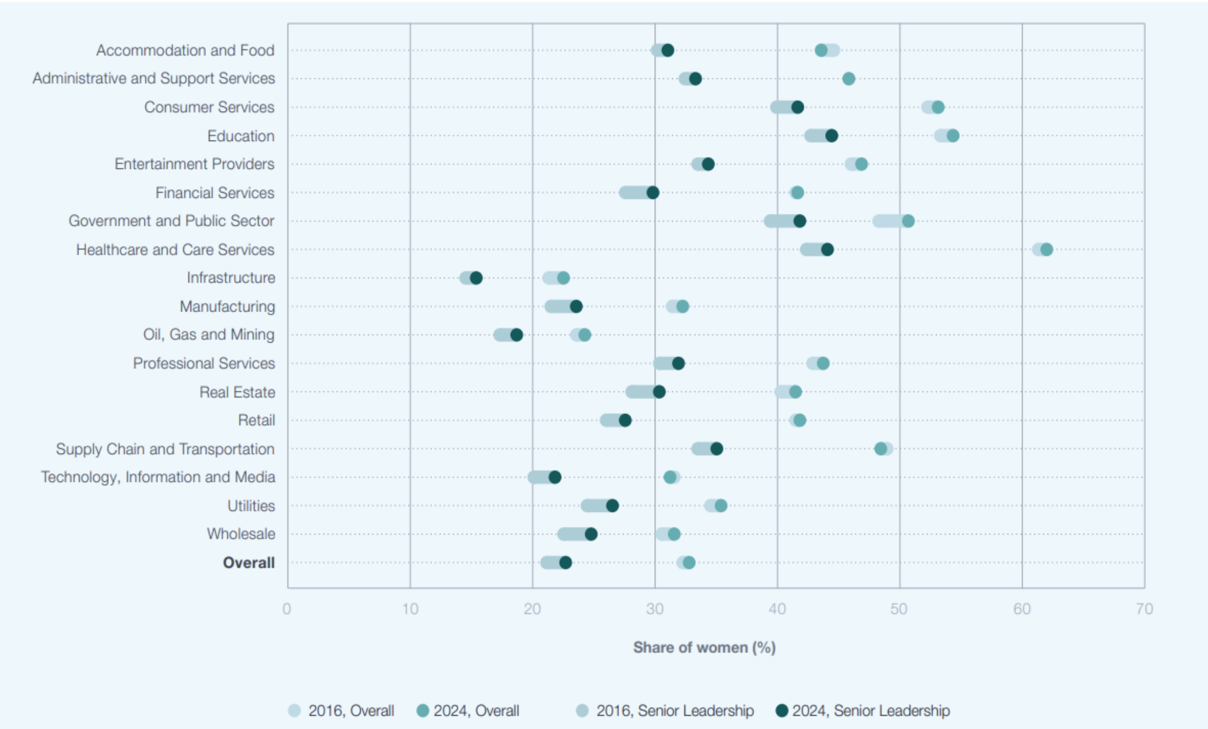

Figure 1: Share of women in senior leadership 2016-2024

Women's educational attainment and eligibility for labour market participation have improved significantly, and this is evidenced by the increase in the number of women enrolled in STEM fields at universities (World Economic Forum, n.d.; Parmaxi et al., 2024). There are still not enough opportunities for women in the technology sector, which leads to decreased employment opportunities for women, with gender bias cited as prevalent in academia, particularly in recruitment, promotion and pay (Parmaxi et al., 2024).

The literature covers the following themes around gender equality: increased women enrolment in STEM qualifications at universities; household activities have become gender neutral as many women participate in the labour market; women and girls' health improvement; gender equality in education, healthcare and mining sectors. Gender equality cuts across all United Nations' SDGs as it permeates all levels and spheres of society and involves socio-economic factors, which include economic growth prospects (Leal Filho et al., 2023). From this perspective, the drivers of economic growth through gender equality initiatives must be researched and implemented.

1.5. Research Scope

This exploratory study was conducted to obtain insights into the views of men and women in the technology sector on whether gender equality can drive economic gains. Many studies have incorporated gender equality in other mainstream topics such as education and educational attainment of women (Schreiber & Zinn, 2023); healthcare access, which improves women and girls' health, thereby enhancing life expectancy (Greene & Patton, 2020); enhancing gender equality within the public service (Vyas-Doorgapersad & Bangani, 2020); and the mining industry and driving gender neutrality within the male-dominated sector (Kaggwa, 2020). This study aims to address gender equality as a driver for economic gains within the technology sector, particularly women's opportunities in leadership and other employment levels. The results obtained analysed how gender equality can improve economic growth outcomes.

The study consisted of 12 semi-structured interviews in which open-ended questions were asked to obtain views from both men and women in the technology sector in Gauteng. The following chapter reviews recent academic literature relevant to gender equality as a driver for economic gains, and the insights, theories, and research gaps that shaped the research question are presented below.

2. Literature Review

2.1. Introduction

The importance of bridging the gender gap in the technology sector and the need for research in this aspect has been discussed and explained in the above section. Gender equality in terms of mainstream topics such as education, health and the mining sector have also been discussed. The concept of doing and undoing gender has been defined and will be expanded in the literature review, as this has been one of the strategies women use to persist in the technology sector. However, no evidence of an in-depth research study on how gender equality can be a driver for economic gains in the technology sector has been found.

In this literature review chapter, a discussion of the literature on gender equality at a global level in general will be discussed, and the economic growth perspectives, including technology sector inputs that could be derived from gender equality practices at the individual, industry and country levels will also be discussed. The barriers or challenges to women taking up technology careers were reviewed, and the concepts of “doing and undoing gender” as it pertains to organisations across industries and how this impacts gender equality were reviewed. Finally, research opportunities to expand on the knowledge insights from the existing constructs will be identified. Figure 2 below shows the conceptual framework for the flow of the literature review.

The journal articles and books used for the literature review were obtained from Google Scholar, University of Pretoria libraries and other publicly available global sources such as the United Nations’ SDGs and the World Economic Forum to obtain an understanding of gender equality and to identify existing concepts that formed part of the interview guide and data collection process. The journal articles were rated according to the Academic Journal Guide (AJG) 2021 with rankings 1 up to 4.

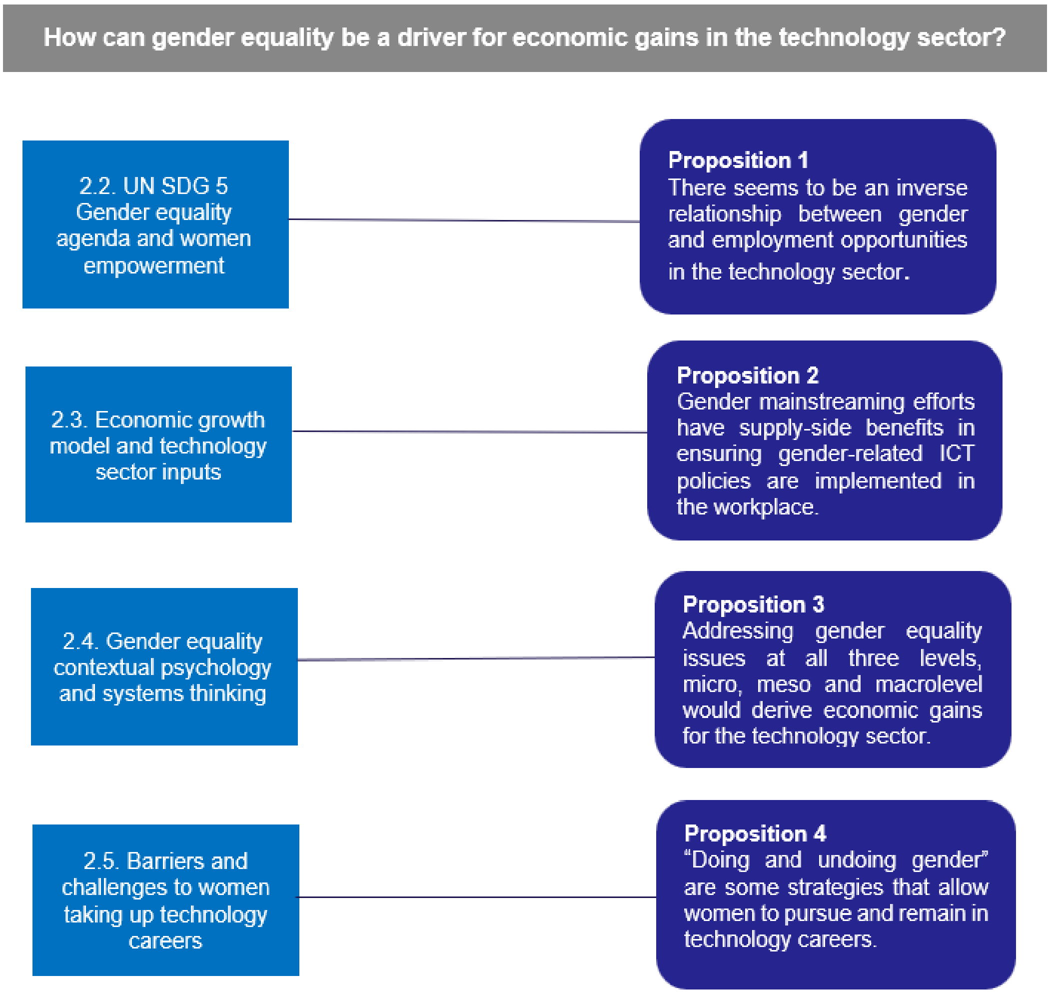

Figure 2: Conceptual framework of the literature review

2.2. The United Nation's SDG 5 gender equality agenda and women empowerment

Gender equality refers to "an equal visibility, empowerment and participation of both sexes in all spheres of public and private life" (European Council, n.d.). This further implies equal rights, opportunities, and responsibilities for both men and women, as well as boys and girls. The opposite of gender equality is gender inequality, not gender difference, and its aim is to strive for full participation of men and women in all spheres of society (European Council, n.d.). To this end, gender equality follows a "whole-of-society paradigm" in its approach to enhanced women's participation in the labour market and to drive economic growth through improved supply to the market of labour as a crucial input to economic production.

The United Nations SDG 5 aims to ensure that women have equal opportunities to leadership positions, that they have access to enabling technology services and strives to end all forms of discrimination against women and girls (United Nations, n.d.). Research pertaining to mainstream topics such as education and the educational attainment of women has been done (Schreiber & Zinn, 2023; Parmaxi et al., 2024). The authors suggested that while women's educational attainment in the STEM sector has increased in recent decades, women's opportunities for employment in the technology sector are still low (Parmaxi et al., 2024). According to the World Economic Forum’s Global Gender Gap Report (2023), South Africa was ranked 20th out of 146 countries for the Global Gender Gap Index 2023. However, the country ranked 81st and 43rd, respectively, for economic participation and opportunity and the educational attainment subindices. This supports Parmaxi et al.’s (2024) view that although educational attainment is high, however, economic participation and opportunities are still low.

At a macro level, the OECD Toolkit for Mainstreaming and Implementing Gender Equality (2023) was designed to support a range of decision-making institutions in their internal processes and improve gender-related policies, legislation and services (Toolkit for Mainstreaming and Implementing Gender Equality, 2023). The Toolkit consists of 6 chapters which provide good practice guidelines and indicates pitfalls to avoid in so far as gender-sensitive practices in parliament, public employment and the judiciary; the strategic use of governance tools to aid gender mainstreaming efforts in infrastructure; and the institutional and governance frameworks for gender equality and mainstreaming. The Toolkit cited why for a “whole of government” gender equality and mainstreaming strategy to work, “the country needs strong institutional frameworks and solid redress mechanisms that promote gender equality in a coordinated manner” (Toolkit for Mainstreaming and Implementing Gender Equality, 2023, p. 13).

Ringblom and Johansson’s (2020) research focused on gender equality in forestry and mining. The authors posited that “gender equality and gender equality work in organisations largely depends on the national context”. Some reasons cited were the regulations and societal norms of the country concerned, which impacted the familial support required to encourage women’s participation in the technology sector. The study suggested that the drivers of gender inequality in male-dominated work organisations were entrenched in two concepts: inequality regimes and intersectionality (Ringblom & Johansson, 2020). The first concept emphasised how work organisations, through their organising practices, produce and uphold inequalities. The second concept emphasised intersectional theory, which gave an understanding of the intricacies of "how power and oppression related to marginalised groups" were explored (Ringblom & Johansson, 2020). Other views suggested that intersectionality beyond STEM is critical to ensure an understanding of gender inequality (Derous & Pepermans, 2019). A major challenge to this is the "double jeopardy" effect where women belonging to two social groups that were undervalued, were considered incompetent for cognitively demanding versus non-cognitively demanding jobs (Hebl & King, 2019; Derous & Pepermans, 2019). The impact of this was a shortage of job opportunities for women despite the high enrolments in STEM qualifications at the university level (Parmaxi et al., 2024).

The non-core nature of some of the low-ranking jobs for women in mining and the impact of organising practices that uphold and produce inequality is implied in Kaggwa's (2020) research on the challenges women face in the mining industry. Some reasons cited for the inequality are that industries like forestry and mining have been historically meritocratic and rational, while other reasons pointed to the International Labour Organisation's (1935) historical ban on the employment of women in the mining sector, thereby neglecting gender equality. To mitigate some of these challenges, the Mining Charter (2004) was then implemented in South Africa to transform the mining sector and bolster business ownership in the mining sector (South African Government, n.d.).

Gender equality relating to improved access to healthcare, which impacted women's and girls' health, thereby enhancing life expectancy, has also been done (Greene & Patton, 2020; World Economic Forum, n.d.). Societal norms often shape men's and women's perceptions of what it means to be identified as a male or female (Greene & Patton, 2020). Gender equality is crucial to the core of women's empowerment and how girls were raised within patriarchal societies, and this transcended into the type of employment opportunities they pursued (Saifuddin et al., 2022). Society was almost prescriptive of how women had to carry themselves in public spaces and how they had male representation (chaperoned) for everything they did. This even transcended how a woman's purity, family honour and social status were represented by how she distanced herself from non-familial men (Saifuddin et al., 2022). These societal norms and many others are deeply rooted in family grooming, religion, beliefs, and values and have also filtered through to the kinds of careers women pursue, such as healthcare, education and other “feminine” career paths.

Other research related to enhancing gender equality within the public service (Vyas-Doorgapersad & Bangani, 2020) and other fields, as discussed above, indicated that the promotion of gender equality cuts across all other SDGs to derive synergies amongst the goal outputs and drives economic and social gains (Leal Filho et al., 2023). Inclusive growth studies pertaining to changes in the labour markets, which aimed to address the need for policymakers to include gender issues and bridge the pre-Apartheid gender gaps, have also been done (Kabeer, 2021; Gradín, 2021).

Western context countries have been leaving technological sector careers, while non-Western context countries have been pursuing technological careers, and this trend has increased since 2012-13 (Saifuddin et al., 2022). Countries such as India and Bangladesh, as well as some countries in the Middle East and North Africa (MENA) region had derived improved economic empowerment for women through encouragement to pursue technology and computer sciences qualifications (Dutta Gupta et al., 2015; Hassan et al., 2011; Saifuddin et. al., 2022). Familial support was cited as the greatest motivator behind women pursuing careers in the technology sector in these developing countries, including South Africa. Maslow’s (1943) motivation theory, also known as Maslow’s hierarchy of needs, is considered the pillar of human motivation. According to Maslow (1943), “People are motivated to achieve certain needs, and other needs take priority over others”. The need for self-actualisation, which is greatly associated with social standing or educational attainment in realising one’s goals, addresses some reasons women pursued challenging yet fulfilling technology careers.

2.3. Economic growth model and technology sector inputs

The Neoclassical Growth Model explains how a steady economic growth rate can be achieved when three factors are involved: labour, capital and technology (Corporate Finance Institute, n.d.). Although there are some assumptions to the model, such as that capital is subject to diminishing returns provided the economy in question is a closed economy, the model does also make some important conclusions about how total output in a steady-state equilibrium was equal to the growth rate of the labour force, notwithstanding the rate of savings. In open economies, such as in the Western contexts or in most developing countries like South Africa, economic growth is derived through technology and knowledge transfers through international trade.

Technological innovations, which are largely dependent on the diffusion of technology, are critical for economic growth and development. Many innovations often occurred as new or existing products were traded (Ayerst et al., 2023). This implies that the foundation of the new products emanated from various sectors with different kinds of knowledge, which, in turn, were factored into production inputs (Ayerst et al., 2023). The outcome was that accounting for technology embodied in trade inputs had important policy implications for the imports and exports of a country (Ayerst et al., 2023). The balance of accounts of a country is then derived from whether a country imports more than it exports or whether it exports more than it imports, similar to South Africa (World Bank, n.d.). This required trade policy changes to try and mitigate high exports by imposing high tariffs and ensuring localised production was supported. The Southern African Development Community (SADC) certifications are another way member states promote locally produced goods or services and strengthen strategic partnerships within the SADC region.

2.3.1. Gender mainstreaming and economic factors

Verloo (2005) described gender mainstreaming as "the (re)organisation, improvement, development and evaluation of policy processes so that a gender equality perspective is incorporated in all policies at all levels and all stages, by the actors normally involved in policy-making" (p. 13). From a South African context, this definition was particularly applicable when considering how mainstream industries and governments had incorporated gender equality initiatives into their company policies. However, they seemed to fall short of addressing the gender equality gap within the technology sector. Gender mainstreaming in education (Schreiber & Zinn, 2023), healthcare access and public service (Greene & Patton, 2020; Vyas-Doorgapersad & Bangani, 2020) and other mainstream topics like mining and forestry has been done. Although this change has been impactful at a macro policy level with gender equality targets, women are still under-represented in the technology sector, particularly in leadership and within the general workforce at a micro firm level and individuals (Mamabolo, 2016 in Vyas-Doorgapersad, 2018).

Furthermore, women's participation in the labour market was largely underscored by very real but under-explored endogenous factors such as gender inequality in the intra-household distribution of roles, lack of transfers of resources between spouses, and incentives that inhibited the supply signal response to the market (Collier, 1993; Haddad et al., 1995; Palmer, 1991; Wold, 1997 in Kabeer & Natali, 2013). The implication of this was that although women in the South African context have access to education and lead healthy lives, some are still deprived of technological products and services due low-income levels within the household and a lack of time to explore these areas of industry in between the many other household responsibilities women uphold (Vyas-Doorgapersad, 2018).

Past models of economic growth considered exogenous factors such as labour to be a given factor in an economy's production, which was usually determined by population growth rates (Kabeer & Natali, 2013). This meant that the human aspects of growth, including gender issues, were excluded from these models, resulting in very exogenously derived macro-level growth outcomes. Kabeer and Natali (2013) further explained that empirical models primarily relied on changes in per capita GDP as a measure of growth, which relied on the per capita income levels. Gender mainstreaming was therefore necessary within the economic context, and newer models should factor gender issues in their contexts, other than the aggregated labour supply to market inputs to country production and technology inputs.

2.3.2. The gender wage gap and the labour market

The gender wage gap was a thorn in the side of many industries and a point of contention within the labour market, hence the need to include gender equality as a factor worth exploring. The notion that men and women with similar experience levels and qualifications should earn similar salaries was a prevalent theme. If organisations were said to follow meritocratic and rational approaches in their hiring processes and how they are organised (Ringblom & Johansson, 2020; Bairoh, 2024), it stands to reason that equal pay for equal work and merit seemed only fair. Additionally, the lack of access to the labour market due to the country's high unemployment rate, coupled with the endogenous factors affecting women's participation in the labour market (such as childrearing duties, domestic activities, and stifled bargaining power between spouses), had exacerbated the gender gap within the labour market (Santos & Klasen, 2021). Furthermore, women lacking access to technology services within their families required an intricate balance between family and work life, where the “double jeopardy” effect of cognitively demanding jobs exacerbated the difficulty of women accessing jobs in the technology sector (Hebl & King, 2019).

