

DIVERSITY AND INNOVATION: A GROUNDED THEORY FROM THE MICRO TO THE
MACRO PERSPECTIVE

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DOCTORAL PROGRAM IN ENTREPRENEURIAL AND MANAGERIAL DEVELOPMENT

MAY 3, 2021

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DIVERSITY AND INNOVATION: A GROUNDED THEORY FROM THE MICRO TO THE
MACRO PERSPECTIVE

Por

Nelcar R. Rivera Martínez

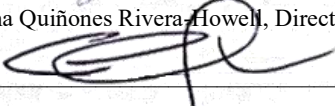
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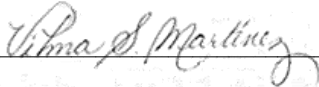
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Abstract

Diversity has been generally accepted as an innovation booster in working teams. It provides an environment that fosters the coexistence of diverging perspectives, fueling innovative approaches to problem resolution. It has been directly correlated to increased profits that are worth the tensions that may surface in the interaction of individuals with different social identities. However, there is a dearth of theories able to explain how diversity connects with innovation in the macro sphere. In fact, the Global Innovation Index currently does not consider workforce diversity as an element in its calculation, despite being the most comprehensive global innovation competitiveness measure. This study used grounded theory and case study strategies to demonstrate how diversity—gender, ethnic and nationality, and age—of a country’s workforce influence the results of the Global Innovation Index in the short, medium, and long terms. The proposed new theories are oriented toward maximizing the innovation potential of diverse workforces through conscious policy making.

Dedication

I dedicate this dissertation to the loving memory of my grandmother, Edelmira Pérez Rodríguez (Mai Miro). For some, she may have been just a school janitor. For me, she was the fuel to reach the stars. El negrito de güela lo logró. This is for her, and because of her.



Acknowledgements

I would like thank Dr. Zulma Quiñones Rivera-Howell for being an inspiration in my graduate career. Your guidance and motivation were key toward making it right to the end. I also thank my committee members, Dr. Carlos Irizarry Guzmán and Dr. Andrés Gutiérrez Desa, for their time, support, and invaluable insights.

I would like to express my gratitude to my co-workers and friends—Pedro Marín Hernández and Brian Pagán Núñez. You went far and beyond the call of duty with me in this process and never denied your help, especially when I needed it the most.

I thank my family for I am who I am because of your love and unconditional support. Mami y Papi, su resiliencia hace que cualquier obstáculo en la vida parezca insignificante. Gracias por amarme y por sembrar todo lo bueno que hay en mí. My sister Elizabeth, thank you for being my silent guardian. I love you indeed.

Thank you to my friends, as many as you are. I am my best self around you.

Finally, I thank my wife Ruby. Mi amor, gracias por lanzarte conmigo en este viaje. Siempre has sido, y seguirás siendo, a quien quiero correr en mis triunfos y fracasos. Gracias por enseñarme en cada paso que no existen los caminos sin salida. Solo hace falta armarse de valor para saltar los muros, cruzar los montes, lanzarse a los abismos, y surcar los mares. Te amo.

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Chapter 1: Introduction

Diversity unlocks innovation: Hewlett, Marshall and Sherbin (2013) arrived at this conclusion from a study that included survey results from 1,800 professionals, 40 case studies, and multiple focus groups and interviews. This is not a novel conclusion. In fact, Oyler & Golden Pryor (2009) acknowledged that Peter Drucker had been discussing diversity issues as they affected countries, industries, organizations, and individuals since early in his career (p. 424). Ever since, the positive effect of diversity in team creativity has been an idea generally accepted. In their publication *Fostering Innovation through a Diverse Workforce*, Forbes Insights (n.d.) presented the results of a survey regarding diversity and its effect on innovation to 321 executives. The results ratified that companies are capitalizing on workforce diversity and that diversity is essential for driving innovation. Citing van Knippenberg et al. (2004), Garcia Martinez, Zouaghi, and Garcia Marco (2017) highlight that “teams with diverse backgrounds bring together a wider spectrum of task-relevant knowledge, experience and perspectives that are distinct and non-redundant” (p. 311). They add, citing Page (2007), that these distinct perspectives “can be combined in new ways, leading to positive cognitive effects” (p. 311). Even though there is a strong business case for promoting diversity as an innovation booster at the micro level (teams and companies), at the macro level (countries and regions) there is still a significant gap in the knowledge of the role that diversity plays in driving innovation-based global competitiveness.

The Innovation Capability Pillar of the Global Competitiveness Index published by the World Economic Forum, and the Global Innovation Index published jointly by INSEAD, Cornell University, and the World Intellectual Property Organization measure innovation competitiveness among countries every year. Of these two measures, only the Innovation

Capability Pillar of the Global Competitiveness Index incorporates workforce diversity as an element for innovation since the release of its 2018 report. It measures workforce diversity on a scale from 1 to 7 using the results from the survey question “In your country, to what extent do companies have a diverse workforce (e.g., in terms of ethnicity, religion, sexual orientation, gender)?”, submitted as part of the Executive Opinion Survey (World Economic Forum, 2018, p. 641; 2019, p. 624). Therefore, as is, the Innovation Capability Pillar does not consider workforce diversity in the macro perspective. Instead, it aggregates the micro perspectives of business executives to reach conclusions at the macro level.

Such a macro perspective of diversity and its effects in the innovation competitiveness of countries is still fuzzy and needs to be clarified. As the world approaches a new era of light-speed innovation, countries need to build knowledge about the right set of enablers, including workforce demographics, which will impact their ability to compete with the rest of the world. Policymakers can then consciously set the landscape for promoting advanced innovation, as disruptive, disturbing, and revolutionary as it may be.

Background

It seems surreal how fast different technologies are evolving. Artificial intelligence (AI), nanotechnology, biotechnology, 3D printing, and the Internet of things (IoT) are just some of the technologies that are combining in response to relevant issues. For Klaus Schwab (2017), the world is on the verge of what he considers the fourth industrial revolution. The digital, physical, and biological megatrends are enabling breakthrough solutions to unresolved problems (pp. 14–23). It is now possible to discuss harvesting animal organs to address the shortage of human organs for transplants. Self-driving cars are no longer fictional gadgets. Smart factories, remote surgeries, digital currencies, increasingly resilient materials, and many other inventions display

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the rapid advancement of human knowledge, fundamentally influencing multiple disciplines.

What does technological progress have to do with global competitiveness?

The innovations introduced by the fourth industrial revolution are expected to become key elements of global competition. The Global Competitiveness Report 2017–2018 highlights the immense potential of these technologies to become a source of growth for countries (World Economic Forum, 2017). Lanzillotti (2003) refers to Schumpeter's *Capitalism, Socialism, and Democracy*, to explain that the constant injection of new innovations fuels the economy and revolutionizes the economic structure by destroying obsolete sources of growth and creating new value (p. 470–471). For Schumpeter, innovation is the heart of economic growth (Eggink, 2013, p. 2842), and economic growth is the aspiration of countries. Thus, it is important for countries to step on a scale of innovation to understand if their current innovation capabilities will inject the needed amount of fuel to deliver economic growth.

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Measuring Innovation

Standard measures provide the opportunity to picture the current state and render insights for understanding gaps and overlaps. The two main global innovation measures currently used are the Innovation Capability Pillar of the Global Competitiveness Index and the Global Innovation Index. These measures shed light on the advantages and disadvantages of on a country's innovation competitiveness. Both measures take into account key innovation enablers and outputs in their calculations, coming up with a score that allows for a country ranking. The Global Innovation Index is the most comprehensive of the measures, which includes a combination of sub-indices, pillars, sub-pillars, and indicators that helps to explain a country's potential to compete in the realm of innovation.

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The Global Innovation Index

The Global Innovation Index is calculated using the simple average of the Innovation Input sub-index and the Innovation Output sub-index, in a range that goes from 0 to 100. Each of the sub-indices has several pillars and sub-pillars that are calculated to reach an overall score, summarized below.

Innovation Input Sub-Index. This sub-index is the simple average of the scores of five pillars. Each pillar is calculated as follows:

Institutions. The weighted average of political, regulatory, and business environment sub-pillars.

Human Capital and Research. The weighted average of education, tertiary education, and research and development sub-pillars.

Infrastructure. The weighted average of information and communication technology, general infrastructure, and ecological sustainability sub-pillars.

Market Sophistication. The weighted average of credit, investment, trade, competition, and market scale sub-pillars.

Business Sophistication. The weighted average of knowledge workers, innovation linkages, and knowledge absorption sub-pillars.

Innovation Output Sub-Index. This sub-index is the simple average of two pillars scores with each pillar calculated as follows:

Knowledge and Technology Outputs. The weighted average of knowledge creation, knowledge impact, and knowledge diffusion sub-pillars.

Creative Outputs. The weighted average of intangible assets, creative goods and services, and online creativity sub-pillars.

As presented, demographic diversity is not an element covered in the calculation of the Global Innovation Index. Nonetheless, diversity is generally embraced at the micro level as an innovation booster, considering that “teams who have diverse members with complementary skills are more creative and innovative than homogeneous teams” (Mote, 2010, p. 16). Is this a gap in the Global Innovation Index, or is innovation at the macro level disassociated from demographic diversity?

Diversity and Innovation at the Macro Level

Diversity in teams has been identified as a powerful booster to develop innovative solutions to problems. However, there are two sides to a coin. Milliken and Martins (1996) mention that “the results of research on heterogeneity in groups suggests that diversity offers both a great opportunity for organizations as well as an enormous challenge” (p. 403). They describe diversity in teams as a double-edged sword, on the one hand increasing the opportunity for creativity, while on the other leading to the likelihood that group members might be dissatisfied and hence fail to identify with the group. The complex dynamics that can be observed in a diverse working team will never be as complex as what can be observed at the country level. The case of the United States is a good example to open the discussion around this topic.

United States: An Innovation Titan and a Diversity Pressure Cooker

The United States was ranked third in the Global Innovation Index for 2020 (Cornell University, INSEAD, & WIPO, 2020), and second in the Innovation Capability Pillar of the Global Competitiveness Index for 2019 (World Economic Forum, 2019, p.585). While it was outperforming other nations in innovation, there were serious conversations about how diversity

was being socially accepted in the country, hence the need to understand if diversity and innovation were related at the country level.

The Black Lives Matter movement resurged in the United States after the recent tragic losses of George Floyd and Breonna Taylor, among many others that once again put police brutality under the spotlight. The movement raised the pressure level for federal and local governments and the private sector to strengthen diversity, inclusion, and belonging policies that foster that everyone feels safe and welcome. As statistically presented by Luhby (2020), race has been proven to be a key factor for inequality in the United States in areas such as wealth, income, unemployment, poverty, and healthcare. Based on her sources, white American households were 10 times wealthier, earned over 50% higher income, had lower unemployment and poverty rates, and had a lesser percentage of their population without health insurance than black American counterparts. Lee et al. (2020) agreed that racial inequality in the United States was an issue. Their argument was based in the following statistics from July 2020:

1. One in three Black families had zero or negative wealth.
2. One in three Black children lived in poverty.
3. One in six Black adults were not able to pay a utility bill on time or not pay it at all in the previous three months.
4. One in ten Black adults were not able to pay mortgage or rent in the previous three months.
5. One in six Black adults had lost their jobs in the previous three months.

Inequality in the United States had/has also been impacting its workforce. In 2019, 33% of charges filed with the U.S Equal Employment Opportunity Commission claimed racial discrimination (U.S. Equal Employment Opportunity Commission, n.d.).

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Race has not been the only driver for unequal treatment suffered in the United States or in other countries. In fact, gender inequality has been one of the core issues actively addressed by the United Nations and a topic of interest for the World Economic Forum. The Global Gender Gap Index is published every year by the latter with the aim of measuring the magnitude of gender-based disparities. In 2020, the United States ranked 53 globally in the Global Gender Gap Index (World Economic Forum, 2019). Global attention to this issue has been key to elevating the discussion and influencing policymakers to act for improvement. Unfortunately, racial disparity issues do not receive the same level of attention. As described by Ozbilgin (2018), the efforts to overcome racial inequality have been less fructiferous than the fight against gender inequality, mainly because “the movement for racial equality has remained too local, with individual campaigns failing to get international consensus.”

Research Problem

Diversity has been generally accepted as beneficial for business, and companies are actively advocating for it by strengthening their diversity, inclusion, and belonging policies. Aside from being the correct thing to do from a humanistic perspective, it can be also profitable. A Boston Consulting Group study found that companies with more diverse management teams have 19% higher revenues due to innovation (Eswaran, 2019). However, it was still unclear if the same relationship between demographic diversity and innovation existed at the macro level. Moreover, the sociopolitical processes for the heterogenization of a country’s workforce and the macro effect that they have in innovation were yet to be defined. This research followed the Grounded Theory methodology to ~~abductively~~ discover commonalities in sociopolitical processes that helped to connect the dots between countries’ workforce demographic diversity and their innovation competitiveness. In ~~abductive~~ qualitative research, the use of the data is “to

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explore a phenomenon, identify themes and patterns, locate these in a conceptual framework, and test this through subsequent data collection” (Saunders, Lewis, & Thornhill, 2019, p. 153). The resulting theories were then tested following the Case Study approach to analyze two countries in depth.

Justification

Countries are always in competing. There are multiple measures overseen by prestigious organizations that provide countries with standards that intend to trigger change for the better. Among these measures are the Innovation Capability Pillar of the Global Competitiveness Index, published by the World Economic Forum, and the Global Innovation Index, published jointly by INSEAD, Cornell University, and the World Intellectual Property Organization. The third is the most comprehensive measure for global innovation. However, it does not account for workforce demographic diversity in any of its elements. Meanwhile, the Innovation Capability Pillar of the Global Competitiveness Index started incorporating workforce diversity as an element for innovation since the release of its 2018 report. Nonetheless, as is, the Innovation Capability Pillar does not measure workforce diversity at a macro level. Instead, it aggregates the micro perspectives of business executives to arrive at conclusions at the macro level. It was important to first understand how a country’s level of workforce diversity affected its innovation competitiveness, and based on those findings, propose it as an enabling element in the calculation.

Purpose of the Study

The purpose of this research was to fill a void in theory related to the relationship between the level of workforce demographic diversity in a country and its innovation competitiveness. Despite the clear benefits of diverse teams for boosting innovation at the micro

level, there were still many unknowns about the social dynamics in a country related to workforce demographic diversity and their effects on innovation. The results of this research may help to strengthen global innovation measures by incorporating workforce demographic diversity and its modifying variables as inputs, understanding that they can affect innovation competitiveness. This research helped to identify the common sociopolitical processes that fostered the heterogenization of the workforce of various countries and the best approach for maximizing innovation competitiveness.

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Objectives of the Study

This research had five objectives.

1. Identify the top two innovation players within regional clusters of countries based on their scores in the Global Innovation Index and sub-indices for 2013–2020.
2. Develop the workforce demographic diversity profile of the countries assessed.
3. Identify patterns and common themes that help to abduct the relationship between workforce demographic diversity and innovation competitiveness at the macro level.
4. Develop a new theory that explains the relationship of workforce diversity and innovation competitiveness at the macro level.
5. Test the newly developed theories by performing case studies for two countries.

Research Questions

This research followed a two-stage approach, using the Grounded Theory methodology in the first stage and a Case Study methodology in the second stage. As explained by Sbaraini et al. (2011), grounded theory studies begin with open questions, and researchers presume that they may know little about the meanings that drive the actions of their participants, in this case,

countries. For this reason, no hypotheses were developed, as the approach was initially inductive. Within this context, the questions that guided this research were open-ended and exploratory by nature. Questions lead to data exploration for understanding the sociopolitical processes that govern workforce heterogenization and its effect on innovation competitiveness. Under the Grounded Theory methodology, a process is “the linking of sequences of action/interaction as they pertain to the management of, control over or response to, a phenomenon” (Strauss & Corbin, 1990, p. 143). In this line of thinking, the following research questions initially led the data collection process:

1. What is the country’s innovation competitiveness profile?
2. How has the country’s innovation competitiveness profile changed over time?
3. What is the country’s workforce demographic diversity profile?
4. How has the country’s workforce demographic diversity profile evolved over time?
5. What diversity fostering policies have been implemented in the country over time?
6. What has been the effect of these policies in the demographic diversity profile of the country’s workforce?
7. What relationship between workforce demographic diversity and innovation competitiveness can be abducted from the data collected?

Theoretical Framework

The Theoretical Framework was built from the foundations of key theories that help explain the concept of diversity, its connection to innovation at the micro level, and the relevance of innovation to competitiveness at the macro level. Theories from psychology and classical

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theorists, such as Peter Drucker and Joseph Schumpeter, came together to provide a framework for the analyses in this research. This framework highlights the relevance of diversity as a way of elevating human dignity and innovation as a key for sustainable long-term economic growth.

What is Diversity?

Tamn et al. (2019) propose a theoretical framework around workforce diversity based on commonly referenced theories in Psychology—the Social Identity and Self-Categorization Theories, the Information and Decision-Making Theory, and the Similarity/Attraction Theory.

Social Identity and Self-Categorization Theories. Trepte and Loy (2017) explain that these theories suggest that individuals will self-categorize as members of certain groups, based on nationality, gender, beliefs, and other variables, and that they will engage in processes of social comparison, derogating individuals in other groups with the aim of increasing self-esteem.

Information and Decision-Making Theory. Tamn et al. (2019) indicate that this theory positively correlates diverse workgroups and outcomes, basically because heterogeneous teams possess more inequity, ideas, and knowledge, citing Cox, Lobel, & McLeod (1991) and Pitts & Jarry (2007).

Similarity/Attraction Theory. Ruitjen (2020) cites several researchers such as Tajfel (1982), Wilson and Sherrell (1993), Cialdini (1993), Kelly (1955), Byrne (1969), and Duck and Craig (1978) and explains that the Similarity/Attraction Theory is the phenomenon that can be described as the tendency of individuals to be attracted to others that share similar characteristics and therefore can be more easily persuaded by them.

Together, these theories help explain the dynamics in a working team and how diversity may influence them.

Diversity from the perspective of Peter Drucker

Although mainly recognized for his vast contributions to the study and practice of management, Oyler and Golden Pryor (2009) compiled Drucker's perspective on diversity as it evolved over time. From his point of view, cultural diversity was needed to serve the common purposes of humankind, and management was the instrument to make it happen (p.422).

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Much changed about his perspective towards economic theories and society after the Great Depression that followed World War II and the fall of the Nazi regime. According to Oyler and Golden Pryor (2009, p.424), Drucker understood that the industrial society was weak, not from the stand of producing goods, but from the foundations of a functional society. For him, Nazism had to be dismantled from its roots by reaffirming the principles of humankind equality, regardless of race, nationality, or color. Going further, he conditioned social functionality to the empowerment and active participation of all its individuals. In other words, diversity had to be embraced for everyone is equal, and deserved be elevated through a sense of inclusivity and belonging of all members of society.

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As early as 1946, Drucker was raising concerns about equal opportunities and treatment for all workers, regardless of their differences (Oyler and Golden Pryor, 2009, p. 425). He believed that the promotion of workplace diversity would foster equal opportunity and treatment among employees. He was indeed a pioneer in making management practitioners accountable for operationalizing the ethical principles of diversity in the workplace.

Not to undervalue the ethical motivations, there are by far other motives to foster a heterogeneous workforce: it is profitable. Rehr (2017) cites from Drucker's book, *The Effective Executive*, to explain how beneficial it is for a business executive to receive advice from diverging viewpoints when considering decision-making. The dynamics ignited by disagreement

come together to exponentially raise the number of potential alternatives to solve a problem, which if well-managed, can result in innovative solutions.

Schumpeter's Innovation Theory and its Relevance for Economic Growth

Bellofiore (1999, p. 1011) talks about Schumpeter's theory of innovation and explains the Schumpeterian definition as the production of other things, or the same thing by a different method. Under Schumpeter's theory, innovation encompasses the introduction of new production methods, the creation of new goods, opening of new markets, the identification of new sources of raw materials or semi-manufactured materials, or the organizational transformation of an industry. Dodgson (2011) adds that Schumpeter conceptualization of innovation goes far beyond mere production of goods, asserting that "Schumpeter is noted for his contention that innovation occurs not only in products and processes, but also in organization, markets, and supply" (p. 1120).

Schumpeter believed that innovation plays an important role in disturbing the equilibrium. He challenged the traditional static economic models because they failed to adjust to real economic systems. "The traditional view of an economic system's tendency towards equilibrium and its ability to explain and predict certain phenomena ... is ... unable to predict the consequences of discontinuous changes in the traditional way of doing things" (Eggink, 2013, p. 2841).

For Schumpeter, innovation is the heart of economic growth and is driven by entrepreneurs (Eggink, 2013, p. 2842) who are radicals with an extraordinary drive to be part of the capitalist class. Innovation is the result of their motivation (Bellofiore, 1999, p. 1011). As explained by Lanzillotti (2003, p. 471), Schumpeter's innovation is revolutionary and transforms the economic system from within.

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Recent research supports the Schumpeterian vision of innovation and the role that it plays in economic growth. The McKinsey Global Institute estimated in 2015 an overall value gain of \$3.9 trillion–\$11.1 trillion by 2025, directly related to the Internet of Things in nine settings, including home, offices, factories, retail environments, worksites, humans, logistics and navigation, cities, and vehicles (Manyika, Chui, Bisson, et al., 2015). The Internet of Things is one of the technologies encompassed in Schwab’s concept of the Fourth Industrial Revolution. Kurz (2016) agrees, explaining that the “fourth industrial revolution based on cyber-physical systems can be expected to have an important impact on economic performance.”

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Lanzillotti (2003) argues that Schumpeter had a dual view of innovation, stating that “His theory of creative destruction treats innovation in both a ‘broad’ and a ‘narrow’ context” (p. 471). He continues to describe that for Schumpeter innovation comes to disrupt the equilibrium to then approach a new equilibrium, but just temporarily, to repeat the cycle afterwards.

Conceptual Model

Figure 1 shows a graphical representation of the study, which was focused on the identification of commonalities related to diversity in the workforce of countries, aiming to define a new theory regarding the relationship of workforce diversity and innovation-based competitiveness at the macro level.

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Figure 1

Conceptual model for the study.



Delimitations

For this study, innovation competitiveness was measured in the context of the Global Innovation Index, considering the scores of the main index, sub-indices, pillars, and sub-pillars from 2013 to 2020. Workforce diversity was initially scoped to the following variables and subadjacent variables in a longitudinal analysis of 1990–2020:

1. Gender
 - a. Workforce participation by gender
 - b. Income disparity
 - c. Female participation by industry
 - d. Females in political leadership roles
 - e. Females in business leadership roles
 - f. Level of education by gender

2. Age

- a. Workforce participation by age group
- b. Age group participation by industry
- c. Age group participation in political leadership roles
- d. Age group participation in business leadership roles
- e. Level of education by age group

3. Ethnicity

- a. Workforce participation by ethnic group
- b. Income disparity
- c. Ethnic group participation by industry
- d. Ethnic group participation in political leadership roles
- e. Ethnic group participation in business leadership roles
- f. Level of education by ethnic group

The study was rescoped based on data availability. Given the exploratory nature of this research, data collection was open-ended, hence other data was incorporated into the analysis as it evolved. For example, Hofstede's masculinity societal dimension scores provided by Hofstede Insights (n.d.) were included in the study to provide a cultural context to the analysis of gender diversity.

Definition of Terms

Diversity: “the distribution of differences among the members of a unit with respect to a common attribute” (Harrison & Klein, 2007, p. 1200). In the context of this dissertation, diversity was measured in demographic terms of the gender, age, and ethnicity of the population

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of countries and their workforce, as obtained from public sources—primarily from the International Labor Organization database.

Innovation: Based on Schumpeter’s work, “the production of other things, or of the same thing by a different method” (Bellofiore, 1999, p. 1011).

Global Innovation Index (GII): A measure for innovation that considers multiple variables, segregated between inputs and outputs for innovation; published jointly on a yearly basis by INSEAD, Cornell University, and the World Intellectual Property Organization.

As previously explained, this research intended to unveil the relationship between workforce diversity of countries and their innovation competitiveness. Chapter 2 presents a limited collection of previous research that connects some elements of diversity with innovation or economic competitiveness in a macro context.

Chapter 2: Literature Review

Anticipating a potential growth in the public interest around the development of the Fourth Industrial Revolution, this study delivered new theory that helps to connect macro diversity with the competitiveness of a country in the global innovation race. Although the connection between diverse teams and innovation has been deeply analyzed at the micro level, there was very limited research available on the topic of diversity and innovation at the country level. “Very few studies are global in the sense that they have examined innovation and the potential factors for a broad range of countries,” Woynar (2011, p. 4). Most of the research that consider macro results for innovation are circumscribed around cultural and country of origin diversity. Meanwhile, the body of literature that explains the effects of gender diversity and generational diversity on innovation is very scarce.

Cultural-Nationality Diversity and Innovation at the Macro Perspective

A dissertation about ethnolinguistic diversity and its impact on innovation at the country level by Aleksy-Szucsich (2007) was one of the few available studies that covered the topic in a true macro perspective. Its core argument was that “ethnolinguistic diversity might increase the levels of creativity, openness to change, and entrepreneurship and thus, it might increase the overall innovative potential for countries” (p. 2). The author considered that the interaction of culturally diverse individuals conditions the society for openness to change, creating an innovation-friendly environment. It also fosters entrepreneurship, not only by energizing entrepreneurs to act, but also by offering a more receptive audience. According to Woynar (2011), “diversity is necessary for innovation” (p. 109). The rationale is that diversity assures that problems and solutions are taken outside of the box for breakthrough innovation. He argues that “Diversity makes the notions of ‘common’, ‘usual’ or ‘norm’ obsolete” (p. 109).

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There are multiple political and economic benefits to cultural diversity, according to Aleksy-Szucsich's (2007) research. Citing Doran (2001), among its benefits, cultural diversity strengthens the capacity for honest government, as well as a greater opportunity for specialization, more innovation and higher productivity (p. 13). However, there are diverging opinions in the body of literature that highlight the adverse effects of cultural diversity. Referring to a cross-country analysis performed by Alesina and La Ferrara (2004) to examine the impact of the level of income and institutions on the relationship between ethnic diversity and economic performance, Aleksy-Szucsich (2007, p. 30) explains that the net impact of ethnic diversity across countries is negative. The negative effects respond to the increased complexity of managing a more diverse population. Nonetheless, the same study concluded that the level of income and the existence of democratic institutions are moderating variables that help countries offset the negative impact of cultural diversity and harvest positive results from it. In essence, rich democracies benefit from ethnic diversity.

As a solution, Alesina and La Ferrara (2004), in alignment with Alesina and Spolaore (2003), support the creation of smaller, more homogenous states, rather than multi-ethnic states. Their argument is that free trade already enables the needed economic interactions between heterogeneous societies that return the benefits of diversity in production. With this, they argue, it is better to seek more homogeneous states and avoid the complexity of multi-ethnic societies, even though "promoting racial homogeneity is unappealing and probably incorrect" (Aleksy-Szucsich, 2007, p. 31).

Ethnic Diversity: Two Sides of a Coin

Diversity has mixed blessings (Williams & O'Reilly, 1998); it is not all good, nor is it all bad. Cultural diversity has multiple known advantages and disadvantages that have been very

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well defended by scholars. On the positive side, Aleksy-Szucsich (2007) posits that one of the primary benefits of having a culturally diverse society is that it prepares the country for competing in global markets. The rationale is that a more culturally diverse society is a better representation of the global population and provides valuable insights for faster adaptation to changes in the international environment.

The process of globalization entails that the countries, in order to remain competitive on the global scale, have to address not only the consumer needs of their own societies but they have to also address the needs of the consumers on the global market. To understand consumer markets throughout the world and to compete in them, the countries need to possess the insight into the characteristics of consumers in many cultures. Countries with a more ethnically diverse workforce have a better chance of addressing the needs of those customers (Aleksy-Szucsich, 2007, p. 55).

Alnaimi (2012, p. 36–38) lists these nine benefits of workforce cultural diversity:

1. It is a factor for development as it widens the range of open to everyone (UNESCO, 2001).
2. In the context of globalization, culturally diverse employees contribute a variety of ideas that may bring more profit to businesses.
3. A culturally diverse workforce represents an opportunity for business growth as it can lead companies to address the customized needs of a larger portion of the total population.
4. It discourages discrimination.
5. It helps with the recruitment and retention of the best talent (Harvard Business Review on managing diversity, 2001).

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6. It returns better profits anchored in the diverse background of the individuals.
7. It creates an environment for generating new ideas.
8. It can provide a solution for clustering if harmonious relationships are built among team members.
9. It provides global advantages (Mansour, 2004) such as:
 - a. A fertile source of human cultural enrichment
 - b. The preservation of biological diversity
 - c. The aesthetic value of cultural diversity
 - d. An expression of freedom, fostering cultural and intellectual creativity

As there are advantages, scholars have also highlighted significant disadvantages of cultural diversity.

While successful organizations learn to manage to turn that (cultural diversity) to their full advantage, problems such as conflicts and crimes cannot be overruled due to the vast differences in ethnicities, language, culture, religion, beliefs, customs, habits, and several other aspects related to having a diversified workforce. Alnaimi (2012, p. 14)

Easterly and Levine (1997), as cited by Aleksy-Szucsich, (2007, p. 19), presented a study which became a benchmark, arguing that ethnic diversity is detrimental to the rate of growth. “The cross-country regression analysis conducted by Easterly and Levine indicated that going from complete homogeneity to complete heterogeneity is associated with a 2.3% fall in economic growth”, she mentions. The main driver for declined growth is “that ethnically fragmented economies may find it difficult to agree on public goods and good policies” (p. 19).