Multiple studies have shown the gender wage gap in South Africa (Mosomi, 2019; Casale et al., 2021; Oyenubi & Mosomi, 2024). Some consensus obtained from these studies was that the gender wage gap resulted from structural, not compositional factors - such as women being more educated on average than men (Oyenubi & Mosomi, 2024). In the past, the gender wage gap in the South African labour market was considered wider at the bottom of the distribution. However, this gap narrowed faster post-Apartheid (Oyenubi & Mosomi, 2024). Other literature suggested that gender segregation permeated education, job requirements, and earnings (Roberts & Schöer, 2021). Women had to forgo certain jobs due to safety concerns or the labour-intensive nature of the job. The lack of decision-making power in the household due to limited education and restrained earnings was also cited as a challenge, thereby stifling women's participation in the labour market and only exacerbating the “double jeopardy” effect (Hebl & King, 2019; Derous & Pepermans, 2019).

Another view from Oyenubi and Mosomi (2024) is that South Africa is one of the most unequal societies in the world, with a Gini coefficient of 0.63 in 2024 (Statista, n.d.) posed an interesting study. Two reasons were cited for this: First, the labour market income contributes over 70% to this inequality; therefore, analysing gender inequality in the labour market would require that overall wage inequality also be considered (Oyenubi & Mosomi, 2024). Discriminatory laws from the Apartheid era between 1948 – 1994 resulted in a legacy wage and gender gap in the labour market. This was due to the intersectionality where black men and women were concentrated in elementary positions such as domestic work. In contrast, white men were concentrated in managerial and professional occupations, and white women concentrated in professional and clerking occupations (Oyenubi & Mosomi, 2024). Second, the initiatives imposed by the government to try and reverse the legacy of Apartheid, laws such as the Employment Equity (EE) Act of 1998 with the implementation of affirmative action for previously marginalised groups considered (Oyenubi & Mosomi, 2024).

The importance of enabling laws within the country was also cited as a key factor in bridging the gender pay gap in many countries. Figure 3 below depicts the share of countries with laws regarding equal pay in 2024. According to the Global Gender Gap Report 2024, the “estimated investment that could be required to achieve gender equality for developing economies could reach up to $7.8 trillion annually”. This suggests that many economies globally aim to address gender parity issues through Diversity, Equity and Inclusion (DEI) policies, however this has been slow as one in five economies that have legislated equal pay for equal work had also implemented measures to redress the pay gap.

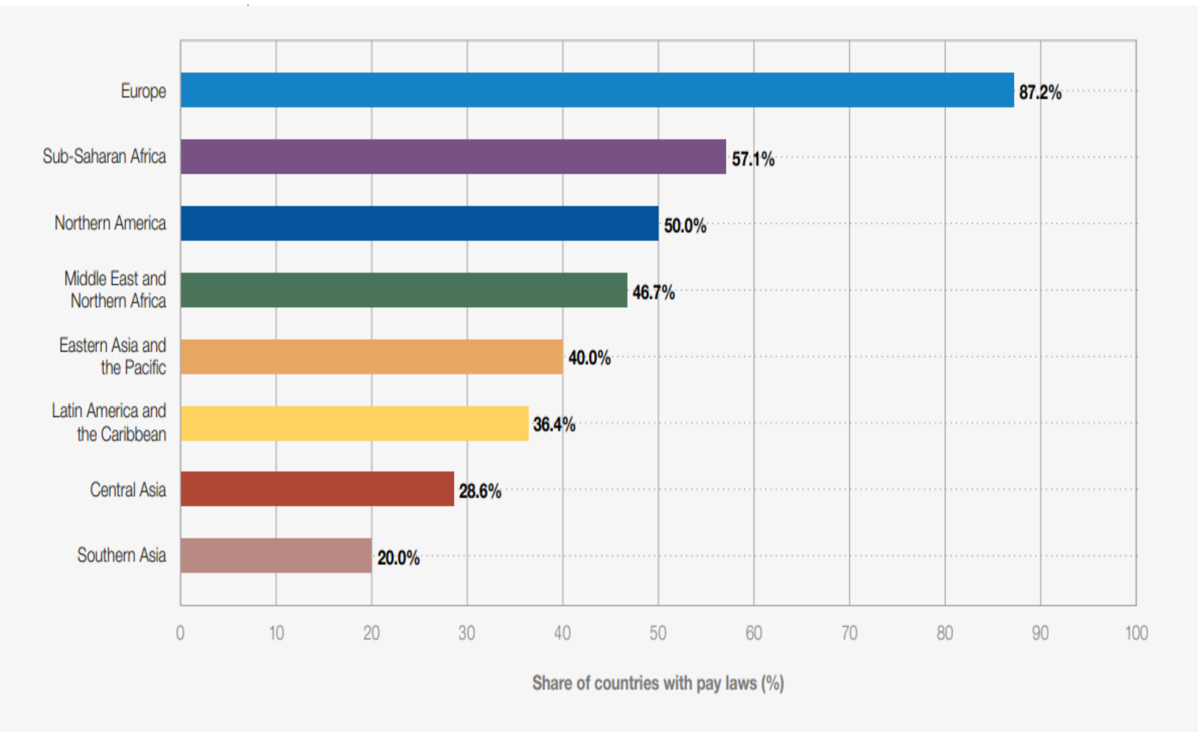

Figure 3: Share of countries with pay equity laws by percentage

2.3.3. The relationship between labour market, gender and economic growth

Notwithstanding other factors like educational attainment and health, the relationship between labour market participation, gender and economic growth is inextricably intertwined. Azzollini et al. (2023) examine “how gender equality in the labour market would affect household earnings inequality for both coupled or single-led households” (p. 2). The authors suggest that “women’s employment rates mainly drive household earnings inequality”. (p. 2). The authors further support Treas’s (1987) study when “arguing that the main driver of the increase in household inequality in the US was the increase in the variance of men’s earnings and that in contrast, the increase in women’s earnings ameliorated the inequality” (p. 2). To this end, the study advocates for men's and women’s equal gender roles. Initiatives related to policy development in developed countries have significantly focused on women’s positioning but not so much on the hours worked (Azzollini et al., 2023). In addition, household earnings inequality, according to the Gini index, averaged between 9.5%, with 17% in countries like the Czech Republic and 4% in countries like Lithuania. The STEM workforce is the most affected by earnings inequality concerns, hence the focus on the technology sector in the wake of technological advancements and how women's participation in this sector is still lagging.

The neoclassical school of thought discussed above seemed to strive for a purely positive impact of development on gender equality and female labour force participation in all stages of the country’s development (Ruiters & Charteris, 2020). However, this view was opposed by other studies (Boserup, 1970; Luci, 2009; Kabeer & Natali, 2013 in Ruiters & Charteris, 2020) who posited that the effect of gender equality on labour force participation is mainly dependent on the country’s stage of development. The reasons cited were that female labour force participation was high in low-income sectors such as agriculture, where household and market production were closely linked (Ruiters & Charteris, 2020). As industries became more sophisticated and moved to manufacturing and services, female labour force participation started to shrink.

In the later years since 2013, other studies (Eastin & Prakash, 2013 in Ruiters & Charteris, 2020) argued that development in terms of labour force participation “had a positive effect on gender equality if low levels of economic output due to social and political developments” supported it. However, this resulted in diminishing returns or a “plateaux” was reached if output increased due to potential discriminatory institutions perpetuating male dominance (Ruiters & Charteris, 2020). This meant that institutions that changed policies and supported gender parity in employment experienced high output and female labour participation (Ruiters & Charteris, 2020). Economic development policies alone are not enough and hold much debate as to whether they can drive gender equality in labour force participation, and instead, active labour market policies must be sought to enforce and drive female labour force participation (Ruiters & Charteris, 2020).

As far as gender equality in labour force participation in economic development is concerned, various direct and indirect factors in which gender equality in labour force participation can impact economic growth (Ruiters & Charteris, 2020). First, gender discrimination, which limits the employment opportunities available, eliminates qualified women from the talent pool as men who are less qualified dominate the opportunities. Consequently, the average productive pool shrinks, limiting the economy's full growth potential (Ruiters & Charteris, 2020). Second, women's employment increased women's earning potential and thereby increased household bargaining power. This improved the education and healthcare of children and ultimately reduced fertility rates, which led to reduced dependency and increased future economic growth through future human capital capabilities, higher investments and quicker credit repayments (Ruiters & Charteris, 2020). Third, gender inequality distortions resulting from separate male and female activities that spouses undertake result in losses experienced from lack of female participation and diminished returns from male participation (Ruiters & Charteris, 2020). This results in reduced productive activities and a lack of maintenance of household assets and technology, leading to declining or hampered growth (Ruiters & Charteris, 2020).

Transfers of economic resources to women result in higher human capital and largely depend on whether production is human capital-intensive (Santos & Klasen, 2021). The authors further describe the paradoxical effects: On one side of the coin, "transfers of economic resources to women yield economic growth in economies where production is human capital intensive" (p. 599). Evidence of this was mentioned in "more developed, knowledge-intensive, service economies". On the other hand, however, it is suggested that "positive economic growth from transfers of resources to women increases with the size of the gender wage gap, that is, it decreases with female empowerment" (p.599). Gender equality in labour force participation impacting economic development provided evidence for the need to enable government policies that target industrial sector growth, such as transport, retail, mining, financial services, and agriculture, to stimulate growth in these sectors. Furthermore, training programmes that reintroduced women into the labour force market were also suggested.

2.4. Gender equality contextual psychology and systems thinking

Context psychology implies that “the mesolevel and macrolevel modify effects that emanate from a microlevel, and vice versa”, suggesting that considering gender equality from all three levels is critical (Guthridge et al., 2022, p. 2). The authors distinguish these factors: First, micro-level effects could be individual characteristics, including beliefs, values, emotions, behaviours and biology. Second, mesolevel factors have to do with interpersonal interactions with family, work, industry or school. Third, macro-level factors include broader social and cultural norms, religion, and politics. Social norms in this context are considered normal behaviour by societies or groups within a community.

From the perspective of Guthridge et al. (2022), the implication is that “context matters” when addressing gender equality issues from micro, meso and macro levels. Social norms, as described, are explained to exist within the mind, whereas gender norms exist outside the mind (Guthridge et al., 2022). Both these norms are produced and reproduced through social interaction. While there are psychological causes for macrophenomena, such as patriarchy, these phenomena also affect individuals and how they perceive gender. The authors posit that, for instance, affirmative action laws should reduce individual prejudice through increased contact between genders (meso), and this can also take place from the bottom up, where prejudice against women and girls was considered a “multilevel syndrome” (Guthridge et al., 2022).

Saifuddin et al. (2022) further suggest that familial support was the most influential factor in women’s pursuit of technological careers in patriarchal societies. The reasons cited for this were that most families in these societies relied on male representation to define their value. In addition, social norms around women exhibiting gender-congruent behaviours are the expected way of life in these societies, as a woman’s way of being directly impacts family status (Saifuddin et al., 2022). In many religions or traditions in South Africa and other Muslim or tribal societies, women are expected by society to behave, dress or act in certain ways or are not allowed to pursue certain types of employment. Therefore, negotiating technology careers with family is the main driver for women’s emancipation in this context to pursue and persist in the technology profession.

“Gender stereotypes” and misleading misconceptions about technology have deterred women and girls’ desire to pursue technology careers (Shava, 2021). The author posited that teachers’ beliefs also greatly influenced girls' or boys’ beliefs about pursuing technology-related subjects at school. For gender equality to be realised at all levels, families and communities must dissipate patriarchal demands and encourage women and girls to pursue technology careers (Shava, 2021).

Systems thinking conceptualises the intersection between problems and processes locally and globally (Arnold & Wade, 2015 in Guthridge et al., 2022). Systems thinking is a "complex interplay of solving wicked problems with constantly evolving factors" (Barnejee & Lowalekar, 2021 in Guthridge et al., 2022, p. 1). According to systems thinking, gender equality can be realised only if interventions at the micro-, meso- and macrolevel are aligned and not individualistically derived. The gender equality gap within the technology sector requires the alignment of meso-, micro- and macrolevel interventions that address societal, individual, and familial efforts. To change the thinking of societies and families, a "whole of society paradigm" is required to encourage and support young women and girls to pursue male-dominated technology careers without fear of prejudice or discrimination.

2.5. Barriers and challenges to women taking up technology careers

Parmaxi et al. (2024) explained that "there is a significant number of women that quit technology careers due to parenthood, unfriendly working conditions and microaggressions, including dissatisfaction with management and the quest for better career opportunities" (p. 3). Despite the high number of women pursuing STEM qualifications from universities and technical colleges, the number of women who quit technology careers was high due to uneven gender roles in their families, society and within organisations (Parmaxi et al., 2024). Furthermore, women in the technology fields often face a number of barriers that inhibit their career growth, such as "gender bias and stereotypes, sexual harassment and a lack of a work-life balance, as well as socio-cultural barriers that hinder career progress" (Parmaxi et al., 2024, p. 3). These barriers and challenges, coupled with the technically demanding nature of technology jobs, have discouraged many women from pursuing and persisting in technology careers. Furthermore, sexual harassment was cited as another inhibitor for women to pursue technology careers as they felt isolated from social networks, which are requisite for career growth in the technology sector.

Gender parity in modern technology fields such as artificial intelligence (AI) and big data, core programming and generative AI skills was cited as another challenge (WEF Global Gender Gap Report, 2024). Figure 4 below depicts the percentage of enrolments in online

AI and digital courses across genders from 2015 through 2023. With technological advancements such as AI, machine learning and robotics transforming entire industries and eliminating repetitive work tasks, these courses were cited as critical for the current work trends in the technology sector. The primary outcome cited for this change was to create a pipeline of skilled individuals to join the technology sector, particularly women. Although there was a significant uptick across genders in enrolment between 2015 and 2023, especially in AI and big data, fields such as programming, networks, and cybersecurity still lag. This suggested that these emerging technological competencies have translated to the work of the future, and therefore, targeted interventions to achieve gender parity in these areas are critical (WEF Global Gender Gap Report, 2024). The demand for STEM skills in the economy was cited as increasingly high yet skilling decisions depend on available company reskilling and upskilling opportunities (WEF Global Gender Gap Report, 2024).

While many firms' decisions on upskilling and reskilling are major human resource management strategies, the types of skillsets that women are introduced to or succession planned for are critical in meeting this challenge. From the figure 4 below, it seems programming and other fields, such as cybersecurity, still experience gender inequality partly due to the demanding nature of the work but also due to women's unwillingness to pursue these careers as they perceive them as difficult. The impact of the "double-jeopardy" effect, coupled with how most firms were still meritocratic in their recruitment processes, will require that these skills ought to be prioritised from tertiary and school levels to create a steady pipeline of candidates ready to join the sector, particularly women and girls.

Figure 4 continues on the next page…

Figure 4: Gender parity in online AI and digital course enrolments

"Doing and undoing gender" was discussed in detail in the above section. Many firms and individuals employed within the technology sector are still grappling with how this phenomenon can enable or disable women persistence within the sector. The reasons cited for this are that not all women tend to focus on gender-congruent behaviours when doing their jobs, but instead, meritocracy and whether they are capable of performing in their roles were the major decision drivers. Although "doing and undoing gender" was perceived as a challenge for women in the technology sector, some literature suggested that male middle managers can act as change agents in how they influence gender equality in the workplace (Kelan, 2022). The main driver for this is that middle managers are often regarded as the "linchpin" that connects senior leadership and junior staff who execute the operational functions (Kelan, 2022). In addition, gender equality is considered a strategic imperative by senior leadership and therefore, middle managers act as "change intermediaries" who have to cascade this strategic imperative down to junior staff for execution (Kelan, 2022). Male middle managers were also suggested to account for 70% of all middle management positions, ideally positioning them to drive gender equality changes within organisations (Kelan, 2022). Another way male middle managers were considered to be undoing gender is by attending meetings or networking events initially regarded as for women only (Kelan, 2022).

Other views suggested that “doing and undoing gender” also prevails in entrepreneurship (Branicki et al., 2023), within the public service (Bishu & Heckler, 2021) and even in social contexts such as male carer or female breadwinner families (Pinho & Gaunt, 2021). Other literature suggests that many organisations are experiencing challenges dealing with the male-female gender dichotomy in efforts to improve gender inequality (Grzelec, 2024). The challenges of gender equality and equal female participation in the labour force is still rife across different industries. Grzelec (2024) further suggests that this phenomenon places responsibility on organisations to find congruence between “doing and saying” when driving gender equality issues. This suggests that gender equality requires a “whole of society paradigm” in managing gender equality issues at all levels of society.

The implication is that interventions at a micro- (country), meso- (industry) and macrolevel are still insufficient to align the complex issue of gender equality within STEM careers, specifically within the technology sector. Considering all these factors, coupled with the current economic outlook and the country's high unemployment rate, there are still not enough employment opportunities suitable for women to thrive and succeed within the technology sector. Lastly, much research has been done concerning the relationship between gender inequality and economic growth (Cuberes & Teignier, 2014) and longitudinal studies on gender inequality and economic growth (Forsythe et al., 2000), but not much research has been done relating to gender equality as a driver for economic gains within the technology sector.

2.6. Conclusion

In conclusion, the concepts of gender equality as found in the literature and how these pertain to the United Nations SDG 5 and the gender equality agenda; the concept of economic growth and technology sector inputs; the gender equality contextual psychology and systems thinking, and the barriers or challenges deterring women from entering the technology sector were discussed. These were pertinent in weeding out and cultivating relevant concepts that would pose the next part of this research study – the important propositions derived from the literature review. Chapter 3 describes the research propositions and how these were arrived at using the literature. The propositions are linked to the interview guide questions categorised into specific themes related to gender equality and employment opportunities in the technology sector, gender mainstreaming, doing and undoing gender, and economic gains that may be derived.

3. Research Propositions

The literature that pertains to gender equality within the technology sector, particularly the gender equality agenda and women empowerment; the economic development perspectives and if these were impacted by gender equality; the contextual psychology of gender equality and systems thinking; and the barriers and challenges to women taking up opportunities in the technology sector were reviewed in chapter 2. While many concepts were explored in the literature review, only concepts related to this study will be explored further, and propositions will be made.

The concept of gender equality was explained in detail in the preceding chapter. However, many views expressed in the literature require further exploration. On the one hand, gender equality in the educational attainment of STEM qualifications has seen remarkable growth in recent decades (Parmaxi et al., 2024), while on the other hand, opportunities for women in the technology sector are still low. Other concerns were regarding the “double jeopardy” effect as a contributor to gender inequality, as women found it difficult to secure employment for cognitively demanding jobs (Hebl & King, 2019; Derous & Pepermans, 2019). In other views, Ringblom and Johansson (2020) explained intersectionality and how work organisations in their organising practices uphold and produce gender inequality and that historically, male-dominated industries have been meritocratic and rational. These contrary views have led to the following proposition:

P1: There seems to be an inverse relationship between gender and employment opportunities in the technology sector.

Although gender mainstreaming in education (Schreiber & Zinn, 2023), healthcare access and public service (Greene & Patton, 2020; Vyas-Doorgapersad & Bangani, 2020) and other mainstream topics like mining and forestry were done, there is not much done on the technology sector and initiatives related to gender parity have not yielded the desired results. The widened gender gap, its impact on female labour force participation, and whether it can drive economic development are still of much focus (Ruiters & Charteris, 2020). From the demand side, women's labour force participation and their involvement could lead to improvements in the bargaining power of spouses within the household and mitigate the exogenous factors prohibiting female participation, whereas, on the supply side, women's empowerment could improve economic development through improved earnings, and policies that drive female labour force participation could bolster economic development (Ruiters & Charteris, 2020). Considering these factors, the following proposition was made:

P2: Gender mainstreaming efforts have supply-side benefits in ensuring gender-related ICT policies are implemented in the workplace.

Systems thinking requires a "whole of society paradigm" when considering all factors that affect gender equality issues. Therefore, issues at macro (country), meso (industry), and micro (individual) levels should be considered. At a country level, policies that drive gender equality and societal norms have been a major determinant in whether women persist in pursuing technological careers. In patriarchal societies, familial support is the most influential factor when it comes to women's pursuit of technological careers (Saifuddin et al., 2022). Beliefs and cultural influences, as well as how women and girls were groomed to not regard themselves as capable of persisting in the technology sector, were influenced by the patriarchal nature of societies, where male representation determined women's careers and even marriages. Considering that systems thinking requires multilateral thinking at all levels, the following proposition was made:

P3: Addressing gender equality issues at all three levels, micro, meso and macrolevel would derive economic gains for the technology sector.

Considering the barriers that limit women from persisting in technology careers that they choose to pursue, many strategies were discussed to mitigate these challenges. Some strategies identified were "doing and undoing gender" where women either have to adopt or abandon gender-congruent behaviours to enable them to take up careers in the technology sector (Saifuddin et al., 2022). Barriers such as a lack of work-life balance, an inflexible working environment, the technical nature of job opportunities in technology, and the way women were groomed to shy away from technology careers were cited (Parmaxi et al., 2024). It also became evident that men can act as change agents in driving gender equality by "doing and undoing gender" in the workplace (Kelan, 2022). Considering these challenges, interventions around doing and undoing gender are still a prevalent strategy across industries therefore the following proposition was made:

P4: "Doing and undoing gender" are some strategies that allow women to pursue and remain in technology careers.

4. Research Methodology

4.1. Introduction

This chapter aims to outline the research methodology and design applied to answer the research question posed in Chapter 1 and to address the propositions made in Chapter 3. The data collection was conducted using semi-structured interviews with a sample of 12 men and women in Gauteng employed in the technology sector. Purposive sampling techniques were applied to specify criteria for the sample. The criteria ensured that views from both men and women were gathered regarding different themes, which stemmed from the propositions, and questions under each theme were asked. The four themes were the relationship between gender and employment opportunities in the technology sector, gender mainstreaming within the firm, "doing and undoing gender in the technology sector, and economic benefits at macro-, meso- and micro-levels. The research propositions linked to each theme and questions were identified on the interview guide for easy reference.

The possibility of concerns related to the reliability and validity of the data collected were considered when designing the research methodology, data collection and analysis. Risk mitigation and management of these concerns were formulated and conducted considering the resources available to the researcher, including time constraints. Ethical considerations were addressed and considered during data collection by ensuring the anonymity of participants. They were also identified in the study's limitations at the end of this chapter.

4.2. Choice of research methodology and design

The main focus of this research study is to find out through in-depth data analysis if gender equality can be a driver for economic gains within the technology sector. To obtain deeper insights from participants, propositions were made from consulted literature through a philosophy of interpretivism so that the researcher could take an empathetic stance to the participants' views (Saunders and Lewis, 2018; Myers, 2020). Through the interpretivist philosophical lens, the researcher gain deeper insights into the participant's feedback (Myers, 2020) and remained open-minded yet engaging to new knowledge that came out of the interviews. This particular approach is important in analysing the data gathered from the interviews and in analysing gender equality as a driver for economic gains in the technology sector.

An exploratory, qualitative study was appropriate to gain an in-depth understanding of the socially constructed reality of the participants on gender equality and whether it can result in economic gains for the technology sector. The qualitative study was appropriate because the social context of the participants and possible history related to their views on a complex social topic such as gender equality was being understood and how this has impacted their career choices and how they view things in the context of their lived experiences. Therefore, qualitative thinking requires this approach when understanding social phenomena such as gender equality and what it means to those impacted by it.

To conduct research into whether gender equality can drive economic gains within the technology sector, different views from men and women within the technology sector in Gauteng were identified as the research sample using purposive sampling techniques. Gauteng is considered an economic powerhouse of South Africa, with about one-third of the country's GDP being in the province (Stats SA, n.d.). The majority of studies on gender equality have been in mainstream topics such as education (Schreiber & Zinn, 2023), health (Greene & Patton, 2020) and the mining sector (Kaggwa, 2020); while emerging topics such as female entrepreneurship and gender equality in the technological change era still requires in-depth focus (Belingheri et. al., 2021). This study will, therefore, contribute to the existing literature with a methodology approach that combines existing strategies on gender equality with economic gains to obtain insights into a single study within the technology sector.

A combined deductive and inductive approach was used during the course of the study. First, peer-reviewed academic journals were consulted to weed out and cultivate an understanding of the gender equality landscape and the concepts specified were used to develop a semi-structured interview guide that would inform data collection. Yin (2016) categorises this as a deductive approach, as the theoretical concepts were used to determine the data to be collected through semi-structured interviews. Second, the study then followed an inductive approach by identifying themes that emerged during the data analysis, making the analysis more flexible and incorporating a deeper understanding of the participants' meanings (Yin, 2016). Combining both deductive and inductive approaches in a single study is also supported by Saunders and Lewis (2018). The concepts derived from existing literature and the new themes identified during data analysis will then be combined to make accurate inferences from the insights received.

The data was collected through semi-structured online interviews using Microsoft (MS) Teams software. Participants were asked questions according to a structured interview guide (Annexure A) with questions sorted into themes and an open semi-structured approach to enable rephrasing of questions to adapt to the context and circumstances of the interview following an easy conversation tone (Yin, 2016). The reason for this approach was to provide freedom and room for the participants to open up and share new insights, and the interviews were recorded and transcribed with the participants' permission and taking notes during the interview to increase the transparency and trustworthiness of the data collected and research findings. Due to the limited time of the study, interviews were only conducted once in 2024, and at no other time; therefore, the results are only representative of the snapshot period in time in 2024 and therefore, no extrapolation to past or future periods can be made.

Considering that economic gains depend on various factors within the economy, the research design involved consulting different sources of literature to gain deeper insights into whether economic gains can be achieved within the technology sector in South Africa, with a focus on gender equality. The research is focused on providing a platform for participants to express their perspectives, to gain insight into the potential economic benefits that could result from gender equality within the technology sector.

4.3. Population

The population for this research would be all men and women in the technology sector in South Africa. Since the study will focus on economic gains, which are usually country-province specific, it will focus on a South African context in terms of economic gains realisation through gender equality in the technology sector.

4.4. Unit of analysis

The unit of analysis is men and women employed in the technology sector in Gauteng to obtain their views on gender equality as a driver for economic gains.

4.5. Sampling method and size

The sample would be men and women in the technology sector within Gauteng. According to Stats SA (n.d.), Gauteng is the economic powerhouse of South Africa accounting for about one third of the GDP of the country. Therefore, gathering data obtain views from both men and women within the Gauteng province about gender equality being a driver for economic gains. Purposive sampling techniques were used to specify criteria for candidates to be men and women employed in the technology sector within the Gauteng province.

First, initial research was conducted using a network of existing candidates. Then, the remaining participants were identified through snowball sampling based on the outcomes of the snowball sampling exercise and purposive sampling criteria. The criteria specifically targeted men and women within the technology sector in Gauteng. As the literature does not provide guidelines or boilerplate for estimating sample sizes for purposively sampled interviews, the researcher set the sample size to 12 men and women within the technology sector in Gauteng until saturation was reached (Guest et al., 2006; Pratt, 2009).

Taking into account the lack of a set of rules about the sample size of qualitative research including the flexibility, openness and adaptability to the interviews (Patton, 2015), the limit was set with the understanding that interviews would end once saturation was reached for the sample size. The level of appropriateness for the data collected is as critical as the number of participants to determine sample adequacy (O'Reilly & Parker, 2013). For this reason, the aim was not to drive a set number of interviews but to gather data about the viewpoints on gender equality driving economic gains in the technology sector and to provide further information that addresses the propositions made from the literature.

To be able to access men and women employed in the technology sector in Gauteng proved, the researcher booked interviews in advance with the participants as interviews would take about 45 minutes to an hour each and it was challenging to secure participants' time without making prior arrangements. Due to time constraints and the use of snowballing sampling, participants' interviews had to be aligned to their work-life demands.

4.6. Measurement Instrument and data collection tools

According to Golafshani (2003), the researcher or interviewer is the research instrument in a qualitative study. The interviewer or researcher serves to use her senses in the information-gathering process and has to interpret the interview context (Maxwell, 2013). To ensure consistent data collection amongst participants, an interview guide was used to collect data from the sample and the questions were grouped under the themes from the literature reviewed and propositions made in chapter 3. Once collected, the data was analysed and coded into themes using Atlas.ti software so that recurring patterns or themes were grouped or categorised. These groupings or code were then summarised and the findings are discussed in chapter 5 of this study.

To strengthen the credibility and effectiveness of the data collection, audio transcription and recording were enabled during each interview using Microsoft (MS) Teams software. To ensure the quality of the data and relevance of the questions to the participants, the researcher adapted the questions and the context of the participants to encourage freedom of expression from the participants.

4.7. Data gathering process and collection method

Data was gathered using semi-structured interviews and an interview guide with the relevant questions categorised into concepts from the literature and linked to propositions made in chapter 3 of this study. The interviews were conducted online using MS Teams software, and live transcription and recording were enabled with permission from each participant. The interviews were conducted in English as all participants felt comfortable engaging in this language, and the researcher encouraged freedom of expression from the participants to reduce interviewer bias and improve the trustworthiness of the data.

The interview commenced with of explaining the research purpose and topic, with the assurance of confidentiality of responses and that no personally identifying information would be revealed. A copy of the informed consent letter indicating the time it would take the interview and, after reminding them of the voluntary participation statement, the participant would affix their signature and then return the consent letter to me at the start or after the interview. The interviewer would then encouraging as much openness and freedom of expression as possible, with minimal interruptions, clarifying concepts, or giving examples as requested.

The following process in each interview took place to ensure adaptability and flexibility to the circumstances and participants:

1. The interview would start, and the researcher would start recording and transcription on MS Teams.
2. The theme related to the questions was explained, and then the questions would be asked if the participant understood the meaning.
3. Detailed verbatim notes were taken as the participant replied to each question, with further probing or clarity seeking as they went along.
4. Considered adjusting the interview guide to align to whether the participant was male or female and if circumstances dictated.
5. Analyse the data collected and saved against the participant's record.

Taking into account the fact that the researcher's personal biases may have an influence on participants' feedback through lived experiences, education and familiarity with the technology sector, mitigations had to be applied to reduce the risk of impacting the trustworthiness of the data (Maxwell, 2013). Furthermore, these mitigations were the researcher's objectivity and meticulous note-taking of participant feedback as accurately as possible, with recording and transcription enabled throughout the interview.

The interviews were booked in advance with the participants at a time and date suited to their work-life demands. They were conducted in a semi-structured manner, with participants connecting remotely to the interviews and encouraged to express their views as freely as possible. To further encourage freedom of expression, certain concepts and examples were given to participants so that they understood the concepts clearly prior to responding to the question asked.

4.8. Data analysis approach

The analysis of the data will be thematic or pattern extraction due to the qualitative nature of the research. The data cannot be counted or measured, or expressed easily in numerical terms (Guthridge et al., 2022). The following steps were taken in analysing the data:

Step 1: The researcher had to familiarise themselves with the data to ensure they could obtain a deeper understanding and insights or contexts from the data in line with the interpretivism approach (Saunders & Lewis, 2018).
Step 2: Define initial codes and code interview data
Step 3: Search for emerging themes in the initially coded data
Step 4: Review themes and create a thematic map of codes using Atlas.ti.
Step 5: Refine the specifics of each theme and further analyse if required
Step 6: Develop a mapping of codes and themes categorised for this study for inclusion in the results/findings section.

According to Braun & Clarke (2006), "thematic analysis provides a flexible, yet rich and detailed account of data" and avoids the notion that "anything goes". To ensure rich analysis, a checklist and a second analysis of the codes were done to ensure the trustworthiness of the thematic analysis. The final thematic map is shown in Annexure B which shows the final codes and code retrieved from the thematic analysis.

4.9. Data quality strategies

Triangulation is "the use of multiple methods or data sources to develop a comprehensive understanding of phenomena" (Patton, 1999 in Carter et al., 2014). Data concepts were already gathered from the literature, and therefore, to test their applicability to the participants, the concepts were themed, and therefore, to test their applicability to the participants, the concepts were themed, and then questions were asked that gauged detail from the participants to understand their views. The researcher's experience in the technology sector and the current concerns also aided in crafting the interview guide but also made it clear that possible bias could be introduced due to the lived experiences of the researcher. To mitigate this, the interviewer's objectivity and freedom of speech were encouraged during the interviews. The researcher's openness and flexibility as circumstances dictated also ensured maximum benefit and learning from the interviews.

4.10. Research Ethical Considerations

The research ethics requirements at the Gordon Institute of Business Science (GIBS) require the researcher to obtain ethical clearance from the Ethics Committee, outlining this methodology chapter and plans of how interviews will be conducted prior to collecting data (see Appendix 1). Participants in the research study are required to sign a consent form, as shown in Appendix 2, after confidentiality and anonymity requirements have been clarified and the proceedings of the interview explained to them.

4.11. Limitations of the research

4.11.1. Researcher bias and assumptions

This research study has some limitations as a result of the time-bound nature of the research. First, the data will not be numerically quantifiable; however, only themes or codes were used in the thematic analysis to derive the results and the discussion sections. Second, the researcher's biases and assumptions may impact on objectivity in analysing the data. The researcher's assumption on the outcome of the study may be the fact that fixing gender equality issues would improve the representation of women within the technology sector; and that gender equality issues are only related to female participation in the labour force.

The first limitation related to data not being quantifiable holds true and the qualitative data was coded and themes identified using Atlas.ti in order to ensure thematic analysis of the data and linked to the research propositions. The second point in terms of researcher bias was mitigated in two ways: First, during the interviews the researcher took detailed notes verbatim during the interview to ensure accurate capturing of participants' feedback as discussed in section 4.9 above. Second, the researcher's assumptions on the outcome of the study have been addressed due to the reporting of the research findings objectively.

Due to the time-bound nature of the research study, the feedback is taken at a certain point in time during the time when the research study was conducted and the results cannot be extrapolated to other timelines in the future as discussed below.

4.11.2. Time horizon

The qualitative research is a cross-sectional study and was conducted at a particular point in time and therefore is a snapshot of findings at a particular point in 2024. Gender equality in the technology sector and the representation of women in the sector may change in the future, therefore extrapolation of the results to future periods may not be possible.

4.11.3. Gender bias

The researcher was a female employed in the technology sector, and possible experiences and lived experiences may introduce bias. To mitigate this risk, the objectivity encouraging freedom of expression and taking a neutral stance to participants’ views were adopted as described in the data quality strategies section of this study. From a participant's perspective, gender bias was not a factor as both men and women who are employed in the technology sector were interviewed at different times, and they had no view of the other participant's viewpoints.

In the next chapter, we will show the results of the data collection in line with the thematic analysis concept discussed earlier in this chapter.

5. Results/Findings

5.1. Introduction

This chapter will be presenting the key findings or results from the interviews conducted with 12 participants within the technology sector in Gauteng. The interviews were conducted in a semi-structured manner using an interview guide as described in Chapter 4.

The results section commences with a brief description of the participants and provides information about their background and context of the interviews conducted. This will be followed by a qualitative analysis of the participants' feedback for each proposition where key themes emerged and participants' responses were identified and supported by relevant and insightful quotations.

5.2. Interview Participants and Context

The names of all participants were changed to pseudonyms to protect their identities and maintain confidentiality requirements as initially agreed in the interview and during ethical clearance. The participants were both men and women working within the technology sector in Gauteng, and the interview guide was adapted to suit their context and circumstances to ensure flexibility and to ensure they were free to express themselves. Table 1 below shows a summarised list of the participants and their context in relation to the interviews conducted.

Table 1 follows on the next page…

Table 1: List of interview participants and context

No.	**Pseudonym**	**Field in technology sector**	**No. of years employed**	**Male**	**Female**
1.	Participant One (P1)	IT Service Management	6-10 years		
2.	Participant Two (P2)	Digital & IT	20+ years		
3.	Participant Three (P3)	IT Service Management	15-20 years		
4.	Participant Four (P4)	Digital & IT	20+ years		
5.	Participant Five (P5)	Telecommunications	6-10 years		
6.	Participant Six (P6)	Commercial IT	11-15 years		
7.	Participant Seven (P7)	Medical IT	6-10 years		
8.	Participant Eight (P8)	Application development	20+ years		
9.	Participant Nine (P9)	IT Infrastructure & Networks	11-15 years		
10.	Participant Ten (P10)	Medical IT	20+ years		
11.	Participant Eleven (P11)	Cybersecurity	15-20 years		
12.	Participant Twelve (P12)	Cybersecurity	20+ years		

Male **Female**

The technology landscape represented by the participants covered areas ranging from infrastructure and networks, application development, IT service management, cybersecurity, application development, telecommunications, medical IT, commercial IT, digital and IT, amongst other areas. This approach ensured that diverse backgrounds and contexts could be represented, although not all could be covered due to the limited time resources available. The technology sector is generally still fragmented with many highly technical areas such as infrastructure and networks or application development highly male dominated. The participants sometimes felt they were being sexist when they had to make comments related to the reasons why females take up or do not take up careers in the technology sector. For this reason, the researcher had to provide assurance to the participants that their feedback is valuable and will contribute significantly to the research to ensure insightful feedback that can add to the academic discourse.

Although the meetings were conducted on MS Teams, transcription and recording as well as live notes capturing in front of the participant was done to ensure the accuracy of data captured. The interviews were conducted in English as all participants were proficient in speaking, reading and understanding the language. However, transcription on MS Teams has some challenges capturing the proper sentiment from the participant and for this reason, the feedback from the notes quotations will be used to illustrate the accurate sentiment of the participants. The original transcripts of the participants were not edited but the supplementary notes and recordings assisted in deriving the full sentiment of the participants during the qualitative data analysis phase.

5.3. Results: Proposition 1

P1: There seems to be an inverse relationship between gender and employment opportunities in the technology sector.

The below codes were formulated and linked to P1 to derive insights pertaining to the views of participants regarding the availability of employment opportunities for women in the technology sector; the recruitment decisions that bring about employment opportunities for women in their firm; whether opportunities were available for women in top leadership and other levels; and the influential factors that drove recruitment decisions.

Figure 5 below summarises the results that will be addressed from P1 and the codes concerned. The diagram indicates the codes related to proposition 1 asked during the interviews and shows the main outcomes from the insights obtained from the interviews. Each code’s results will be explained separately in the sections that follow with supporting quotations for each.