Alnaimi (2012, p. 39–41) adds to the discussion by presenting a list of these seven disadvantages of workforce cultural diversity:

1. The increased difficulty for interacting and establishing relationships, mainly driven by communication barriers.
2. The barriers of cultural diversity cause an uneasy atmosphere.
3. The language related issues and accents might create uncomfortable situations that have the potential to make certain individuals feel excluded.
4. Different cultures have different values and etiquette that may be offensive for others.
5. There are culturally sourced differences in tone of voice that may lead to confusion.
6. Culturally diverse organizations are inherently impacted by the dynamics of the international environment.
7. It complicates cultural identities.

Advantages and disadvantages of cultural diversity can be perceived in the micro and macro perspectives. “Thus, effective management of cultural diversity is indeed considered essential” (Alnaimi 2012, p. 35).

Global Mobility as a Source of Cultural Diversity

Cultural diversity in a country is the result of international migration, a significantly increasing phenomenon. Bah (2019, p. 12) explains that “over the last 15 years the number of international migrants has grown rapidly. The number of international migrants reached 244 million in 2015 compared to 222 million in 2010, 191 million in 2005, and 173 million in 2000” (United Nations, 2015.). The global mobility of the population increases the opportunity for cross-cultural interactions but does not ensure that receiving countries harvest the full benefit of the capabilities of immigrants. Not taking advantage of immigrants’ full potential is a significant

loss for receiving countries. What is at stake? Aleksy-Szucsich, (2007, p. 74) explains that immigrants, very much in alignment with the Schumpeter's innovation theory, have personal characteristics like those of entrepreneurs. She points out that "Like entrepreneurs, for example, they tend to be dynamic risk-takers—especially in the early stages of a flow when information about the point of destination is incomplete and the likelihood of success uncertain" (p. 74). Other authors connect the compatibility of immigrants with the entrepreneurial drive and the necessity to compensate their low social status. Aleksy-Szucsich, (2007, p. 75) mentions that Hagen (1958, 1961) explained that minorities who suffer discrimination try to demonstrate their worth, and often do so by succeeding in business. She also refers to Schumpeter (1934) who noticed the entrepreneurial pattern in minorities and argued that the entrepreneurial drive is particularly stronger in those for whom wealth accumulation is the only chance for achieving social recognition.

Unfortunately, host countries continue to diminish the benefits that immigrants bring to the table. In a study performed for international migration in Portugal, Bah (2019) explains that "the skills that immigrants acquired before migration are not fully utilized on the international labor market. When immigrants are compared to natives, the evidence reveals that given the same occupation, immigrants are mostly overeducated (brain waste or occupation-skill mismatch)" (p. 13). This occupation-skill mismatch results in a negative selection of immigrants, which means that immigrants flowing to host countries will be of decreasing quality over time (Bah, 2019, p. 29).

Immigrants are not the sole way of transcultural diversity for countries. Emigrants also create networks that foster cross-pollination among cultures and result in increased innovation outputs for both the host country and the country of origin. Baiardi (2017, p. 55-56, 106) refers

to studies from Griffith et al. (2006), Kerr (2008), and Moser et al. (2014) to explain how ethnic networks enable knowledge spillovers, observable between United States and United Kingdom in the technology industry before the 1990's, Chinese networks in the United States, and the Jewish migrating from Germany to the United States when the Nazi party was governing.

The benefits of establishing ethnic networks among countries are at the core of what they call global innovation bridges (GIB). Martinez de Velasco (2015) defines GIBs as:

an economic development tool that seeks to create economic development opportunities in a country or region by helping innovative home-grown firms introduce new goods and services to global markets through an institutionalized, cross-national business support structure that includes a network of offices, human resources, specialized advisory services, and financial resources. (p. 24)

GIBs are government-sponsored institutions that help establish local firms in foreign soil, with the objective of immersing in global markets for learning the business landscape and enabling competition. GIBs create business networks with the aspiration of fostering innovation and increasing trade between countries.

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Harvesting the Advantages of Cultural Diversity

The advantages of cultural diversity for countries are not to be mistaken as a given outcome. Aleksy-Szucsich, (2007, p. 83) reports that scholars indicate that the context in which cultural diversity is placed is crucial for the realization of its benefits. Citing Hartenian & Gudmundson (2000), she explains that “having diversity is not enough to reap the benefits associated with it because the presence of a resource does not imply its use” (p. 83).

The double-edged qualities of ethnic diversity imply that once you have diversity, you simply have to have the right context in place. Otherwise, not only you will not be able to

reap the benefits of it, but you might also experience the negative sides of ethnic diversity such as high level of conflict and communication breakdowns. Therefore, as argued by the scholars of organizational science, ethnic diversity is a type of resource that cannot be just left by itself. It needs to be managed and leveraged, which means that it needs to be put in the right context.” (p.83)

Precisely, this dissertation pursued the abductive discovery of the right context to maximize the benefits of workforce diversity at the country level. Aleksy-Szucsich (2007, p. 102–132) extrapolates theories of organizational sciences to the macro level to establish several conditioning variables that enable the right setting for successfully managing ethnic diversity and harvesting its benefits.

Value in diversity translated into Democratic Pluralism. Aleksy-Szucsich argues that valuing diversity means that a country establishes rules and policies that cherish and encourage diversity among its citizens by supporting “the cultivation of diverse ethnocultural identities and practices of its citizens, that the country promotes the attitude of appreciation and tolerance towards diversity among its citizens” (2007, p. 106-107).

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The integration-and-learning perspectives translated into policies for integrating diverse people and those to show that the country treats diversity as a learning resource. For Aleksy-Szucsich this can be achieved by demonstrating an integrative approach towards immigrants and foreign-born residents, particularly in what it refers to merging foreign talent into the local labor market.

The verification of personal self-views translated into the country’s recognition of cultural differences. As explained by Aleksy-Szucsich all citizens need to feel that it is okay to be culturally different. This acceptance of cultural diversity must come not only from the

government, but from other citizens as well. A tangible way of doing so may be through allowing national minorities to develop self-government structures. Other ways are affirmative action programs, assuring fair representation in legislative or advisory institutions, reforms to school curriculums, cultural development programs, among others.

Simultaneous verification of personal and social self-views translated into a broader country definition of nationhood. This means switching from a definition of nationhood-based ethnicity to a definition that is neutral with respect to **ethnocultural** identities, explains Aleksy-Szucsich (2007). To put it simply, ethnicity is not part of the criteria for membership.

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Growth and innovation focused strategy. Aleksy-Szucsich elaborates that “A country that wants to take advantage of diversity has to assume a position to exploit that resource. Otherwise, the country would not be able to use it and benefit from it” (2007, p. 131).

Intentional interaction between diverse individuals. There must be a means of fostering intercultural interactions in the different spheres of society. Having a common language is a key enabler for the successful development of these relationships.

Although put together specifically to provide potential solutions to reap the benefits of ethnocultural diversity at the country level, the above-mentioned may generally be applicable as moderating variables to maximize the results from the other demographic diversity variables covered in this study: gender and age. Aleksy-Szucsich’s study referenced confirmed a positive impact of ethnolinguistic diversity in the creativity, openness, and innovation of countries when the national setting was the right one.

The results have revealed that countries which are more ethnically diverse are more creative and more open to change, and thus more innovative. The results have provided

support for the claim that a culturally diverse workforce is more adaptive to changes and it is more likely to produce a variety of ideas and novel approaches and a more exhaustive list of possible alternatives to solve problems. (Aleksy-Szucsich, 2007, p. 229-230)

Gender Diversity and Innovation at the Macro Perspective

Research centered on gender diversity and its effect on innovation macro results is very scarce. The scattered studies on the topic oscillate between the impact that females in managerial roles have in innovation and the existent gender salary gap. Both were extrapolated to the country level in this study. For instance, this research helped to **abductively** determine the relationship between gender diversity, specifically in leading structures of political power, and the impact of gender-driven unequal treatment in the innovation results of a country.

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In the sphere of female leadership, Sharma (2013, p. 15) argues that female managers increase the diversity of knowledge which in turn may have a positive impact in the innovation performance. The impact does not come solely as the result of female managers encouraging innovation, but also in the innovation intensity of firms (Sharma 2013, p. 44). Sharma (2013, p. 48) concluded that there is a linear relationship between the number of females in leadership positions and the level of innovation of the firm. This may lead to the thinking that the level of innovation will continue to grow as a higher number of women get into managerial positions. However, the author predicts a curvilinear effect in the relationship, given that the level of diversity will be **reduced**, as women become a majority. Sharma's (2013) prediction could not be confirmed, most probably because of the scarce number of firms with enough number of females in managerial positions to prove this correct.

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Osterreich (2002, p. 74) discusses the topic of the gender salary gap, particularly contrasting how this phenomenon is observed in countries south of the United States. Citing Joeke (1999), the author explains that the bigger salary gap between males and females in developing countries responds to the composition of the manufacturing workforce driven by the intentional selection of lower paid female workers to compete globally by offering lower prices. This fact was relevant to this study as it highlights that female participation in the workforce of a country does not necessarily translate in equal participation of the creative process that leads to innovation. This connects back to what Aleksy-Szucsich (2007, p. 131) elucidates, that having a diverse workforce does not imply benefits if it is not exploited to its potential.

Age Diversity and Innovation at the Macro Perspective

Relevant literature that presents generational diversity in the workforce of a country and how it relates to innovation macro results is extremely scarce. Saarteinen-Erben (2010) stresses the importance of understanding how an aging workforce may **impact countries**, as “this demographic shift is not a temporary feature.” She expresses concern about the little evidence of employers seeking to “retain older workers or leveraging their capabilities and intellectual expertise” Saarteinen-Erben, (2010, p. 2). As she reports in her study, this demographic shift will primarily **impact** developed nations whose projections show that the individuals over age 50 will represent most of the population between 2010 and 2030. The global population will experience the same demographic shift by 2050 Saarteinen-Erben, (2010, p. 11-12).

Understanding this, generational diversity in a country’s workforce will be unavoidable and will require adequate management to optimize innovation results. Studies at the micro level have concluded that age diversity may negatively **impact** team dynamics and innovation, especially when the generational gap is more perceivable. Wegge et al. (2012) performed a

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research program that ran for six years to monitor the effectiveness and innovation of teams with high age diversity among members. Their results show that managerial intervention for focusing the team on the expected innovative outcomes through a clear definition of objectives and vision was a key enabler to mitigate the natural diverging dynamics between younger and older team members. If extrapolated to the country level, government intervention to create a labor environment that promotes cross-generational participation and fosters respect for generational diversity as a driver for innovation will be required to mitigate the natural divergence of diverse individuals.

Filling a Void

The collection of available literature on the topic revealed a void that had to be filled to understand the relationship between gender, age, and ethnic diversity of a country's workforce and its innovation results. It strengthened the need for the **abductive** identification of key environmental factors that could help reap the most benefits from a diverse workforce. The resulting new theories of this research may help policymakers in defining cohesive strategies tailored to match their current and future demographic projections.

The next chapter presents the methodology used by the researcher to explore the macro connections of the multiple diversity and innovation variables and test the findings for delivering new theories.

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Chapter 3: Methodology

Introduction

As concluded in previous research, the relationship between diversity and performance is indirect (Aleksy-Szucsich, 2007, p. 82). Hence, it is difficult to explain it without understanding the full context of the society under research. Looking for appropriate ways of “exploring and understanding the meaning individuals or groups ascribe to a social or human problem” (Creswell & Creswell, 2018, p. 4), the researcher chose to follow a qualitative approach for **abductively** developing new theory that explains the phenomena behind the relationship between diversity and innovation competitiveness at the global level.

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Qualitative research, particularly Grounded Theory, has been found to be very suitable when trying to explain the efficacy of policy description, offering a unique experience and benefits to new researchers (Boadu & Sorour, 2015, p. 144). Looking for answers to ontological research questions this study combined grounded theory and case study methodologies for delivering new theories based on the collected data. In this chapter, the researcher explains the structure of the study following “the research onion” approach introduced by Saunders, Lewis, & Thornhill (2019, p. 130).

Researcher’s Philosophy

The researcher approached this study from an ontological interpretivist standpoint. Saunders, Lewis, & Thornhill (2019, p. 135) define ontology as the research philosophy that looks for answering what the nature of reality is. When applied through an interpretivist lens, ontological research looks for creating “new, richer understandings and interpretations of social worlds and context” (Saunders, Lewis, & Thornhill, 2019, p. 149) that help with defining the nature of reality. In the context of this study, the body of literature available had not been fully

capable of explaining the connection between diversity and innovation in the macro perspective. At first sight, there seems to be diversity-driven social crises in some of the top global competitors in innovation. Patterns in demographic diversity that help explain creative responses in the population to deliver innovation outputs are not easily detectable. Hence, this philosophical approach led the researcher in identifying those social responses in the macro sphere that connect diversity and innovation, from the context of the collective reality of each country. “As different people of different backgrounds, under different circumstances and at different times make different meanings, so create and experience different social realities” (Saunders, Lewis, & Thornhill, 2019, p. 149).

Approach to Theory Development

The researcher used an abductive approach to theory development. Saunders, Lewis, & Thornhill, (2019, p. 155) explain that an abductive study oscillates between deduction and induction, moving back and forth from data to theory and from theory to data. The flexibility of an **abductive** approach to theory development provided the researcher with room for exploring phenomena with enough ingenuity to keep asking questions while progressively narrowing down to theories that answered them. The **abductive** approach to theory development served the researcher of this study well to discover new theories that help explain how demographic diversity in the workforce of a country is related to its innovation results.

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Methodological Choice

The methodology of this study was qualitative. Creswell & Creswell (2018, p. 180-182) provide several key characteristics of a qualitative study. These are:

1. Data collection happens mainly at the field, not in a lab, protecting as much the social context where participants experience the issue.

2. The researcher is the data collection instrument; he or she collects the data and interprets it.
3. Data comes from multiple sources, such as interviews, observations, and documents, and are all in open-ended forms. The researcher interprets the data and organizes it into codes and themes.
4. The researcher moves inductively between themes trying to make sense of the data collected, and then uses deduction to gather additional data to support the themes identified. This is what Saunders, Lewis, & Thornhill, (2019, p. 155) describe as abduction.
5. The researcher keeps the focus in the meaning that individuals in the study give to observed phenomena, trying to understand how they perceive the problem.
6. The research design is emergent, meaning that the researcher must be comfortable with adjusting the research plan as needed throughout all the phases of the investigation. Research questions, the data gathering plan, individuals under study, anything can change in the iterative process of data gathering and analysis.
7. The researcher seeks for a holistic perspective of the research problem, considering multiple points of view, factors, and interactions.

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Research Strategies

This study was built using Grounded Theory and Case Study research strategies.

Grounded Theory was first introduced by Glasser and Strauss in 1967, but goes back to 1965 when they had the necessity to design research off the scientific method boundaries. Chun Tie, Birks & Francis (2019) narrate how Glasser and Strauss developed the grounded theory research methodology as an alternative to the misfit of the scientific method to their investigation. Strauss,

an expert in symbolic interactionism, and Glasser, expert in descriptive statistics, worked together in a study with terminally ill patients with different conscious level of their sickness. They examined how patients reacted to the knowledge of their terminal condition and the behaviors of caregivers. To do so, they developed the constant comparative method for organizing and analyzing qualitative data.

Grounded Theory Research Process

Chun Tie, Birks & Francis (2019) elaborate the general grounded theory process as follows:

1. Purposive selection of participants. The researcher selects the individuals that can help with answering the research questions.
2. Concurrent data collection and analysis. There is no distinction between gathering and analyzing data. The process is iterative and will repeat as needed until theory is developed from the data.
 - a. Data collection and data generation – all data is admissible, regardless of its qualitative or quantitative nature.
 - b. Coding – in coding, the researcher identifies concepts and similarities that are recurrently observed in data.
 - i. Initial coding and identification of categories
 - ii. Intermediate coding, selection of core themes and data saturation
 - iii. Advanced coding, storyline definition and theoretical coding
 - c. Memoing – this is how researchers informally document their analysis and decisions made concerning sampling, coding, and identification of themes and relationships.

3. Generation of the grounded theory. Once common themes are refined, the researcher generates new theory that can explain the underlying processes that precede social phenomena.

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In combination with a case study, grounded theory helped to fill the theoretical void regarding demographical diversity and innovation results of countries.

Case Study Research Process

Bromley (1990) defines a case study as a “systematic inquiry into an event or a set of related events which aims to describe and explain the phenomenon of interest,” with the objective of collecting sufficient evidence that supports an argument strong enough to be recognized among competent investigators as the preferred interpretation of the events. Under this definition, a combined strategy of grounded theory and case study worked perfectly for the researcher, aiming to strengthen the underlying arguments of the newly developed theory.

Zucker (2009) provides a set of recommended steps to build a case study. As some of the suggested steps are embedded in the grounded theory research design, the researcher leveraged common steps to streamline the study.

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1. Define the purpose and rationale of the study, including the significance of the phenomena being studied and the research questions.
2. Design the study considering the unit of analysis and the purpose of the research.
3. Define the data collection strategy.
4. Describe the case in detail.
5. Analyze the situation under the lens of the research purpose and unit of analysis.
6. Analyze the findings considering the purpose and rationale of the study.
7. Establish rigor by incorporating other cases for contrasting results.

In this study, the researcher tested the emerging grounded theories by incorporating case studies of two countries with different innovation profiles. The case studies helped to strengthen the arguments of the emerging grounded theories and firmly proposed them as such.

Research Time Horizon

According to Al Darmaki (2015, p.95) the time horizon indicates the length of the study, and if it is representative of a particular period or an extended period. It can be categorized as cross-sectional or longitudinal. A cross-sectional time horizon aims for answering the research question in a particular time snapshot, while a longitudinal time horizon focuses on the evolution of research phenomena along time. This research had a longitudinal time horizon, considering innovation results data from 2013-2020 and workforce demographic diversity data from 1990-2020.

Research Technique and Procedures

This is the final layer of the ‘research onion’ (Saunders, Lewis, & Thornhill, 2019, p. 130). Once philosophies, methodology and strategies are defined, the technique and procedures unveil details around sample size and selection, and collection of data. Al Darmaki (2015, p.95) highlights that a sample is a representation of a particular population. Therefore, before selecting a sample, it is important to ascertain the targeted population of the research. In this study, the world was divided into the following clusters: North America, Latin America and the Caribbean, Europe, Africa and Middle East, and Asia Pacific. The top two innovation performers, based on the average ranking for the Global Innovation Index from 2013–2020, were chosen from each cluster to further advance the study following the grounded theory approach. Data was collected and simultaneously analyzed to answer the initial and emerging research questions. Upon generation of grounded theory, two countries with diverging innovation profiles

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were chosen to develop case studies that helped to confirm or disconfirm the emerging theories. The countries used for the case studies were not part of the original sample of countries used for developing the grounded theories. The selection of the countries that were part of this study is better explained in Chapter 4.

In the ~~abductive~~ spirit of this study, the methodology was subject to changes and adjustments as required to enable discovery of those “richer understandings and interpretations of social worlds and context” (Saunders, Lewis, & Thornhill, 2019, p. 149) that helped with defining the nature of the reality.

The next chapter presents the research results. Its construction displays the iterative thinking process that governs the methodological approaches used by the researcher throughout the investigation.

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Chapter 4: Results

Introduction

The purpose of this research was to fill a void in theory related to the relationship between the level of workforce demographic diversity in a country and its innovation competitiveness. Despite the clear benefits of diverse teams for boosting innovation at the micro level, there were still many unknowns about the social dynamics in a country related to workforce demographic diversity and their effects on innovation. The results of this research can be useful for strengthening global innovation measures by incorporating workforce demographic diversity and its modifying variables as inputs, understanding how it can affect innovation competitiveness. It can also help identify the common sociopolitical processes that undergo for the heterogenization of a country's workforce and the best approach for maximizing innovation competitiveness.

A combined methodology of grounded theory and case studies helped with delivering and testing new theories based on data analysis and providing answers to ontological research questions.

Ten countries were selected for the scope of this study. The selection criteria were based on the geographical region and the average Global Innovation Index for each country. Five regions were defined: North America, Latin America and the Caribbean, Europe, Africa and Middle East, and Asia Pacific. The top two competitors from each region were identified with the calculated average Global Innovation Index score from 2013 to 2020. Narrowing down the analysis to include only the top competitors from each region provided a context for fair comparison between countries, while acknowledging regional differences. The countries selected for this research are Canada, Chile, Costa Rica, Cyprus, Hong Kong, Israel, Singapore, Sweden,

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Switzerland, and the United States. Table 1 shows the Global Innovation Index overall average for the countries selected, calculated from yearly scores from 2013 to 2020.

Table 1

Top Two Competitors per Region Based on Average Global Innovation Index Score from 2013 to 2020.

Region	Country	Overall Average Score
Africa and Middle East	Israel	56.6
	Cyprus	47.2
Asia Pacific	Singapore	61.6
	Hong Kong	57.1
Europe	Switzerland	66.8
	Sweden	63.8
Latin America and the Caribbean	Chile	39.1
	Costa Rica	36.7
North America	United States of America	62.1
	Canada	56.3

Note. The data for the calculation of the Overall Average Score for the Global Innovation Index from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

For the ten countries in scope, the researcher collected and analyzed data following the grounded theory methodology to respond to the following research questions:

1. What is the innovation competitiveness profile of the country?

2. How has the innovation competitiveness profile of the country changed over time?
3. What is the demographic diversity profile of the country's workforce?
4. How has the demographic diversity profile of the country's workforce evolved over time?
5. What diversity fostering policies have been implemented in the country over time?
6. What has been the effect of these policies in the demographic diversity profile of the country's workforce?
7. What relationship between workforce demographic diversity and innovation competitiveness can be abducted from the data collected?

The case study methodology helped to test the new theory developed and see how applicable it is in the global context of innovation competitiveness.

Country Innovation Competitiveness Profile

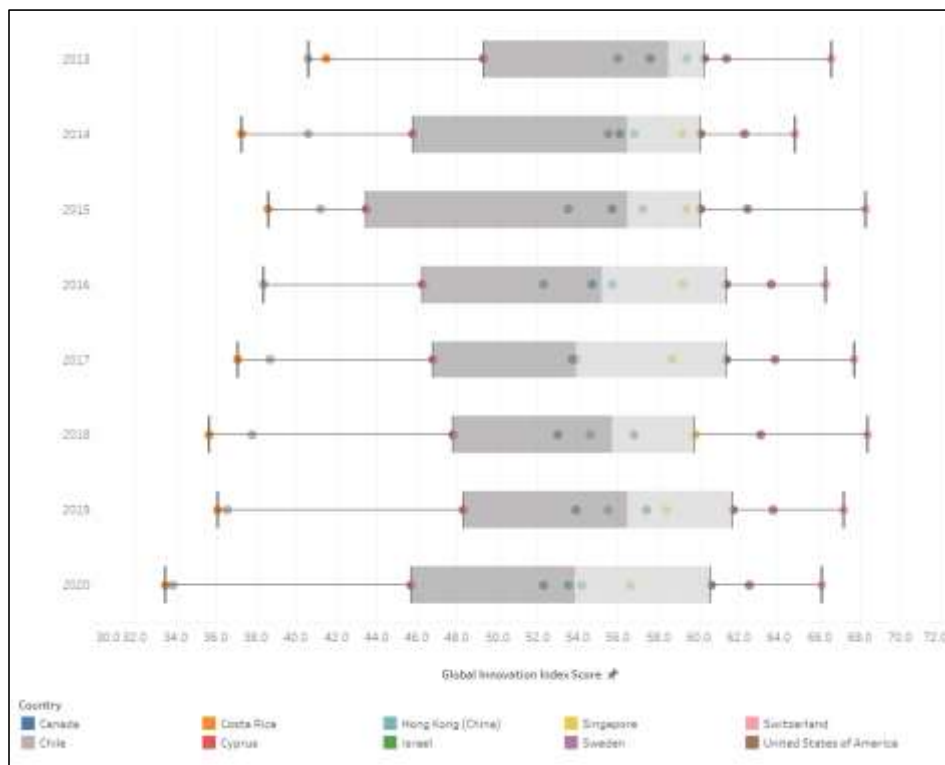
Analyses for Global Innovation Index, sub-indices, pillars, and sub-pillars are based on the *Indicator Rankings & Analysis | Global Innovation Index* data set by Cornell University, INSEAD, and WIPO (2020), and scoped for the ten countries selected: Canada, Chile, Costa Rica, Cyprus, Hong Kong, Israel, Singapore, Sweden, Switzerland, and the United States. The Global Innovation Index scores ranged between 33.5 and 68.4 from 2013 to 2020. The yearly median for the Global Innovation Index of these countries has oscillated between 53.9 and 58.5.

As shown in boxplots in Figure 2, for the eight years in scope, the European countries, Switzerland and Sweden, led the competition year after year, while Latin American countries, Chile and Costa Rica, consistently scored the lowest among the ten. Cyprus also scored at the

bottom quartile, yet its results from 2017 to 2020 were approximately ten points higher than those of the Latin American countries in the study. The United States scored at the top quartile, relatively close to Sweden, the second highest score of the group for the 2013 to 2020 period. The rest of the countries in the group oscillated between the second and third quartiles, with countries in the Asia Pacific region dominating the third quartile for most of the period.

Figure 2

2013-2020 Global Innovation Index Scores Boxplots by Year.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020,

(<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD

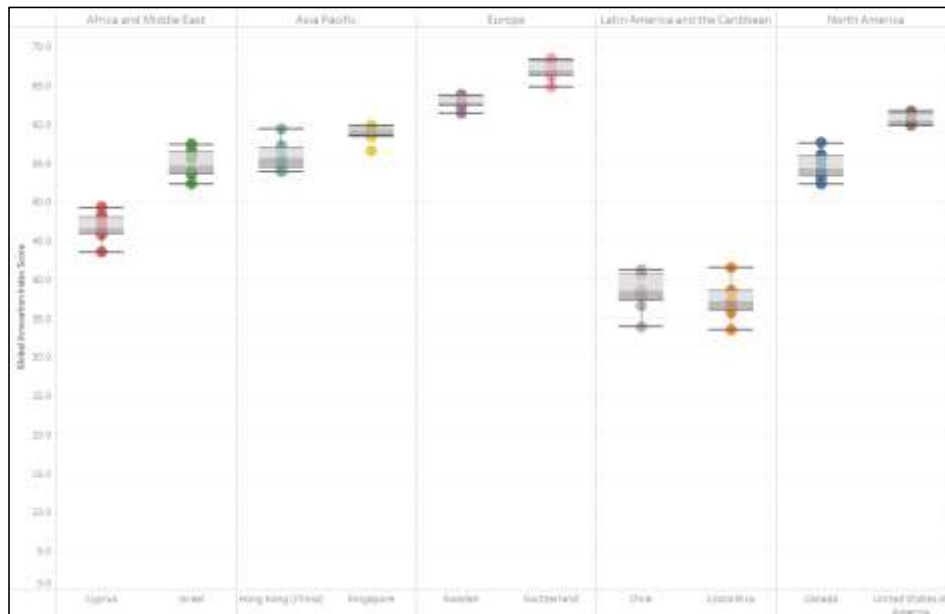
WIPO.

The boxplots in Figure 3 show that Singapore, Sweden, Switzerland, and the United States have the lowest variability in the Global Innovation Index scores for the period, as suggested by the dispersion of data points. On the other end, Chile and Costa Rica show larger dispersion of data points for their Global Innovation Index scores from 2013 to 2020. This suggests that countries with the highest score have plateaued with minimum changes during the period. On the other end, countries with a greater room for improvement may be more challenging to predict.

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Figure 3

2013-2020 Global Innovation Index Scores Boxplots by Country.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

As explained in Chapter 2, the Global Innovation Index is the simple average of sub-indices Innovation Input and Innovation Output. Sub-indices are calculated from multiple tiers down, identified as pillars, sub-pillars, and indicators. Details on the innovation performance of each country will be summarized in a longitudinal context for the period from 2013 to 2020, sourced from the Global Innovation Index reports (Cornell University, INSEAD, & WIPO, 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020a; 2020b). To help with understanding how the performance of a country in the different pillars, sub-pillars, and indicators compare to the performance of its peers, each report highlights those pillars, sub-pillars, and indicators that are marked as strengths or weaknesses. This helps identify areas in which the country is a benchmark for the rest of the world, as well as those where the country should not be used as the reference standard.

The countries will be discussed in order of rank, based on the Global Innovation Index average score for the period.

Switzerland. This European country has been the absolute winner in global innovation for the period. It has been ranked in first place in the Global Innovation Index and in the Innovation Output Sub-Index from 2013 to 2020. The Knowledge and Technology Outputs pillar has consistently been ranked first for the period as well. The pillars of Creative Outputs and Business Sophistication have also been ranked in the top three for most of the period. The sub-pillars that have been consistent strengths for Switzerland are Ecological Sustainability,

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Knowledge Workers, Knowledge Creation, Creative Goods and Services, and Political Environment. None of the pillars or sub-pillars have been identified as a weakness for Switzerland from 2013 to 2020. Switzerland's weaknesses are only identifiable at the indicator level. Table 2 summarizes the ratio of strengths versus weaknesses in the innovation pillars, sub-pillars, and indicators for Switzerland. The increase in the count of strengths while maintaining the count of weaknesses demonstrates that Switzerland is a tough competitor to beat.

Table 2

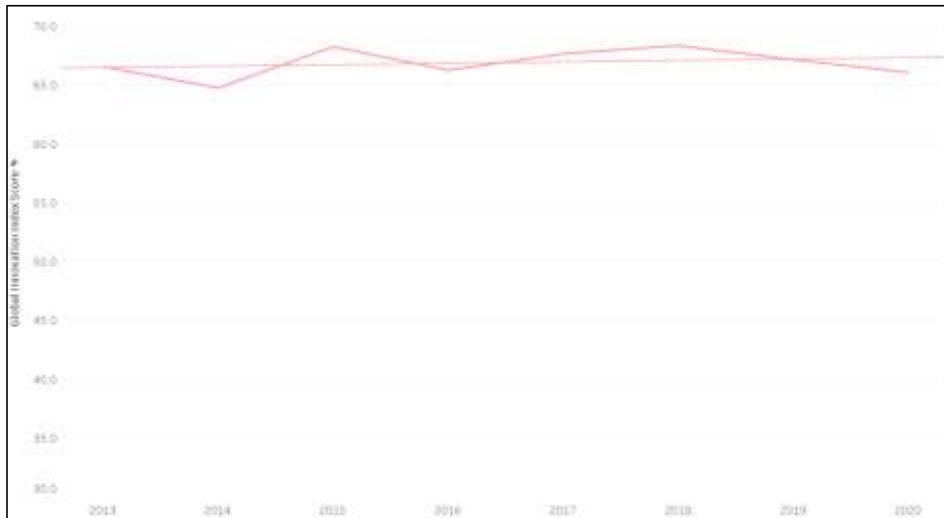
Switzerland's Innovation Pillars, Sub-Pillars, and Indicators Strengths vs Weaknesses Ratio for the Global Innovation Index from 2013 to 2020.

Source	Year	Strengths	Weaknesses	Strengths ÷ Weaknesses
[Cornell University, INSEAD & WIPO (2013, p. 251)]	2013	15	11	1.36
[Cornell University, INSEAD & WIPO (2014, p. 262)]	2014	21	10	2.10
[Cornell University, INSEAD & WIPO (2015, p. 282)]	2015	22	10	2.20
[Cornell University, INSEAD & WIPO (2016, p. 285)]	2016	23	10	2.30
[Cornell University, INSEAD & WIPO (2017, p. 293)]	2017	25	10	2.50
[Cornell University, INSEAD & WIPO (2018, p. 325)]	2018	28	10	2.80
[Cornell University, INSEAD & WIPO (2019, p. 329)]	2019	29	10	2.90
[Cornell University, INSEAD & WIPO (2020, p. 327)]	2020	28	11	2.55

The Global Innovation Index Score for Switzerland has been over 60 for 2013 to 2020, with a peak score of 68.4 in 2018 and the lowest 64.8 in 2014. As Figure 4 shows, Switzerland's performance in the Global Innovation Index has been stable for the period with a practically flat trend. Its ability to maintain the first-place rank depends on the sustainability of its current performance and on the performance trends of close runners. The sudden drop in the strengths versus weaknesses ratio for 2020 should not be overlooked, as it provides better insights as to how the country compares to its peers and may indicate a loss of competitive advantage.

Figure 4

Switzerland's Global Innovation Index Scoring Trend from 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Sweden. In second place, with an average score of 63.8 in the Global Innovation Index from 2013 to 2020, is Sweden. The country has been ranked second best in the Global Innovation Index for most years in the period, except for 2014 and 2018 when it was ranked in third position. The United Kingdom and The Netherlands ranked second in those years, respectively. Sweden scored in the top five for Innovation Input and Innovation Output sub-indices from 2016 to 2020. The Knowledge and Technology Outputs pillar and the Infrastructure pillar have been consistently highlighted as strengths for the country for most of the period. The Business Sophistication pillar has been a growing strength as well, improving from an eleventh-

place ranking in 2013 to first place in the 2019 and 2020 rankings. None of the pillars or sub-pillars have been identified as a weakness for Sweden from 2013 to 2020. Table 3 summarizes the ratio of strengths versus weaknesses in the innovation pillars, sub-pillars, and indicators for Sweden. Apart from the period of 2015 to 2018 that observed drastic changes in the number of strengths, the rest of the years showed a stable performance in innovation pillars, sub-pillars, and indicators, in comparison to its peers.

Table 3

Sweden's Innovation Pillars, Sub-Pillars, and Indicators Strengths vs Weaknesses Ratio for the Global Innovation Index from 2013 to 2020.

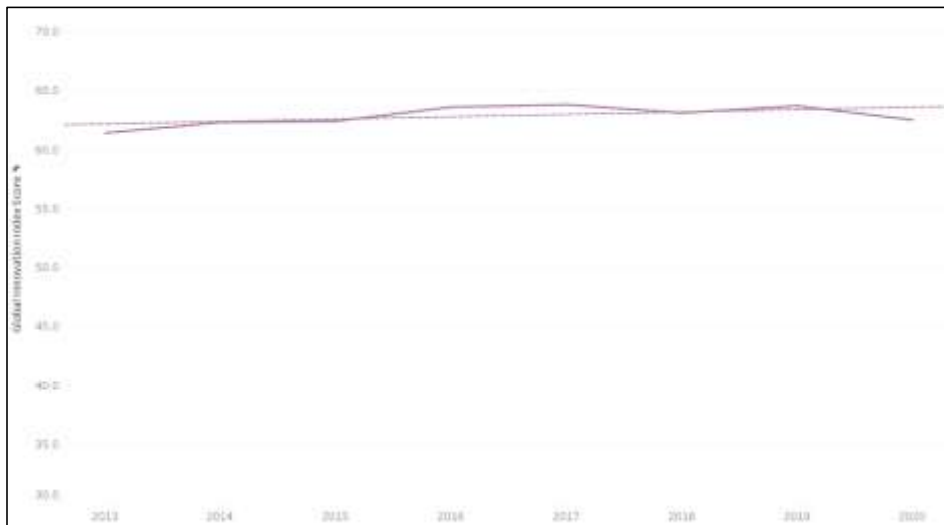
Source	Year	Strengths	Weaknesses	Strengths ÷ Weaknesses
[Cornell University, INSEAD & WIPO (2013, p. 250)]	2013	19	11	1.73
[Cornell University, INSEAD & WIPO (2014, p. 261)]	2014	17	10	1.70
[Cornell University, INSEAD & WIPO (2015, p. 281)]	2015	18	10	1.80
[Cornell University, INSEAD & WIPO (2016, p. 284)]	2016	23	10	2.30
[Cornell University, INSEAD & WIPO (2017, p. 292)]	2017	16	10	1.60
[Cornell University, INSEAD & WIPO (2018, p. 324)]	2018	20	10	2.00
[Cornell University, INSEAD & WIPO (2019, p. 328)]	2019	20	10	2.00
[Cornell University, INSEAD & WIPO (2020, p. 326)]	2020	20	10	2.00

The Global Innovation Index Score for Sweden has been over 60 for 2013 to 2020 as well, with peak scoring of 63.8 in 2017 and the lowest score of 61.4 in 2013. As Figure 5 shows, similarly to Switzerland, Sweden's performance in the Global Innovation Index has been stable for the period with a practically flat trend. To solidify its second-place rank, Sweden needs to boost its current performance and distance itself from close runners. The steadiness of its strengths versus weaknesses ratio from 2018 to 2020 provides insights on how the country

compares to its peers. Sweden should pursue crossing the threshold on those pillars, sub-pillars, and indicators that are close to becoming a strength to improve its competitive advantage.

Figure 5

Sweden's Global Innovation Index Scoring Trend from 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

United States. In third place on the list is the United States with an average score of 62.1 in the Global Innovation Index from 2013 to 2020. The country has been ranked in the top five in Global Innovation Index for most years in the period, except for 2014 and 2018, when it was ranked in sixth position. Different from Switzerland and Sweden, The United States ranked higher in the Innovation Input sub-index than in the Innovation Output sub-index for all years in scope. The country ranked among the top five in Innovation Input every year, except from 2018

when it was ranked in sixth position. The Market Sophistication pillar has been consistently highlighted as a strength for the country for the whole period. As for weaknesses highlighted for the period in pillars and sub-pillars, the Creative Outputs sub-pillar of Intangible Assets and the Human Capital and Research sub-pillar of Tertiary education were identified in 2013 and 2018, respectively. Table 4 summarizes the ratio of strengths versus weaknesses in the innovation pillars, sub-pillars, and indicators for United States. As an interesting fact, the United States has shown a better strengths versus weaknesses ratio than Sweden for the entire period, reaching over 2.00 for most years, except for 2013 and 2015.

Table 4

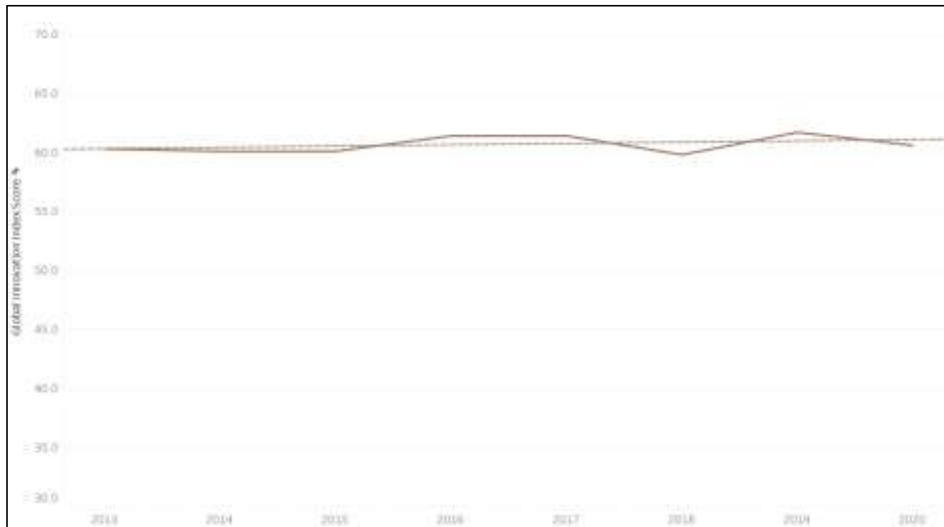
United States' Innovation Pillars, Sub-Pillars, and Indicators Strengths vs Weaknesses Ratio for the Global Innovation Index from 2013 to 2020.

Source	Year	Strengths	Weaknesses	Strengths ÷ Weaknesses
[Cornell University, INSEAD & WIPO (2013, p. 264)]	2013	16	11	1.45
[Cornell University, INSEAD & WIPO (2014, p. 275)]	2014	21	10	2.10
[Cornell University, INSEAD & WIPO (2015, p. 295)]	2015	19	10	1.90
[Cornell University, INSEAD & WIPO (2016, p. 297)]	2016	22	10	2.20
[Cornell University, INSEAD & WIPO (2017, p. 306)]	2017	20	10	2.00
[Cornell University, INSEAD & WIPO (2018, p. 338)]	2018	22	11	2.00
[Cornell University, INSEAD & WIPO (2019, p. 341)]	2019	25	10	2.50
[Cornell University, INSEAD & WIPO (2020, p. 339)]	2020	24	10	2.40

The Global Innovation Index Score for United States has remained somewhat steady, oscillating between the high 50's and the low 60's, with a peak score of 61.7 in 2019 and the lowest score of 59.8 in 2018, a range of less than two points. The trend shown in Figure 6 supports the stability of the United States' Global Innovation Index scoring for the period.

Figure 6

United States' Global Innovation Index Scoring Trend from 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Singapore. Fourth on the list is Singapore, the first country from the Asia Pacific region. With an average score of 61.6 in the Global Innovation Index from 2013 to 2020, Singapore is the last country in scope to reach an average score over 60. The country has been ranked in the top ten in the Global Innovation Index for the period. It had slowly improved its ranking in the overall score from eight place in 2013 to fifth place in 2019. However, it slid back to eighth place in 2020. Singapore is the indisputable winner in the Innovation Input sub-index. It was ranked first every year from 2013 to 2020. The Business Sophistication pillar has been consistently highlighted as a strength for the country almost every year in the period, except for

2020. Singapore ranked first in this pillar from 2013 to 2016; second in 2017 and 2018; fourth in 2019; and finally sixth in 2020. The Institutions pillar has been a solid strength since 2015 when it was ranked second best. From 2016 to 2020 Singapore ranked first in the world in Institutions. In terms of key weaknesses, the Education sub-pillar was highlighted as a weakness for Singapore from 2014 to 2017, and then again in 2019 and 2020. Besides Education, only the Intangible Assets sub-pillar was identified as a weakness in 2013. There have been additional weaknesses at the indicator level, however, not at the pillar or sub-pillar level. Table 5 summarizes Singapore's ratio of strengths versus weaknesses in the innovation pillars, sub-pillars, and indicators.

Table 5

Singapore's Innovation Pillars, Sub-Pillars, and Indicators Strengths vs Weaknesses Ratio for the Global Innovation Index from 2013 to 2020.

Source	Year	Strengths	Weaknesses	Strengths ÷ Weaknesses
[Cornell University, INSEAD & WIPO (2013, p. 242)]	2013	21	11	1.90
[Cornell University, INSEAD & WIPO (2014, p. 253)]	2014	21	11	1.90
[Cornell University, INSEAD & WIPO (2015, p. 273)]	2015	22	11	2.00
[Cornell University, INSEAD & WIPO (2016, p. 278)]	2016	24	11	2.18
[Cornell University, INSEAD & WIPO (2017, p. 286)]	2017	21	11	1.90
[Cornell University, INSEAD & WIPO (2018, p. 318)]	2018	21	10	2.10
[Cornell University, INSEAD & WIPO (2019, p. 322)]	2019	19	13	1.46
[Cornell University, INSEAD & WIPO (2020, p. 320)]	2020	22	11	2.00

The Global Innovation Index Score for Singapore shows a mild downtrend, heavily impacted by the 2019 and 2020 scores. Figure 7 shows the tendency with the sudden downtrend starting from the highest score of 59.8 in 2018 to the lowest score of 56.6 in 2020.

Figure 7

Singapore's Global Innovation Index Scoring Trend from 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Hong Kong. Behind Singapore on the list is Hong Kong. It scored an average of 57.1 in the Global Innovation Index from 2013 to 2020. The country has been ranked in the top fifteen in the Global Innovation Index for most of the period, except for 2017 when it was ranked in sixteenth place. It improved its ranking in the overall score since that year to eleventh place in 2020. Hong Kong is a strong competitor in the Innovation Input sub-index. It has consistently been ranked in the top 10 for the period. With a top three ranking for the period, including first place in 2013 and 2020, the Market Sophistication pillar has been consistently highlighted as a strength for the country. The Infrastructure pillar has been a secondary strength for Hong Kong

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during the period, particularly from 2013 to 2016, and in 2018 when it was ranked first. However, in 2020 it fell back to eleventh place. Hong Kong does not have consistent weaknesses at the pillar or sub-pillar tiers. Only the Knowledge Diffusion sub-pillar in 2013 and the Education sub-pillar in 2017 were identified as weaknesses. Table 6 summarizes the ratio of strengths versus weaknesses in the innovation pillars, sub-pillars, and indicators for Hong Kong. In 2016, the country obtained its highest ratio of strengths versus weaknesses with 2.70. The ratio was sustained over 2.00 until 2019.

Table 6

Hong Kong's Innovation Pillars, Sub-Pillars, and Indicators Strengths vs Weaknesses Ratio for the Global Innovation Index from 2013 to 2020.

Source	Year	Strengths	Weaknesses	Strengths ÷ Weaknesses
[Cornell University, INSEAD & WIPO (2013, p. 184)]	2013	19	11	1.73
[Cornell University, INSEAD & WIPO (2014, p. 194)]	2014	19	10	1.90
[Cornell University, INSEAD & WIPO (2015, p. 214)]	2015	19	10	1.90
[Cornell University, INSEAD & WIPO (2016, p. 222)]	2016	27	10	2.70
[Cornell University, INSEAD & WIPO (2017, p. 231)]	2017	24	11	2.18
[Cornell University, INSEAD & WIPO (2018, p. 263)]	2018	22	10	2.20
[Cornell University, INSEAD & WIPO (2019, p. 265)]	2019	20	10	2.00
[Cornell University, INSEAD & WIPO (2020, p. 262)]	2020	22	12	1.83

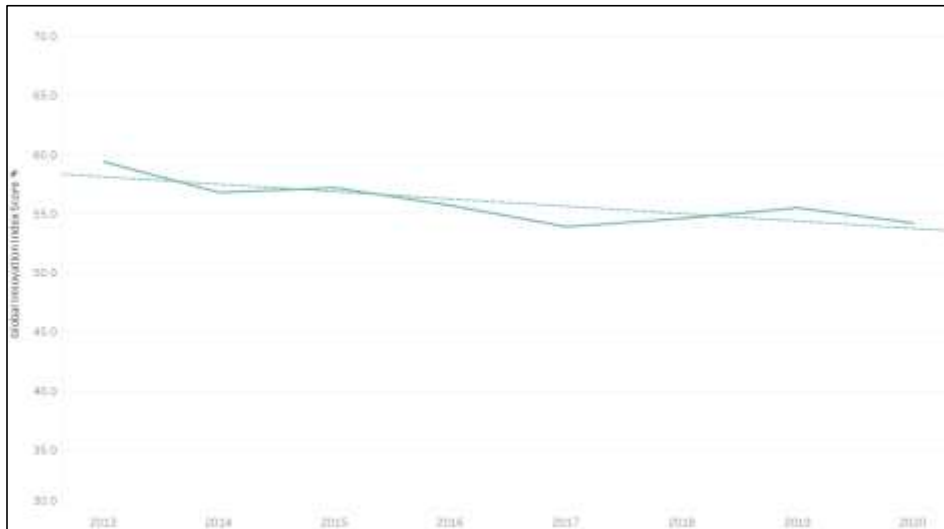
The Global Innovation Index Score for Hong Kong shows a downtrend since 2013, that seemed to momentarily change direction from 2017 to 2019. Figure 8 shows the tendency with a peak score of 59.4 in 2013 and the lowest score of 53.9 in 2017.

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Figure 8

Hong Kong's Global Innovation Index Scoring Trend from 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Israel. From the Africa and the Middle East region, Israel runs sixth in the list with an average score of 56.6 in the Global Innovation Index from 2013 to 2020. The country has been oscillating between the top twenty-five and the top fifteen Global Innovation Index rankings, showing significant improvements in ranking from 2018 to 2020. The Business Sophistication pillar has been consistently highlighted as a strength for the country most of the period, except for 2015 when it was ranked in eleventh position. Israel recovered its position regarding this pillar to rank third in the world from 2018 to 2020. The Knowledge and Technology Outputs pillar has been a secondary strength for Israel during the period, regularly ranking in the top ten.

Israel has not had weaknesses identified at the pillar tier. At the sub-pillar tier, Intangible Assets was identified as a weakness in 2013, 2014, 2015, and 2020, and Tertiary Education in 2019 and 2020. Table 7 summarizes the ratio of its strengths and weaknesses in the innovation pillars, sub-pillars, and indicators. In comparison to the first five countries, Israel is the first to show a ratio of strengths versus weaknesses lower than 2.00.

Table 7

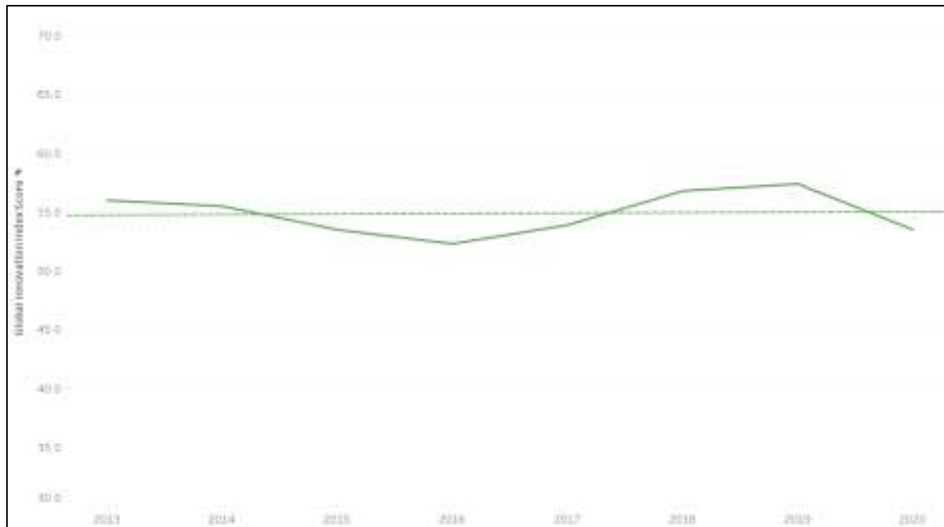
Israel's Innovation Pillars, Sub-Pillars, and Indicators Strengths vs Weaknesses Ratio for the Global Innovation Index from 2013 to 2020.

Source	Year	Strengths	Weaknesses	Strengths ÷ Weaknesses
[Cornell University, INSEAD & WIPO (2013, p. 191)]	2013	15	15	1.00
[Cornell University, INSEAD & WIPO (2014, p. 201)]	2014	20	11	1.82
[Cornell University, INSEAD & WIPO (2015, p. 221)]	2015	12	11	1.09
[Cornell University, INSEAD & WIPO (2016, p. 229)]	2016	13	10	1.30
[Cornell University, INSEAD & WIPO (2017, p. 238)]	2017	13	10	1.30
[Cornell University, INSEAD & WIPO (2018, p. 270)]	2018	14	10	1.40
[Cornell University, INSEAD & WIPO (2019, p. 272)]	2019	15	11	1.36
[Cornell University, INSEAD & WIPO (2020, p. 269)]	2020	15	12	1.25

The Global Innovation Index Score for Israel shows a flat trend for the period as shown in Figure 9, with a wider range as compared to previously showcased countries. There is more than a five points difference between the lowest score of 52.3 in 2016 and the highest score of 57.4 in 2019.

Figure 9

Israel's Global Innovation Index Scoring Trend from 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Canada. Four positions below the United States is Canada, its regional peer, running number seven on the list with an average score of 56.3 in the Global Innovation Index from 2013 to 2020. Canada has been a solid member of the top twenty list of the Global Innovation Index rankings for the period. The highest ranking achieved was the eleventh position in 2013. Canada has also been in the top 10 ranking for the Innovation Input sub-index for the period. Market Sophistication and Institutions pillars have been consistently highlighted as strengths for the country. No pillar has been identified as a weakness. However, at the sub-pillar tier, Education was identified as a weakness in 2015, 2016, 2017, and 2018; Ecological Sustainability was

identified as a weakness from 2016 to 2019; and Creative goods and Services was identified as a weakness in 2014 and 2018. Table 8 summarizes Canada's ratio of strengths versus weaknesses in the innovation pillars, sub-pillars, and indicators. Similar to Israel, the ratio of strengths versus weaknesses for Canada was lower than 2.00 during the whole period.

Table 8

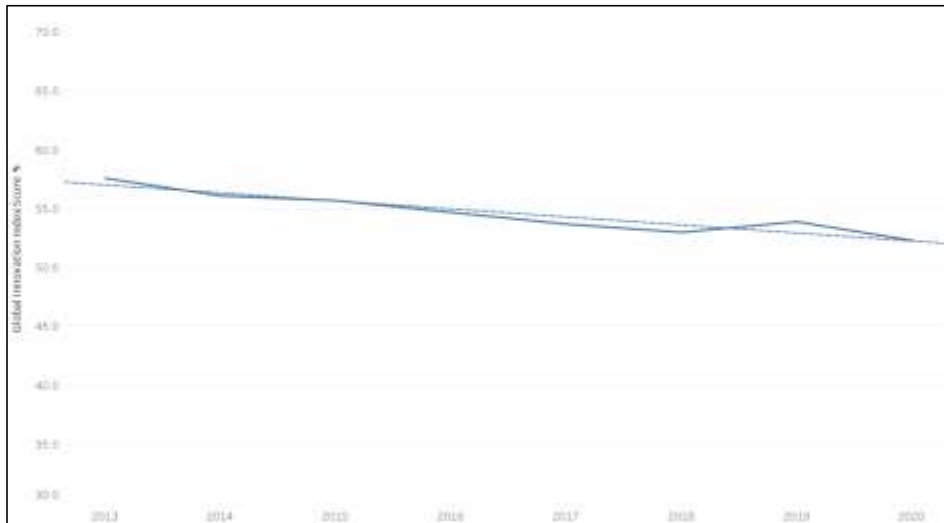
Canada's Innovation Pillars, Sub-Pillars, and Indicators Strengths vs Weaknesses Ratio for the Global Innovation Index from 2013 to 2020.

Source	Year	Strengths	Weaknesses	Strengths ÷ Weaknesses
[Cornell University, INSEAD & WIPO (2013, p. 154)]	2013	18	12	1.50
[Cornell University, INSEAD & WIPO (2014, p. 166)]	2014	18	11	1.64
[Cornell University, INSEAD & WIPO (2015, p. 186)]	2015	15	11	1.36
[Cornell University, INSEAD & WIPO (2016, p. 197)]	2016	18	12	1.50
[Cornell University, INSEAD & WIPO (2017, p. 207)]	2017	13	12	1.08
[Cornell University, INSEAD & WIPO (2018, p. 239)]	2018	20	13	1.54
[Cornell University, INSEAD & WIPO (2019, p. 240)]	2019	15	11	1.36
[Cornell University, INSEAD & WIPO (2020, p. 237)]	2020	17	10	1.70

The Global Innovation Index Score for Canada shows a downtrend for the period as shown in Figure 10. The peak score was 57.6 in 2013, and the lowest score was 52.3 in 2020. In the regional context, Canada's peak score is more than two points lower than the United States' lowest score for the period.

Figure 10

Canada's Global Innovation Index Scoring Trend from 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Cyprus. Cyprus placed eighth among the countries in the list with an average score of 47.2 in the Global Innovation Index from 2013 to 2020. Part of the top thirty ranking of countries for most of the period, except for 2015 and 2016, Cyprus runs second in its region. Cyprus does not enjoy consistent strengths in any of the pillars. Only the pillars of Creative Outputs, Market Sophistication, and Institutions were highlighted as strengths in 2013, 2014 and 2015, and 2014, respectively. As for weaknesses at the pillar and sub-pillar tiers, Cyprus had sub-pillars General Infrastructure and Investment, highlighted in 2016 and 2018, and 2020, respectively.

Interestingly, Cyprus was the only country in this study that had no strengths or weaknesses

identified in any of the tiers in 2017, thereby considered an average competitor. Table 9 summarizes the ratio of strengths versus weaknesses in the innovation pillars, sub-pillars, and indicators for Cyprus.

Table 9

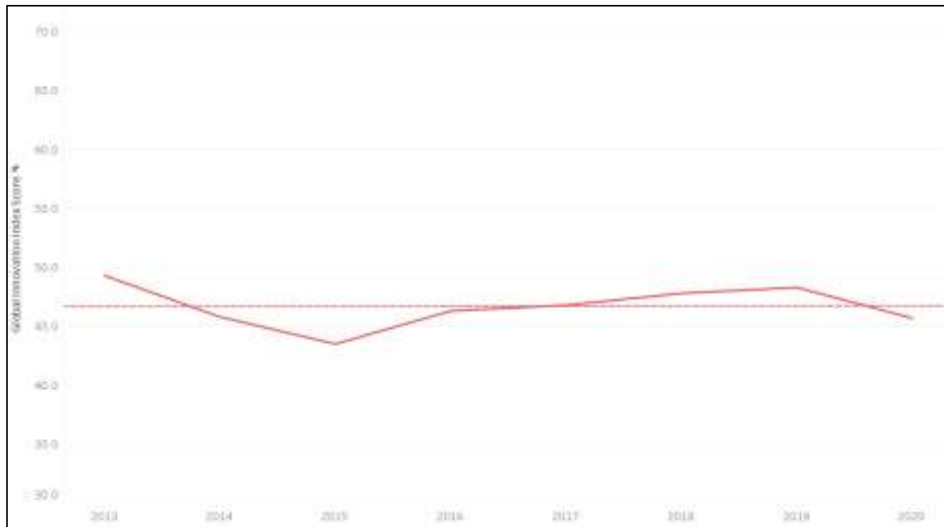
Cyprus' Innovation Pillars, Sub-Pillars, and Indicators Strengths vs Weaknesses Ratio for the Global Innovation Index from 2013 to 2020.

Source	Year	Strengths	Weaknesses	Strengths ÷ Weaknesses
[Cornell University, INSEAD & WIPO (2013, p. 162)]	2013	16	10	1.60
[Cornell University, INSEAD & WIPO (2014, p. 173)]	2014	18	10	1.80
[Cornell University, INSEAD & WIPO (2015, p. 193)]	2015	15	11	1.36
[Cornell University, INSEAD & WIPO (2016, p. 204)]	2016	13	11	1.18
[Cornell University, INSEAD & WIPO (2017, p. 214)]	2017	0	0	Blank
[Cornell University, INSEAD & WIPO (2018, p. 246)]	2018	14	11	1.27
[Cornell University, INSEAD & WIPO (2019, p. 247)]	2019	12	10	1.20
[Cornell University, INSEAD & WIPO (2020, p. 244)]	2020	11	11	1.00

The Global Innovation Index Score for Cyprus shows a flat, albeit more erratic, trend for the period as shown in Figure 11. This trend is very similar to the trend observed in its regional peer, Israel. The peak score was 49.3 in 2013, and the lowest score was 43.5 in 2015.

Figure 11

Cyprus' Global Innovation Index Scoring Trend from 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Chile. The final two countries in the list are part of the Latin American and the Caribbean region. First is Chile, having attained an average score of 39.1 in the Global Innovation Index from 2013 to 2020. Chile was part of the top fifty ranking of countries from 2013 to 2018. In 2019 it fell off the list, ranking fifty-first in the world and then fifty-fourth a year after. Chile does not count with strengths in any of the pillars for the period; there are several at the sub-pillar and indicator tiers. As for weaknesses, there are none at the pillar tier either. At the sub-pillar level, Creative Goods and Services was identified from 2013 to 2017; Knowledge Diffusion was identified in 2013, 2014, and 2020; Innovation Linkages was identified in 2018

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and 2019. Going down the list of countries, the count of strengths at the innovation pillars, sub-pillars, and indicators level also goes down. Chile is the first country in this study to go below the 1.00 threshold in the ratio of strengths versus weaknesses. Table 10 summarizes the ratio of strengths versus weaknesses in the innovation pillars, sub-pillars, and indicators for Chile.