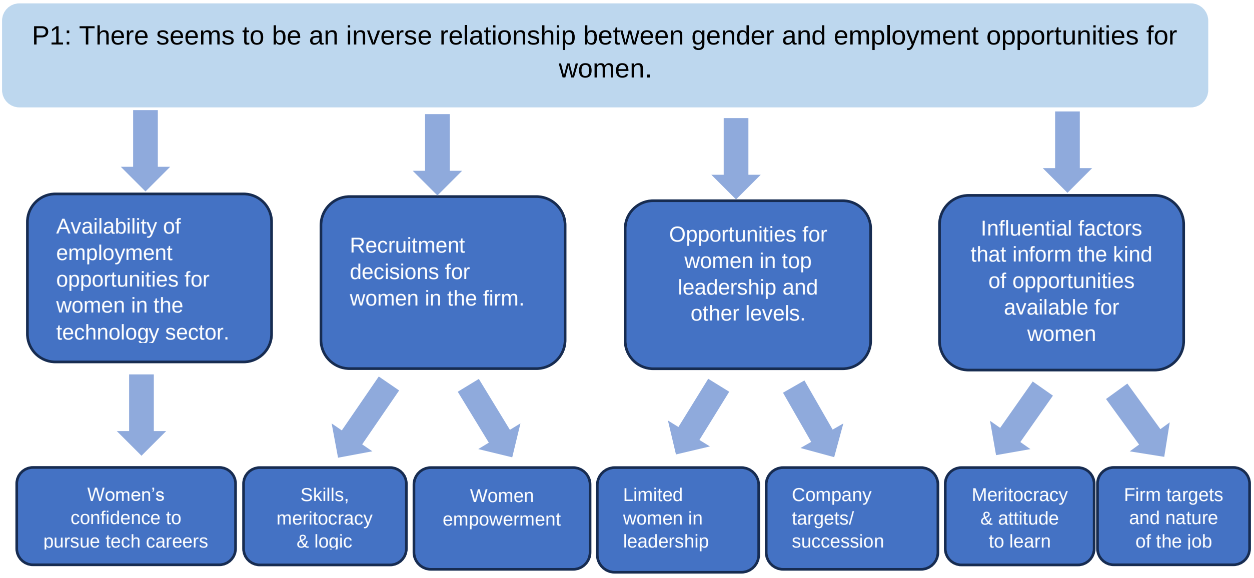

Figure 5: Overview of results (Proposition 1)

5.3.1. Availability of employment opportunities for women in the technology sector.

There was nascent demand as far as career opportunities for women in the technology sector are concerned. This suggested that although there are opportunities for women in the technology sector, women do not generally seek out these opportunities and perhaps lack the confidence in their skillsets for technology careers despite their enrolment for technology careers in university or college. This is not to suggest that opportunities for women do not exist in the technology sector in general. However, it did suggest that women generally failed to seek opportunities or lacked willingness to participate in the technology sector. Another sentiment shared was that women preferred other professions like Accounting and seemed to perceive the technology sector as male dominated.

"There are employment opportunities in the sector if the candidate feels they should go out and get them. Not many women qualified. The general feeling they would prefer other qualifications like Accounting other than Tech as they perceive it as a male sector." (P1)

"I think the opportunities are there but I don't know whether women are ready or not. We are constantly looking for women and I am just not sure whether women are ready for

technology careers. I have done a lot of empowerement initiatives but I notice women are fearful and held back to try opportunities in technology as compared to their male counterparts. For example I have two interns one male and another female, the male was very outspoken but female very timid and reserved.” (P8)

5.3.2. Recruitment decisions for women in the firm

This code was created to understand the views of participants regarding recruitment decisions within the IT departments of their firms and how employment opportunities came about for women. It emerged from the discussions that the availability of opportunities for women within the technology sector were still driven from two main areas: First, the skills, meritocracy and logic; and second from the deliberate drive for women empowerment in the workplace.

“We are an equal opportunity employer and we don't differentiate between male and female. The only major requirement is that people must work shifts. My team is majority female in my current firm and the firm is "blind" in terms of gender and it is all meritocratic.” (P12)

“*There are no specific job specs because currently women are in these pink phantom roles like secretaries, risk and HR. Women in leadership roles are aimed at 30% so the CVs being reviewed should be equal in terms of 50/50 so intentionality is also part of the plan and to ensure we align with diversity. The women then get assessed fairly to identify skillsets and suitability for the role then they get appointed if they are fit for the role. Headhunting of women who are thriving in these spaces is then another factor when looking for women candidates.”* (P5)

“In terms of the women agenda, there is a decision to drive women participation in the top positions. I report directly to a woman and she is quite active in driving women opportunities. Even organisationwide women opportunities are rife even women truck drivers for the logistics section, so it is a pretty massive agenda around ensuring their participation.” (P2)

5.3.3. Opportunities for women in top leadership and other levels

The code on opportunities for women in top leadership and other levels was created to determine women representation within the technology sector or firm. The question was adapted to suit the circumstance for those participants where the firm was a technology firm, the question was adapted to representation of women in leadership and other levels from a firm perspective. The general result was that there are opportunities for women at all levels or a succession plan and company targets were a driver for employment opportunities to groom women to leadership and other levels.

“There are opportunities for women in leadership positions and all other levels. In freight forwarding the 2IC for this division is a woman and this is targeted at all levels.” (P2)

“It's hard to say that opportunities are available for women but people grow through their career paths or get promoted and the aim is to replace a like for like replacement in terms of when a woman leaves we put another one to maintain the targets. It is difficult to say that the aim is to only target women. The other side of the coin is that some women are shy to apply for some roles and you realise mostly males are applying so we have tried to deliberately target certain women and enquire why they didn't apply. So we work with the women to try and give them confidence to apply so that they can qualify for the roles. We are intentional about what we do to ensure the women are encouraged to apply. So going forward we now have a SLATE for women and we review the representation of women and we try and challenge the SLATES if there is discrepancies for women opportunities so that they are assisted with PDP and career advancement according to due process.” (P10)

5.3.4. Influential factors that inform the kind of opportunities made available for women in the firm

The aim of this code was to obtain feedback from the participants about what they thought were the factors that influenced the kind of employment opportunities that were made available for women in the firm. From the discussions, it was ascertained that many firms do not have criteria or factors that contribute to how they identify opportunities for women. Instead, the skillsets and whether the person had an attitude to learn. As a result of scarcity of skills, the creation of a pipeline was another factor considered to ensure the risk of staff poaching was mitigated. Other views suggested that the nature of the job requirements and skills required a female as it could be executed better by a female. For instance, a role which required skills such as attention to detail and communication would be better suited for a female. Other views still suggested that merit, company targets and reporting requirements held firms accountable for achieving gender equality.

"No we don't have targets or other factors as we are still in startup mode and even with acquisition, we still look at the best CV and not purely in terms of gender. There is a clear set of requirements that are required. Before we could interview a lot of people in a week, so now our approach has changed to include technical expertise and how to spot attacks and threats and vulnerabilities. We have now moved from skills to aptitude, bright eyes, bushy tail and attitude to learn. The technical elements are about 50% and the rest is soft skills. We elevate and promote within our teams and allow them to teach the others and so create a pipeline. Because of scarcity of skills, poaching of staff is a challenge but we have created a steady stream of interns that we groom until professional placement." (P12)

"Women are more attentive to detail for example so for QA jobs they are more suited than men. So some roles are more suited to women than males because of the attention to detail, but merit also plays a major role as long as you can get the job done." (P8)

"The targets that have been set are critical and reported in the company results, so 50% women and 50% men target has been set but this is still simplistic and then the next level is that 30% should be in leadership and then next to that level another 30% in technology positions and not just low-level positions so that we can be accountable to it. This forces us to report in all areas of the business, sustainable report, executive scorecards for KPIs and other company reports. Communication of this strategy and KPIs would hold us accountable to it." (P5)

5.4. Results: Proposition 2

P2: Gender mainstreaming efforts have supply-side benefits in ensuring gender-related ICT policies are implemented in the workplace.

The below codes were formulated under P2 to derive insights from participants regarding their views on gender mainstreaming having supply-side benefits in ensuring that company policies are supportive of gender equality within the workplace. As discussed in Chapter 2, gender mainstreaming efforts at a country, industry and firm levels have been done to balance out gender inequality issues. This suggested that measures should be put in place at all levels to facilitate gender equality issues within the technology sector.

Figure 6 below describes the overall results for P2 with codes and insights from the participants' views concerning gender mainstreaming efforts at a firm and other levels. The code pertaining to the number of men versus women within the IT section or firm; the number of women in leadership positions including Board level; whether company policies catered for gender equality within the IT section or firm; and how the firm involved women in the technology sector were assessed.

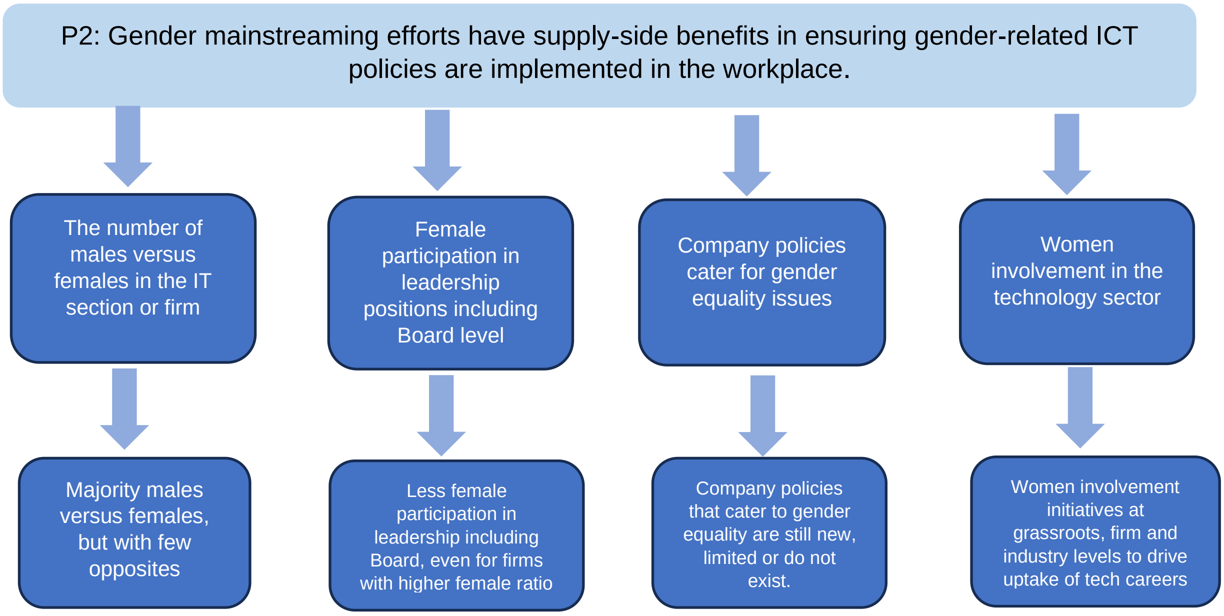

Figure 6: Overview of results (Proposition 2)

5.4.1. The ratio of males versus females in the IT section or firm

This code assessed the number of males versus females within the firm or IT section of the firm. This was largely dependent on the circumstances where, if the firm was a technology firm, then male versus female ratio would be assessed at firm level, and if there was an IT section, then it would be assessed at department level. This was in line with adapting to the context and circumstances of the participant. The majority of participants suggested a higher ratio of males versus females, and this was both within the firm or within the IT section depending on the context of the participant. Some views suggested anomalies or the opposite picture where there were more females than males. However, there was still no equal representation of males versus females within the firm.

“65% male and 35% females estimated, at Group tech landscape.” (P5)

“About 60% male and 40% female” (P8)

“90% female and 10% men estimated.” (P7)

“70% male and 30% female estimated” (P6)

“We don't have an IT dpartment as everyone is IT since it is a technology firm so this will be organisation level so 55% male and 45% female estimated.” (P10)

“Overall in the firm there is more women than men, but in IT department there are 60% men and 40% females estimated. It aligns to traditional outcomes that in the past IT has been a male dominated industry but now they are catching up and obtaining opportunities in tech.” (P11)

5.4.2. Female participation in leadership positions including Board level

The purpose of the female participation in leadership positions including Board level code was to obtain how many of the females that were already employed in the firm as per section 5.4.1. above were in leadership positions including at the Board level. The result in this section was that fewer females than males were in leadership positions including Board level for most firms. This was true even in firms where there was the opposite outcome - majority females than males - where one would expect that more females would be in leadership.

“None at our startup but the acquiring company has some female leadership in top management.” (P12)

"30% of them fall in leadership including Board." (P7)

"Less than 5% in leadership including Board level." (P5)

"About 10% of the 30% females are in leadership including Board." (P4)

"We report to a CISO, and in IT there is only about 20% for our division." (P11)

5.4.3. Company policies cater for gender equality issues

Company policies as part of gender mainstreaming focussed all governance-related and operational including hiring decisions on gender equality issues were critical in driving gender equality amongst firms and within industry. The aim of this code was to determine if firm policies at a micro level did cater for gender equality issues and whether these policies were at a firm level or IT section depending on the context of the participants. The results revealed that some firms did not have gender equality policies in place, while others were still in their infancy stage of developing them; while yet others had initiatives but did not have formalised policies that drive gender equality issues.

"Inclusion and diversity policy encourages having women, people with disabilities, etc. Programmes like She Leads aims to develop women from previosuly disadvantaged backgrounds and having female drivers in the logistics space. The challenge is getting swamped in strategy and operational targets than doing more to drive women agenda. The fact that IT sits outside the country in India, so doing something in terms of training is limited. Logistics is very male dominated and if you are a female which is able to understand the logistics landscape, then it creates an opportunity for women to grow beyond the immediate vacinity of their work." (P4)

"There's guidelines from a gender equality perspective but from business unit perspective nothing specific. From an HR or organisation stance then work life balance is also advocated and the understandiung that women also look after families and school drop offs and other responsibilities are accepted." (P6)

"No, we are ISO 27001 which means we have to have policies speaking to governance. Our HR is still outsourced and we have a People policy and it has not matured and

formalised yet. This is something we need to be looking at in terms of gender equality and so our acquirer is a large distributor listed on the JSE who would then enable us to align to these new policies on gender equality." (P12)

"Honestly no gender equality policies at company or department and no initiatives, so it would be an improvement for our firm." (P8)

"There has been identification of the gender pay gap and reporting on it, they are intentional about closing that gap. The other one is the EE where they are targeting women more for positions. There are also other general policies around ways of work which address social and family aspects which address women and their maternal responsibilities but also as leaders within corporate." (P3)

5.4.4. Women involvement in the technology sector

Women's involvement initiatives in the technology sector made specific reference to structures or other industry-related as well as grassroots-level initiatives that aimed to address gender equality issues and involve women to persuade them to take up technology careers or groom young girls' affiliation to technology careers. The results revealed that firms did have initiatives that address the women agenda at firm level and some at grassroots level in schools to support gender equality, although some felt that they could be doing more.

"We train girl children in Tech with partnerships with technology firms to train and groom girls on coding and other technology skills." (P8)

"We have specific programmes that attract young graduates as interns, we have a recruitment drive in universities and high schools and spark interest in the sector and firm. We have employee resource groups that ensure women are supported in their career development plans. We also participate in Women in Tech conferences or speaking we assist with resources so we can support them to participate." (P10)

"We are not doing enough, and in the IT section having been acquired by another firm we have a lot to adjust to. Cross skilling, and understanding that we are a global business. International or exhange programs such as assigning candidates to other

regions would empower women and assess different country specific ways of doing logistics. The technology experts are in Europe for us and we have Health and Auto expertise so exchanging would assist with cross skilling. Building a niche skill for yourself in the market due to the small number of players and the market. Rural schools are still backwards in terms of STEM subjects so the limitations of women who are willing to take up this career, and if we are serious about it, we should start from schools and adopt them from a young age to learn the skills and groom girls in STEM programmes. This is both private and public schools, we could focus on all of them and drive the fully fledged STEM empowered schools and include them as part of the graduate programmes we already have." (P4)

5.5. Results: Proposition 3

P3: Addressing gender equality issues at all three levels, micro, meso and macrolevel would derive economic gains for the technology sector.

To obtain a clear earnings levels and economic standing of the participants, the annual salary range of the participants was also asked to determine their earnings potential. The consensus was that there seemed to be higher earnings in the technology career compared to other careers. Some participants confirmed that the technology sector paid higher salaries due to it being a "tropical skill" as it is in high demand.

The formulation of codes for P3 was to determine if any benefits could be derived by participants' employment in the technology sector and how that had improved or not improved their lives; whether their gender had helped or not helped their technology career; whether there were gender equality initiatives that could be done at a macro-, meso- and micro levels; and whether they considered gender equality as a driver for economic gains. Figure 7 below shows the overall results derived from participants' feedback regarding gender equality at a macro-, meso- and micro levels and whether this had any bearing on gender equality outcomes for firms, industry and the country and whether the country could derive economic gains from such initiatives.

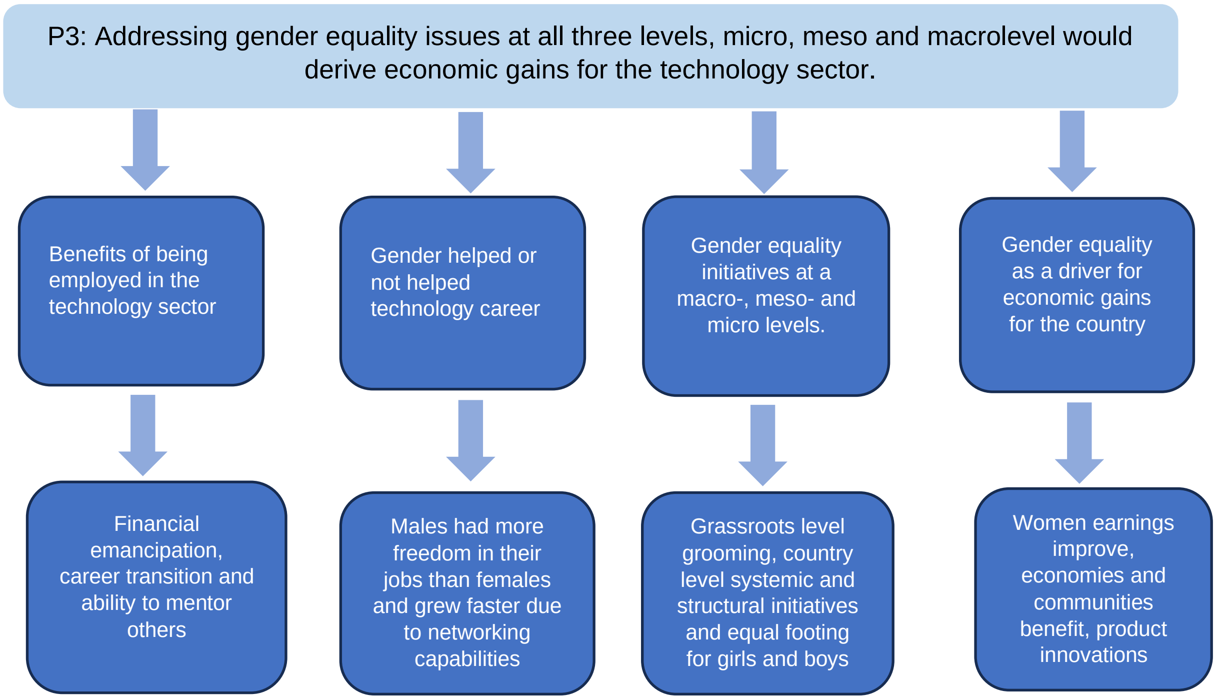

Figure 7: Overview of Results (Proposition 3)

5.5.1. Benefits of being employed in the technology sector

Apart from financial emancipation that the majority of the participants suggested they enjoy, the creativity, enhanced skillsets and the ability to grow within the firm had been some benefits cited for being in the technology sector. From the results, the participants also suggested that technology sector helped them transition their careers from other fields such as Finance into the technology sector as it permeates most areas of business and helped them understand the reasons behind the numbers due to the innovations they dealt with in the technology sector. Participants also suggested that being in a technology career, they now had the ability to empower young girls, and that it had brought confidence in their abilities as professionals. A lack of access to technology services while growing up was also cited as part of how a technology career has improved the participants lives as they now felt they could pay it forward and empower those around them and that they had learnt a lot from the sector and keep abreast of trends in the market and improved skills and capabilities.