Table 10

Chile's Innovation Pillars, Sub-Pillars, and Indicators Strengths vs Weaknesses Ratio for the Global Innovation Index from 2013 to 2020.

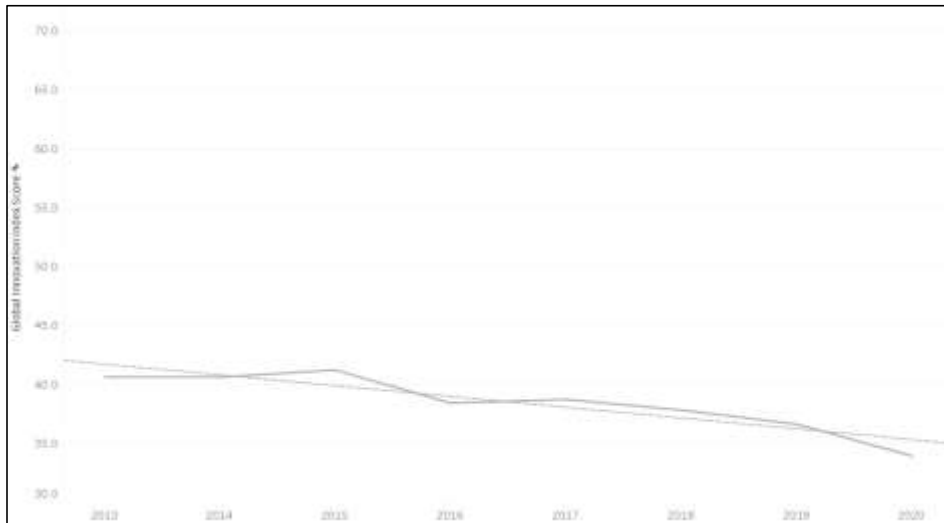
Source	Year	Strengths	Weaknesses	Strengths ÷ Weaknesses
[Cornell University, INSEAD & WIPO (2013, p. 156)]	2013	17	13	1.31
[Cornell University, INSEAD & WIPO (2014, p. 167)]	2014	13	13	1.00
[Cornell University, INSEAD & WIPO (2015, p. 187)]	2015	10	11	0.91
[Cornell University, INSEAD & WIPO (2016, p. 198)]	2016	11	11	1.00
[Cornell University, INSEAD & WIPO (2017, p. 208)]	2017	10	11	0.91
[Cornell University, INSEAD & WIPO (2018, p. 240)]	2018	10	11	0.91
[Cornell University, INSEAD & WIPO (2019, p. 241)]	2019	11	10	1.10
[Cornell University, INSEAD & WIPO (2020, p. 238)]	2020	11	11	1.00

The Global Innovation Index Score for Chile trended downwards for the period as shown in Figure 12. It continues to lose terrain in the innovation competition as other regional peers, such as Costa Rica and Mexico, are running closely. Chile's peak score was 41.2 in 2015 and its lowest 33.9 in 2020, a very significant drop of 7.3 points in just five years.

Commented [DAG50]: 2015 and

Figure 12

Chile's Global Innovation Index Scoring Trend from 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Costa Rica. The last runner in the list of countries in scope for this study is Costa Rica. Costa Rica had an average score of 36.7 in the Global Innovation Index from 2013 to 2020, 2.4 points less than its regional peer, Chile. Coming from being ranked in thirty-ninth place in 2013, the country has been struggling in the latter years to stay in the top 60 ranking. The Knowledge and Technology Outputs pillar, once a strength for Costa Rica, was not sustained after 2013. Other strengths were identified at the sub-pillar and indicator tiers. As for weaknesses, the Market Sophistication pillar was highlighted in 2014 and 2015 when the country was ranked in position number 121 and 120, respectively, for that pillar. Several weaknesses have been

identified at the sub-pillar tier in the period. The Investment sub-pillar was identified every year of the period; the Business Environment sub-pillar was identified in 2013, 2019, and 2020; the Knowledge Creation sub-pillar was identified in 2013, 2014, and 2015; the Credit sub-pillar was identified in 2015; the Knowledge Impact sub-pillar was identified in 2016; and the General Infrastructure sub-pillar was identified in 2017, and 2020. Like Chile, Costa Rica also went below the 1.00 threshold in the ratio of strengths versus weaknesses for some of the years in the period. Table 11 summarizes Costa Rica's ratio of strengths versus weaknesses in the innovation pillars, sub-pillars, and indicators.

Table 11

Costa Rica's Innovation Pillars, Sub-Pillars, and Indicators Strengths vs Weaknesses Ratio for the Global Innovation Index from 2013 to 2020.

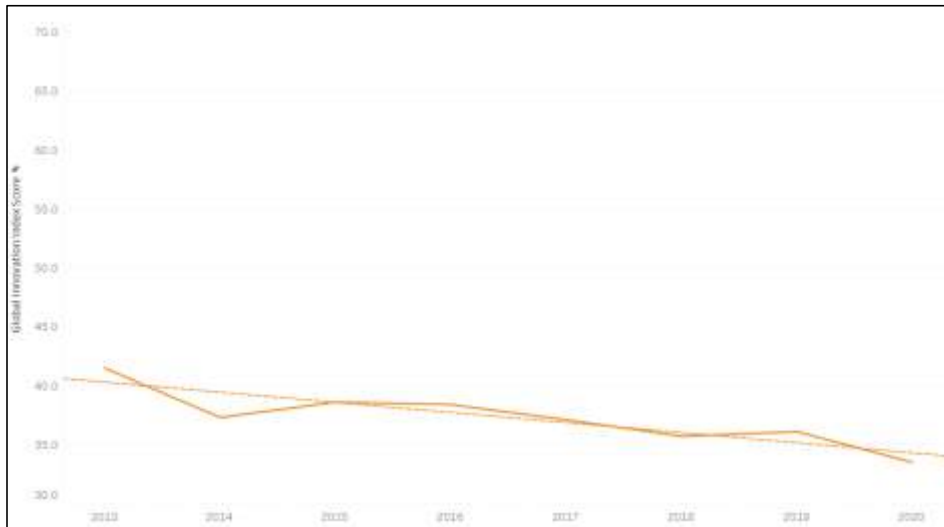
Source	Year	Strengths	Weaknesses	Strengths ÷ Weaknesses
[Cornell University, INSEAD & WIPO (2013, p. 159)]	2013	16	15	1.07
[Cornell University, INSEAD & WIPO (2014, p. 170)]	2014	15	13	1.15
[Cornell University, INSEAD & WIPO (2015, p. 190)]	2015	13	14	0.93
[Cornell University, INSEAD & WIPO (2016, p. 201)]	2016	14	12	1.17
[Cornell University, INSEAD & WIPO (2017, p. 211)]	2017	13	9	1.44
[Cornell University, INSEAD & WIPO (2018, p. 243)]	2018	10	11	0.91
[Cornell University, INSEAD & WIPO (2019, p. 244)]	2019	11	12	0.92
[Cornell University, INSEAD & WIPO (2020, p. 241)]	2020	13	13	1.00

The Global Innovation Index Score for Costa Rica also trends downwards for the period as shown in Figure 13, similar to what was shown for its regional peer, Chile. Costa Rica's peak score was 41.5 in 2013 and its lowest score was 33.5 in 2020, a drop of 8.0 points.

Commented [DAG51]: 2013

Figure 13

Costa Rica's Global Innovation Index Scoring Trend from 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Demographic Profile of Countries' Workforces

The demographics of countries are constantly changing, including their workforces. For the ten countries in the scope of this study, the researcher evaluated the workforce diversity in terms of gender, age groups, and nationality in a longitudinal analysis from 1990 to 2020. Presenting country workforce demographics have changed over time helps with identifying the turning points that led to follow-up questions to uncover drivers for change.

In the context of this study, workforce or labor force is defined in alignment with the standard definition provided by the International Labor Organization (n.d.a), which states:

As defined in international standards (19th ICLS, 2013), the Labor force captures those persons of working age who are actively engaged in the Labor market. It is the sum of persons employed and the unemployed. Together these two groups of the working-age population represent the supply of Labor for the production of goods and services in exchange for remuneration existing in a country at a given point in time.

Scoping the study for the total workforce instead of only the employed workforce was the sole judgement of the researcher. It is the result of understanding that, based on the definition previously provided, the combination of employed and unemployed persons are the primary component of the production of goods and services. Therefore, the total workforce must be at the core of Schumpeter's theory of innovation as the source of labor to produce new products or services, or for transforming the way existing products or services are produced (Bellofiore, 1991).

Commented [DAG52]: provided

Commented [DAG53]: services

Measures of Workforce Diversity. Diversity in a country's workforce was measured in the context of gender, age, and birthplace as a facsimile of nationality.

Gender diversity. The measure of gender diversity was standardized to be the percentage of female workers in the country's workforce for each year in context.

Age diversity. The generational data for countries' workforces is presented by the International Labor Organization (n.d.) in generational bands as follows:

1. Ages 15 to 24
2. Ages 25 to 34
3. Ages 35 to 44
4. Ages 45 to 54
5. Ages 55 to 64

6. Ages 65 and over

To measure diversity, the researcher calculated the percentage of workers in the workforce within each age band and calculated the standard deviation among the percentages for each year in context. Less standard deviation is less variability in the participation from different age groups, and therefore, a more diverse workforce. Because inherently a population distributes normally, it is expected that extreme age bands are less represented. To avoid the impact of these extremes value to the calculation of the standard deviation, the researcher split the age diversity analysis into two metrics. The first one is the standard deviation for the percentages of workers within age groups 25 to 64. The second one is the standard deviation for the percentages of workers within age groups 15 to 24, and 65 and over. This analysis allowed the researcher to find interesting results in countries as they equalize the representation in their workforces of new workers and the most experienced workers. Note that age data was not available for Chile.

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Ethnic/Nationality diversity. The International Labor Organization (n.d.) provides birthplace data as a binary variable that was used by the researcher as a facsimile to measure ethnic or nationality diversity. Workers are divided into natives or foreigners. The percentage of foreigners in a country’s workforce was used as the measure for ethnic/nationality diversity. Worker nationality data was not available for Singapore, Chile, and Hong Kong.

Switzerland. The top innovator in the world, Switzerland, had a total population growth of 6.2% from 2013 to 2020 ([Cornell University, INSEAD & WIPO, 2013; 2020]), as shown in Table 12.

Table 12
Total Population of Switzerland for Years in Scope.

Country	Source	Year	Total Population (millions)	Year over Year Growth

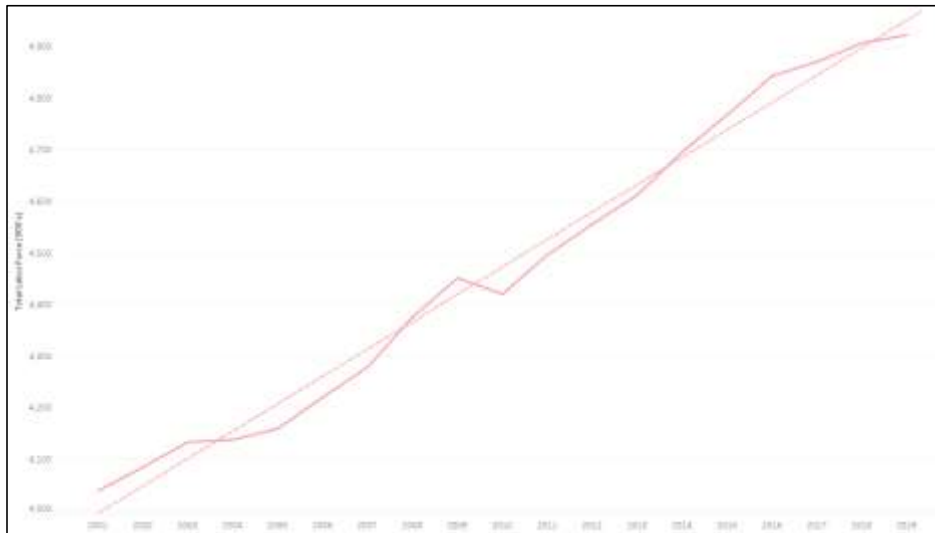
Switzerland	Cornell University, INSEAD & WIPO (2013, p. 251)	2013	8.1	Base
	Cornell University, INSEAD & WIPO (2014, p. 262)	2014	8.0	-1.2%
	Cornell University, INSEAD & WIPO (2015, p. 282)	2015	8.2	2.5%
	Cornell University, INSEAD & WIPO (2016, p. 285)	2016	8.3	1.2%
	Cornell University, INSEAD & WIPO (2017, p. 293)	2017	8.4	1.2%
	Cornell University, INSEAD & WIPO (2018, p. 325)	2018	8.5	1.2%
	Cornell University, INSEAD & WIPO (2019, p. 329)	2019	8.5	0.0%
	Cornell University, INSEAD & WIPO (2020, p. 327)	2020	8.6	1.2%

Note. Year over Year Growth is the percentage of difference from the previous year calculated by the researcher from population numbers in the Global Innovation Index reports.

The total workforce in Switzerland also shows the same growing pattern. For the period from 2013 to 2019 the total workforce increased by 6.7% ([International Labor Organization, n.d.]). Figure 14 shows the uptrend of Switzerland's workforce from 2001 to 2019.

Figure 14

Switzerland's Total Workforce in Thousands for 2001 to 2019.



Note. The workforce data for Switzerland is from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Gender diversity in Switzerland's workforce. As seen in Figure 15, the percentage of female workers in Switzerland's workforce has been increasing over time.

Figure 15

Switzerland's Percentage of Female Workers in the Workforce for 2001 to 2019.

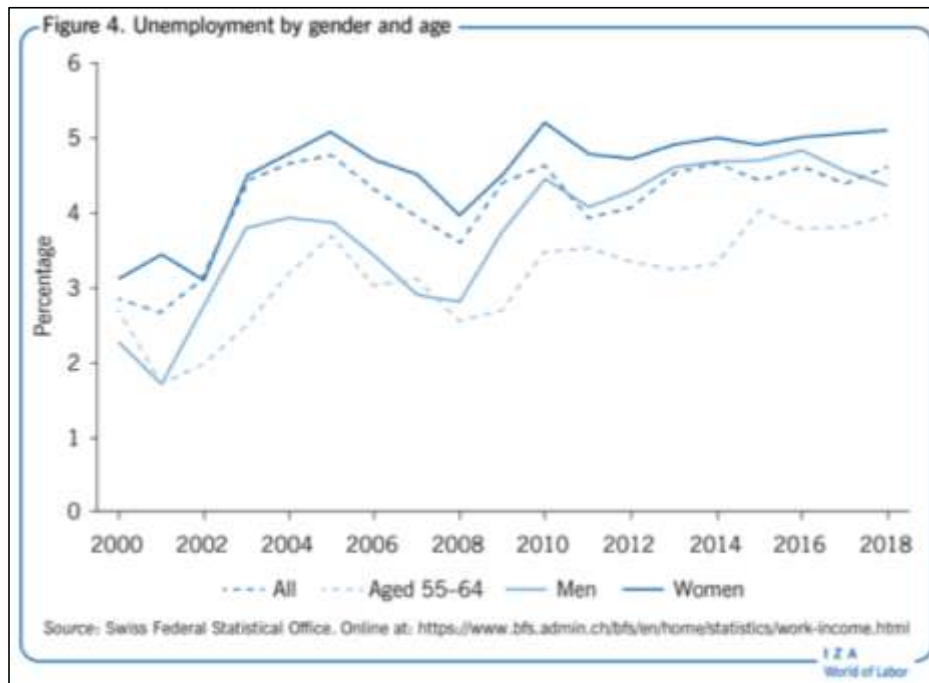


Note. The workforce data for Switzerland is from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

The periods with the highest steep in growth of the percentage of female workers in the Swiss workforce are from 2001 to 2002 and from 2007 to 2008. This coincides with the recessions of 2001 and 2008. According to Lalive and Lehmann (n.d.), these recessions had minimal impact in Switzerland’s labor market. In fact, as seen in Figure 16, in Lalive’s and Lehmann’s (n.d.) analysis highlighting the gender gap in Switzerland’s unemployment rates, the female unemployment rate went down from 2001 to 2002, while male unemployment went up. Similarly, from 2007 to 2008, the women’s unemployment rate had a greater improvement than the men’s.

Figure 16

Switzerland's Unemployment by Gender and Age.



Note. From “The Labor Market in Switzerland, 2000-2018” by R. Lalive and T. Lehmann, n.d., *IZA World of Labor* 2020. (<https://wol.iza.org/articles/the-labor-market-in-switzerland/long>).

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Switzerland's data suggests that the 2001 and 2008 recessions favored gender diversity in the workforce. However, the apparent benefit of recessions to gender diversity in the workforce may be driven by other forces, such as unequal payment between genders and unequal participation by gender in full-time versus part-time jobs.

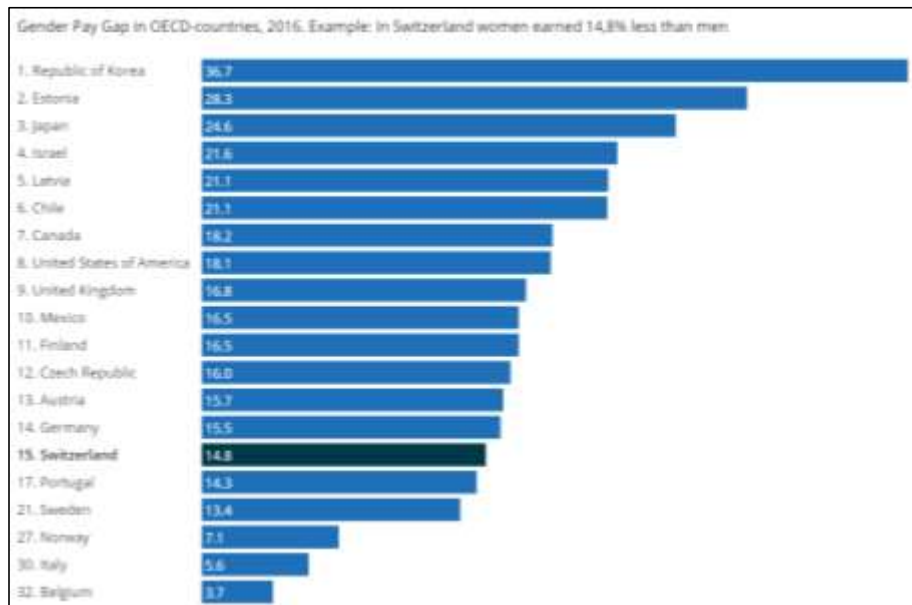
Labor markets may be incentivized to increase the participation of lower paid workers during times of recession. Yoe (2018) describes the long-term negative impact for new workers entering the labor market during recessions.

Entering the labor market during a recession can adversely affect a worker's future earnings and employment perspectives. During a recession, many firms are averse to laying off workers, and prefer to cease hiring new employees or to hire them at lower starting wages. This can be problematic, as salary sends a message to employers and firms about the productivity of a worker. Although someone may have been hired during a recession, they have a label that may persist for years to come, making it difficult to recoup wages that would have accrued if the hire had occurred under better economic conditions.

The message of Yoe (2018) is bad news for Switzerland's efforts to close the gender gap for equal payment. The increase of women in the Swiss workforce during the 2001 and 2008 recessions may perpetuate the existing salary gap between genders. Figure 17 shows that in 2016 Swiss women were earning 14.8% less than their male counterparts, while Figure 18 shows that the gap increased to 15.1% in 2018. A comparison of the charts indicates that Switzerland is not achieving the expected results from its efforts to close the gender pay gap.

Figure 17

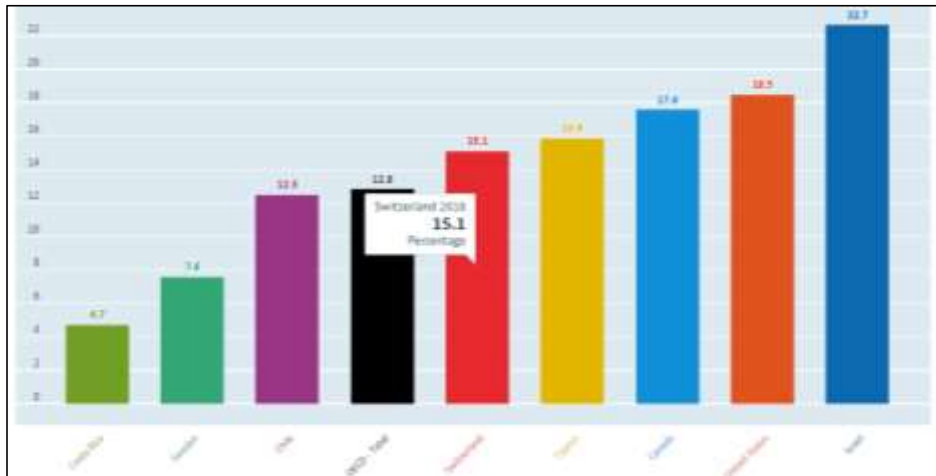
Gender Pay Gap in OECD-Countries, 2016.



Note. From “Swiss Workplace Inequality, by the Numbers”, by A. Kohler, 2019, Swiss Perspectives in 10 Languages. (https://www.swissinfo.ch/eng/mind-the-gap_inequality-in-the-swiss-workplace--by-the-numbers/44809274). Copyright 2017 by SWI swissinfo.ch.

Figure 18

Gender Wage Gap for Employed Women – Switzerland Highlight for 2018.



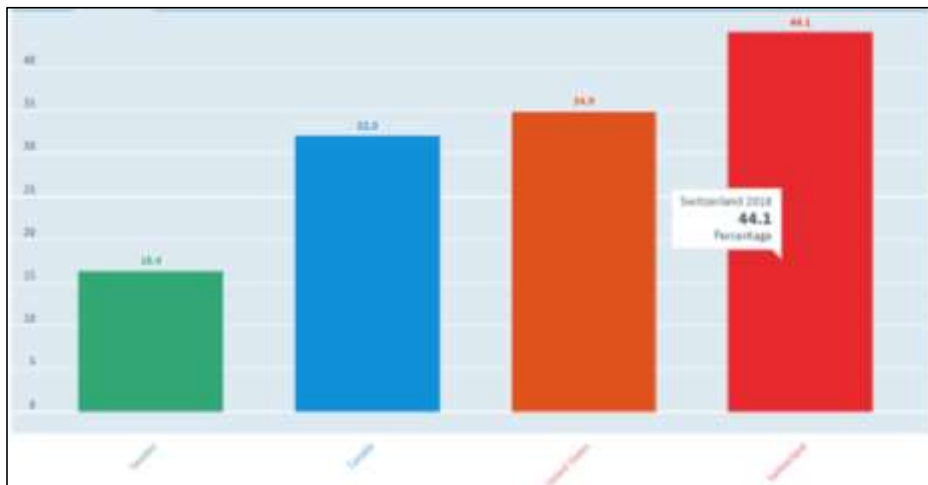
Note. Adapted from “Gender Wage Gap (Indicator)” by OECD, 2021.

(<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by Organization for Economic Co-operation and Development.

Figure 19 shows the wage gap for self-employed women in Switzerland. Based on 2018 data, self-employed women in Switzerland were earning almost half of their male counterparts. This may discourage female entrepreneurs to free-lance because as employees the gender pay gap is much less.

Figure 19

Gender Wage Gap for Self-Employed Women – Switzerland Highlight for 2018.



Note. Adapted from “Gender Wage Gap (Indicator)” by OECD, 2021.

(<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by Organization for Economic Co-operation and Development.

Switzerland also shows a significant gender-based difference between full-time and part-time workers. Kohler (2019) mentions that in 2017 close to 45% of women employed in Switzerland were working 30 hours or less per week. Meanwhile, only 11.2% of Swiss men had part-time jobs of 30 hours or less per week. In other words, in Switzerland, an employed woman is four times more likely to be a part-time employee than a man is. This may be an indicator that Switzerland embraces the traditional roles of genders, and that the gender disparity in part-time versus full-time jobs corresponds to it. In fact, Hofstede Insights (n.d.b) scores Switzerland with a 70 in the masculinity societal dimension as a masculine society. Masculine societies tend towards more traditional gender roles. In this context, the gender disparity observed in Switzerland for part-time versus full-time jobs may be beneficial and culturally sensitive to

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increase and sustain gender diversity in the workforce while cultural transformation happens. The International Labor Organization (2016) highlighted that non-standard employment agreements such as part-time employment are preferred by women in certain countries, Switzerland included, because such arrangements allow them to combine paid work with domestic and care responsibilities.

Women in Switzerland's Politics. Policy makers are a key part of political systems as they create the laws and policies that drive countries through transformation. Ideally, parliaments, senates, and house of representatives should be as diverse as the populations they represent. The researcher looked at how the percentage of women in office in Switzerland's parliament changed over time. Although Figure 20 shows that it has increased over the past thirty years, nevertheless, less than forty percent of the representatives are female, in line with Hofstede's principle for a masculine society where men are expected to be assertive, tough, and oriented to material success, while women are expected to focus on the quality of life ([Hofstede], 2014, November 18). In fact, the right to vote for women is relatively new in Switzerland. As explained by Glatthard (2021) it was in 1971 when Swiss women were given the right to vote for the first time.

Commented [DAG57]: House of Representatives

In 2018, the percentage of women in the Swiss parliament passed the threshold of 30% and quickly moved up the ladder to close to 40% in 2020. This is the result of the elections in October 2019, which are known as the women's election (Glatthard, 2021). Nonetheless, this rapid growth came after a long period of steady gains from 2010 to 2018.

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Glatthard (2021) attributes the rapid growth in the latter years to several societal and political factors. For example, he mentions the #MeToo movement and the growing interest of

climate change and other left-wing policies that are represented by parties with a higher number of female candidates.

Figure 20

Percentage of Women in the Swiss Parliament from 1990 to 2020.



Note. Adapted from “[Council Members Since 1848]” by The Federal Assembly – The Swiss Parliament, n.d.,

<https://www.parlament.ch/en/ratsmitglieder#k=PdMemberCouncilCouncilDateFirstJoining%3E%3D1989-12-30#s=11>. Copyright by The Swiss Parliament.

Age diversity in Switzerland’s workforce. When looking into the generational data of workers in the Swiss workforce, it shows little variation among the percentages of participants of different age groups. Figure 21 shows the standard deviation analysis for the percentages of workers in the different age bands within 25 to 64 years, while Figure 22 shows the same for age bands 15 to 24, and 65 and over. The Swiss workforce is more diverse and balanced to include

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members from the different age bands between 25 and 64. However, the participation from new workers and the most experienced workers is not as balanced.

Figure 21

Standard Deviation of the Percentage of Workers in the Swiss Workforce from Age Bands Within Ages 25 to 64 from 2001 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Switzerland from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 22

Standard Deviation of the Percentage of Workers in the Swiss Workforce from Age Bands 15 to 24, and 65 and Over from 2001 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Switzerland from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 22 shows certain turning points in time that coincide with recession years 2001 and 2008. Because these shifts are not perceived in Figure 21 for age groups between 25 and 64, this could be highlighting population of workers that are more vulnerable to recessions. Kassa and Gould (2020) reflecting on the work from Forsythe (2019) state that

While the unemployment rate for all workers, regardless of age, race/ethnicity, gender, or educational attainment rises during recessions, the unemployment rate for younger

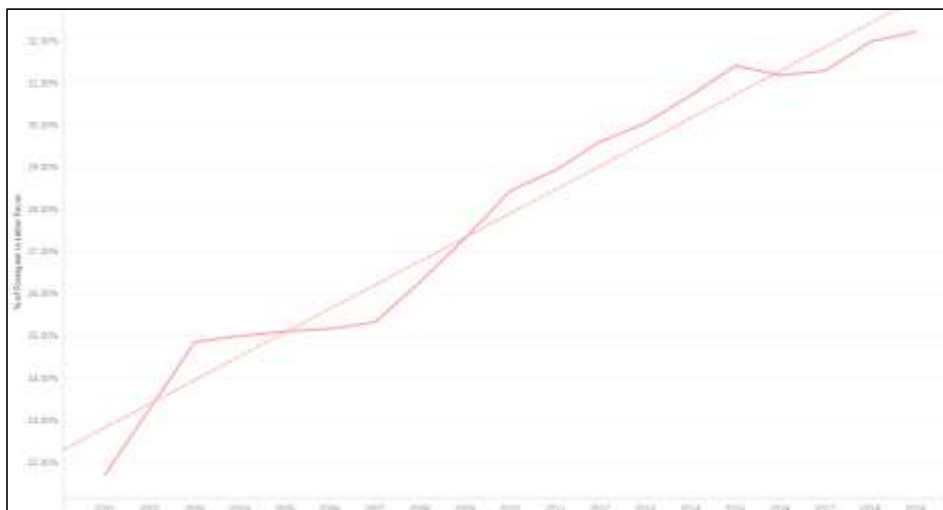
workers often rises faster and higher compared with older workers due, in part, to employer hiring skewing away from less experienced workers.

On the other hand, recessions often discourage older workers from retiring, and companies may issue policies in favor to accommodate workers for gradual retirement (*Impact of the Recession on Age Management Policies*, 2011). The combination of high unemployment rates for the youngest workers and the delayed retirement of the oldest workers during recessions may cause increased uneven participation of these age groups in a country's workforce, as can be observed from Switzerland's data.

Ethnic/Nationality diversity in Switzerland's workforce. The Swiss workforce has a high and still increasing number of foreigners as shown in the data from 2001 to 2019 in Figure 23.

Figure 23

Percentage of Foreigners in Switzerland's Workforce from 2001 to 2019.