"It has definitely improved my life. Working in tech has given me an opportunity to empower other previously disadvantaged youth and work with them in graduate recruitment programs. Tech has broken me out of my shell because in Finance I could

speak to numbers, but in Tech I get to see the difference we make in people's lives. The financial rewards are also very critical as in my past financial career I was paid less. I am now even more creative in the environment and being exposed to solutions like Co-pilot has made me learn a lot about what tech can do. Curiousity has also risen due to being in Tech and my role is also to drive innovation and I couldn't think of another space to work. I am now also able to drive thought leadership but can now have conversations and engage at a higher level in spaces that I participate in and driving thought leadership, I feel like I am living and not working only. It is part of living now and just part of breathing." (P5)

"From an industry perspective, ICT gets paid more I would think so. The AI, coding, tropical industry and therefore if it is a required skill it tends to pay higher. From improving my life, economic emancipation has been a big benefit as I am in tech sales and so rewards for me have always been great." (P6)

"For me, it gave me an opportunity in the technology space it gave me the business and financial aspects of the business. Other careers are narrow in that they do not have a holistic view of the business. But for me it has made me understand the business and has given me the tools even as a business person, entrepreurial perspective and entry to understand what is happening in other fields like supply chain even though I have not studied it." (P2)

"Oh my God! Wow, being able to be employed for a long time over 25 years has allowed me to build a very comforable life for my family, education for children and lead a comfortable lifestyle. But this has also given me an opportunity to learn and stay relevant within my capabilities and being able to keep employed and employable. Without that I think I would not be able to support my family and life goals I have set. The technology sector is needed and impactful for family, community and on other areas of life. Growing up I did not have technology access so I try to go back to my community to plant or give back support from a technology and other resources so they can pursue technology educational opportunities." (P10)

5.5.2. Gender helped or not helped technology career

When considering gender equality, this code required participants views about whether being male or female helped or did not help their technology careers. Some participants felt that being male assisted with their careers as it was easier to relate to manage relationships with line management or they could network with other colleagues after hours which was not so easy for female counterparts. Other participants who were female suggested they are now able to do things they ordinarily would not have been able to do before joining the technology sector.

"It has helped in that most males that were managing me were male and I could relate to another man as opposed to a female. Whereas a female manager it can be tough to feel vulnerable with. My male line manager I can contact at any time but females may shy away from something like that. It has helped me but I believe things are changing and females are leading so you end up relating to them. In terms of career growth I did not ask too many questions with my male counterparts but with females I tend to shy away from that." (P11)

"Being a male, I would not have been in the position I am in and throughout my career being a male has definitely helped in advancing my career. Recently since 5 years ago, women have been able to grow through it. However, females have had to struggle to grow and since we live in a patriarchal society it has had an impact on womoen trying to advance and social networking which the sector thrives on." (P12)

5.5.3. Gender equality initiatives at a macro, meso and micro levels.

For gender equality issues to be effective in all areas, initiatives at a macro, meso and micro levels were critical to ensure the gender gap is bridged. The results from the participants suggested that gender equality from a systemic and structural angle is being done but also women have to build the skillsets and confidence and put up their hands to join the sector. Other views suggested that while their respective firms have a strategic intent to drive gender equality, targeting girls and boys at schools so they could begin career studies with an equal footing would also drive gender equality at grassroots level.

"On the one hand we have structural and systemic programmes that are being driven for women to grow skillsets, on the other hand it is the participation levels as I mentioned so how women put up their hand and join the sector. How do we build confidence and how do we get women to feel permanently invited for a job or opportunity even when they don't fill the 100% criteria. It is also an innate and willingness as a driver for women to join the sector. How do we get women to self-master and join women leader or shadow them so they can get used to the space and how to operate in the environment." (P10)

"I'm appreciative of my firm's strategic intent to hire women in tech and leadership positions. From a country level I think there is initiatives to drive gender equiality and from lower grass roots levels then there is also a need to drive technology careers from a young age." (P6)

"I think we need to target schools, so that by the time you choose a career you already have a path and if we teach girl children in school it gives an option to ensure they are able to learn and get ahead before tertiary. So balancing the scales for both girls and boys is important so they have equal footing." (P8)

5.5.4. Gender equality as a driver for economic gains for the country

Gender equality as a driver for economic gains in the country or technology sector demands a holistic view of where women empowerment could derive gains for communities and the country alike. The participants views demonstrated a resounding consensus when considering whether gender equality could be a driver for economic gains within the sector or country. The reasons were such that if women empowered, families and communities becomes empowered and even children education gets improved. Other results suggested that through women participation, the type of product innovations that would be derived would also improve women and girls' lifestyles and therefore contributing to the economy.

"Absolutely! There is a saying that when you empower a woman you empower a community and so many doors will open if you offer opportunities to women. People gravitate towards other people that are like them so if we don't open up the space to other women and mirror the environment and mentor each other to aspire to them, we limit them but if we do we empower them. There is power in numbers so women seeing

others can inspire them to grow. Representation that matters and those in power how they open doors for others and not as a tick box exercise for the sake of compliance." (P10)

"Definitely! Economic gains can be derived from gender equality in the sector. Women have always been seen as housewives and by getting them into jobs they are able to work and earn salaries and look after families. The financial emancipation also grows our economy quite well since women are now equal to their male spouses as they bring in income to the household." (P7)

"Absolutely! Think about the different products or solutions that we do which assist women. What can be done with regards to women's needs for menstruation, menopause, and not only just male neautral solutions. If you look at top 10 firms in the workplace, about 6 are technology companies and are male driven and focus on tech but what would happen if they included women in the leadership. More products for women would be generated and it is inevitable that if you bring women into the picture you drive innovations to existing and new products which would benefit the economy." (P5)

"Definitely! If we could get more women and there is a shortage of about 360 employees in technology. Countries like Estonia, Singapore and others have prioritised education and make them skilled in tech so they can identify gaps in the environment to drive skills in tech. Technological skills is on the scarce skills list in all countries including SA and it cuts across all sectors even medical sector where we have doctors we cannot employ but import them from Cuba. So government needs to have an implemented policy to address skills shortage in Tech." (P12)

5.6. Results: Proposition 4

P4: "Doing and undoing gender" are some strategies that allow women to pursue and remain in technology careers.

"Doing and undoing gender" are some strategies females have been suggested to employ to persist in technology careers. This concept was explained to participants, with examples given for clarity to those participants who did not understand it. The code was formulated to understand whether the participant's job required long hours and how often, how the participants balanced their family and work lives, whether their families supported their technology careers, participants' motivations for taking up a technology career, how the participants managed being male or female in the technology sector, and participants' views about what caused females to take up or not take up technology careers.

Figure 8 below shows the overall results from the code doing and undoing gender and its code and each code will be discussed with quotations from some of the feedback received.

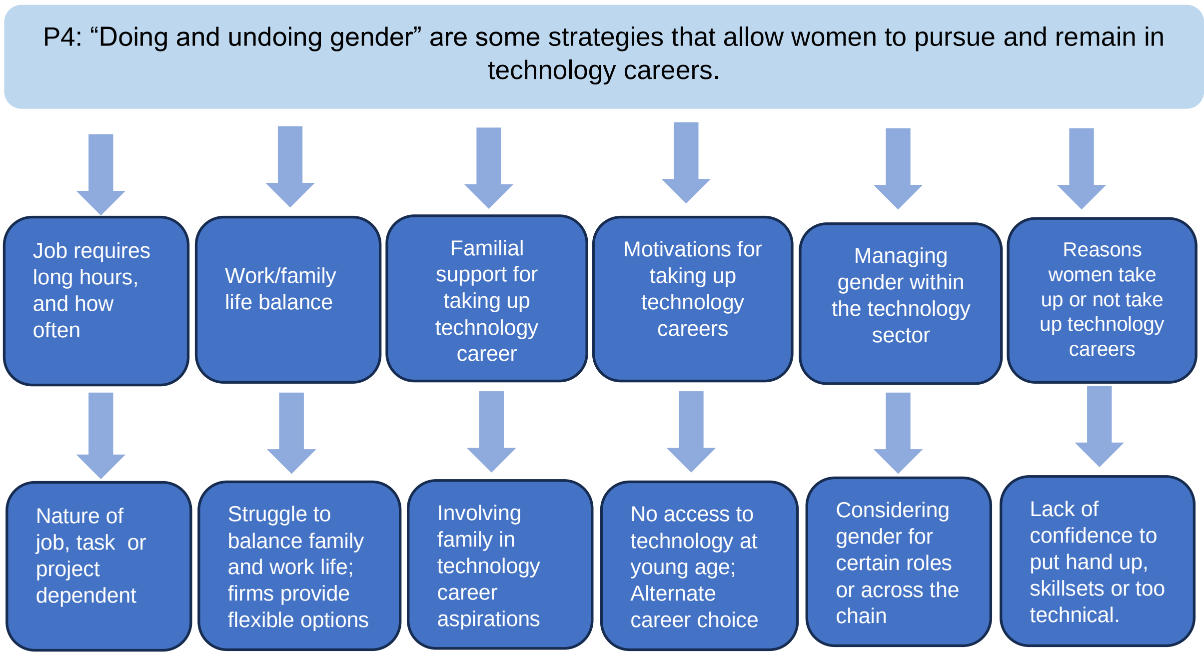

Figure 8: Overview of results (Proposition 4)

5.6.1. Job requires long hours and how often

The code on whether the participants' job required them to work long and how often they had to do so was to ascertain whether their job had regular long hours of work which can compromise work/life balance if not managed properly. The consensus amongst participants was that it depends on the project, job or task that was at hand but this was not the standard norm. With technological advancements and collaboration tools which allow employees to work from home, some participants suggested they do not always have to be at the office and can take work home if required. However, this was not the norm in their lives and it was dependent on the work being done and its nature whether it was to fix a bug in production which couldn't wait or if it was to fix something broken. On the contrary, other participants felt they had to work long hours due to the volumes of the work they do or due to the night shifts the environment they work in demanded. Feedback related to long working hours was received from some participants while others felt that their employers were starting to be accommodating and offered flexible work timelines.

"Yes it does require long hours but it depends on the project and timelines. It is not standard and is only by exception. Sometimes you have to take work home, and depending on the nature of the problem in production there may be a need to resolve issues during weekends or nights. In terms of takling work home, it is more preferential and based on family requirements depending whether the task can be done at work or at home." (P2)

"Yes absolutely I am required to work long hours often. Maybe 3 of the 5 days a week I may be working long hours. The nature of the work demands long hours due to volumes. The average work allocation is that a person can do work for 3 people due to the workload." (P10)

"Mine does because I am in incident management and I operate in a 24/7 business which requires resolution. In a technology space the stability of the environment determines how often you work, but if the environment is weak you end up seeing longer hours. So it is not often it just depends on the amount of work and nature of concerns." (P3)

"There are times where I will work 12 or 6 hours but normally when we are off shift we hand over our work to the next team. Unless if work was not finished then you finish it but it depends on the problem which may lead to long hours." (P11)

"It is mostly from a level 1 perspective so it is a 24-hour job and it is 12 hours which also allows them to work shifts and they get LILO and it is based on 4 days on and 4 days off. The other females not on shifts work normal hours but we are very flexible and we don't keep seats warm and only focus on outcomes not presence. Dress code is also informal to allow people flexibility and comfort." (P12)

5.6.2. Work/family life balance

The code on work and family life balance was to determine if the participants felt they have a work and healthy life balance where they allocated enough family time and work time. Participants suggested that it was tough to balance work and family life due to the demanding nature of their lifestyles and because of other family needs like commuting to school in the mornings and afternoons. On the other hand, some participants felt post-Covid 19, some rules around family requirements have been accommodating to family lives; while others suggested that their teams had a close bond and knew each others' family lives assisted in promoting healthy work/life balance through encouraging taking leave or offering work from home and/or rotation basis.

"It's tough because you have kids that have to be taken to and fetched from school. You find that sometimes you work from early morning to late evening so you need to make arrangements that need to be made. This is both female or male and it has been an issue and we have raised them but sometimes it is not accepted in terms of the firm being more important. Some colleagues have even felt they want to change jobs due to that. It is a challenge because even with nanny some cannot drive so it is an extreme difficulty at the moment. Must be tougher for the females." (P11)

"We are a very close knit team and we know each other's children and family lives. We try to support family life. We structure our shifts so that 4 people are available and if someone needs to be on leave we cater to that. We also try to rotate shifts and allow a promotion path so that people do not work shifts for long. Family, future and finance we strive to attain and we try to enable our people to have open door policy and enable them to progress." (P12)

5.6.3. Familial support for taking up a technology career

The code on whether the participants' families supported their technology careers was formulated to obtain participants' views as to whether the familial support and motivations to persist in the technology sector. The majority of the participants concurred with this notion that their families supported their careers and emphasised communication with them as a driver for sustained support. Some participants cited that their work requires them to travel a lot and communication and planning do allow them to travel as their families can function even while they are away. Career transitions into technology sector also required a lot of family support for some participants who felt they needed a career transition into technology.

"Yes there is support for my career in my family and the important thing is to communicate about it especially since we work night shift. Even to my children I communicate it, and there is support it is not easy as my partner is in the medical profession so it is not easy." (P11)

"Absolutely! I travel a lot as part of my work so I can leave for days on end and the household can run even when I am not there and I am free to travel as I need. My job requires continuous learning so I am often in training or exams and my family understands that I need to attend to this career goals and the adaptability of my family helps." (P10)

"Yes, my family supports my technology career. My background is a qualified CA (SA) so when I was able to explore the engine of the organisation to use my financial knowledge to be able to advise and work with the firm to learn more about tech. I then studied to align myself to the tech sector. The research process has been gruelling but it taught me a lot about the work required in Tech. But support from family during this transition assisted and the need for me to adapt to IT was essential for my transition." (P5)

"Yes they do, and they look up to me. They tell family proudly about my success and career. And they say it with love and pride since it is medical IT and the satisfaction you get from it knowing you are saving lives, even my family is looking to work like me. They want to follow in your footsteps and it is motivating." (P7)

5.6.4. Motivations for taking up technology careers

The code on motivations for taking up technology careers was critical in understanding how participants ended up doing the work they did. Some motivations suggested that it was an alternative career to the first choice the participants had wanted. What got interesting was how most participants mentioned that they came to love the sector once they were in it after not winning in their initial chosen careers. There were a minority that mentioned they grew up in the technological environment so it was a natural progression to work in that career. What also became evident for most participants was that although they now work in the technology sector, they did not always grow up having access to technological services or products. This has resulted in some of those participants to pay it forward and groom young girls and boys in their immediate communities to ensure access from grassroots levels.

"I was going to be a doctor so life happened and I ended in technology and I came in to technology by chance but I fell in love with it and realised there is a lot to learn in it. The preconceived ideas about it being for nerds and owe don't communicate it enough that the tech space is full of alternative paths and sections without necessary being technical. So most people I have seen do not come from technology but the impact of technology on lives and work is very great to witness." (P10)

"First I wanted to be a medical doctor but because of family finances, I wanted to study computer science. Studying computers was something very interesting and it seemed special to be studying computers and therefore I fell in lovbe with the sector." (P2)

"For me it was pure chance, I got a bursary from telecoms firm and engineering sounded dangerous so I tried technology instead. Because I am a fiddler and I always try things so when I got into coding I was learning a lot and there is always more than one way of doing it, and as a coder it meant I could try new things and 20 years later I am still here." (P8)

"I was interested in Tech since high school and had computer studies in high school and from there it grew onto me until University and beyond and even work. My family knew and my Mom groomed me from a young age for it." (P9)

5.6.5. Managing gender within the technology sector

The managing gender within the technology sector code was formulated to understand how females handle being female and the same for the males. The aim of this code was to obtain insights into whether the males had to handle or manage to be male in how they conduct their jobs. This also assessed whether the male participants had to consider their female counterparts in the workplace and how work got done. The majority of the participants suggested that they did not have to manage being male, but some female participants suggested they used being female to their advantage to be drivers of change and to infuse nurturing into the work environment. Some participants do not consider gender since their circumstances led them to grow up not focussed on gender. An opposing view was that women also need to stop relying on programmes and instead go out and find opportunities for themselves and not rely on programmes.

"I don't realise being a female in the sector as I joined at a young age and I have not had the time and thought to consider being a female. I have not had to be reminded of being a female and I have been fortunate to have people around me who did not bring the female issue up. However, there are female leadership programmes that have been developed and I would be invited so it made me realise there is a context to it. I am observing that some women are using being a crutch in a male dominated environment so the stance is that women now tend to drive their growth purely because of this forum. Outside of the forums they are not visible and only stays in the forum so it is almost futile as it is not the same loud gender equality issues outside of forums. Let's give a chance to be women outside of the forums and let's pursue opportunities for the sake of the opportunities not because we are driving a point. I mentor young women in intern and lower level environments but the women have grown into mid career so there was frustration around no growth and so dependency on programmes. So let's lead with finding opportunities for ourselves instead of waiting for programmes to create them." (P10)

"I use it to my advantage, as I am unapologetic about my position. I currently work with the CTO portfolio and I am the only female who is his direct report. So I use it to my advantage to direct certain areas of the team especially since it is males who are technical so with 7 boys in the room, no one focuses on the people element so I bring that in the room. It is not about being in a skirt and heels and be a sounding board so that they can bring the people element to it. I now even play a part with onboarding of new candidates with passion and align the new ones with their skillsets and growth paths, not just focussing on technology so I provide a leadership role and I embrace my femininity but I call out the human element of things. We do not need to be boys at the table to make an impact. Technology represents its creators so we have to adapt landscape to suit both men and women so being at the table requires me to bring the female elements to the conversation, and these products need to suit women so that we

can adapt to the changing lanscape as most products are male suited more than females." (P5)

5.6.6. Reasons women take up or not take up technology careers

When considering this code, the aim was to understand the reasons why women took up or did not take up technology careers. With perceptions of the technology sector being difficult and the technical nature of the technology jobs, participants suggested that women still perceive the sector as difficult or lifestyle changes have led women to change demanding technology careers. Other suggestions cited were that technology careers require constant accountability may deter females from taking up technology careers, while the data analytics and financial emancipation brought on by the job were some reasons cited for taking up technology careers.

"I'm thinking why there's one or two top executives in technology. I think women have other factors that they have to deal with. A friend or ex colleagues of mine had married, got children and then decided an IT career is challenging. Sometimes women choose less demanding careers so they can be able to cope with all the other demands that they face. From a country or outside perspective, women think it is too technical just like in Engineering so then lack of interest in it. Some women don't even feel the need to prove themselves to anyone so STEM roles are not appealing to women as result."
"The 24/7 kind of accountability, you are responsible for the organisation throughout so people could feel it is too much responsibility and continuously. The tech landscape is analytical and flexibility is also important, and women in the tech space are very analytical whereas their male counterparts seem to be more rigid so females seem to enjoy the analytics within this space." (P6)

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5.7. Summary of results

From the results, it has been ascertained that gender equality is still not achieved at the macro, meso and micro levels. The availability of employment opportunities for women in the technology sector still reveals that there is nascent demand of technology careers, partly because women lack confidence to seek out such opportunities as they perceive them as difficult and also because firms are still very largely meritocratic and logical in how they recruited. This filtered into how recruitment decisions for technology careers were still undercut by women's suitability in terms of skills and how many firms are still lagging behind when it comes to women empowerment initiatives in the firm to deliberately recruit women in top leadership and other levels. The low representation of women at all levels within the firm further suggested that gender equality is still not reached and this was evident even in firms where there were more females than males. This has led to influential factors that drive women's opportunities in the technology sector through initiatives targeted at encouraging women's affiliation to the sector, albeit still slow.

Gender mainstreaming efforts, although very pervasive at a macro and meso level, it is still lacking at a micro level as many firms still do not have policies that cater to gender equality issues. Furthermore, women involvement initiatives in the technology sector were still not mature and varied amongst firms as they were not specific enough. Women leadership including Board level seemed lower than women in all levels and this was true even in firms with higher females than males in leadership.

"Doing and undoing gender" was influential in how women perceived the technology sector to be demanding work with long hours, and how this was perceived to impact work/life balance and revealed the motivations for the many participants who joined the sector. Other views around women's reluctance to take up or not take up careers suggested that although there could be initiatives that support driving the gender equality agenda, the onus is on women to have the willingness to pursue and persist in technology careers.