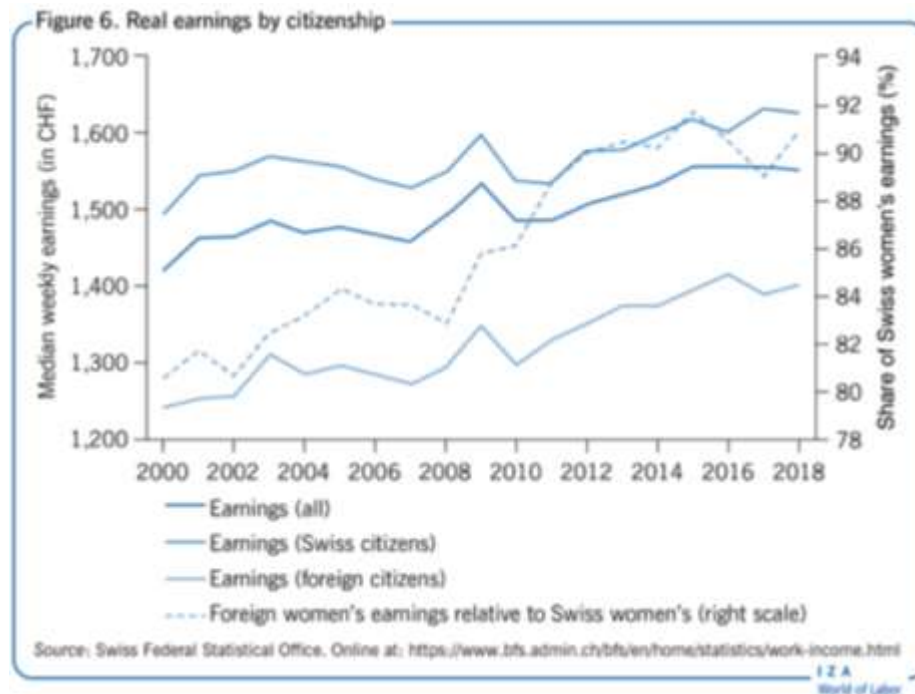


Note. The workforce data for Switzerland is from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996–2020 by the International Labor Organization.

The growth in the percentage of foreigners in the Swiss workforce was not impacted by the recessions of 2001 and 2008. In fact, Figure 23 shows steeper growth during those years. Peri (2010) found that in the United States foreign workers would adversely affect native workers, particularly during economic downturns. On the contrary, when the economy is growing, immigration has no impact to native jobs. This labor market reaction during recessions could be incentivized by the pay gap between native and foreign workers shown in Figure 24.

Figure 24

Switzerland’s Real Earnings for Native and Foreign Workers.



Note. From “The Labor Market in Switzerland, 2000-2018” by R. Lalive and T. Lehmann, n.d., *IZA World of Labor* 2020. (<https://wol.iza.org/articles/the-labor-market-in-switzerland/long>).
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Sweden. Following Switzerland in the Global Innovation Index ranking, Sweden’s population does not show the same growth patterns as its regional peer. Table 13 shows total population per year for Sweden, as presented in the different Global Innovation Index reports from 2013 to 2020.

Table 13

Total Population of Sweden for the Years in Scope.

Country	Source	Year	Total Population (millions)	Year over Year Growth
Sweden	[Cornell University, INSEAD & WIPO (2013, p. 250)]	2013	10.0	Base
	[Cornell University, INSEAD & WIPO (2014, p. 261)]	2014	9.5	-5.0%
	[Cornell University, INSEAD & WIPO (2015, p. 281)]	2015	9.6	1.1%
	[Cornell University, INSEAD & WIPO (2016, p. 284)]	2016	9.8	2.1%
	[Cornell University, INSEAD & WIPO (2017, p. 292)]	2017	9.9	1.0%
	[Cornell University, INSEAD & WIPO (2018, p. 324)]	2018	9.9	0.0%
	[Cornell University, INSEAD & WIPO (2019, p. 328)]	2019	10.0	1.0%
	[Cornell University, INSEAD & WIPO (2020, p. 326)]	2020	10.0	0.0%

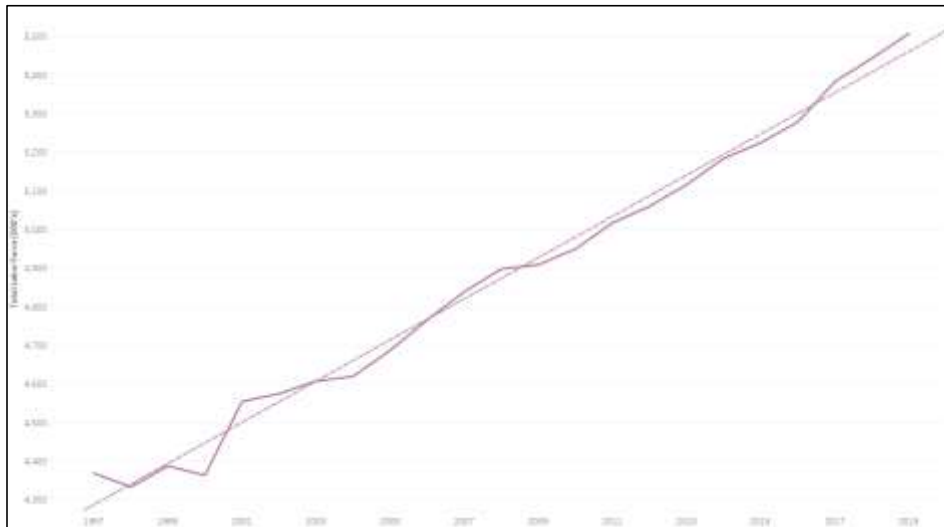
Note. Year over Year Growth is the percentage of the difference from the previous year calculated by the researcher from population numbers in the Global Innovation Index reports.

While the total population stayed flat from 2013 to 2020, Sweden’s workforce tells a very different story. From 1997 to 2019, the Swedish workforce increased by 26.1%, and 7.7% from 2013 to 2019 ([International Labor Organization, n.d.]b). Figure 25 shows the uptrend in Sweden’s workforce from 1997 to 2019.

Commented [DAG60]: 2020,

Figure 25

Sweden's Total Workforce in Thousands from 1997 to 2019.



Note. The workforce data for Sweden is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

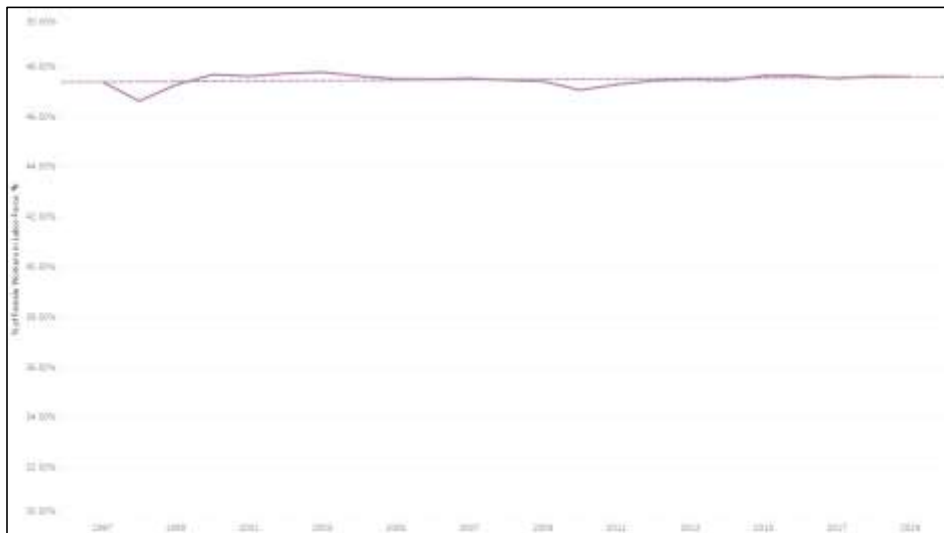
Gender diversity in Sweden's workforce. As seen in Figure 26, the percentage of female workers in Sweden is higher than Switzerland's numbers but with a flatter trend. The observations for Switzerland regarding the increase in the percentage of female workers during the 2001 and 2008 recession years do not apply to Sweden. Gottfries (n.d.) explains that because Swedish women tend to work in industries less likely to be affected by economic cycles, such as trade, healthcare, and education, they were barely impacted by the recession in 2008.

The data from the International Labor Organization is not available before 1997. However, Gottfries (n.d.) highlights that the participation of women in the Swedish labor force had dramatic increases from the 70's until 1990, at which point there was practically no

difference between genders. The crisis in the early 1990s had a similar impact in the labor market for both genders.

Figure 26

Sweden's Percentage of Female Workers in the Workforce for 1997 to 2019.



Note. The workforce data for Sweden is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo org data/>). Copyright 1996-2020 by the International Labor Organization.

Gottfries (n.d.) mentions that separate taxation of men and women is one of the most significant contributing factors to the high percentage of women in the Swedish workforce. Selin (2009) was able to prove a direct relationship between the Swedish tax reform of 1971 and the dramatic increase of women in the workforce observed in the following decades. As Selin explains, in the previous Swedish tax policy the average tax rate for a married woman was a function of the income of her husband. The tax reform of 1971 made labor income tax equal for everyone, regardless of marital status. That change meant a radical increase in net wages for

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many married women, which in turn, translated into the increased participation of women in the workforce.

However, the tax reform of 1971 is just one of many policies that Sweden has implemented throughout its history that promote women's participation in the workforce. The following are key milestones for advancing gender equality in Sweden, as presented by the Swedish Institute (2021):

1. 1842 – School reform to allow education of girls.
2. 1846 – Widows, divorcees, and unmarried women allowed to work in certain areas.
3. 1919 – All women gain the right to vote.
4. 1938 – Birth control and abortion are legalized.
5. 1955 – Three months of paid maternity leave for working women.
6. 1971 – Joint taxation of spouses abolished.
7. 1974 – Parental leave replaces maternity leave.
8. 1978 – Abortion permitted until the eighteenth week of pregnancy.
9. 1980 – Gender discrimination at work made illegal.
10. 1991 – Gender equality legislation, replaced by the Discrimination Act in 2009.
11. 2002 – Parental leave: 480 days, with two months reserved for each parent.
12. 2009 – Establishment of the Equality Ombudsman.
13. 2016 – Parental leave updated with three months reserved for each parent.

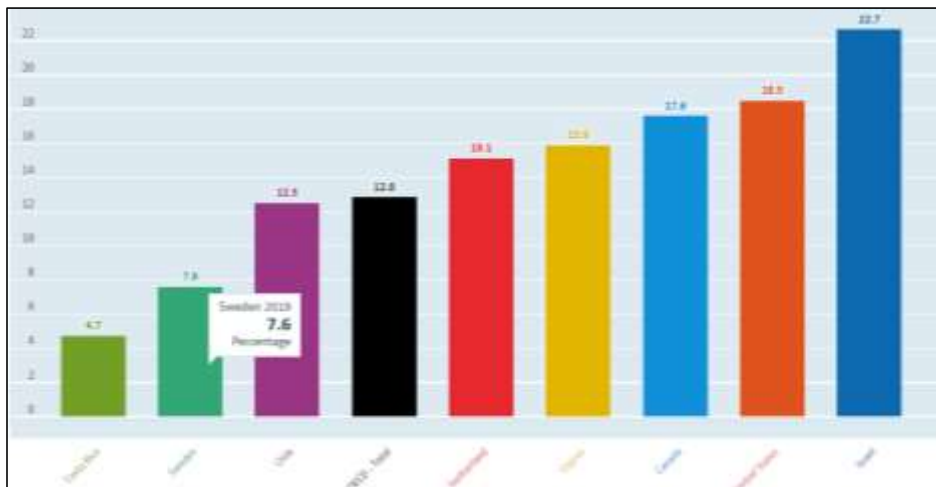
These milestones are all intended to advance gender equality. Nonetheless, according to Figure 26, the impact of legislation after 2000 in the percentage of females in the Swedish workforce seems to be negligible, or at least not comparable to the impact of the legislation of the 70's.

Commented [DAG62]: Todas esas palabras después de las fechas pienso que van en mayúscula. Ej, School, Widows

For employed women, the gender pay gap in Sweden is almost half that of Switzerland, and for the self-employed almost one third. Figure 27 shows how Sweden's gender wage gap for employed women compares to the other countries in this study, excepting Singapore and Hong Kong as there is no data available in the OECD database. Figure 28 compares Sweden's gender wage gap for self-employed women with Canada, the United States, and Switzerland.

Figure 27

Gender Wage Gap for Employed Women – Sweden Highlight for 2019.



Note. Adapted from “Gender Wage Gap (Indicator)” by OECD, 2021.

(<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by Organization for Economic Co-operation and Development.

Figure 28

Gender Wage Gap for Employed Women – Sweden Highlight for 2018.



Note. Adapted from “Gender Wage Gap (Indicator)” by OECD, 2021.

(<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by Organization for Economic Co-operation and Development.

From what has been presented so far, Sweden seems to be aligned to what is a feminine society, based on Hofstede’s societal dimensions. In fact, with a very low score of five in the Masculinity societal dimension, Hofstede’s Insights (n.d. a) describes Sweden as a feminine society. This explains why Sweden was decades ahead of the rest of the world, bringing policies that ensure equal gender treatment to both genders and delivering results with an almost 50-50 gender-balanced workforce.

Women in Sweden’s Politics. Women have been a core part of the Swedish political power for decades. They received voting rights more than fifty years earlier than women in Switzerland. The percentage of women in office mirrors closely the percentage of female

workers in the Swedish workforce. Figure 29 shows how the percentage of women in parliament increased from less than 40% in the early 90's to almost 50% in 2020.

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Figure 29

Percentage of Women in Swedish Riksdag from 1990 to 2020.



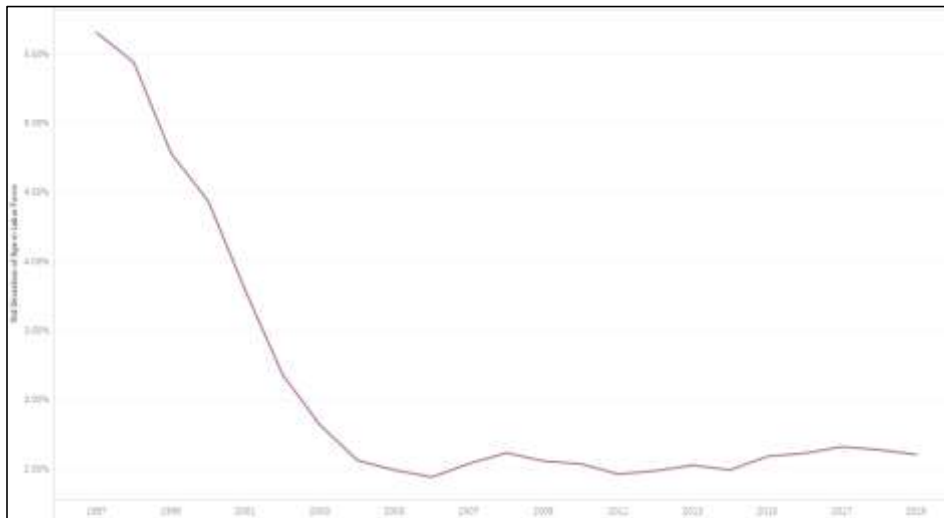
Note. Adapted from “[The Riksdag Open Data]” by Sveriges Riskdag, n.d.,

<http://data.riksdagen.se/data/ledamoter/>.

Age diversity in Sweden's Workforce. The stratification of the Swedish workforce into the defined generational brackets shows very little variation among the percentages of workers in the different age groups. Figure 30 shows how that variability continues to reduce over time, reaching a certain plateau for age groups within 25 to 64 years.

Figure 30

Standard Deviation of the Percentage of Workers in the Swedish Workforce from Age Bands Within 25 to 64 Years from 1997 to 2019.



Note. The workforce data for Sweden is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 31 shows the variability scoped for age groups 15 to 24, and 65 and older. There was increased variation for the 2000 decade and then an extreme reduction of that variation beginning in 2008. This is the result of aggressive policies to address an aging population. Sweden incentivizes workers to remain employed over age 65. This has been reinforced since 2006 with tax reforms that favor work-related income versus pension income, tax credits for employees 65 and older, and making disability a much less attractive option to exit the workforce (*Impact of the Recession on Age Management Policies*, 2011). Contrary to when retaining older workers is merely a response to economic crises, when it is policy-driven, the retention of older

employees does not have a negative impact on the younger generation entering the workforce. This is particularly true for Sweden because the younger generation is spending more time in school and taking gap years (Gottfried, n.d.). This combination of scenarios allows smoother transitions into and out of the workforce, and results in the coexistence of the youngest and the oldest workers in equal representation.

Figure 31

Standard Deviation of the Percentage of Workers in the Swedish Workforce from Age Bands 15 to 24, and 65 and Over from 1997 to 2019.



Note. The workforce data for Sweden is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Ethnic/Nationality diversity in Sweden’s workforce. The percentage of foreign workers in the Swedish workforce has been at least ten percentual points less than what was observed for

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Switzerland. However, it has increased by almost twenty points since 1997. Figure 32 shows the uptrend for the percentage of foreign workers in Sweden from 1997 to 2019.

Figure 32

Percentage of Foreigners in Sweden's Workforce from 1997 to 2019.



Note. The workforce data for Sweden is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Gottfried (n.d.) provides context to help understand the proportion of foreign workers in Sweden’s workforce. He first explains that insertion into the workforce is getting much harder for workers without upper secondary school; 66% were not employed in 2016. He then connects it to immigration, explaining that

Sweden has had substantial immigration over the years. Decades ago, most immigrants came from European countries, and established themselves quickly in the Swedish labor market. More recently, many immigrants are refugees and family members of refugees

coming from non-European countries. These immigrants have very varied backgrounds in terms of education, language skills, and experience. A large proportion of these workers has trouble finding jobs.

United States. Ranked third in innovation from the list of countries in this study, the United States has the largest population of the group. Table 14 shows how the total population of the country has changed every year from 2013 to 2020.

Table 14

Total Population of United States for the Years in Scope.

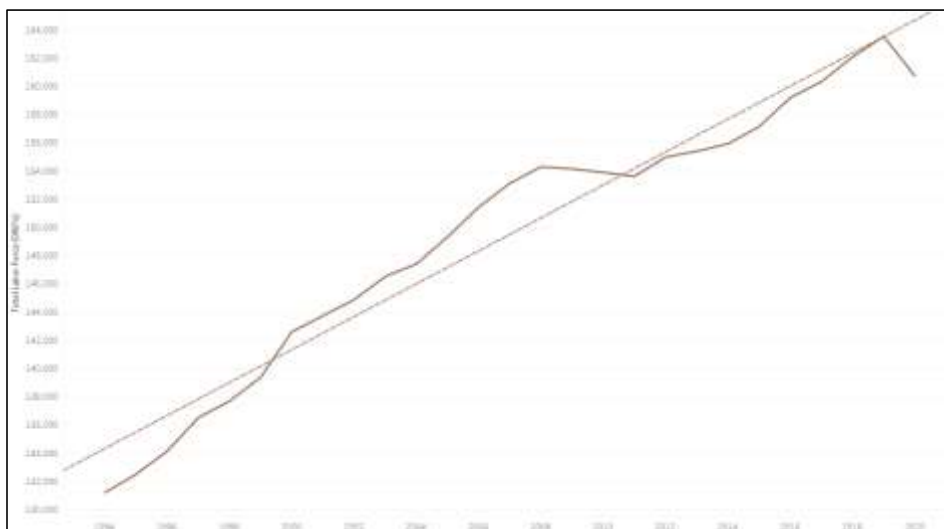
Country	Source	Year	Total Population (millions)	Year over Year Growth
United States	Cornell University, INSEAD & WIPO (2013, p. 264)	2013	327.9	Base
	Cornell University, INSEAD & WIPO (2014, p. 275)	2014	313.9	-4.3%
	Cornell University, INSEAD & WIPO (2015, p. 295)	2015	322.6	2.8%
	Cornell University, INSEAD & WIPO (2016, p. 297)	2016	321.8	-0.2%
	Cornell University, INSEAD & WIPO (2017, p. 306)	2017	324.1	0.7%
	Cornell University, INSEAD & WIPO (2018, p. 338)	2018	324.5	0.1%
	Cornell University, INSEAD & WIPO (2019, p. 341)	2019	326.8	0.7%
	Cornell University, INSEAD & WIPO (2020, p. 339)	2020	329.1	0.7%

Note. Year over Year Growth is the percentage of difference from previous year calculated by the researcher from population numbers in the Global Innovation Index reports. The total population of United States remained practically flat from 2013 to 2020, with an increase of 0.4%.

The total workforce, however, increased 3.4% from 2013 to 2020 and 22.5% since 1994 ([International Labor Organization, n.d.]b). Figure 33 shows the sustained uptrend of the American workforce.

Figure 33

United States' Total Workforce in Thousands for 1994 to 2020.



Note. The workforce data for the United States is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

There are two key turning points that can be observed in the total workforce numbers for the United States: the impact of the 2008 recession, and the impact of the Coronavirus (COVID-19) pandemic in 2020. From 2008 to 2011, the American workforce lost 0.4% workers, while from 2019 to 2020 the country lost 1.7% of its workforce. Despite the significant injection to unemployment benefits that could have helped retain workers in the workforce, the loss of jobs

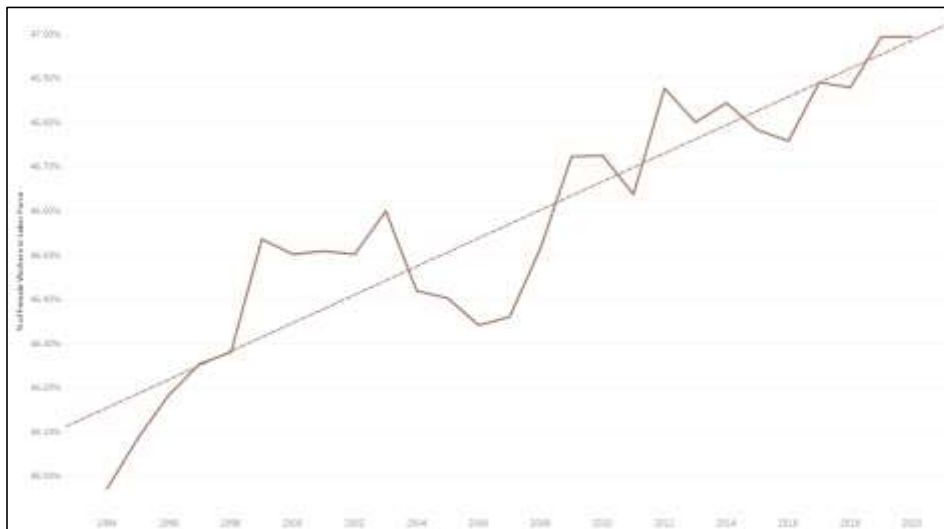
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still impacted the overall participation. Johnson Hess (2020) states that the impact of the COVID-19 pandemic to jobs in the United States is much higher. As she explains, in the beginning of the pandemic nearly 22 million workers lost their jobs. Although many were able to return to the employed workforce, still by December 2020 there were 10 million fewer jobs than before the pandemic.

Gender diversity in United States Workforce. The percentage of female workers in the United States is rising. In 2020, about 47% of the total workers were females ([International Labor Organization, n.d.]). Figure 34 shows the uptrend of percentage of female workers in the American workforce.

Figure 34

United States' Percentage of Female Workers in Workforce for 1994 to 2020.



Note. The workforce data for the United States is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor

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Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Interestingly enough, the percentage of female workers in the American workforce behaved differently than the overall workforce during the 2008 recession and the 2020 Coronavirus outbreak. While the total workforce lost 0.4% of workers from 2008 to 2011, the percentage of females in the workforce increased from 46.5% to 46.6%, indicating that fewer female workers were impacted by this recession than male workers. This ties back with what was observed for Sweden's female workers during the same recession, for which Gottfries (n.d.) explains that the driver may be that women tend to work in industries such as trade, healthcare, and education, which are rarely impacted by economic cycles.

Similarly, the percentage of female workers in the American workforce remained the same for 2019 as for 2020. That means that the loss of workers observed in Figure 33 from 2019 to 2020 impacted both genders proportionally. This differs from the early findings reported by Kashen, Glynn, and Novello (2020) which highlighted that numbers for September 2020 showed women and men left the American workforce in a ratio of four to one. Most of the women claimed childcare and school closure to be the main drivers for their dropout from the workforce.

Movements for gender equality in the United States go back to the Eighteenth Century. The following timeline adapted from History.com Editors (2021) lists the most relevant facts that have contributed to the advancement of equal gender participation in the American workforce:

1. 1920 – Ratification of the 19th Amendment to the United States Constitution protects the right to vote to all citizens, regardless of sex.
2. 1960 – The Food and Drug Administration approves the first birth control pill for commercial distribution.

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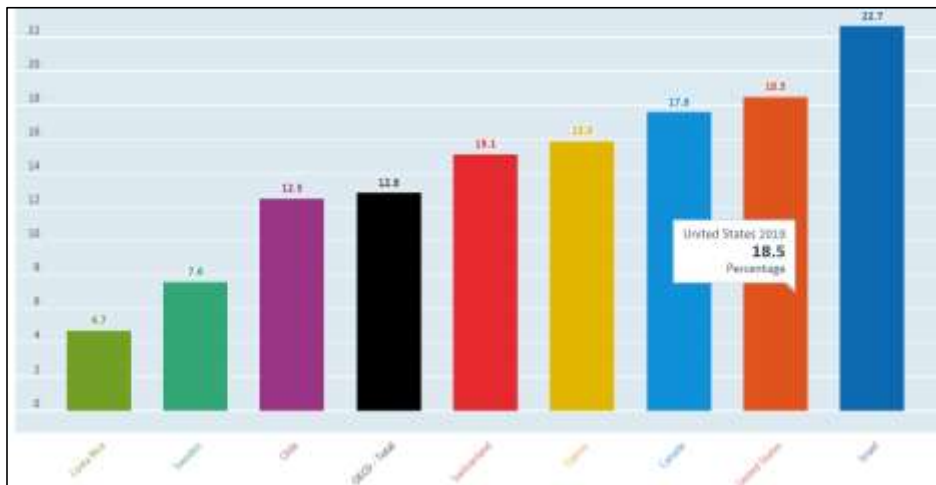
3. 1963 – The Equal Pay Act is signed into law, prohibiting sex-based wage discrimination.
4. 1964 – The Civil Rights Act is signed into law, banning employment discrimination based on race, religion, national origin, or sex.
5. 1972 – Title IX of the Education Amendments is signed into law, prohibiting sex-based discrimination in any education program receiving federal assistance.
6. 1973 – The Supreme Court declares that the Constitution protects a woman's legal right to an abortion.
7. 1981 – Sandra Day O'Connor is sworn as the first woman to the Supreme Court.
8. 2013 – The United States military removes the ban against women serving in combat positions.

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Regardless of the efforts to ensure equal opportunities for both genders, the United States still has the second largest gender wage gap among the countries in this study, excluding Singapore and Hong Kong for which data is not available in the OECD database. Figure 35 shows how the United States' gender wage gap for employed women compares to the rest of the countries in this study.

Figure 35

Gender Wage Gap for Employed Women – United States Highlight for 2019.



Note. Adapted from “Gender Wage Gap (Indicator)” by OECD, 2021.

(<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by Organization for Economic Co-operation and Development.

Figure 36 compares the wage gap for self-employed women. The gap is almost double that for employed women.

Figure 36

Gender Wage Gap for Self-Employed Women – United States Highlight for 2019.



Note. Adapted from “Gender Wage Gap (Indicator)” by OECD, 2021.

(<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by Organization for Economic Co-operation and Development.

There are several causes that contribute to the gender pay gap. One of the main reasons is that women take breaks in their careers to have children or may accept lower paid positions that offer flexible working schedules to ease family care. Another hidden factor is gender-based discrimination driven by unconscious biases that women will leave their careers to have children or that they should earn less because their “mommy duties” will make them less productive (*The State of the Gender Pay Gap 2020*, 2021). These biases may correlate with Hofstede’s masculine society in which gender roles tend to be traditionally differentiated ([Hofstede], 2014, November 18). In fact, Hofstede Insights (n.d.) describes the American society as masculine with a high score of 62 and explains that it is not only about being successful, but about being able to show

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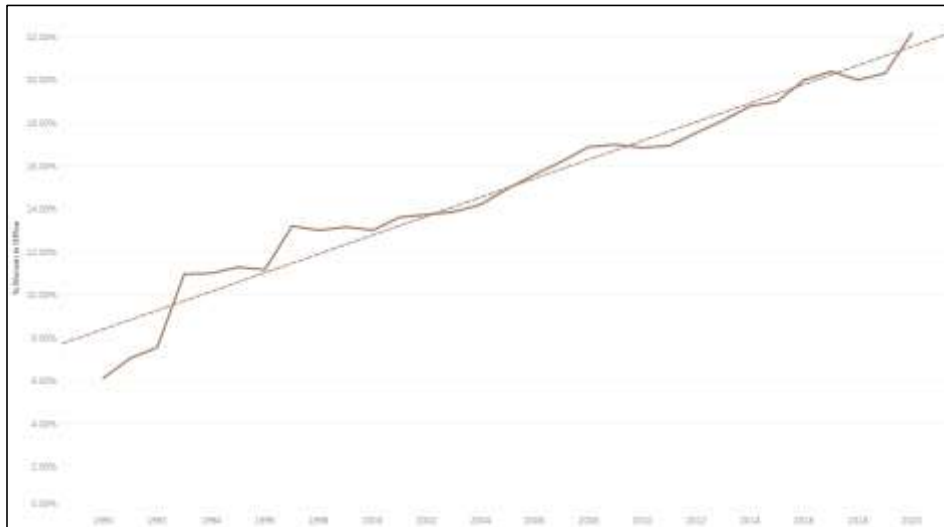
one's success. Therefore, a career break or slowdown to take care of the family can be considered a sign of weakness in comparison to those that can uninterruptedly show results.

Because the gender wage gap and other forms of labor discrimination seem to be highly correlated to women's maternity, birth control policies would then be the main contributor favoring the increasing percentage of women in the workforce.

Women in American Politics. Policy makers have the power to advance gender equality through legislation. However, United States has the lowest percent of female members of Congress among the first three countries discussed in this study. Figure 37 shows the proportion of female members of Congress since 1990.

Figure 37

Percentage of Women in the United States Congress from 1990 to 2020.



Note. Adapted from “[Legislative Research Results – Members]” by Library of Congress, n.d., (<https://www.congress.gov/search?searchResultViewType=expanded&pageSize=100&q={%22s>

[ource%22:%22members%22,%22congress%22:\[%22107%22,%22108%22,%22109%22,%22110%22,111\]}\). Copyright by Library of Congress.](#)

Sanbonmatsu (2020) analyzes the low female representation in the United States Congress and highlights these structural factors that contribute to sustain the underrepresentation of women in law making:

1. Lack of a statute for establishing a gender quota for candidates or officeholders, a popular practice around the globe for electing parliament members.
2. The two-party system and the lack of term limits makes it an advantage for incumbent Congress members, most of them males, to remain in office.
3. Lower public interest in women political leaders resulting from the unconscious bias that men are better political leaders, which has its roots in the overrepresentation of men in elective office.
4. The cost of campaigning continues to rise, putting women and men of color at a disadvantage due to historical issues on employment opportunities, personal income, and wealth.

To correct these structural factors, Sanbonmatsu (2020) considers that political parties must take accountability to balance the pool of candidates, avoid counterposing of racial and gender equality movements in the selection of candidates, and watch out for the exclusion of moderate party members from running for office as both parties continue to polarize.

Age diversity in the United States' workforce. The generational data for the American workforce shows that the proportion of workers from different age groups is becoming more balanced with time. Figure 38 shows the standard deviation analysis for the percentages of workers in the different age bands within 25 to 64. Figure 39 shows the same analysis for age

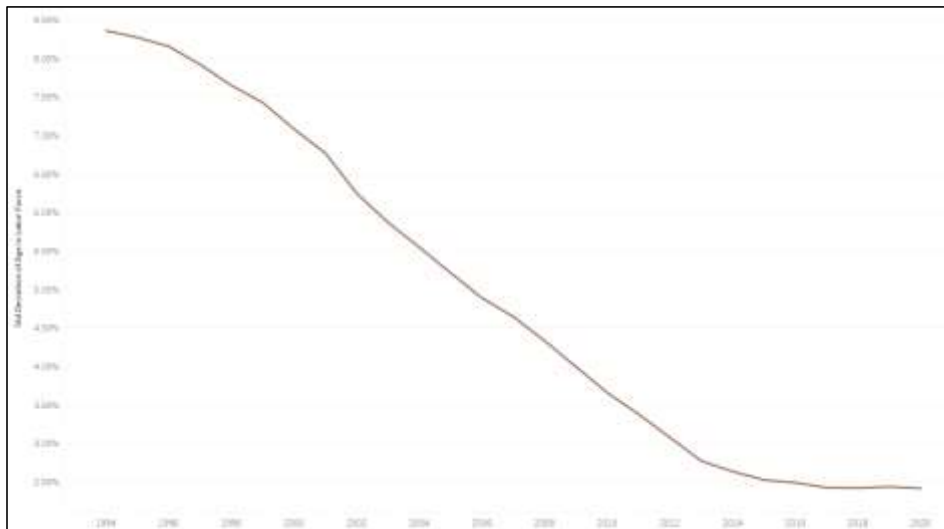
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bands 15 to 24, and 65 and above. As what was observed for Sweden in age groups 25 to 64, the curve seems to flatten when the standard deviation reaches around 2.5%. The United States is doing much better than Switzerland and Sweden in both categories of age diversity.

Figure 38

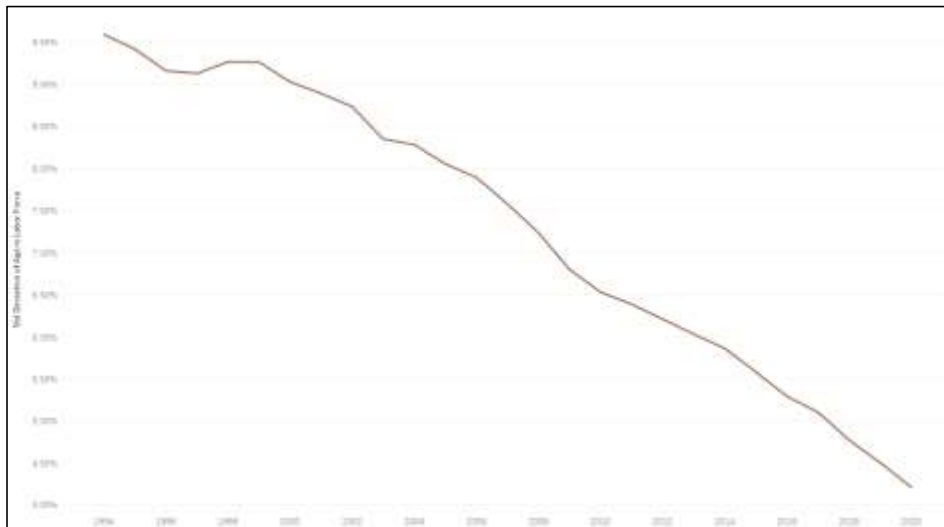
Standard Deviation of the Percentage of Workers in the American Workforce from Age Bands Within 25 to 64 Years from 1994 to 2020.



Note. The workforce data for United States is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 39

Standard Deviation of the Percentage of Workers in the American Workforce from Age Bands 15 to 24, and 65 and Over from 1994 to 2020.



Note. The workforce data for United States is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

DeSilver (2019), shares some facts about the American workforce that may explain why it is better balanced in terms of the proportion of workers from different age groups.

1. Gen Xers reached a steady-state participation in the workforce.
2. The proportion of millennials in the workforce continues to grow and is now the most represented.
3. Boomers are retiring at a much slower rate than the prior generations.

4. The younger generation is taking much longer to join the workforce.
5. Older Americans are working in greater numbers than in previous decades.

The last two facts may explain why Figure 39 downtrends sharply to a more balanced representation of the youngest and oldest generations in the American workforce.

Alexandra (2019) explains that young Americans are taking longer to join the workforce mainly because they are focusing on competing academically, hoping that the effort will pay off later. In fact, in 2015 college graduates earned 56% more than high school graduates (Rugaber, 2017), so logically, the earnings gap between educated versus non-educated workers serves to incentivize delaying joining the workforce.

Commented [DAG74]: graduates

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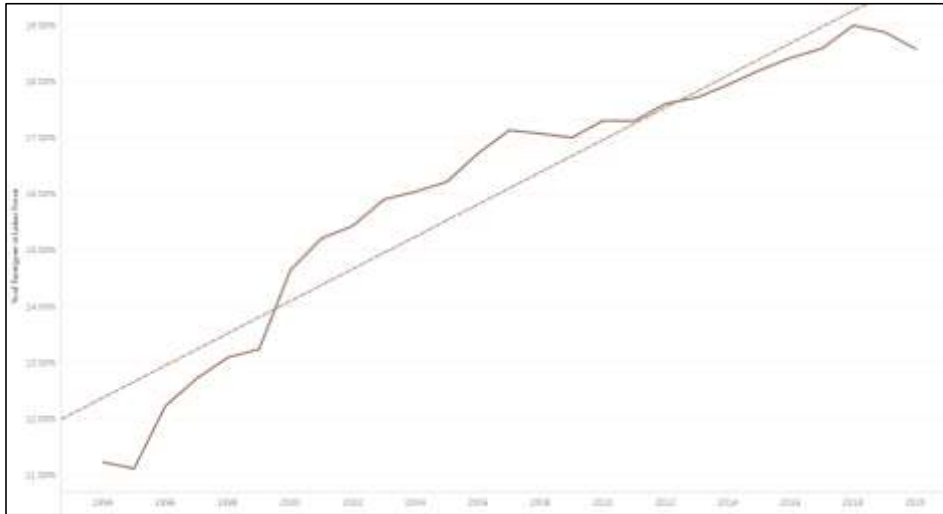
Bossworth, Burtless, and Zhang (2016) comment on the potential reasons accounting for a rising number of workers over 65 in the American workforce. They mention that changes to the social security benefits encourage later retirement, delaying a full pension entitlement to age 66. Many employer-funded retiree health plans have been eliminated. As a result of the rising costs of healthcare, older workers have opted to retain jobs that offer health insurance. Also, the shift from private defined-benefit (DB) to defined-contribution (DC) workplace pension plans has reduced the incentive to retire at younger ages. DB plans can create powerful incentives for workers to leave career jobs after they have attained the earliest eligible benefit payment age. In contrast, DC plans usually provide stronger incentives for older workers to keep working in jobs because the value of a worker's fund accumulation continues to grow every year contributions are made to the plan, including years when the worker is past 65 or 70. (p. 10)

Commented [DAG76]: In addition,

Ethnic/Nationality diversity in the United States' Workforce. The proportion of foreign workers in the United States has increased over time; however, as seen in Figure 40, there have been cycles of increasing and decreasing growth.

Figure 40

Percentage of Foreigners in United States' Workforce from 1994 to 2020.



Note. The workforce data for United States is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

In the decade of 2000s there was an increase of highly educated immigrants, primarily from Asia. These highly educated immigrants are more likely to have a background in science, technology, engineering, or mathematics than U.S. born workers with a college education, which is very beneficial for generating economic growth from immigration (Peri, 2017). That may explain the improved growth rate in the proportion of foreigners in the American workforce from 1999 to 2008. With the recession in 2008, that growth slowed down.

In 2019, the percentage of foreigners in the workforce decreased for the first time since 1995, dropping again in 2020. This drop comes as direct consequence of President Trump’s

policies designed to reduce immigration back to the levels of the 70s. Among those policies are the reduction of refugee admissions, stricter rules for asylum eligibility, burdensome requirements to qualify for permanent residency or citizenship, greater scrutiny of high-skill worker visas, and controlling length of stay limits for international students (Jordan, 2021). Additionally, the travel restrictions driven by the COVID-19 pandemic may have contributed to a further reduction in 2020.

Singapore. Fourth on the list of countries in this study, Singapore experimented a growth in total population of 7.4% from 2013 to 2020 ([Cornell University, INSEAD & WIPO, 2013; 2020]). Table 15 shows the details year by year.

Table 15

Total Population of Singapore for Years in Scope.

Country	Source	Year	Total Population (millions)	Year over Year Growth
Singapore	Cornell University, INSEAD & WIPO (2013, p. 242)	2013	5.4	Base
	Cornell University, INSEAD & WIPO (2014, p. 253)	2014	5.3	-1.9%
	Cornell University, INSEAD & WIPO (2015, p. 273)	2015	5.5	3.8%
	Cornell University, INSEAD & WIPO (2016, p. 278)	2016	5.6	1.2%
	Cornell University, INSEAD & WIPO (2017, p. 286)	2017	5.7	1.8%
	Cornell University, INSEAD & WIPO (2018, p. 318)	2018	5.7	0.0%
	Cornell University, INSEAD & WIPO (2019, p. 322)	2019	5.8	1.8%
	Cornell University, INSEAD & WIPO (2020, p. 320)	2020	5.8	0.0%

Note. Year over Year Growth is the percentage of difference from the previous year calculated by the researcher from population numbers in the Global Innovation Index reports.

Singapore's workforce increased more than its population during the same period. From 2013 to 2020, the workforce grew by 9.7%, and from 1990 to 2020 it increased by 78.4% ([*Labor, Employment, Wages and Productivity*, 2021]). So far in this study Singapore has been the country exhibiting most growth in workforce. Figure 41 shows the growth pattern of Singapore's workforce. There are no major turning points that may indicate shifts in trend.

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Figure 41

Singapore's Total Workforce for Years in Scope.



Note. The workforce data for Singapore is from “[*Labor, Employment, Wages and Productivity*]”, by Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data>). Copyright 2021 by Government of Singapore.

Gender diversity in Singapore's workforce. Different from previously discussed countries, Singapore shows a downtrend in the proportion of women in its workforce. However, this downtrend is leading the country in the right direction to a more balanced workforce. The

reason, as Figure 42 shows, is that in the 90's Singapore had a very high proportion of female workers, even more than the usual male proportion in other countries.

Figure 42

Singapore's Percentage of Female Workers in Workforce for 1990 to 2020.



Note. The workforce data for Singapore is from “[*Labor, Employment, Wages and Productivity*]”, by Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data>). Copyright 2021 by Government of Singapore.

Ducanes and Abella (2008) refer to The Oregonian (1990), LA Times (1987), and Yeoh (2007) to explain that the high proportion of female workers in the 1990s responds to an active intervention by the government encouraging housewives to participate in the workforce to mitigate the labor shortage issue. The Ministry of Manpower incentivized companies to make part-time jobs available to housewives desiring to join or return to the workforce, and work

permits to domestic workers were intentionally extended to facilitate the integration of Singaporean women into the workforce.

The government continues to actively encourage women to participate in the workforce. A program was launched in August 2017 targeting female professionals, managers, executives, and technicians that had been out of the workforce for two or more years. The program provided government funds to subsidize a work-trial, training, and mentorship period to help women who had paused their careers to get up to speed in business and technology matters (Seow, 2017).

However, women are still underrepresented in business leadership positions and are still struggling with unequal pay. Women represent only 8% of boards in Singapore and are paid about 10% less than men for performing the same job. Even women themselves think they deserve less than men because they have family matters to take care of over a job (Vaswani, 2015).

Women in Singapore's Politics. The number of women in parliament increased dramatically from 1990 to 2020. The growth in female representation is steeper than that observed for Switzerland, Sweden, and the United States. Figure 43 shows the uptrend.

Lyons (2005) provides insightful information that explains key political reforms and the role of the major political party (the People's Action Party) in transforming the system to increase female participation in politics. Until 1984 there was no female representation in Singapore's parliament. It took time for party leaders to deal with the unconscious bias that women were voluntarily excluding themselves from politics because of their family responsibilities. Candidates of the People's Action Party would have a higher probability of getting elected, therefore, getting selected as a PAP candidate was the fastest way for women to win a seat in the parliament. To facilitate the selection of female candidates, the PAP removed a

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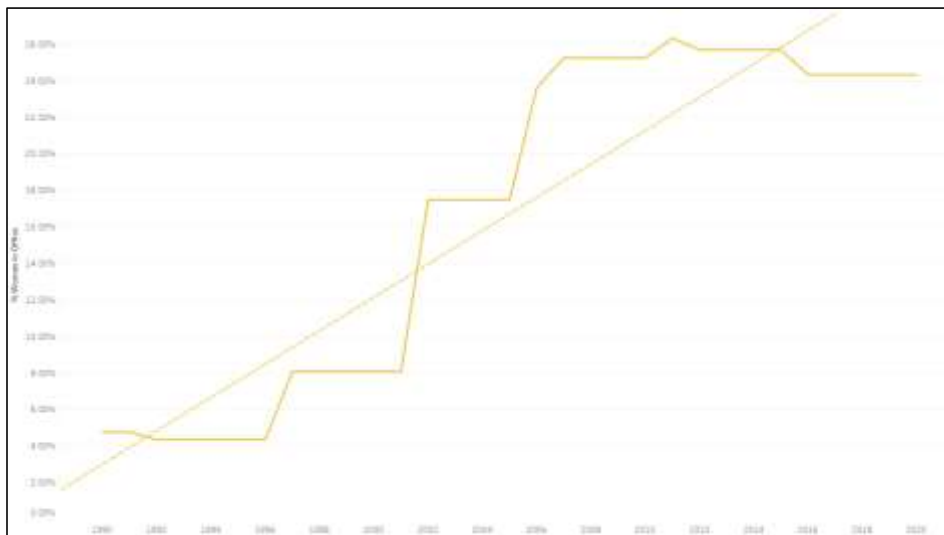
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requirement for candidates to be married persons. Although not publicly admitted, accepting single candidates helped them avoid having the conversation about traditional gender roles, as single women do not have to deal with family responsibilities.

Figure 43

% of Women in Singapore's Parliament from 1990 to 2020.



Note. Adapted from “[List of MPs by Parliament]” by Parliament of Singapore, n.d., (<https://www.parliament.gov.sg/history/list-of-mps-by-parliament>). Copyright 2017 by Singapore Parliament.

Lyons (2005) further explains that major political reforms like the Group Representative Constituencies and the Nominated Member of Parliament scheme were important contributors toward increasing the number of female parliament members. The PAP used the Group Representative Constituencies to combine young, inexperienced women in the same ticket with experienced popular men, thereby increasing the women’s chances of being elected. The Nominated Member of Parliament are selected by nominating interest groups, basically to lobby

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in favor of those groups. Women have been able to join the parliament as a Nominated Member of Parliament since the beginning.

Singapore scores 48 in masculinity in Hofstede's societal dimensions. This is practically in the middle of the scale, tending to the feminine side (Hofstede Insights, n.d.). Being ranked in the middle may explain the contradicting measures observed regarding women's role in society: extremely high representation in the workforce, but very low participation in political roles. Nonetheless, Singapore seems to be moving towards more gender equality and balancing of opportunities to combine traditional and non-traditional gender roles.

Age diversity in Singapore's Workforce. The generational data for Singapore's workforce shows great progress to a very balanced proportion of workers from the different age groups. Figures 44 and 45 show how the variation in the proportion of workers from different age groups has been improving over time.

Figure 44

Standard Deviation of the Percentage of Workers in Singapore's Workforce from Age Bands Within 25 to 64 Years from 1990 to 2020.



Note. The workforce data for Singapore is from “[*Labor, Employment, Wages and Productivity*]”, by Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data>). Copyright 2021 by Government of Singapore.

Figure 45

Standard Deviation of the Percentage of Workers in Singapore's Workforce from Age Bands 15 to 24, and 65 and Over from 1990 to 2020.



Note. The workforce data for Singapore is from “[*Labor, Employment, Wages and Productivity*]”, by Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data>). Copyright 2021 by Government of Singapore.

The participation of the oldest generation has been increasing over time. To address labor shortages, the government has incorporated different policies throughout the years, several of them aiming to retain older workers in the workforce. As explained by Ducanes and Abella (2008), Singapore had statutory retirement at age 55 until 1993 when it was raised to 60 and eventually to 62 in 2000. In July 2022, the statutory retirement age will be increased again to 63, and the re-employment age to 68, progressing to 65/70, respectively, by 2030 (*Singapore to*

Raise Retirement, Re-Employment Ages as Planned in 2022, 2021). The government also created the Skills Development Fund to provide for the training needs of retirees that wanted to reincorporate into the workforce (Ducanes & Abella, 2008).

Ethnic/Nationality diversity in Singapore's workforce. Singapore's Department of Statistics accounts for foreign workers separate from the total workforce. Table 16 shows the total foreign workers in Singapore from 2015 to 2020. Foreign workers inject over 50% additional labor to Singapore's workforce. Ducanes & Abella (2008) highlight that the foreign workforce has been key to help offset the labor shortage in the country, with an estimated proportion of 29% of the total workforce in 2000. They also explain that Singapore openly welcomes skilled workers and encourages them to stay permanently. In 2020, passes for professional, managers, executives, specialists, and mid-level skilled workers represented 28% of Singapore's total foreign workforce, versus 26% in 2015 ([Ministry of Manpower, 2021]).

Table 16

Foreign Workers in Singapore from 2015 to 2020.

Month-Year	Total Foreign Workforce
December 2015	1,387,300
December 2016	1,393,000
December 2017	1,368,000
December 2018	1,386,000
December 2019	1,427,500
December 2020	1,351,800

Note. Adapted from "Foreign Workforce Numbers", by Ministry of Manpower, 2021,

(<https://www.mom.gov.sg/documents-and-publications/foreign-workforce-numbers>). Copyright

2021 by Government of Singapore.

Hong Kong. Hong Kong follows on the list with a 1.3% decline in total population from 2013 to 2020 ([Cornell University, INSEAD & WIPO, 2013; 2020]). Table 17 shows the details year by year.

Table 17

Total Population of Hong Kong for Years in Scope.

Country	Source	Year	Total Population (millions)	Year over Year Growth
Hong Kong	Cornell University, INSEAD & WIPO (2013, p. 184)	2013	7.5	Base
	Cornell University, INSEAD & WIPO (2014, p. 194)	2014	7.2	-4.0%
	Cornell University, INSEAD & WIPO (2015, p. 214)	2015	7.3	1.4%
	Cornell University, INSEAD & WIPO (2016, p. 222)	2016	7.3	0.0%
	Cornell University, INSEAD & WIPO (2017, p. 231)	2017	7.3	0.0%
	Cornell University, INSEAD & WIPO (2018, p. 263)	2018	7.4	1.4%
	Cornell University, INSEAD & WIPO (2019, p. 265)	2019	7.4	0.0%
	Cornell University, INSEAD & WIPO (2020, p. 262)	2020	7.4	0.0%

Note. Year over Year Growth is the percentage of difference from previous year calculated by the researcher from population numbers in the Global Innovation Index reports.

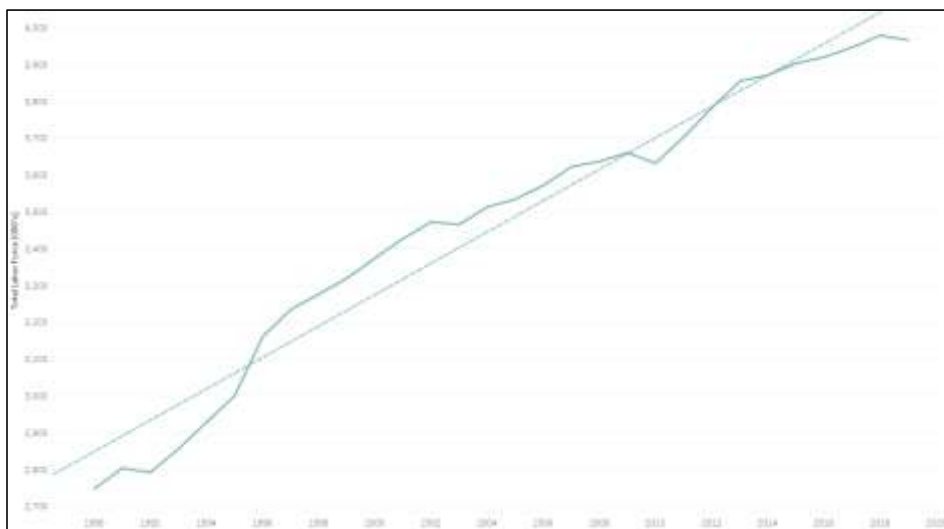
Hong Kong's decline in population is expected to continue in the coming years for several reasons. In 2020, there were 16% more deaths than births. About 20% of the population is expected to emigrate to the United Kingdom in response to an immigration route opened for Hong Kong's British nationals. Canada also relaxed immigration measures for the people of Hong Kong. In addition, national security laws imposed by China in Hong Kong are incentivizing residents to emigrate (Chan, 2021).

Commented [DAG83]: immigrate

The total workforce did reflect a growth slowdown for the period, in comparison to previous decades, as well as a decline after 2018. Figure 46 shows how Hong Kong's workforce has changed over time.

Figure 46

Hong Kong's Total Workforce in Thousands for 1990 to 2019.



Note. The workforce data for Hong Kong is from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and Government of the Hong Kong Special Administrative Region.

The decline in total workforce 2010 was a consequence of delayed effects of the 2008 recession that impacted employment rates and put pressure on wages. Many companies decided to move operations to mainland China as a more competitive labor market (Cheung, 2010). A

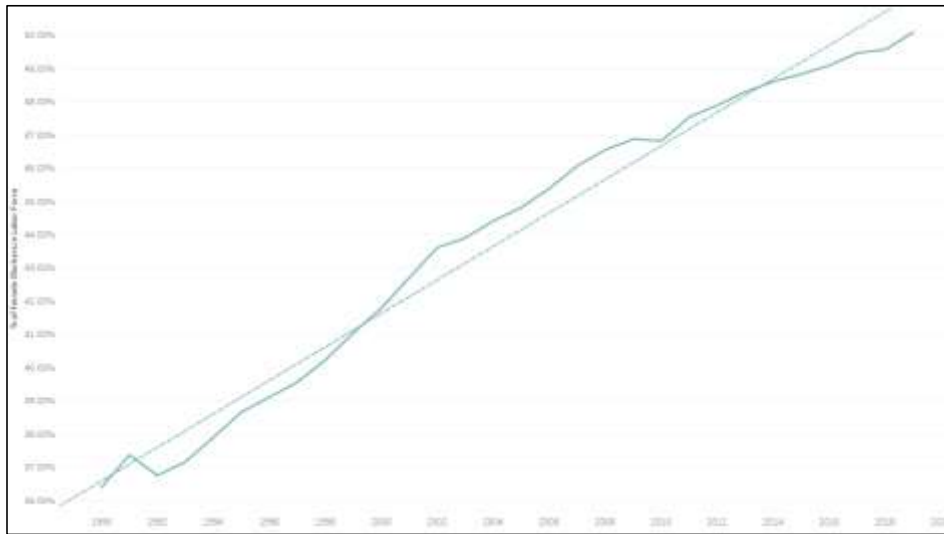
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similar decline was observed in 2019, responding to economic contractions due to several violent anti-government protests and the U.S.-China trade war (Reuters Staff, 2020).

Gender diversity in Hong Kong's workforce. Women have gained an increased presence in Hong Kong's workforce, reaching a 50% proportion for a perfectly balanced labor force in 2019. An increase in the growth rate in the proportion of women in the is noticeable from 1997, when the former British colony was transferred to China, to 2009, when a slight decline occurred most likely resulting from the 2008 recession. Figure 47 shows the trends.

Figure 47

Hong Kong's percentage of Female Workers in the Workforce for 1990 to 2019.



Note. The workforce data for Hong Kong is from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by the Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and Government of the Hong Kong Special Administrative Region.

The Women's Commission Secretariat (2011) presented a very comprehensive plan for women's development. Sophia Kao, who was the chairperson of the Women's Commission, highlighted that fully engaging women in the labor market was key to addressing the issues of an aging population and labor shortage. The plan had thirteen main goals. These are:

1. Enhance women's participation in decision-making in public affairs.
 - a. Motivate women to vote.
 - b. Encourage female candidate nominations in political parties.
 - c. Increase awareness of gender biases in the election process.
 - d. Approve all pregnancy and postnatal care leave applications.
 - e. Ensure female involvement in public and community service.
2. Support a balanced gender composition in advisory and statutory bodies.
3. Enhance health education of women.
4. Promote awareness of breast cancer.
5. Improve medical facilities for disabled women.
6. Augment support for victims of domestic and sexual violence.
7. Foster a culture of zero tolerance to violence.
8. Promote women's life-long learning and enhance their leadership skills.
9. Strengthen gender and parent education.
10. Set measures to enhance women's economic status.
11. Eliminate gender-based discrimination at work.
12. Increase protection for part-time employees.

Despite Hong Kong's success in increasing female presence in its workforce, there is still a long way to go to achieve gender equality. In 2018 women in Hong Kong were earning in

average HKD\$6,500 less than men per month. The gap was HKD\$6,000 per month in 2016, and HKD\$3,500 in 2006 (*Monthly Gender Pay Gap Widens to \$6,500*, 2019). Baska (2018) shares a study with data from 250,000 employees from 500 different companies in Hong Kong showing that the gender wage gap increases with age. On average, a woman before her 20's earns more than a man of the same age. In their 30's, women earn an average 11% less than their male counterparts, and the gap rises to 50% when they reach their 60s. The average wage gap was 33% in 2018.

There are many factors contributing to the gender wage gap in Hong Kong. Some of them are the gender distribution per industry and occupation, hours worked, education, experience, and gender distribution in business leadership roles. (*Monthly Gender Pay Gap Widens to \$6,500*, 2019).

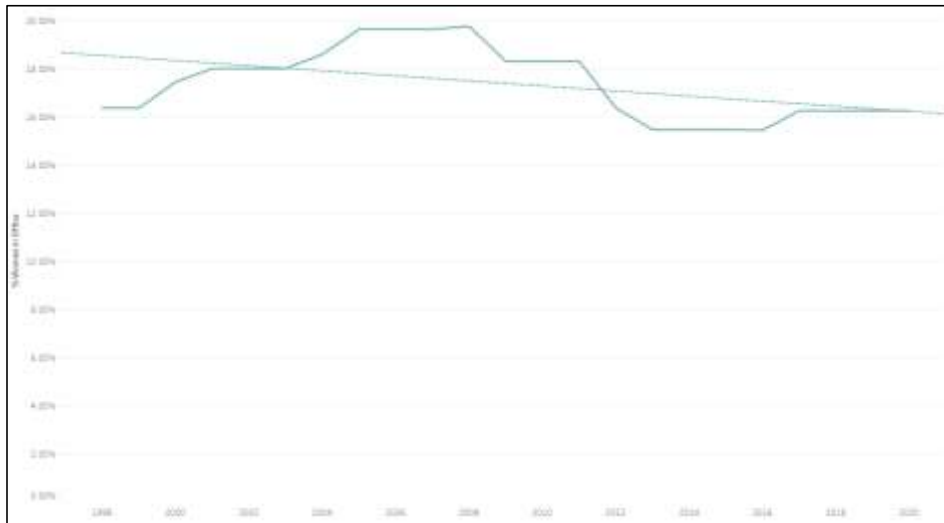
Like Singapore, Hong Kong tends to be in the middle in Hofstede's masculinity societal dimension, with a score of 57, which is considered a moderate masculine society (Hofstede Insights, n.d.). As previously mentioned, masculine societies tend to embrace traditional gender roles, preferring that women take care of the family.