Chapter 6 discusses the results or findings made here and concludes with a summary of findings compared to the literature and whether these add to, extend, or contradict the literature.

6. Discussion of Results

6.1. Introduction

The results from the data collected from semi-structured interviews as presented in Chapter 5 are discussed and will be summarised in Appendix 3. The discussion is presented according to the sequence of the propositions made and collectively provides into gender equality as a driver for economic gains within the technology sector.

The results are compared and contrasted against the existing literature to extend the body of knowledge related to gender equality being a driver for economic gains.

6.2. Discussion: Research Proposition 1

The first research proposition explored the relationship between gender equality and employment opportunities for women in the technology sector. The literature suggested that while women's educational attainment in the STEM sector has increased in recent decades, women's opportunities for employment in the technology sector are still low (Parmaxi et al., 2024). The literature further suggested that gender equality work in organisations is still dependent on the country context and that firms are still meritocratic and logical in their recruitment drives, and how their organising practices still uphold and promote gender inequality (Ringblom & Johansson, 2020).

The discussion of this research proposition commences with the relationship between labour force participation and gender equality, which largely determines the availability of employment opportunities for women in the technology sector. Labour force participation is largely rooted in the neoclassical school of thought, which determines a country's economic growth and is the focus of this research study. Each of these will now be discussed in the sections that follow.

6.2.1. Labour force participation and the availability of employment opportunities for women

According to Ruiters and Charteris (2020), the neoclassical school of thought suggests that sustaining a steady economic growth rate requires three factors to be at play: capital, labour and technology. In terms of this growth model, the neoclassical school of thought seemed to strive for a purely positive impact of development on gender equality and female labour force participation in all stages of the country's development; while other opposing views suggested that this is purely dependent on the country's stage of development. The authors further suggested that there are various direct and indirect factors that can impact female labour force participation. These factors were the elimination of gender discrimination, which limits the employment opportunities available by eliminating qualified women from the talent pool as less qualified men dominate the opportunities; women's improved earnings potential which increases household bargaining power; and gender distortion due to separate "male and female activities" that spouses undertake resulting in losses experienced from lack of female participation and diminished returns from male participation (Ruiters & Charteris, 2020). On the opposite end of this spectrum, in low-income sectors such as agriculture, where household and market production were closely linked, female labour force participation rose considerably compared to industries like manufacturing and services (Ruiters & Charteris, 2020).

This study found that although employment opportunities for women in the technology sector do exist, women still lack the confidence and the positive attitude to apply for employment opportunities in the technology sector as they perceive it as difficult and this phenomenon is acute even with high educational attainment in STEM qualifications. Another finding was that firms were still largely meritocratic and logical in how they recruited within the firm. The lack of gender equality policies when making recruitment decisions also negates gender equality and exacerbates this problem. This challenge creates scarcity of employment opportunities and deters women's participation in the technology labour force, although opportunities are available and they do possess the necessary skillsets.

During the interviews, participants' views about whether women employment opportunities existed were asked. All 12 participants interviewed were very discerning in their explanation that meritocracy, attitude to learn, and logic still drive employment decisions and that as much as opportunities do exist, women must be willing to pursue them. These findings indicate that although women are increasingly obtaining their qualifications in the STEM sector, the availability of opportunities for women is still very low as meritocracy and logic, not gender equality, still drive recruitment decisions thereby limiting female labour force participation and stifling economic growth (Ringblom & Johansson, 2020;

Ruiters & Charteris, 2020; Schreiber & Zinn, 2023; Parmaxi et al., 2024). This further suggests that awareness programmes at all levels of society to join the technology sector are critical, but it also places the onus or responsibility on women to seek opportunities in the technology sector and not wait for programmes or gender equality initiatives.

6.2.2. Recruitment decisions for women in the firm

Ringblom and Johansson (2020) suggest that the drivers of gender inequality in male-dominated work organisations were entrenched in two concepts: inequality regimes and intersectionality (Ringblom & Johansson, 2020). The first concept emphasised how work organisations, through their organising practices, produce and uphold inequalities, while the second concept explained the intricacies of how power and oppression related to marginalised groups were explored. Furthermore, the authors argued that most firms' organising practices are still very meritocratic and logical in their recruitment decisions without considering gender equality as a driver.

This study found that firms had different approaches to recruiting women in the technology sector. On the one hand, considerations of whether they possess the skills and whether they are capable of doing the job took first prize. There were also discussions about how BEE and other employment equity laws exist as a guide however due to historical and industry contexts, women are still not fully considered, or if they are considered, then some firms' deliberate efforts to upskill or to target women became the decider on whether women can be employed or not. It, therefore, suggests that there are no universal gender equality considerations amongst firms and that gender equality is still only partially considered at the micro and meso levels.

Participants' views about how employment opportunities for women came about in their respective firms were asked. All 12 participants were discerning in how historically there has been a gender gap in terms of women joining the sector but firms are now trying to catch, albeit still slow, to prioritise women employment in the technology sector and to be deliberate about gender equality efforts in their recruitment decisions. These findings indicate that recruitment decisions of firms ought to include gender equality in their efforts, and that the meritocratic approach to employment is still a driver as far as employment decisions for women are still concerned at both the micro and meso levels (Ringblom & Johansson, 2020).

6.2.3. Women in leadership positions and other levels

The United Nations' SDG 5 aims to ensure that women have equal opportunities to leadership positions, that they have access to enabling technology services and strives to end all forms of discrimination against women and girls (United Nations, n.d.). Equal representation of women all levels within the firm is the major driver as far as gender equality outcomes are concerned. At a macro level, gender equality targets and the employment equity policies have been impactful in their efforts to drive this phenomenon. Despite these efforts, gender equality at the industry and firm levels still requires much attention, particularly women representation in leadership and other levels in the technology sector (Vyas-Doorgapersad, 2018; Bairoh, 2024; Parmaxi et al., 2024).

This study found that there are opportunities for women at all levels or a succession plan and company targets were a driver for employment opportunities to groom women to leadership and other levels, therefore equality in women representation in leadership positions and other levels is still not achieved. The discussions related to this were also driven by how there are policy related targets and laws like employment equity which strive to drive gender equality at a macro (country) level, but at a technology sector and firm levels there is still inequality in women leadership and other levels partly due to historical inequality regimes and partly due to the succession pipeline challenges where women perceive the technology sector as difficult and thereby limits their appetite to join or lead in the sector.

Participants views about whether there were currently any opportunities for women in leadership and other levels within their respective firm were asked. All participants felt that opportunities for women at leadership existed but this was either determined by the firm's strategic intent or succession plan to groom women and this intention was not present across all firms as most relied solely on meritocracy and skillsets. These findings, therefore, indicate that for equal representation of women in leadership and other levels to be achieved, firms have to be strategic and intentional about recruiting or grooming women into leadership positions, and this is closely linked to recruitment decisions discussed above.

6.2.4. Factors that influence the kind of opportunities for women in the technology sector

Western context countries have been leaving technological sector careers, while non-Western context countries have been pursuing technological careers, and this trend has increased since 2012-13 (Saifuddin et al., 2022). This suggests that encouraging technology careers within developing countries and the pursuit of technology qualifications has risen considerably during this period. In the same vein, familial support has been regarded a drive for women pursuing technology careers and this has been cited as the greatest differentiator in the patriarchal societies of women in developing countries. Societal norms often shape men's and women's perceptions of what it means to be identified as a male or female (Greene & Patton, 2020). Gender equality is crucial to the core of women's empowerment and how girls were raised within patriarchal societies, and this transcended into the type of employment opportunities they pursued (Saifuddin et al., 2022). At a firm level, these factors and other gender equality initiatives were not applied in arriving at recruitment decisions for women in the technology sector.

This study found that there were not any specific criteria or factors that influenced the kind of recruitment decisions made for the kind of opportunities that are made available for women. Meritocracy and logic were the major factor when considering the kind of opportunities that are made available. Gender equality policies at a macro level also did not exist for some participants' firms thereby negating the gender equality agenda. The results were further informed by how some participants felt this is a point of improvement as their firms do not currently have any factors that drive employment opportunity decisions for women in the technology sector.

Participants were asked whether there were any factors that influenced the kind of employment opportunities they made available to women in the technology sector or section of the firm. Most participants suggested that gender equity targets at a firm level were the driver or that they did not have anything related to gender equality and this had no influence on how they decided to recruit and saw it as a point of improvement for their respective firm. These findings suggest that although there are factors that influence gender equality decisions at a macro (country) level and societal levels, many firms still do not get influenced by these initiatives and these may be a compliance tool rather than an intentional or strategic initiative at the firm level.

6.3. Discussion: Research Proposition 2

The second research proposition will discuss gender mainstreaming efforts within the firm and how these could have supply-side effects for economic growth within the technology sector. The literature defines gender mainstreaming is a concept where firms drive all focus to the gender equality goal and make it central to all socio-economic activities (Vyas-Doorgapersad, 2018). The literature further suggests that although at a macro (country) and policy level, this definition has been impactful in mainstream topics such as healthcare, education and public service; it has been shortcoming in the technology sector. Kabeer and Natali (2013) further explained that past economic models focused on exogenous factors such as labour as a given factor in an economy's production, which was usually determined by population growth rates. The authors further suggested that this led to the exclusion of human aspects of growth including gender issues and empirical models relied on GDP per capita income levels, and that gender issues should be factored in newer economic models to drive economic growth.

The discussion of this research proposition commences with the understanding of the ratio of men to women within the firm or IT section of the firm, and how many of the women colleagues are at top leadership including Board level, whether the firm has policies that cater to gender equality within the technology section or firm, and the kind of women involvement initiatives that the firm undertakes to drive the technology sector. Each of these will now be discussed in the sections that follow.

6.3.1. Ratio of men versus women in the technology section or firm

The ratio of women versus men in the firm is a direct representation of whether the firm recognises women's involvement, particularly in the technology sector. The literature suggests that efforts at the firm level and particularly within the technology sector are critical in ensuring that gender equality issues are factored in all aspects of the firm (Vyas-Doorgapersad, 2018) and that although at a country level, these policies are impactful, at a firm or sector level the same policies are not adhered to thereby driving gender inequality as other factors like meritocracy take precedence over deliberate gender equality initiatives.

This study found that majority of the participants firms had more men than women in the technology section of the firm or within the firm in general. This discussion had to be adapted to suit the circumstance of the participant as some firms are technology firms so the decisions were at the firm level. This finding held true even in the rare cases where the firm had a majority of women at a firm level but had fewer women in the technology section of the firm.

Participants were asked to estimate the number of males versus females within the technology section or firm depending on the circumstance of the participant. Most participants indicated a higher ratio of males versus females within the firm or IT section and this was true even for those that had more females than males at a firm level. These findings suggest that although firms have factored women in their recruitment efforts and this is evident in the ratio of men to women, there is still no equality as far as equal representation of males versus females at all levels.

6.3.2. Female colleagues at top leadership including Board level

Top leadership and the Board of a firm are perfectly positioned to drive gender equality issues within the firm and to model best practices for other firms in the industry. For this reason, the literature suggests that women representation in leadership positions is crucial in order to drive the gender equality narrative and to model practices that provide maximum impact through leadership power and influence. Women representation at top leadership is still a challenge for many firms within the technology sector, and Target 5.5 advocates for “women’s full participation and equal opportunities for leadership at all levels” (United Nations, n.d.). In addition, gender equality is considered a strategic imperative by senior leadership and therefore, middle managers act as “change intermediaries” who have to cascade this strategic imperative down to junior staff for execution (Kelan, 2022).

This study found that fewer women colleagues are represented in top leadership, including at the board level, and that this is true even for firms where the ratio of women exceeds that of men. This links to the ratio of males versus females discussion held above. Furthermore, the study found that although women leadership existed in some participants’ firms, some firms were recruiting outside at the senior management or C suite and Board levels as succession plans did not cater for employment opportunities at those levels for women.

Participants were asked that out of the ratio of males to females that was discussed in the previous section, how many of the females were in top leadership including Board level. The results to this question suggested that all firms in the sample had fewer females in top leadership, including at the Board level, and this held true even for those firms that had a higher ratio of females versus males. These findings suggest that there is still gender inequality at the leadership including Board levels and that firms need to put in place measures at the firm level to try bridge the gender gap at the helm of firms.

6.3.3. Policies that cater to gender equality issues within the firm or IT section

The OECD Toolkit for Mainstreaming and Implementing Gender Equality 2023 was designed to support a range of decision-making institutions in their internal processes and improve gender-related policies, legislation and services. The Toolkit consists of 6 chapters which provide good practice guidelines and indicate pitfalls to avoid in so far as gender-sensitive practices in parliament, public employment and the judiciary; the strategic use of governance tools to aid gender mainstreaming efforts in infrastructure; and the institutional and governance frameworks for gender equality and mainstreaming. According to the Global Gender Gap Report 2024, there is significant investment in the future for countries to implement gender pay equity initiatives to redress the gender pay inequities of the past. This suggests that many economies globally aim to address gender parity issues through Diversity, Equity and Inclusion (DEI) policies, however this has been slow as one in five economies that have legislated equal pay for equal work had also implemented measures to redress the pay gap. Other views suggest that there have been many gender pay studies in South Africa with the consensus that these largely stem from structural pre-Apartheid regimes (Mosomi, 2019; Casale et al., 2021; Oyenubi & Mosomi, 2024). While these initiatives are all well and good from a macro governance and institutional perspective, at an industry and firm level, the technology sector is still lacking in guidelines for achieving gender equality.

This study found that specific policies to address gender equality including gender pay either in the firm or within the technology section of the firm are still to be implemented or were identified as a point of improvement. Another finding was that initiatives and not formalised policies existed within some firms as a means to address gender equality issues. Participants were asked whether policies existed at the firm or technology section. Most participants suggested that these are usually employment equity laws at a firm level. Nothing formal from a gender equality perspective existed or suggested that they have initiatives instead of formal policies that looked after women or general gender interests, such as flexible working times for mothers, catering for school drop-offs and the like.

These findings suggest that while gender equality is still being discussed and is widely acknowledged amongst firms, proper enabling policies that drive gender equality and redress mechanisms for gender pay inequity are still lacking if not existing at all. At a macro level, enabling laws do exist and have had an impact but at an industry and micro firm levels, particularly the technology sector, these are still worth serious consideration to intentionally drive gender equality.

6.3.4. Women involvement initiatives within the technology sector

The literature explains that "gender stereotypes" and misleading misconceptions about technology have deterred women and girls' desire to pursue technology careers (Shava, 2021). Women involvement in the technology sector is not viewed from a firm level but also at a grassroots level. The author posited that teachers' beliefs also greatly influenced girls' or boys' beliefs about pursuing technology-related subjects at school. For gender equality to be realised at all levels, families and communities must dissipate patriarchal demands and encourage women and girls to pursue technology careers (Shava, 2021). Previously disadvantaged girls and boys ought to be given access to enabling technologies to drive their affiliation with technology as this will have future implications once they are in the professional workplace.

This study found that most firms do have women involvement initiatives within the technology sector. However, these are not formalised as they were spread between internships within the firm or shadowing for succession planning, to the community or adopting schools, as well as graduate recruitment drives for promoting STEM professions. Participants were asked if their firms had women involvement initiatives and most participants were discerning in their explanation that they do have the programmes but they believed more could be done at grassroots, college or tertiary levels and particularly in rural communities where enabling technology is still extremely lacking. Some participants cited logistical challenges and exactly what to do in those areas as donating computers for instance would lead to other issues such as lack of infrastructure for network connectivity and safety as these could easily be stolen.

These findings suggest that not only is female or male involvement an important driver for the gender equality agenda, the findings also suggests that the initiatives have to follow a "whole of society paradigm" and a systems thinking approach which will be discussed in the next section - gender equality driving economic benefits at a macro, meso and micro levels.

6.4. Discussion: Research Proposition 3

The third research proposition will discuss economic benefits at a macro, meso and micro levels. From the perspective of Guthridge et al. (2022), the implication is that "context matters" when addressing gender equality issues from micro, meso and macro levels. Context psychology implies that "the mesolevel and macrolevel modify effects that emanate from a microlevel, and vice versa", suggesting that considering gender equality from all three levels is critical (Guthridge et al., 2022, p. 2).

The discussion of this research proposition commences an understanding of the earnings potential of the participants by understanding their annual salary range, whether being employed in the technology sector has improved or not improved their lives, how this has helped their technology careers, what initiatives they thought should be implemented at the macro, meso and micro levels, and whether overall they thought economic gains or growth could be derived through gender equality in the technology sector. Each of these will now be discussed in the sections that follow.

6.4.1. Being employed in the technology sector improved or not improved participants' lives

Guthridge et al. (2022) distinguish between macro, meso and micro levels: First, micro-level effects could be individual characteristics, including beliefs, values, emotions, behaviours and biology. Second, mesolevel factors have to do with interpersonal interactions with family, work, industry or school. Third, macro-level factors include broader social and cultural norms, religion, and politics.

To assess this concept at a micro level, the participants were first asked their annual salary range to determine their earning potential and then questions around whether they thought being employed in the technology sector had improved or not improved their lives. The participants suggested that because technology sector is a tropical skill it tends to pay more which has led to their economic emancipation, in addition to other benefits. This study revealed that being employed in the technology sector has had great improvements in the participants' lives, both professionally and personally. Reasons cited for this were financial emancipation as most participants felt that, compared to other sectors like Accounting, they enjoyed higher financial rewards. Secondly, the participants suggested that the technology career has improved their career prospects as some transitioned careers or are able to have a holistic understanding of the business due to being in the technology section or firm. Furthermore, community involvement in paying it forward and grooming young boys and girls to love the technology sector was another finding from the participants.

These findings suggest that although there is still inequality in terms of male versus female employment in the technology sector, for those who are employed in it, there are both financial and other gains or benefits that can be derived from it. This has permeated across the participants' immediate societies and communities, which is driving the gender equality agenda forward.

6.4.2. Gender helped or not helped technology career

As discussed in section 6.4.1. above, Guthridge et al. (2022) suggest that gender equality outcomes should be between genders and vice versa at the micro level. This concept aimed to find out whether being female or male has helped the technology careers of the participants. Social norms in this context are considered normal behaviour by societies or groups within a community (Guthridge et al., 2022). Participants suggested that being employed in the technology sector did help their careers, and this was particularly true for males who cited reasons such as being able to resonate with their male line managers and being able to engage in social networking activities after hours, which the technology sector community thrives on. Some female participants also mentioned they do attend social networking events and are now able to join industry networks and other forums that drive women's empowerment and the gender equality agenda, as well as create a community of professionals that are thriving for one common cause.

These findings suggested that women's empowerment through industry and social networks is critical in driving gender equality, and both women and men have greatly benefited from these initiatives over the past five years.

6.4.3. Gender equality initiatives to be done within the firm and sector

Affirmative action laws should reduce individual prejudice through increased contact between genders (meso), and this can also take place from the bottom up, where prejudice against women and girls was considered a “multilevel syndrome” (Guthridge et al., 2022). Saifuddin et al. (2022) further suggest that familial support was the most influential factor in women pursuing technological careers in patriarchal societies. Women familial support in this context has had a great influence in terms of whether they choose to pursue technology careers. This also has major ramifications as some women were raised to only consider “feminine” careers such as in health, education or hospitality for instance. For firms to change this narrative and drive gender equality within the firm, gender equality initiatives have been suggested to align women and girls’ affilitation with the technology sector.

This study found that initiatives such as teaching girls and boys that technology from a grassroots level is an enabler for all was important. School subjects such as robotics are critical in shaping their affiliation with technology and to ensure that they do not only get to see it at tertiary level. This was also required, particularly in government or public schools, which usually lack subjects such as robotics or technological infrastructure, to be able to adequately offer enabling technology to girls and boys and to teach them that these are not gender roles.

These findings suggest that although enabling policies do exist, as discussed above, these other initiatives from an implementation at the grassroots level are still lacking. Therefore, enabling technology should be between genders at the meso level and must include societal and family support as well as drive individual beliefs in schools that technology careers are worthy of being pursued.