Women in Hong Kong's Politics. The female representation in the Legislative Council of Hong Kong is low and trending down. From 1998 to 2005, there was a slight increase in the proportion of women in the council to occupy nearly 20% of the seats. Since then, women have lost representation and are back to proportions comparable to 1998, as shown in Figure 48.

Commented [DAG85]: 2005,

Figure 48

% of Women in the Legislative Council of Hong Kong from 1998 to 2020.



Note. Adapted from “[Precedence List of LegCo Members]” by Legislative Council of the Hong Kong Special Administrative Region of the People’s Republic of China, n.d.,

(<https://www.legco.gov.hk/general/english/members/members.html>). Copyright 2021 by The

Legislative Council Commission.

The traditional gender roles are heavily embedded in Hong Kong’s culture and may be the principal reason holding back female representation in the Legislative Council.

The long period of British rule, combined with highly developed international financial and trading sectors, has made Hong Kong one of the most Westernized societies in Asia. Women are not necessarily expected to marry; girls generally have access to education, and the preference for boys that is prevalent in many other Asian societies is barely perceptible.

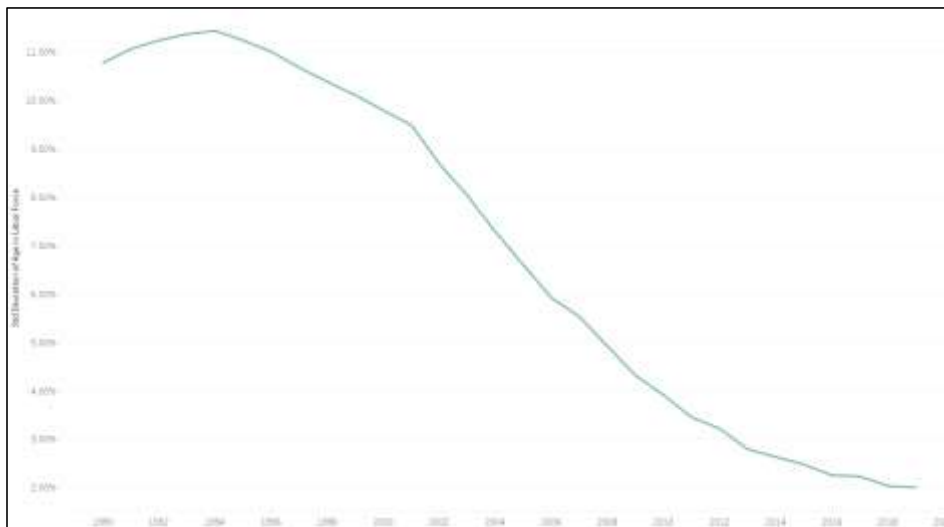
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Yet social attitudes remain traditional, casting women squarely in the role of homemaker and mother — even when they are also breadwinners. Women are also expected to look after elderly relatives, a phenomenon that will intensify as Hong Kong's population ages, thanks to a low birthrate (Wassener, 2011).

Age diversity in Hong Kong's workforce. The generational data of workers in Hong Kong follows patterns like the Western countries, with decreasing variation in the proportion of workers from the different groups. Figure 49 shows the standard deviation for the percentages of workers in the different age bands within 25 to 64 years, while Figure 50 shows the same for age bands 15 to 24, and 65 and over. Hong Kong's workforce has become more age-diverse with time.

Figure 49

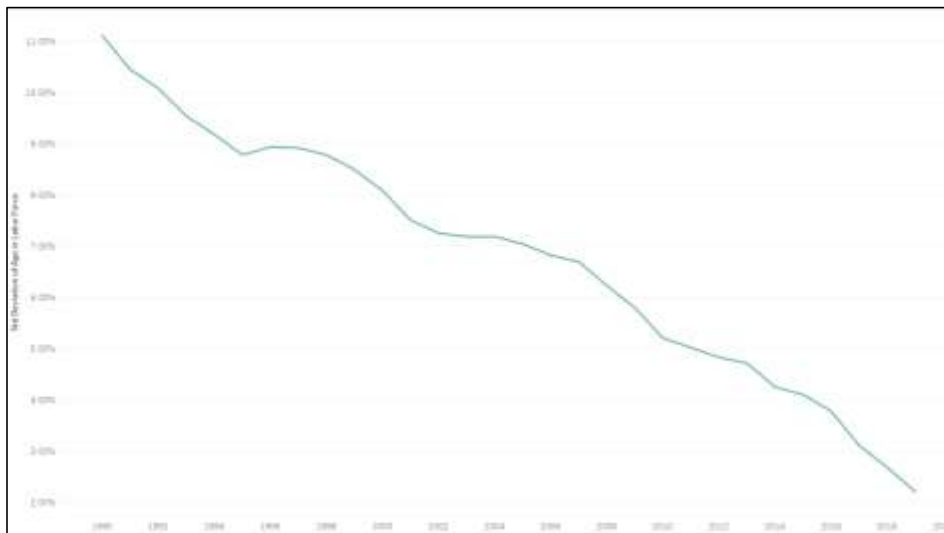
Standard Deviation of the Percentage of Workers in Hong Kong's Workforce from Age Bands Within 25 to 64 Years from 1990 to 2019.



Note. The workforce data for Hong Kong is from “[Statistics of Labor Force, Unemployment and Underemployment]”, by Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and Government of the Hong Kong Special Administrative Region.

Figure 50

Standard Deviation of the Percentage of Workers in Hong Kong's Workforce from Age Bands 15 to 24, and 65 and Over from 1990 to 2019.



Note. The workforce data for Hong Kong is from “[Statistics of Labor Force, Unemployment and Underemployment]”, by Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and Government of the Hong Kong Special Administrative Region.

Although Hong Kong's database appears to be very well balanced with representation from different age groups, its aging population is a concern for policy makers. Chan (2019) presents a picture of the future workforce that needs attention today. By 2064 it is expected that about 36% of the population will be 65 or older. The government must prepare the political landscape to increasingly retain more elderly workers to maintain an efficient labor market that meets the demands of goods and services.

Ethnic/Nationality diversity in Hong Kong's workforce. The data from the Census and Statistics Department does not categorize labor by nationality or ethnic background. When researching Hong Kong's foreign workforce, most of the results relate to foreign domestic helpers. Skilled immigrants are differentiated from foreign domestic helpers and imported workers. The latter are considered a transient population and have far more work permit restrictions (*Hong Kong's Population, Characteristics and Trends*, n.d.).

Israel. Israel occupies the first position on the list from its region with a growth in total population of 7.6% from 2013 to 2020 ([Cornell University, INSEAD & WIPO, 2013; 2020]).

Table 18 shows the details year by year.

Table 18

Total Population of Israel for Years in Scope.

Country	Source	Year	Total Population (millions)	Year over Year Growth
Israel	Cornell University, INSEAD & WIPO (2013, p. 191)	2013	7.9	Base
	Cornell University, INSEAD & WIPO (2014, p. 201)	2014	7.9	0.0%
	Cornell University, INSEAD & WIPO (2015, p. 221)	2015	7.8	-1.3%
	Cornell University, INSEAD & WIPO (2016, p. 229)	2016	8.1	3.8%
	Cornell University, INSEAD & WIPO (2017, p. 238)	2017	8.2	1.2%
	Cornell University, INSEAD & WIPO (2018, p. 270)	2018	8.3	1.2%

Commented [DAG87]: 2064,

Cornell University, INSEAD & WIPO (2019, p. 272)	2019	8.5	2.4%
Cornell University, INSEAD & WIPO (2020, p. 269)	2020	8.5	0.0%

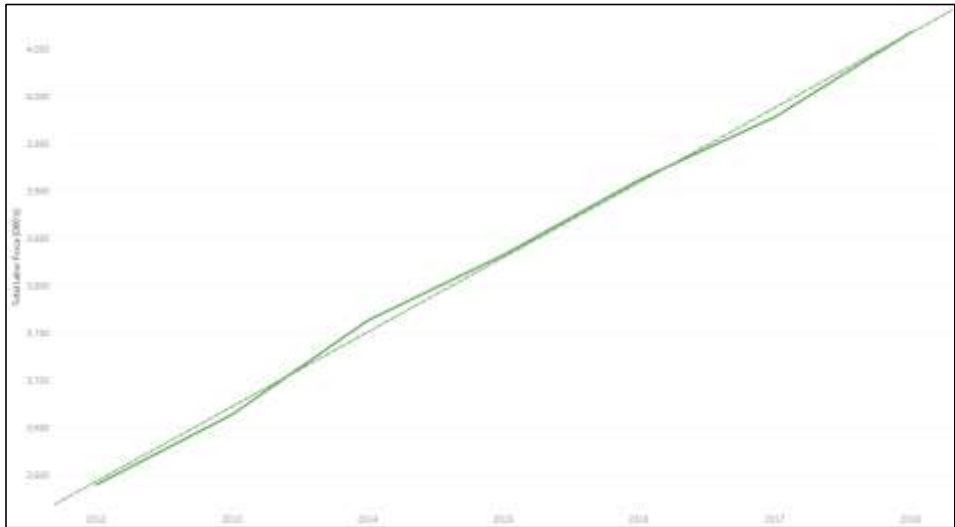
Note. Year over Year Growth is the percentage of difference from previous year calculated by the researcher from population numbers in the Global Innovation Index reports.

Israeli demographics are considered unique within the cluster of developed countries. The fertility rate in Israel explains about 80% of the annual growth. Life expectancy continues to increase. Projections indicate that the Israeli population will rise to nearly 13 million by 2040, with a sharp increase in the population over 70 until 2035. This calls for preparation by investing for greater integration in higher education and the labor market, and for better retirement planning and long-term care services (*Population Projections for Israel, 2017-2040*, 2020).

Commented [DAG88]: and 2020).

Figure 51

Israel's Total Workforce in Thousands for 2012 to 2018.



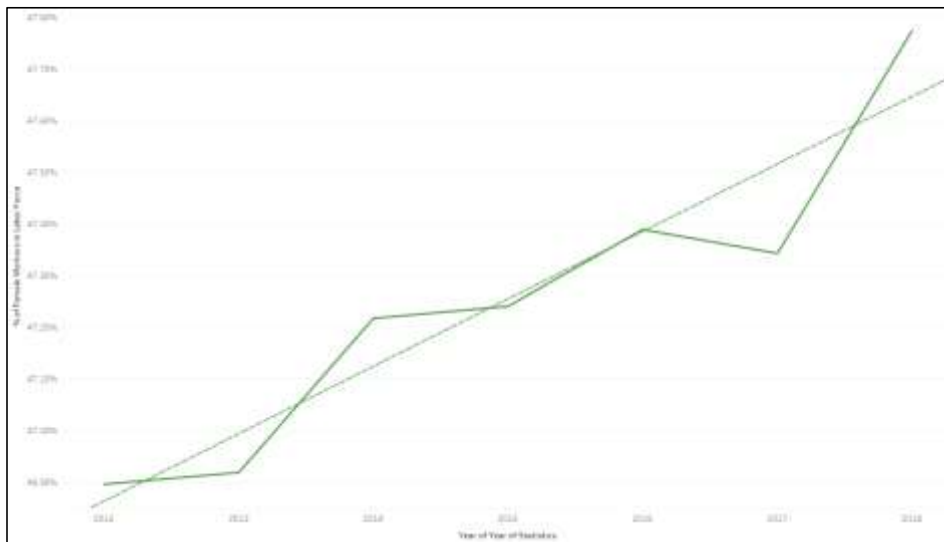
Note. The workforce data for Israel is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 51 shows an uptrend in Israel’s workforce that matches its population growth.

Gender diversity in Israel’s workforce. The proportion of women in the Israeli workforce has been over 45% since 2012 and continued an uptrend that reached close to 48% in 2018, reflected in Figure 52.

Figure 52

Israel’s Percentage of Female Workers in Workforce for 2012 to 2018.



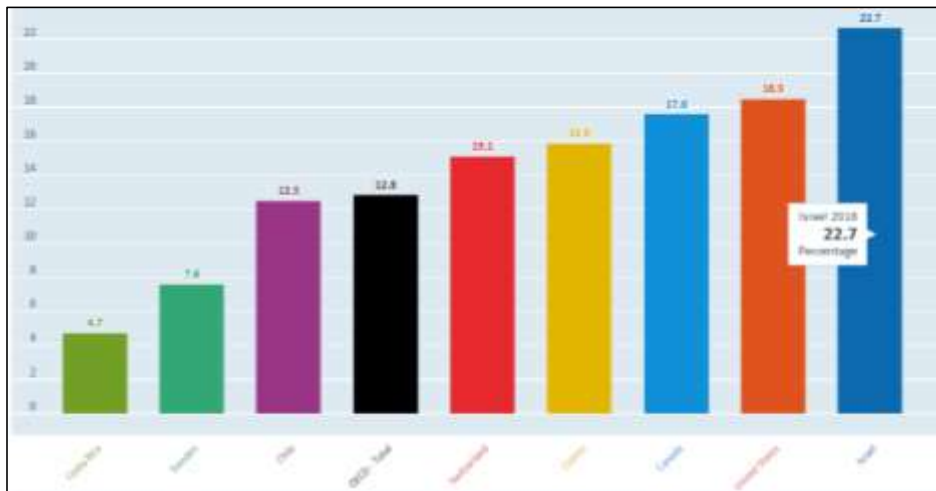
Note. The workforce data for Israel is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Although females represent almost half of the workforce in Israel, the country is far from achieving gender equality. In this study Israel is the country with the largest gender wage gap.

Figure 53 shows how Israel's gender wage gap is 50% larger than Switzerland's and 383% larger than Costa Rica's.

Figure 53

Gender Wage Gap for Employed Woman – Israel Highlight for 2018.



Adapted from “Gender Wage Gap (Indicator)” by OECD, 2021.

(<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by the Organization for Economic Co-operation and Development.

Mind the Gap – Promoting a Feminist Workforce in Israel (n.d.) acknowledges the issue and proposes five goals for more gender equality.

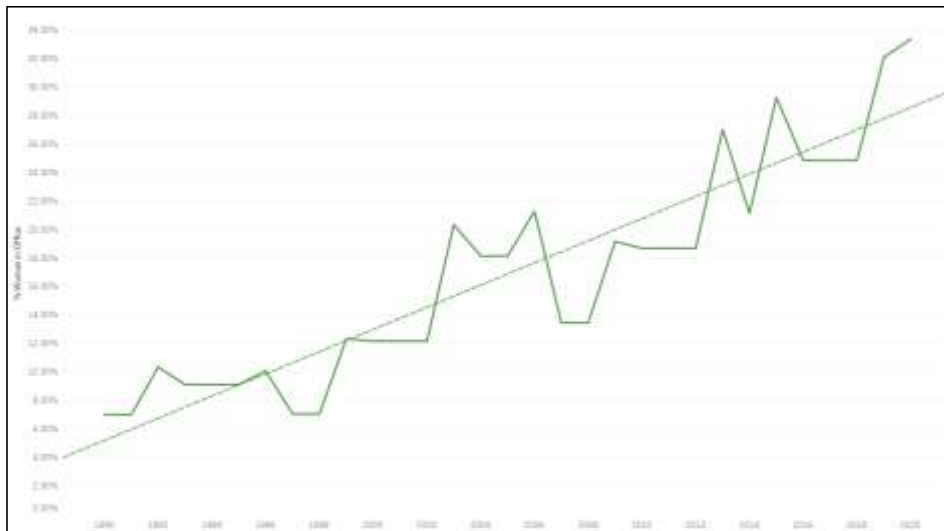
1. Lower the total working hours and develop gender-neutral arrangements for working parents.
2. Reduce the gender segregation in the labor market and raise wages for professions dominated by women.
3. Address the obstacles for minority women in Israel.
4. Recognize the economic value of household duties.

5. Restructure retirement arrangements to reduce the inequality rates among the elderly.

Women in Israeli politics. Israel has been performing much better than the United States and almost as well as Switzerland in incorporating women in the parliament. In 2019 and 2020, women occupied just over 30% of the seats in the Israeli Knesset; Figure 54 shows the uptrend. The increase in the proportion of women in the Knesset in the last three decades has been nearly 371%.

Figure 54

Percentage of Women in Israeli Knesset from 1990 to 2020.



Note. Adapted from “[Knesset Members]” by The Knesset, n.d.,

(https://knesset.gov.il/mk/eng/mkdetails_eng.asp). Copyright 2021 by State of Israel.

The role of women in political parties is key to increasing and sustaining a healthy female representation in political affairs. Avivi (2019) highlights that female leadership in political parties is uncommon. The Eighteenth Knesset from 2009 to 2013 had the highest count of female party leaders, three in total, which accounted for almost 30% of the parties represented therein.

Most parties have addressed the representation issue by reserving certain number of candidacies to minorities, including women. This, together with slots left available by retiring politicians, has contributed to increasing female representation in the Knesset, but it has also limited female chairs to the minimum required.

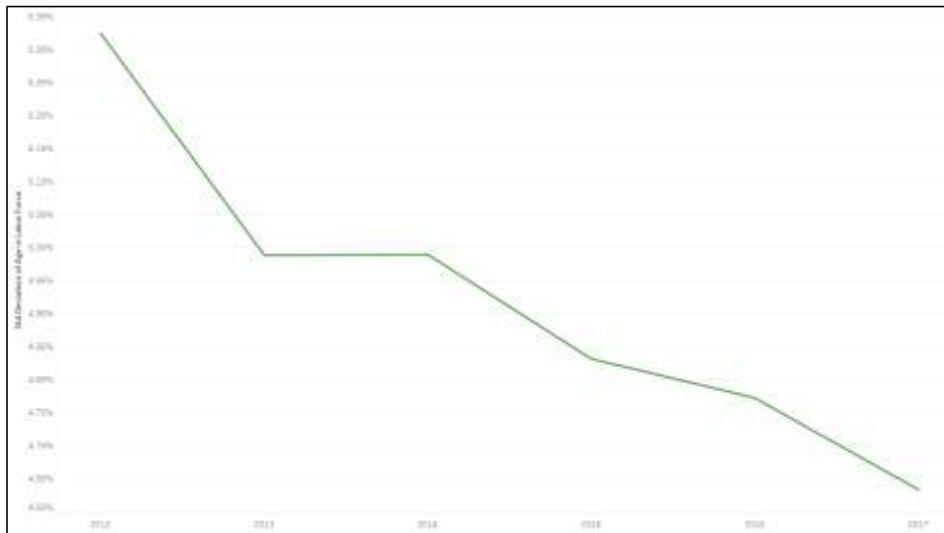
Israel scored 47 in Hofstede's masculinity societal dimension (Hofstede Insights, n.d.), which is a moderate feminine society, like Singapore. Both countries share similar patterns: a high presence of women in the workforce and lower female representation in politics. This may be a repetitive pattern among moderate feminine societies that are dealing with trying to balance traditional gender roles and gender parity.

Age diversity in Israel's workforce. The generational data for Israel's workforce shows a variation in the proportion of workers from the different age groups similar to the countries discussed so far, but the reduction in variation is less aggressive than for the rest of the countries discussed. Figures 55 and 56 show how the variation in the proportion of participants from the different age groups has been decreasing with time. Figure 57 shows how total workers in the different age bands have increased over time. What holds the variation among the proportion of workers from the different age groups slightly higher is the low proportion of workers 55 and older active in the labor force.

Achdut and Gharrah (2008) found that there is a significant drop in participation in the workforce starting two to three years prior to the official retirement age. As workers move to the age band 55 and older, health issues push them out of the workforce. For those 55 and older leaving the workforce, about 55% of women and 60% of men do so due to health deterioration.

Figure 55

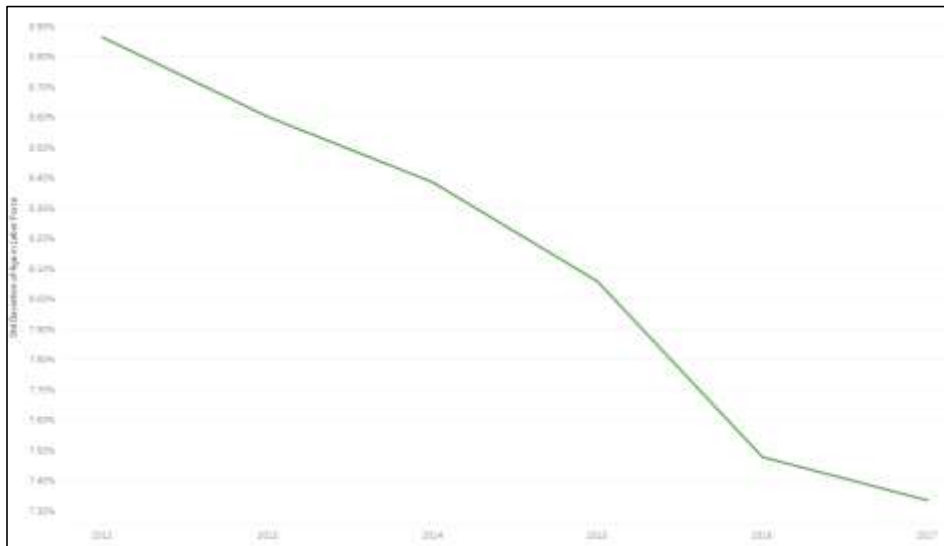
Standard Deviation of the Percentage of Workers in the Israeli Workforce from Age Bands Within 25 to 64 Years from 2012 to 2017.



Note. The workforce data for Israel is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 56

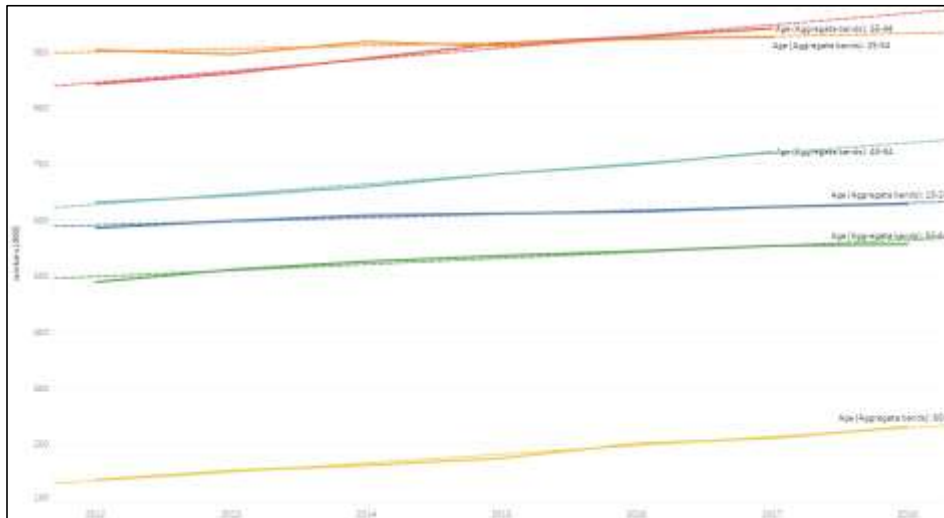
Standard Deviation of the Percentage of Workers in the Israeli Workforce from Age Bands 15 to 24, and 65 and Over from 2012 to 2017.



Note. The workforce data for Israel is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 57

Israeli Workers from Different Age Bands from 2012 to 2017.



Note. The workforce data for Israel is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo org/data/>). Copyright 1996-2020 by the International Labor Organization.

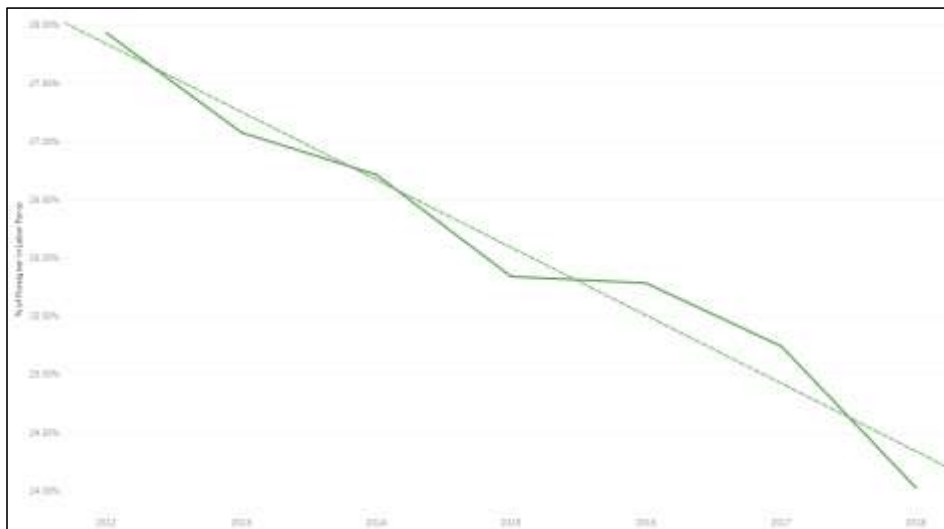
Given that Israel projects significant population growth driven by high fertility rates and labor shortage is very unlikely, it may not seem a priority to engage senior workers more actively in the workforce. Nonetheless, if incremental health issues are keeping workers over 55 away from the workforce, it may later become not only a lack of diversity issue, but an economic issue as well.

Ethnic/Nationality diversity in Israel’s workforce. Israel is the only country in the list showing a decline in foreign workers. It is important to note that Israel is a relatively new state incorporated in 1948, for which the older generations may appear as foreign born and younger generations as native born. Also, with the high fertility rate in Israel (*Population Projections for*

Israel, 2017-2040, 2020), labor shortage is not a driver to increase the import of foreign workers. Still, foreign workers account for almost one fourth of the workforce; Figure 58 shows the downtrend.

Figure 58

Percentage of Foreign Workers in Israel from 2012 to 2018.



Note. The workforce data for Israel is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Canada. Canada has the second largest population from the list of countries in this study, superseded only by its regional peer, the United States. Its population increased 3.6% from 2013 to 2020 ([Cornell University, INSEAD & WIPO, 2013; 2020]); Table 19 shows the details year by year.

Table 19*Total Population of Canada for Years in Scope.*

Country	Source	Year	Total Population (millions)	Year over Year Growth
Canada	Cornell University, INSEAD & WIPO (2013, p. 154)	2013	36.1	Base
	Cornell University, INSEAD & WIPO (2014, p. 166)	2014	34.9	-3.3%
	Cornell University, INSEAD & WIPO (2015, p. 186)	2015	35.5	1.7%
	Cornell University, INSEAD & WIPO (2016, p. 197)	2016	35.9	1.1%
	Cornell University, INSEAD & WIPO (2017, p. 207)	2017	36.3	1.1%
	Cornell University, INSEAD & WIPO (2018, p. 239)	2018	36.6	0.8%
	Cornell University, INSEAD & WIPO (2019, p. 240)	2019	37.0	1.1%
	Cornell University, INSEAD & WIPO (2020, p. 237)	2020	37.4	1.1%

Note. Year over Year Growth is the percentage of difference from the previous year calculated by the researcher from population numbers in the Global Innovation Index reports.

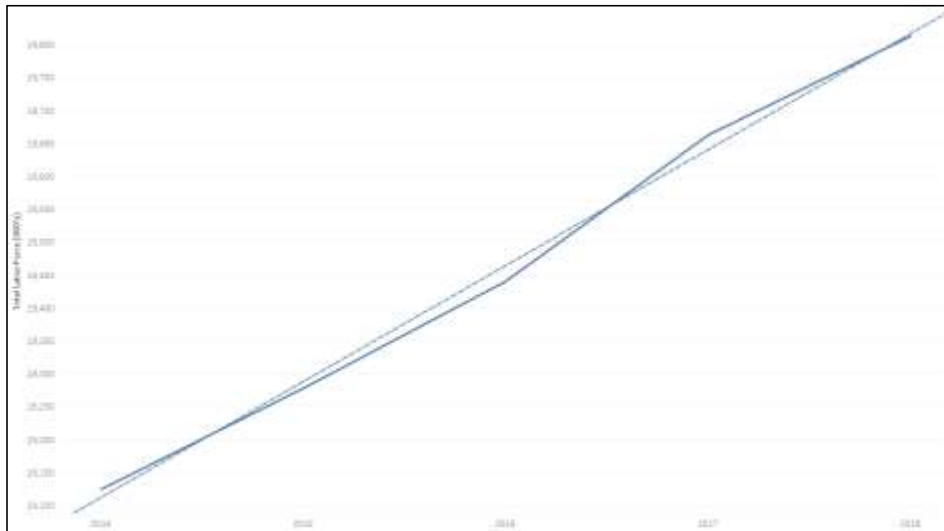
Canada is betting on an aggressive immigration intake to grow its population. As of 2019, 21% of the population was foreign born. By 2021, the population is expected to grow 1% per year from immigration alone, targeting to have 50 million people by 2060. This is the strategy of Canada's liberal government to keep growing in contrast to the population decline in about three decades in most developed countries, as forecasted (Ibbitson and Bricker, 2019).

In 2019, 82% of the population growth came from immigration while only 18% was due to natural births. If Canada's approach to immigration remains as liberal, it is expected to experience workforce expansion and economic growth (Thevenot, 2020).

Figure 59 shows how Canada's workforce increased by 3.6% in the four-year period from 2014 to 2018. Although the data used for this study is limited, the growth in workforce seems to be consistent with the growth trends of the total population.

Figure 59

Canada's Total Workforce in Thousands for 2014 to 2018.