6.4.4. Gender equality resulting in economic gains for the country

Systems thinking conceptualises the intersection between problems and processes locally and globally (Arnold & Wade, 2015 in Guthridge et al., 2022). Systems thinking is a "complex interplay of solving wicked problems with constantly evolving factors" (Barnejee & Lowalekar, 2021 in Guthridge et al., 2022, p. 1). According to systems thinking, gender equality can be realised only if interventions at the micro-, meso- and macrolevel are aligned and not individualistically derived. At a macro level, the OECD Toolkit for Mainstreaming for instance are some tools that the country is aiming to align with the global context by driving best practice guidelines for gender equality and redress mechanisms for past gender inequality regimes.

This study found that initiatives at a country level do exist but the lack of practical implementation is the challenge that many firms face when they want to partner with government on these initiatives. The concern was whether to target schools, but with schools, you also need infrastructure and what happens in terms of getting resources to those schools, especially if they are public government-owned schools. Furthermore, initiatives lacked timelines as no clear roles and responsibilities are available when gender equality initiatives are meant to be driven from firm (micro and meso) to the country level.

These findings suggest that although guidelines like the Toolkit exist, clear implementation and redress mechanisms are still not coordinated and still leave much room for experimentation without clear outcomes from them. Therefore, targeted implementation efforts which have clear monitoring and measurement mechanisms are paramount.

6.5. Discussion: Research Proposition 4

The fourth research proposition will discuss "doing and undoing gender" as some strategies that allow women to pursue and persist in technology careers. Individuals and firms within the technology sector are still grappling with how this phenomenon can enable or disable women's persistence within the sector and whether this phenomenon is only related to females. Kelan (2022) suggests that male middle managers can act as change agents in how they influence gender equality in the workplace and act as change intermediaries between senior leadership and junior staff to execute the gender equality strategic imperatives as laid out by senior leadership. Other views suggested that "doing and undoing gender" also prevails in entrepreneurship (Branicki et al., 2023), within the public service (Bishu & Heckler, 2021) and even in social contexts such as male carer or female breadwinner families (Pinho & Gaunt, 2021).

The discussion of this research proposition commenced with technology career attributes such as whether the job required long hours and how often. Then the "softer" areas around whether family supports their technology career, how they balance work and family life and motivations for taking up a technology career were asked. After that, views about how the participants handle being male or female within their workplace or sector were asked and then finally views about reasons why women take up or not take up technology careers. This aimed to drill down into what barriers or challenges prevent gender equality in the technology sector. Each of these will now be discussed in the sections that follow.

6.5.1. Job requires long hours and how often

Grzelec (2024) suggests that many organisations are experiencing challenges dealing with the male-female gender dichotomy in efforts to improve gender inequality. The author further suggests that this places responsibility on organisations to find congruence between "doing and saying" when driving gender equality issues. Other than familial support and the patriarchal nature of societies that usually deters women from pursuing technology careers, the perceived long hours have also been suggested to be a barrier to joining the technology sector. Furthermore, the participants were asked if their job requires long hours and, if that is the case, how often this takes place.

This study found that most participants' jobs required long hours, but this was due to the nature of the job or due to the project or tasks that the participants were working on at that time. Furthermore, some participants alluded to the fact that due to shift timelines, they have to work long hours, but this was compensated by a balanced time off. Other participants suggested that since Covid-19, their work has become flexible and caters for school drop offs, and other family demands.

These findings suggest that there has been much flexibility within the technology sector, partly because of the nature of the job that it can be done from anywhere where there's connectivity and for the other human contact jobs there is flexible working hours. This links to the next section on work/family life balance.

6.5.2. Work/family life balance

As discussed in section 6.5.1. above, Grzelec (2024) posits that for gender equality issues to be adequately addressed, firms have to find alignment between how they promote gender equality issues and how they provide practical implementation for them. Perceptions of long hours and the impact this has on work/family life balance within the technology sector have been identified as a major barrier to women pursuing technology careers. The participants were asked how they balance work and family life demands to gain insights into whether this has had major impact on their work and family lives.

This study found that most participants do their best to balance between work and family life and they also encourage those they lead to do so by encouraging vacation time off, scheduling important family events and meeting daily life requirements such as school drop offs and family meal times. Other participants suggested they have a close relationship with staff and know their family needs, which ensures they are accommodating, especially since Covid-19.

These findings suggest that many firms are aligning to work/life balance demands by ensuring flexible working conditions and driving the overall employee value proposition. This ensures that employees have all-around well-being between work and family, which impacts productivity.

6.5.3. Familial support to take up technology careers

Some countries in the Middle East and North Africa (MENA) region had derived improved economic empowerment for women through encouragement to pursue technology and computer sciences qualifications (Dutta Gupta et al., 2015; Hassan et al., 2011; Saifuddin et. al., 2022). Familial support was cited as the greatest motivator behind women pursuing careers in the technology sector in these developing countries, including South Africa.

Participants were asked if their family supports them pursuing a technology career to find out how they negotiated their chosen career path with their families. All participants suggested that their families support their technology career and that they themselves also enjoy working in the technology sector even if some cited they had other initial career choices and ended up taking technology careers by chance.

These findings suggest that familial support is critical to ensure that participants persist in their chosen career paths. It also suggests that it is not merely enough to have the skillsets and like it, but also societal and family support also assist in persisting in the technology career.

6.5.4. Motivations for joining the technology sector

Maslow's (1943) motivation theory, also known as Maslow's hierarchy of needs, is considered the pillar of human motivation. According to Maslow (1943), "People are motivated to achieve certain needs, and other needs take priority over others". The need for self-actualisation, which is greatly associated with social standing or educational attainment in realising one's goals, addresses some reasons women pursued challenging yet fulfilling technology careers.

Participants were asked what motivated to take up a career in the technology sector to find out what led them to choose the career. Most participants with the exception of two participants suggested they fell into it by chance and that it wasn't by design. The two participants suggested they grew up using a lot of technology around them and kind of fell in love with it from that young age. This suggested two considerations as discussed with the participants who fell into technology by chance: First, they suggested that technological services need to be provided to boys and girls at a young age as they struggled to access it growing up and now they love what it can do and the participants believe the same should be passed forward to young boys and girls especially in rural and underserved communities. Second, this seemed to suggest the nascent demand of technology careers and how there is a lot that can still be done to drive affiliation for the sector across genders, especially the youth and at grassroots levels.

These findings suggest that although technology careers are still nascent especially for females, there is still a lot that can be done to drive women participation in the technology labour force and to drive technology sector at the grassroots level.

6.5.5. Handling being male or female within the technology sector

The main aim of gender equality is to ensure equal representation of males and females in the workplace, especially in the technology sector. The current landscape is discussed in Chapter 5 and in Section 6.5.4. above is that there is nascent demand for technology careers partly due to a lack of technological services for women and girls and partly due to lack of motivation or confidence to pursue technology careers as it is perceived as male-dominated. Furthermore, the concept of "doing and undoing gender" has had many females conscious about how they handle themselves within the technology careers they have chosen to pursue.

Participants were asked how they handle being male or female within the technology sector and whether they feel they have to consider this in their work. The question was adapted to suit a male or female participant so that their views about whether their gender is something they have to consider and their views about how they observe the opposite gender were sought.

This study found that gender is not something they have had to consider or handle when doing their work and in fact most participants in the field feel being female has helped them raise their voice and be less timid. The male participants suggested being male had a great influence in terms of pay as they feel they would not have earned as much as they do compared to female counterparts, and being employed in a tropical sector like technology has also had its positive impacts. Other views also suggest the social networks that being male has allowed them to enjoy. These findings suggest that although gender did not matter too much when it comes to the work the participants do, the findings do still suggest that the gender pay gap still exists.

6.5.6. Reasons women take up or not take up technology careers

On the positive side, some reasons women take up technology careers is due to the motivations and self-actualisation needs as described in section 6.5.4. above. Women participation in the technology sector has had positive impacts on their financial emancipation and has enabled them to lead successful career paths due to being employed in the technology sector. The economic benefits of this were also discussed in the sections above, where women are able to provide for their families, encourage and inspire societies and communities, and also ensure they save for their children's further education and future investments.

On the negative side, despite the high number of women pursuing STEM qualifications from universities and technical colleges, the number of women who quit technology careers was high due to uneven gender roles in their families, society and within organisations (Parmaxi et al., 2024). Furthermore, women in the technology fields often face a number of barriers that inhibit their career growth, such as "gender bias and stereotypes, sexual harassment and a lack of a work-life balance, as well as socio-cultural barriers that hinder career progress" (Parmaxi et al., 2024, p. 3). These barriers and challenges, coupled with the technically demanding nature of technology jobs, have discouraged many women from pursuing and persisting in technology careers. Furthermore, sexual harassment was cited as another inhibitor for women to pursue technology careers as they felt isolated from social networks, which are requisite for career growth in the technology sector.

Participants were asked what they believe are some of the reasons women take up or not take up technology careers and most participants suggested the reasons already identified here as barriers. Furthermore, some participants suggested that women also need to take ownership of opportunities and not wait for gender equality programmes to take up space. These findings suggested that as much as there are many barriers to women's participation in the technology sector, the onus is also on women to pursue technology careers and not wait for them to be offered.

6.6. Summary of discussion on results

Appendix 3 below shows a summary of the findings from this discussion. The four propositions were discussed at length and some key findings from them are as follows:

First, gender and the availability of opportunities for women in the technology sector seems inversely related. These findings indicate that although women are increasingly obtaining their qualifications in the STEM sector, the availability of opportunities for women is still very low as meritocracy and logic, not gender equality, still drives recruitment decisions thereby limiting female labour force participation and stifling economic growth (Ringblom & Johansson, 2020; Ruiters & Charteris, 2020; Schreiber & Zinn, 2023;

Parmaxi et al., 2024). This was largely driven by the ratio of female participation compared to male participation, which revealed that female participation is still low even when firms have a higher female ratio than male. Second, recruitment decisions of firms ought to include gender equality in their efforts, and that the meritocratic approach to employment is still a driver as far as employment decisions for women are still concerned at both the micro and meso levels (Ringblom & Johansson, 2020). Third, women representation in leadership positions and other levels is still low, and this is true even in firms where the ratio of females to males was high. For equal representation of women in leadership and other levels to be achieved, firms have to be strategic and intentional about recruiting or grooming women into leadership positions. Therefore, these findings seem to affirm the proposition that there seems to be an inverse relationship between gender and the availability of opportunities for women in the technology sector.

Fourth, gender equality seems to be widely acknowledged amongst firms, however there is still a lack of enabling policies that drive gender equality and redress mechanisms for gender pay inequity at the meso (industry) and micro (firm) levels. Although enabling policies do exist at a macro level, other initiatives from an implementation at grassroots level are still lacking to support drive women and girls affiliation to the technology sector. Furthermore, although implementation guidelines like the OECD Toolkit exist at a macro level, practical implementation and redress mechanisms are still not coordinated and still leave much room for experimentation without clear outcomes from them. Therefore, targeted implementation efforts which have clear monitoring and measurement mechanisms are still lacking. Fifth, not only is female or male involvement an important driver for the gender equality agenda, the findings also suggests that the initiatives have to follow a “whole of society paradigm” and systems thinking approach in order to realise economic benefits at a macro, meso and micro levels. These findings therefore affirm the proposition that gender mainstreaming efforts do require intentional efforts and can result in supply side benefits in ensuring ICT policies in the technology sector are implemented at a meso and micro levels.

Sixth, although there is still inequality in terms of male versus female employment in the technology sector, for those that are employed in it there are both financial and other gains or benefits that can be derived from it. Women empowerment through industry and social networks is critical in driving gender equality and both women and men benefit greatly from these initiatives since the past 5 years. These findings affirm the proposition that implementing gender equality at a macro, meso and micro levels would result in economic gains for the technology sector.

Seventh, while exploring the positives and negatives of females and girls pursuing technology careers is a worthwhile topic, many firms are aligning work/life balance by ensuring flexible working conditions and driving the overall employee value proposition so that employees have an all-round well-being between work and family which has an impact on productivity. This is changing many stereotypes around the working conditions related to technology careers and is also making it possible for those aspiring to join the sector, and that gender roles are steadily dissipating as far as working in the technology sector is concerned. Although technology careers are still nascent especially for females in the sector, there is still a lot that can be done to drive women participation in the technology labour force and to drive technology sector at the grassroots level. These findings affirm that doing and undoing gender are some strategies that firms use for women to pursue and persist in technology careers. However, the findings also add to the literature that there is nascent demand in technology careers and that due to the changing nature of work in technology careers, gender neutral roles are eliminating the need for women to apply these strategies.

6.7. Conclusion

The above summary of findings discussed some interesting points about the research propositions made and has shown that many of them hold true and has also added to the literature from the findings in some areas. The literature suggested many reasons why women detract from joining technology careers but it also suggested some very positive ways that women pursue and persist in the technology sector. Economic gains or benefits to be derived from female labour force participation and technology perspective as inputs to a country's production for economic growth has been discussed. The findings from the research also suggested many areas in gender mainstreaming as efforts that still require practical ways to implement gender equality at a macro, meso and micro levels. There have also been additions to the literature in the sense that some technological careers have become gender neutral, and the new ways of working post-Covid 19 have resulted in improved work/life balance for the technology sector, eliminating the need for gender roles in the households and in the workplace. Although many barriers to women taking up technology careers have been cited in the literature, what the literature did not mention, however, is that there are many opportunities for women to join the technology sector and the onus is also on women to pursue technology careers and not wait for them to be offered.

For this reason, the study answered the question how can gender equality be a driver for economic gains in the technology sector by considering four pillars to address this. First, the relationship between gender and employment opportunities for women requires fixing as currently it is inverse and this is true even at leadership levels. Second, gender mainstreaming efforts require practical implementation at the meso and micro levels to ensure they align with the macro level guidelines already suggested. This can be achieved through enabling policies that drive gender equality issues at the meso and micro levels to ensure they cascade down to the grassroots levels of society. Furthermore, implementation at a grassroots level is required to ensure that gender equality is a common phenomenon amongst boys and girls and to drive their affiliation to the technology sector. Third, a systems thinking approach needs to follow a whole of society paradigm which includes all stakeholders in the ecosystem to ensure gender equality becomes the norm, not a tickbox exercise. Finally, doing and undoing gender can be applied even at middle management level and it does not have to be related to females only. Furthermore, gender-neutral roles are emerging, and so the need to prescribe gender roles in the workplace will soon fade, thereby leaving “human” roles that require anyone’s participation if they so wish.

7. Conclusions and Recommendations

7.1. Introduction

There have been concerns related to the wide gender gap within the science, technology, engineering and mathematics (STEM) workforce globally (Hebl & King, 2019), and this has been the catalyst of this study. Many Western context countries and some developing countries have done significant work bridging the gender gap within mainstream sectors such as health, retail, telecommunications and education. Despite these efforts, there is still a huge gap in women's representation within the technology sector (Saifuddin et al., 2022). For this reason, the study explored gender equality as a driver for economic gains in the technology sector. Through this research question, various propositions were made to identify concepts from the literature to ascertain if any or all hold true and what the participants feedback suggests against the propositions made.

This study specifically explored gender equality as a driver for economic gains in the technology sector. Chapter 1 presented that gender equality is over-represented in some sectors and underrepresented in others, particularly in the STEM industry (Parmaxi et al., 2024). The Neoclassical Growth Model outlined the three drivers for a growing economy: labour supply to market, capital and technology (Corporate Finance Institute, n.d.). The theory argued that for an economy to be productive, technological change was significant and influenced the overall functioning of the economy.

Women’s participation in the labour market significantly improves labour supply to the market, thereby increasing technological output – an essential driver for a growing economy. The past gender disparities in income levels, education, labour supply to market and child care have been cited as barriers to gender equality (Santos & Klasen, 2021). Furthermore, the “double jeopardy” effect has seen many women unable to join the technology sector as they are considered not qualified for cognitively demanding jobs. Many barriers to women joining the technology sector, such as parenthood, the highly technical nature of the jobs, gender bias and stereotypes, sexual harassment and a lack of a work-life balance, amongst others (Parmaxi et al., 2024) were cited, and a few propositions to investigate these propositions were made as the focus of this study to answer the research of how gender equality can be a driver for economic gains in the technology sector.

This chapter presents the research findings, provides a discussion of their implications for theory and business, proposes a gender equality framework for macro; meso and micro levels; draws the reader's attention to the limitations of this research; and provides considerations for future research.

7.2. Research findings

Bridging the gender gap has been well documented in many mainstream topics such as healthcare, education and public service, which have done considerable work to bridge the gender gap (Hebl & King, 2019; Schreiber & Zinn, 2023; Greene & Patton, 2020). The gender gap in the STEM sector and particularly in the technology sector and whether this can be a driver for economic gains for the technology sector was the focus of this study. This formed the main basis of the research question as discussed in chapter 1: How can gender equality be a driver for economic gains within the sector?

This research study answered the overall research question by formulating four research propositions and the findings are presented here and summarised in Appendix 3.

7.2.1. Gender equality as a global phenomenon for economic development

It has been discussed in Chapter 1 that gender equality is a global phenomenon, and most countries still try to bridge the gender gap in all areas of business and academia. The “double jeopardy" effect has been identified as a critical barrier to women's participation in the technology labour force (Hebl & King, 2019, p. 2). Women's participation in the labour force is largely underscored by social norms, beliefs, the national context and endogenous factors that make it difficult for women to pursue and persist in technology careers (Saifuddin et al., 2022). Furthermore, familial support in patriarchal societies and how women were raised and groomed are the primary detractors to pursuing technology careers. In addition, many barriers such as the demanding nature of technology careers, parenthood, microaggressions or unfriendly working conditions within the workplace, sexual abuse and many other barriers prevent women from taking up technology careers (Parmaxi et al., 2024). Despite all these challenges, gender equality in the technology sector is still worth much focus and requires a multilevel approach to resolve historical inequity regimes.

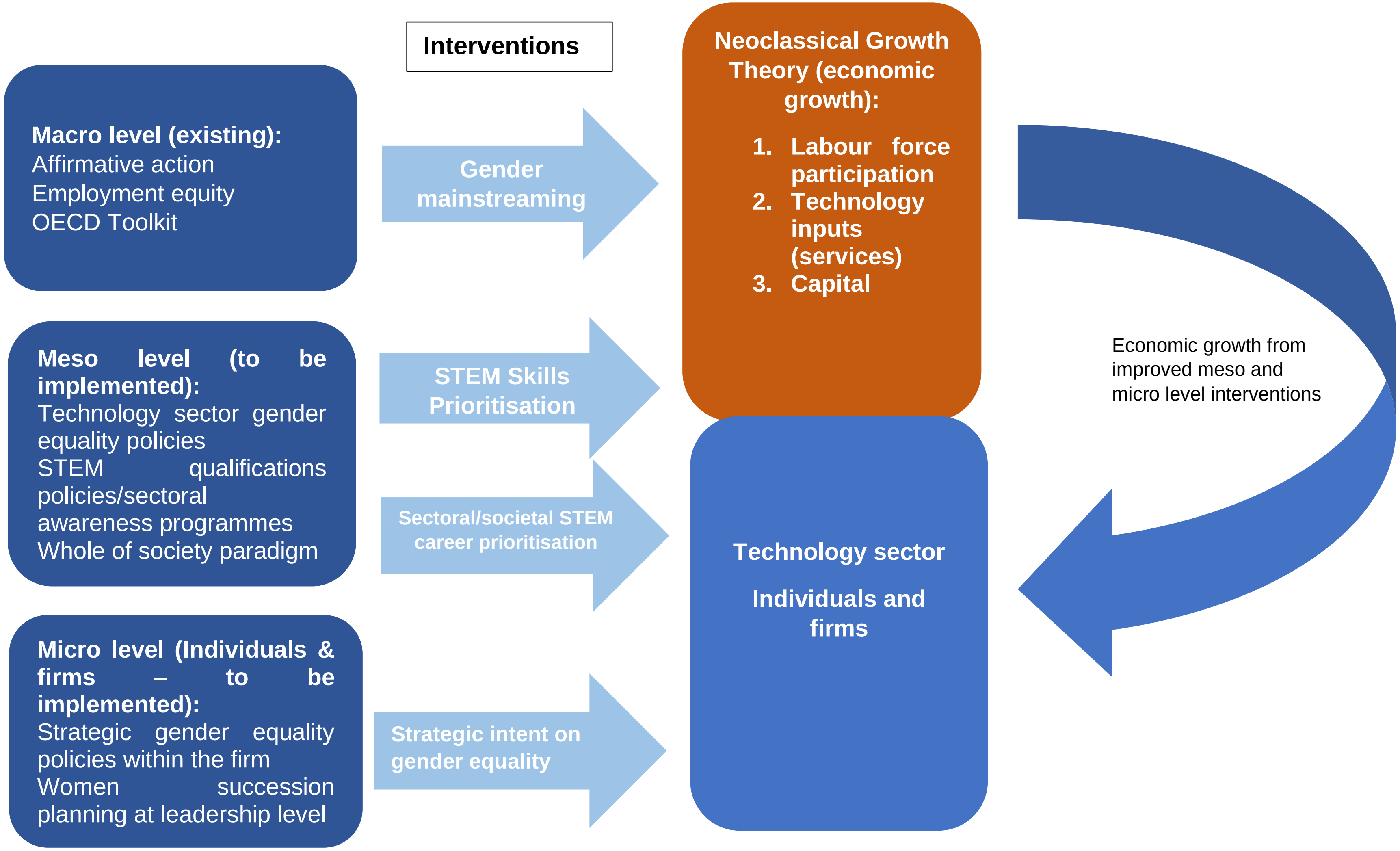
7.2.2. The drivers of economic growth in the technology sector

Gender equality has many economic growth implications: First, the neoclassical school of thought argued that for an economy to be productive, technological change significantly influences the overall functioning of the economy. Women's participation in the labour market significantly improves labour supply to the market, increasing technological output – an essential driver for a growing economy (Corporate Finance Institute, n.d.). Second, eliminating gender discrimination which diminishes the talent pool, improving women's earning potential, and minimising gender distortions as a result of male versus female activities are some ways that economies could reduce gender inequality and aid economic growth (Ruiters & Charteris, 2020). Third, the services sector contributes "about 65% to GDP, 63% of employment and 74% of capital formation in South Africa" (Trade and Industrial Policy Strategies, n.d.). This suggests that the services sector has a significant role to play in improving economic growth, however, gender equality issues are not factored herein, which is a shortcoming of many past economic models (Kabeer & Natali, 2013). It is therefore outside the scope of this research study how gender equality issues can be included in economic models but this could be a consideration for further research.

7.2.3. Gender equality interventions at all three levels

Addressing gender equality issues at all three levels: macro, meso and micro levels requires a "whole of society paradigm" and systems thinking to ensure the practical implementation of initiatives at country level, derive new technology sectoral gender equality policies, prioritise STEM sector skilling, societal and familial support and beliefs and norms that affiliate towards the sector, and being intentional about creating succession planning for women at top leadership including Board levels (micro and firm levels). Ringblom and Johansson's (2020) research suggested that "gender equality and gender equality work in organisations largely depends on the national context". Therefore, understanding the country context, the technology and the specific firms or individuals contexts will ensure a robust response to implementing gender equality mechanisms at all levels. As a result, the proposed framework of implementation of gender equality mechanisms is depticted below to derive economic benefits at a meso and micro levels.

7.3. Proposed Framework: Gender equality and economic gains at the meso and micro levels



The premise of the framework is that for gender equality to thrive within the country context, a “whole of society paradigm” is required. The framework suggests that for the technology sector to derive benefits, meso (industry) and firm or individual (micro) levels interventions are required. The framework derives the macro level as already existing in terms of enabling policies and implementation guidelines at that level, such as affirmative action, employment equity guidelines and the OECD Toolkit, for instance. These are all macro-level enabling policies that already exist at the country level.

The next section of the framework shows the meso-level and micro-level policies to be implemented and the necessary interventions which would link to the technology sector, the people and/or firms in it and then it links these to the neoclassical school of thought where economic gains will be realised through increased labour force participation, technology inputs for the services sector and capital formation strategies to drive the economic gains in the technology sector. While the framework is generalisable in terms of the technology sector and gender equality issues at this point in time, due to the time horizon and the fact that gender equality issues may change in future, it is suggested that the framework not be extrapolated to other future scenarios but may be used to clarify concepts related to gender equality, economic growth using neoclassical theory and the technology sector in a single study which is the focus of this research.

7.4. Implications for Business

The framework above and the findings discussed in Chapter 6 suggest several implications for business at macro, meso and micro levels – which will now be discussed in the sections that follow.

7.4.1. At a macro level – government, policy, economics

Enabling policies that guide gender equality issues have already been introduced and implemented such as affirmative action, employment equity and the OECD Toolkit for gender mainstreaming. However, past economic models exclude gender equality issues since they lack the human element and only addressed the income levels per capita GDP effects. These economic policy reforms at a macro level to include gender issues would factor the human gender elements into country context policies and aid gender mainstreaming efforts.

7.4.2. At a meso level – technology industry

At a meso level, the technology industry lacks gender equality policies that specifically address gender equality issues and sectoral or societal awareness programmes for STEM careers, not only qualifications. Additionally, engaging with societies in driving the adjustment of societal norms, beliefs and perceptions about the technology sector would encourage women and girls at the grassroots levels to pursue and persist in the technology sector. Implementation guidelines at the grassroots levels and women empowerment initiatives came out as critical must-have from the participants feedback which would drive the whole of society paradigm towards a shift in how the technology sector is perceived.

7.4.3. At a micro level – firms and individuals

At a micro level, firms and individuals struggle to factor in gender equality issues within firm policies. Participants' feedback suggested that the majority of firms and their teams have not considered policies that target gender equality issues, although they had initiatives that were not formalised into policies. Implementing firm policies that specifically target women for succession planning into leadership positions, gender equality policies that drive firm strategic objectives to intentionally target women in technology and other leadership careers was also identified as a major step in the right direction towards redress mechanisms that can assist.

7.4.4. Academia

The academic discourse is the lifeblood of mainstreaming gender equality not only within the technology sector but also within academia, such as gender inequality in the STEM field of tertiary institutions. Driving gender equality issues within tertiary institutions would model the way for the above stakeholders at macro, meso and micro levels and provide critical research outcomes such as this study to aid in contributing to the body of literature that would assist in driving gender equality amongst all spheres of society.

7.5. Limitations of this research

An exploratory, qualitative research study has limitations in terms of the generalisability of the research findings or results. Additional limitations specific to this research study due to its design and scope are as follows:

- *Researcher bias*

The main risk of a qualitative study is that the researcher may introduce their own biases and assumptions which may affect the results. Recognising this possibility, the researcher applied data quality strategies to ensure that notes were taken verbatim during the interviews in front of the participants and confirmed for meaning of sentiment where necessary.

- *Time horizon*

The qualitative research is a cross-sectional study and was conducted at a particular point in time and therefore, is a snapshot of findings at a particular point in 2024. Gender equality in the technology sector and the representation of women in the sector may change in the future, therefore, extrapolation of the results to future periods may not be possible.

- *Access to technology sector participants*

As the snowball sampling method was used to identify participants with purposive sampling criteria applied to identify the kind of participants to interview, it became difficult to secure participants' time to schedule interviews as most participants had high-demanding jobs.

- *Gender bias*

The participants were a healthy mix of male versus female participants, although the majority of participants were female. Furthermore, the researcher's own experience in the technology sector could be a factor, but these were mitigated in the researcher bias section above.

7.6. Suggestions for future research

- *Proposed framework for gender equality at the macro, meso and micro levels – the missing elements*

The proposed framework described above mentioned a number of interventions that require to be done to enable a robust macro, meso and micro level impact of gender equality across all three levels. First, research pertaining to the factoring of gender equality issues into newer economic models is suggested at the macro level for reasons cited above regarding the shortcomings of the past economic models. Second, research pertaining the implementation of gender equality issues at the technology sector level and how societal impacts on the technology sector could be used to drive gender equality. Third, at a micro-individual and firm level, the research to factor gender equality issues within company strategic objectives and how these could aid the intentional recruitment of women into top leadership positions are all worth noting.

- *Gender equality at the grassroots level*

Gender equality in STEM tertiary education and in the professional workplace has been the major focus of this study and has guided much of its work. Gender equality at the grassroots level, where elementary education includes robotics and exposing young girls to technology to groom their affiliation to the technology sector, was suggested by many participants, and research of this nature would assist to drive the gender equality narrative even from a grassroots level.

- *Gender-neutral roles within STEM sector and the new ways of working*

From the participants' feedback during the interviews, it became apparent that some participants did not consider their gender when thinking and reflecting on their jobs and how they have pursued and persisted in the technology sector. This has resulted in some participants mentioning they feel that work is "gender neutral" as they have not had to consider it for the type of roles they do. With the new ways of working post-Covid 19, many firms and individuals felt some roles can be performed anywhere and by any gender. As a result, the advent of gender-neutral roles and the new ways of working could be a topic worth exploring.

7.7. Conclusion

This research study has provided insights into gender equality as a driver for economic gains. Semi-structured interviews were conducted with 12 participants, and the findings were analysed to compare, contrast and consolidate participants' perspectives. From the context of gender equality, the findings revealed very pertinent information about interventions at the macro, meso and micro levels that would be required to drive positive gender equality outcomes and whether this can be a driver for economic gains in the technology sector. The findings were combined and the proposed framework that suggests the required interventions including the economic growth model was developed. This framework may be useful in guiding principles related to economic growth, technology sector and gender equality. This study also contributes to the literature with a comprehensive analysis by combining gender equality, the technology sector and economic growth models in a single study.

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9. Annexures

9.1. Annexure A: Interview guide used for data collection

Interview Guide Research Topic: Gender equality as a driver for economic gains in the technology sector.				
No.	**Question**	**Answer**	**Propositions linked to the question**	**Comments**
Demographical questions				
1.	What is your gender?	Male Female	These are validation questions/criteria to ensure that respondents fall within the purposive sampling criteria.	
2.	What age group do you fall into?			
3.	What is your highest level of education?			
4.	How long have you been employed within the technology sector?			
5.	Is your place of employment within Gauteng?	Yes		
Questions pertaining to the relationship between gender and employment opportunities in the technology sector			Linked to proposition 1(P1)	
6.	What is your view about opportunities for women within the technology sector? Please elaborate on this.		Linked to proposition 1(P1)	
7.	How do employment opportunities for women come about within your firm?		Linked to proposition 1(P1)	
8.	Do you currently have opportunities for women in top management? What about other levels? Please elaborate on this.		Linked to proposition 1(P1)	
9.	What are the factors that influence the kind of employment opportunities you make available to women within the technology section of your firm?		Linked to proposition 1(P1)	
Questions pertaining to gender mainstreaming within the firm			Linked to proposition 2 (P2)	
10.	How many males and females are there within the IT department?		Linked to proposition 2 (P2)	
11.	How many of the female colleagues are within leadership positions including Board level?		Linked to proposition 2 (P2)	
12.	Do your company policies cater for gender equality issues within your IT department? Please provide examples or more detail in this regard.		Linked to proposition 2 (P2)	
13.	How does your company involve women in the technology sector?		Linked to proposition 2 (P2)	
Questions pertaining to "doing or undoing gender" in the technology sector (provide brief explanation of what this is)			Linked to proposition 4 (P4)	
14.	Does your job require you to work long hours and if so, how often?		Linked to proposition 4 (P4)	
15.	How do you balance work and family life?		Linked to proposition 4 (P4)	
16.	Does your family support your career in the technology sector?		Linked to proposition 4 (P4)	
17.	What motivated you to take up a career in the technology sector?		Linked to proposition 4 (P4)	
18.	How do you manage being a female within the technology sector? Please elaborate on this.		Linked to proposition 4 (P4)	
19.	In your view, what causes females to take up or not take up careers in the technology sector?		Linked to proposition 4 (P4)	
Questions pertaining to economic benefits at a micro- (firm), meso- (industry) and macro-levels			Linked to proposition 3 (P3)	
20.	What is your annual salary range?	Prefer not to answer	Linked to proposition 3 (P3)	
21.	How has being employed in the technology sector improved or not improved your life? Please elaborate on this.		Linked to proposition 3 (P3)	
22.	How has being a female helped or not helped your technology career?		Linked to proposition 3 (P3)	
23.	What initiatives do you think should be done to drive gender equality within your company? For the industry? South Africa? Please elaborate on these.		Linked to proposition 3 (P3)	
24.	Overall, do you think gender equality in the technology sector could result in economic gains for the country? Please elaborate on this.		Linked to proposition 3 (P3)	

9.2. Annexure B: Thematic analysis with codes and code groups

Table 2: Thematic analysis of codes and group codes

Proposition	Number of codes per group	Code	Code Group 1	Code Group 2	Code Group 3	Code Group 4	Theme
P1		Availability of opportunities for employment in technology				Relationship between gender and employment opportunities	
P1	4	Opportunities for women in top leadership or other levels				Relationship between gender and employment opportunities	Relationship between gender and employment opportunities
P1		Influential factors to employment opportunities				Relationship between gender and employment opportunities	
P1		Employment decisions in technology				Relationship between gender and employment opportunities	
P3		Being female/male helped your technology career		Economic benefits at macro, meso and micro levels			
P3	4	Benefits of being employed in technology sector		Economic benefits at macro, meso and micro levels			Economic benefits at all three levels
P3		Gender equality driving economic gains		Economic benefits at macro, meso and micro levels			
P3		Gender equality initiatives at firm, industry and country levels		Economic benefits at macro, meso and micro levels			
P4		Familial support to take up	Doing or undoing gender				
P4		Handling being female/male in the technology sector	Doing or undoing gender				
P4	6	Job requires long hours?	Doing or undoing gender				Doing or undoing gender
P4		Motivations for joining the	Doing or undoing gender				
P4		Reasons for females to take up or not take up technology	Doing or undoing gender				
P4		Work/family life balance	Doing or undoing gender				
P2		Number of males versus females			Gender mainstreaming		
P2	4	Female colleagues in top leadership including Board level			Gender mainstreaming		Gender mainstreaming
P2		Women involvement initiatives			Gender mainstreaming		
P2		Policies catering for gender			Gender mainstreaming		
	14						

9.3. Annexure C: Consistency Matrix

Table 3: Consistency matrix indicating linkages to literature

RQ: How can gender equality be a driver for economic gains in the technology sector?

Propositions/Questions/ Hypotheses	**Sections in Literature Review**	**Data collection tools**	**Analysis techniques**
1. Proposition 1 (P1): There seems to be an inverse relationship between gender and employment opportunities in the technology sector.	2.2. The United Nation's SDG 5 gender equality agenda and women empowerment	Semi-structured interview guide (Annexure A) Relationship between gender and employment opportunities section (Questions 6-9)	Thematic Content Analysis
2. Proposition 2 (P2): Gender mainstreaming efforts have supply-side benefits in ensuring gender-related ICT policies are implemented in the workplace.	2.2.1. Gender mainstreaming and economic factors	Semi-structured interview guide (Annexure A) Gender mainstreaming within the firm section (Questions 10-13)	Thematic Content Analysis
3. Proposition 3 (P3): Addressing gender equality issues at all three levels, micro, meso and	2.3. Gender equality contextual psychology and systems thinking	Semi-structured interview guide (Annexure A)	Thematic Content Analysis

macrolevel would derive economic gains for the technology sector.		Economic benefits at a macro, meso and micro levels section (Questions 20-24)	
4. Proposition 4 (P4): "Doing and undoing gender" are some strategies that allow women to pursue and remain in technology careers.	2.4. Barriers and challenges to women taking up technology careers	Semi-structured interview guide (Annexure A) Doing or undoing gender section (Questions 14-19)	Thematic Content Analysis

10. Appendices

10.1. Appendix 1: Ethical clearance approval

Gordon Institute of Business Science
University of Pretoria

Ethical Clearance Approved

Dear Fundiswa Sishi,

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

We wish you everything of the best for the rest of the project.

Ethical Clearance Form

Kind Regards

This email has been sent from an unmonitored email account. If you have any comments or concerns, please contact the GIBS Research Admin team.

10.2. Appendix 2: Informed consent letter

Gordon Institute of Business Science
University of Pretoria

Informed consent letter

Dear Sir/Madam

Research Topic: Gender equality as a driver for economic gains within the technology sector

I am currently a student at **the University of Pretoria's Gordon Institute of Business Science** and completing my research in partial fulfilment of an MBA. I am conducting research on gender equality as a driver for economic gains within the technology sector. ***Our interview is expected to last about an hour and will help us understand how gender equality can be a driver for economic gains within the technology sector***. **Your participation is voluntary, and you can withdraw at any time without penalty.** All data will be reported without identifiers. If you have any concerns, please contact my supervisor or me. Our details are provided below.

Researcher name: Fundiswa Sishi
Email: 20802392@mygibs.co.za
Phone: 072 981 8732

Research Supervisor Name: Prof. Flip Schutte
Email: SchutteF@gibs.co.za
Phone: +27 11 771 4000

Signature of participant: ________________________________

Date: ________________

Signature of researcher: ________________________________

Date: 21/08/2024

10.3. Appendix 3: Summary of research findings compared to literature.

Table 4: Summarised findings compared to literature

Supports the literature	**Adds to the literature**	**Contradicts the literature**	**Beyond the scope of the study/future research required**
P1: There seems to be an inverse relationship between gender and employment opportunities in the technology sector.			
Labour force participation and availability of employment opportunities for women • High in low-income sectors like agriculture but low in manufacturing and services. • Neoclassical economic growth: labour, capital and technology • Gender discrimination, improve women's earning potential and minimise gender distortion due to male versus female activities • High educational attainment in STEM qualifications but low opportunities in technology sector.	• Meritocracy and logic still drives how employment opportunities are made available in the technology sector. • Firms have to be intentional and strategic about gender equality in their recruitment decisions • Enabling gender equality policies at a meso and micro levels		• Implementation guidelines for gender equality at the grassroots level • Factoring gender equality issues into newer economic models

Table 4: Summarised findings compared to literature (Continued)

P2: Gender mainstreaming efforts have supply-side benefits in ensuring gender-related ICT policies are implemented in the workplace.			
Gender mainstreaming efforts • Firms put all focus on gender equality activities • Past economic models did not factor human aspects including gender issues but only considered exogenous factors such as GDP per capita • Gender equality policies present in mainstream topics like healthcare, education and public service, but lacking in technology sector.	• Gender mainstreaming at a meso (industry) and micro (firm) levels is required. • Succession planning and women involvement initiatives that support women representation at top leadership up to Board level		• Gender neutral roles in the STEM sector

Table 4: Summarised findings compared to literature (Continued)

P3: Addressing gender equality issues at all three levels, micro, meso and macrolevel would derive economic gains for the technology			
Gender equality at macro, meso and micro levels to drive economic gains • Gender equality considers country context at the macro level • Systems thinking and a "whole of society paradigm" to addressing gender equality issues at the meso and macro levels	• Enabling policies that will drive gender equality at the meso and micro levels • Women empowerment through industry and social networks		
P4: "Doing and undoing gender" are some strategies that allow women to pursue and remain in technology careers.			
Doing and undoing gender as strategies to pursue and persist in technology careers • Middle managers can act as change agents • Prevalent in entrepreneurship, public service and social topics	• Gender neutral roles in the future and that not all technology careers are gender specific		• New ways of work and gender neutral roles in technology sector