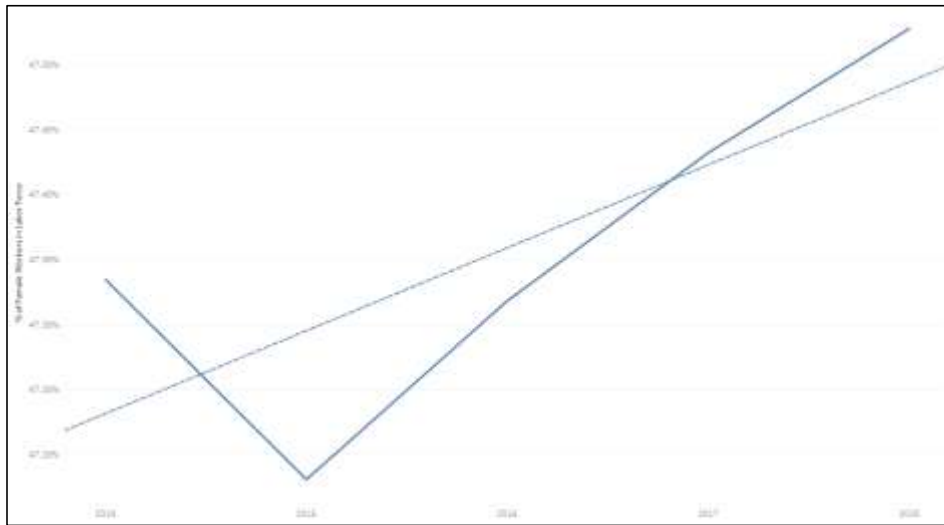


Note. The workforce data for Canada is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Gender diversity in Canada's workforce. The proportion of female workers in Canada's workforce is increasing and close to an even proportion with men. In 2019, women represented 47.4% of the Canadian workforce, whereas in 1976 female workers were just 37.6% of the total. Despite the huge progress, women's participation in the labor market was more vulnerable as the COVID-19 pandemic kicked-in in 2020, dropping from 61.2% in February 2020 to 55.5% in April 2020. The cause for this is primarily due to gender disparity in caregiving responsibilities (*Women in the Workforce – Canada: Quick Take*, 2020). Figure 60 shows the proportion of female workers in the Canadian workforce for a limited range of years.

Figure 60

Canada's Percentage of Female Workers in Workforce for 2014 to 2018.



Note. The workforce data for Canada is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

The article *Women in the Workforce – Canada: Quick Take* (2020) addresses important facts that help put the Canadian female workforce in context:

1. Statistics show that in general, Canadian women are more educated than men. 70% of women between 25 and 34 years are likely to have attained tertiary education, compared to 53% of men in the same age group. Nonetheless, post-secondary education in fields such as energy, agriculture, and construction that have been traditionally dominated by men continues to be so, as the percentage of men with such education is twice the percentage of women.

Commented [DAG89]: men are.

Commented [DAG90]: Seventy percentage

2. Women are underrepresented in business leadership positions. Only 3.5% of CEOs in 2020 were women and female executive officers were only 17.9%. As of December 2020, only 27.6% of boards seats were occupied by women.
3. In 2019, women represented 63.3% of employees in the public sector but just 45.1% of private sector.
4. Canada has the fifth largest workforce in artificial intelligence, yet only 24% is comprised of women.
5. In 2019, women earned 11% less than men, based on average hourly wages. This gap is partially explained by:
 - a. occupational segregation – men working in higher-paying sectors.
 - b. 16.0% of women versus 4.8% of men working part-time.
6. Maternity continues to be a career liability. In 2016, women in the 25-34 age band experienced a 48% drop in earnings the first year after having a child. Women aged 25-29 experienced an additional 14% decrease for the first five years after having a child.

Figures 61 and 62 show Canada's gender wage gap in comparison with other countries in this research. Canada's gap for employed women is exceeded only by the United States and Israel. In the case of self-employed women, the United States and Switzerland have bigger gaps.

Commented [DAG91]: board's

Commented [DAG92]: men, based on average hourly wages did.

Commented [DAG93]: Occupational

Figure 61

Gender Wage Gap for Employed Women – Canada Highlight for 2019.



Adapted from “Gender Wage Gap (Indicator)” by OECD, 2021.

(<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by the Organization for Economic Co-operation and Development.

Figure 62

Gender Wage Gap for Self-Employed Women – Canada Highlight for 2018.



Moyser (2019) explains that motherhood penalties are significant contributors to Canada's perpetuation of the gender pay gap and impact women's careers before and after motherhood. For example, before becoming a mother, women may tend to choose lower-paying, family-friendly career paths in anticipation of motherhood. After giving birth, women may opt for reduced working schedules or child-friendly work environments, even if that means a cut their earnings. Women assume parenthood responsibilities to a larger extent than men, leaving the workforce temporarily or permanently to take care of their families.

Hofstede Insights (n.d.) scores Canada as a moderate masculine society with a score of 52 in its masculinity societal dimension. This explains some of the struggles that women must overcome to sustain successful careers, especially in leadership roles like politics.

Women in Canadian politics. Canada has one of the largest female representations in parliament from the countries in this study, only surpassed by the European countries and Costa

Commented [DAG94]: lower-paying family-friendly career paths

Rica. Figure 63 shows how female representation in the Canadian parliament has changed over time.

Figure 63

Percentage of Women in the Canadian Parliament from 1990 to 2020.



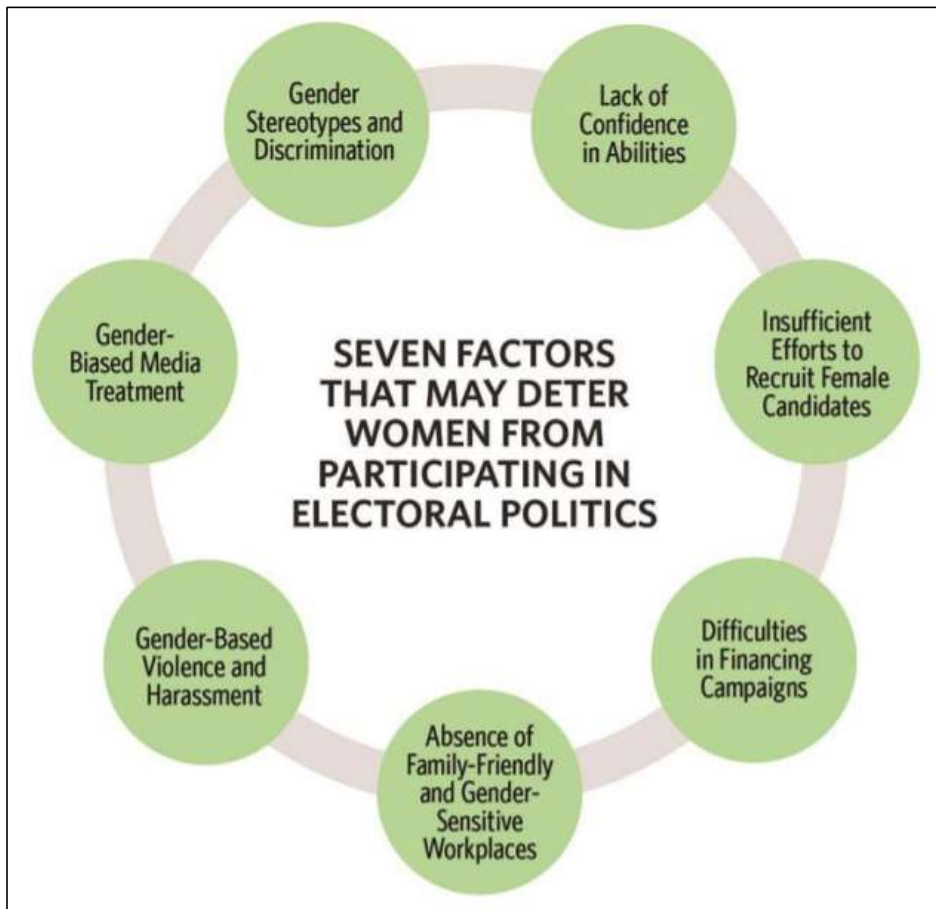
Note. Adapted from “[Parliamentarians]” by Parliament of Canada, n.d., (https://lop.parl.ca/sites/ParlInfo/default/en_CA/People/parliamentarians#parlinfo_row1). Copyright Library of Parliament.

Canada crossed the thirty percent threshold in 2016, with 30.2% of parliament seats occupied by women. However, in 2019 women represented 50.3% of the total population (*Women in the Workforce – Canada: Quick Take*, 2020), signaling that women are underrepresented in public decision-making roles. The parliament designated the Standing Committee of the Status of Women to develop a roadmap to improve the participation of Canadian women in politics. Figure 64 shows several factors that prevent women from participating in political leadership. Common themes are related to biases in gender roles, lack of

accountability from political parties to increase inclusion, and a dearth of gender-neutral policy making that fosters the first.

Figure 64

Factors that may Deter Women from Participating in Electoral Politics.



Note. From “Elect Her: A Roadmap for Improving the Representation of Women in Canadian Politics”, by the Standing Committee of the Status of Women, 2019,

(<https://www.ourcommons.ca/Content/Committee/421/FEWO/Reports/RP10366034/feworp14/feworp14-e.pdf>). Copyright by the Library of Parliament.

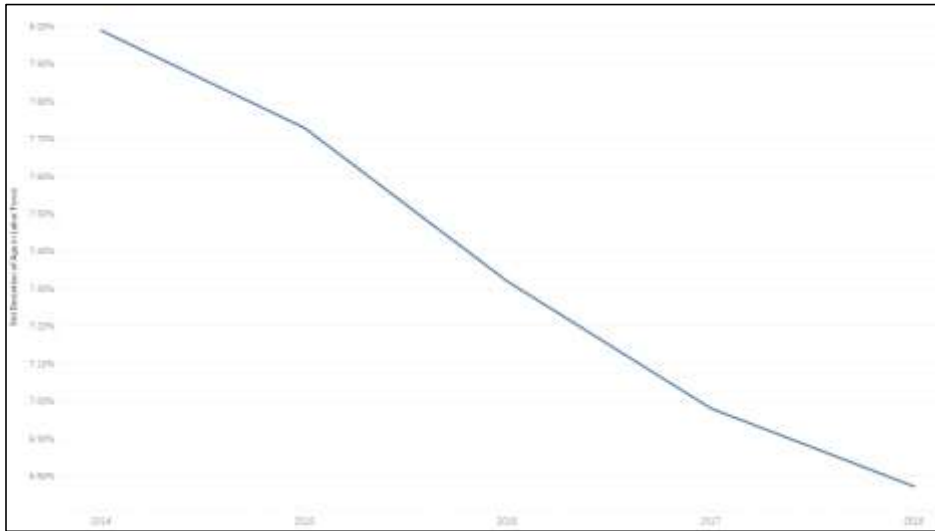
Age diversity in the Canadian workforce. The information available in the International Labor Organization for Canada database splits the generational information of workers into four age bands: 15 to 24 years, 25 to 54 years, 55 to 64 years, and 65 and over. The 25 to 54 age band is too broad to be comparable with the 55 to 64 band analyzed for the rest of the countries. For Canada, the age diversity analysis will be scoped to age groups 15 to 24, and 65 and over. Figure 65 shows how the variation between the proportion of workers from both age bands has changed over time.

Commented [DAG95]: 15 to 24

Commented [DAG96]: proportions

Figure 65

Standard Deviation of the Percentage of Workers in the Canadian Workforce from Age Bands 15 to 24, and 65 and Over from 2014 to 2018.

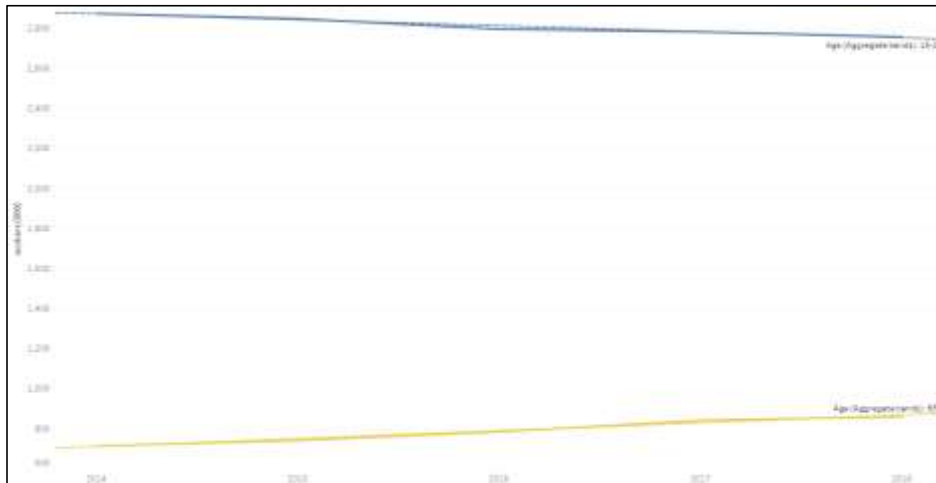


Note. The workforce data for Canada is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Except from Israel, Canada has the least balanced proportion of workers from age bands 15 to 24, and 65 and over in the list of countries analyzed so far. The proportion of the eldest workers in the workforce is less than one third of the youngest workers; Figure 66 shows the gap.

Figure 66

Canadian Workers from Age Bands 15 to 24 Versus 65 and Over from 2014 to 2018.



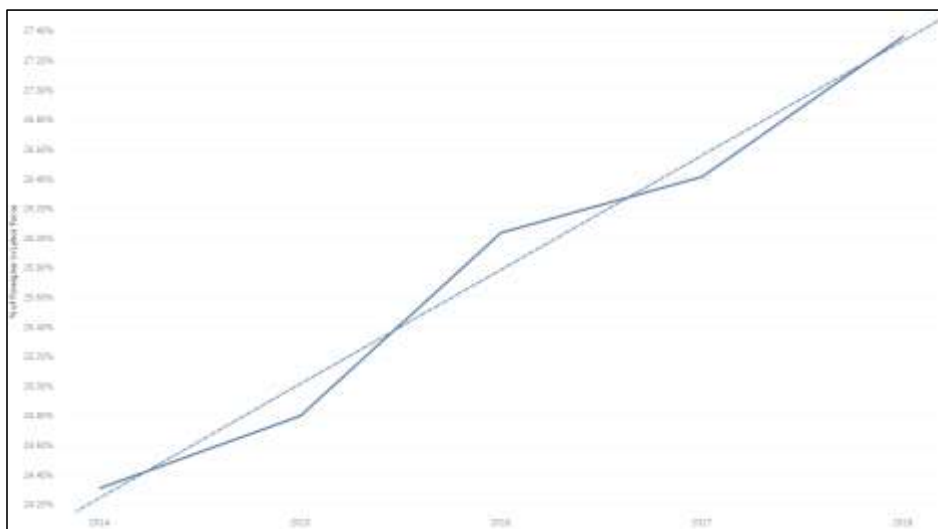
Note. The workforce data for Canada is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Canadian senior workers face multiple challenges when trying to remain active in the workforce or aiming to re-enter it. These include ageism, insufficient education or training, a difficult job-hunting process, health issues, work-life balance challenges, lack of workplace accommodations, and lack of incentives to return to work. Canada is currently working on plans to raise awareness, provide financial incentives, secure health and safety, improve employment legislation, reform the retirement income system, provide alternatives for skills development, develop policy for workplace accommodation, and ameliorate employment services (*Promoting the Labor Force Participation of Older Canadians – Promising Initiatives*, 2018). Retaining senior workers and increasing the proportion of women in the workforce is important for the government, despite the plans to expand its already high foreign workforce.

Ethnic/Nationality diversity in Canada's workforce. Canada has the second largest proportion of foreign workers among the countries in this study, surpassed only by Switzerland. Figure 67 shows how it has increased from 2014 to 2018.

Figure 67

Percentage of Foreigners in Canada's Workforce from 2014 to 2018.



Note. The workforce data for Canada is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Immigrants fill gaps in the Canadian workforce, bringing talent, innovation, population growth, and financial investments (Silverman, 2021). Canada has very liberal immigration policies that already are, and will continue to be, the main source of population growth for the country, including its workforce (Ibbitson and Bricker, 2019). By 2030, the government estimates that more than half of the Canadian workforce will have been born abroad (*How Canada Raises the Bar for Attracting Foreign Skilled Talent*, 2019).

Cyprus. Cyprus has the smallest population among the countries in this study, experimenting 0.0% growth from 2013 to 2020 ([Cornell University, INSEAD & WIPO, 2013; 2020]). Table 20 shows the details year by year.

Table 20

Total Population of Cyprus for Years in Scope.

Country	Source	Year	Total Population (millions)	Year over Year Growth
Cyprus	Cornell University, INSEAD & WIPO (2013, p. 162)	2013	1.2	Base
	Cornell University, INSEAD & WIPO (2014, p. 173)	2014	1.1	-8.3%
	Cornell University, INSEAD & WIPO (2015, p. 193)	2015	1.2	9.0%
	Cornell University, INSEAD & WIPO (2016, p. 204)	2016	1.2	0.0%
	Cornell University, INSEAD & WIPO (2017, p. 214)	2017	1.2	0.0%
	Cornell University, INSEAD & WIPO (2018, p. 246)	2018	1.2	0.0%
	Cornell University, INSEAD & WIPO (2019, p. 247)	2019	1.2	0.0%
	Cornell University, INSEAD & WIPO (2020, p. 244)	2020	1.2	0.0%

Note. Year over Year Growth is the percentage of difference from previous year calculated by the researcher from the population numbers in the Global Innovation Index reports.

The population of Cyprus is expected to grow in 2021 at a rate of 36 people per day, roughly a 1.1% growth. Immigration is expected to account for 58% of the growth and the remaining 42% by net natural growth. Peak population is projected to be 1.4 million by 2065 (*Cyprus Population*, n.d.).

The total workforce in Cyprus grew from 2000 to 2012 as shown in Figure 68, declining from 2012 to 2016, and then trending up again.

Figure 68

Cypriot Total Workforce in Thousands for 2000 to 2019.



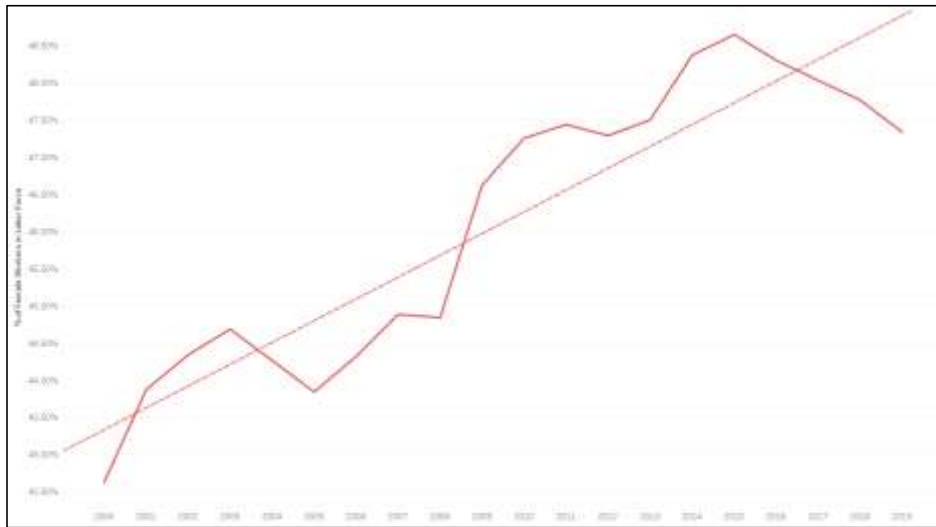
Note. The workforce data for Cyprus is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Goldman (2013) provides details about what caused the crisis that led to the Cypriot workforce drop in 2012. The core of the crisis is at the Cypriot banking system. Cyprus is a tax haven attracting deposits, mainly from Russians. Since Cypriot banks made investments by lending money to Greece, when the Greek economy collapsed the Cypriot banks decided to make higher risk investments by buying Greek government bonds, hoping that the Eurozone would bailout Greece. When that did not happen, Cypriot banks went bankrupt, causing the financial crisis that began in 2012.

Gender diversity in Cyprus’ workforce. Figure 69 shows how the proportion of female workers has changed over time.

Figure 69

Cyprus' Percentage of Female Workers in Workforce for 2000 to 2019.



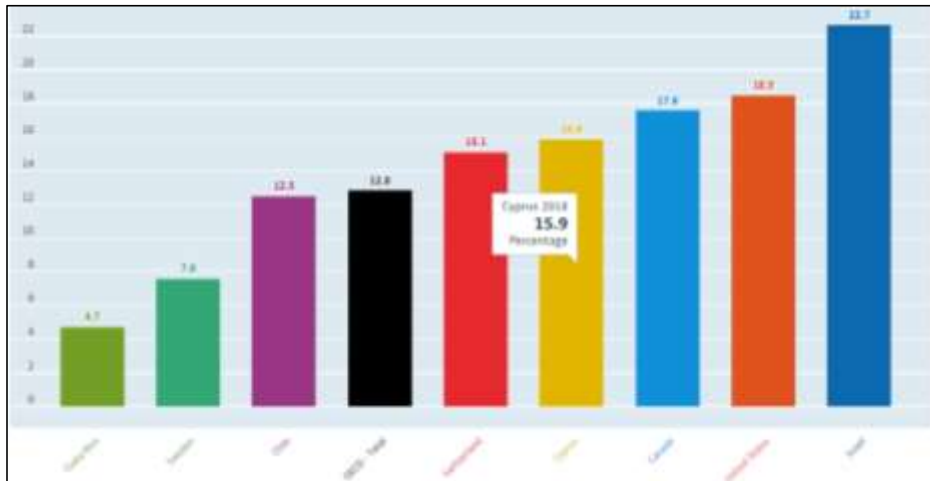
Note. The workforce data for Cyprus is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

There are several observations that can be made from comparing the total workforce trend and the proportion of women in the workforce. First, the proportion of women in the workforce continued to increase throughout the financial crisis until 2015. Then in 2016, when the workforce started to recover, the proportion of female workers started a downward trend until 2019. It can be deduced that the crisis had larger impact on male workers possibly because they are paid more than women. Once the economy recovered from the crisis, the men returned to the workforce in higher numbers. Figure 70 shows Cyprus’ gender wage gap for 2018 in comparison with other countries in this study.

Commented [DAG97]: women are.

Figure 70

Gender Wage Gap for Employed Women – Cyprus Highlight for 2018.



Note. Adapted from the “Gender Wage Gap (Indicator)” by OECD, 2021.

(<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by the Organization for Economic Co-operation and Development.

Zachariou Dodou (n.d.) lists what are considered “women’s privileges” in Cyprus.

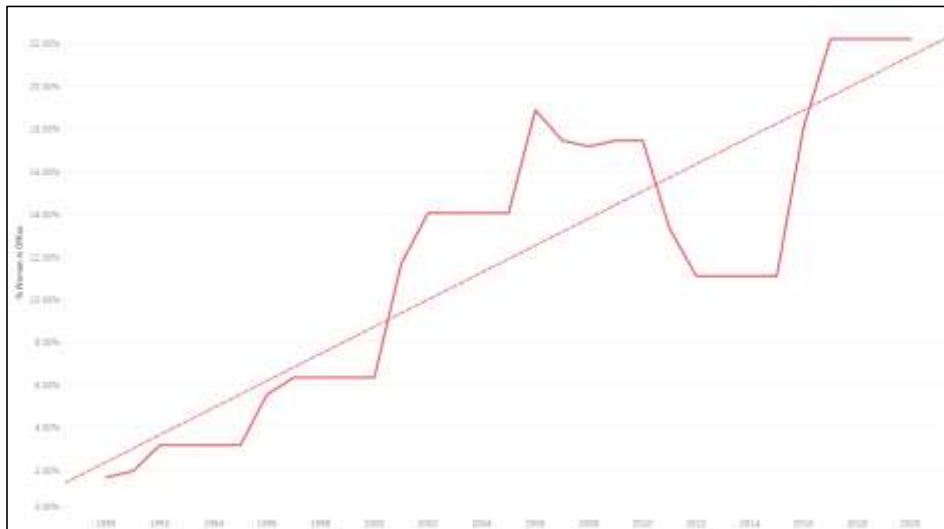
1. Protection of maternity and maternity leave
2. Violence in the family
3. Adoption leave
4. Care leave
5. No service in the army
6. Widow pension from National Social Insurance Fund
7. Social pension for women who have not had contributions to the National Social Insurance Fund.

These types of benefits may be signs of unconscious biases towards the traditional gender roles and may prevent the equal participation of women in the Cypriot society.

Women in Cypriot Politics. Female participation in politics is considerably low in Cyprus. Although the percentage of women in the Cypriot House of Representatives was growing from 1990 to 2006, it suffered a downfall that did not begin to recover until 2016. However, it is important to highlight the amazing advancement that Cyprus made in female representation in the House of Representatives, from almost none back in 1990 to over 20% now as shown in Figure 71.

Figure 71

Percentage of Women in Cypriot Parliament from 1990 to 2020.



Note. Adapted from “[Former Members of the House 1960-2016]” by House of Representatives, n.d., (<http://www.parliament.cy/en/general-information/former-members-of-the-house-1960-2016>). Copyright 2021, House of Representatives.

Cyprus combines elements of the Greek and Turkish heritage in its culture. Hofstede Insights (n.d.) describes Greek culture as a medium ranking masculine society with a score of 57 in Hofstede's masculinity societal dimension. On the other hand, the Turkish culture is described as a feminine society, scoring 45 in Hofstede's masculinity societal dimension. The conflicting cultural views might be responsible for the different patterns in female representation in Cypriot workforce and politics.

Age diversity in Cyprus' workforce. Looking at generational data in the analysis for the Cypriot workforce, there are some patterns that seem to be influenced by the 2012 crisis as well. Figure 72 shows the variation in the proportion of workers from the different age bands from 25 to 64; Figure 73 shows the same for 15 to 24, and 65 and over. Both trends show abrupt increases in variation during the crisis. Figure 74 provides an in-depth view of the details to determine what age groups were impacted the most during the crisis.

Commented [DAG98]: influenced

Figure 72

Standard Deviation of the Percentage of Workers in the Cypriot Workforce from Age Bands Within 25 to 64 Years from 2000 to 2019.



Note. The workforce data for Cyprus is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 73

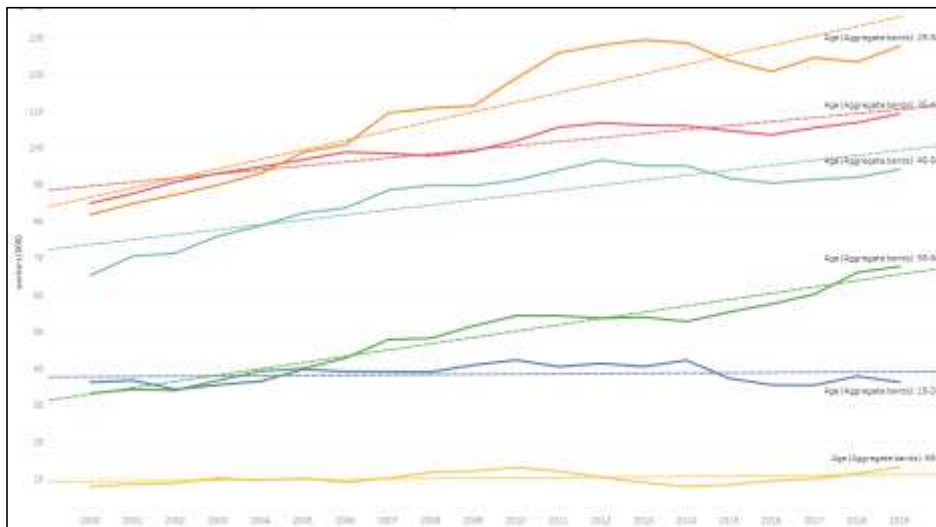
Standard Deviation of the Percentage of Workers in the Cypriot Workforce from Age Bands 15 to 24, and 65 and over from 2000 to 2019.



Note. The workforce data for Cyprus is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 74

Cypriot Workers from Different Age Bands from 2000 to 2019.



Note. The workforce data for Cyprus is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

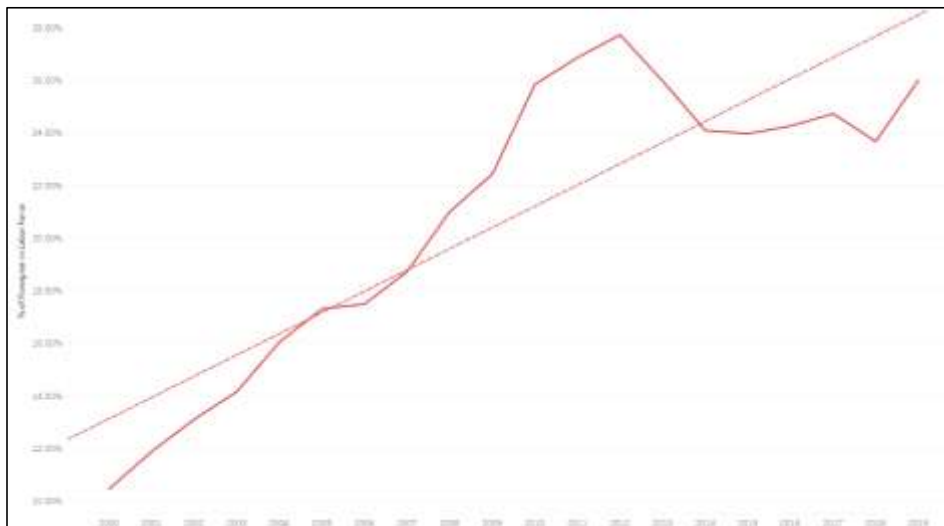
Workers in the 25 to 34 age band were the group with the highest number of participants in the Cypriot workforce since 2005. With the Greek economic crisis in 2010 that led to the collapse of the Cypriot banking system in 2012, the number of workers in that group increased significantly. From Figure 74 it can be inferred that jobs from other age groups were seized by new workers in the 25 to 34 age band, considering that growth in the other age groups either remained flat or lowered their presence in the workforce. As you move into the post-crisis in 2014, workers from the 15 to 24 age group seemed to continue its downward trend, while the rest recovered.

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Ethnic/National diversity in Cyprus' workforce. The foreign participation in the Cypriot workforce is not exempt from the impact of economic crises. As shown in Figure 75, there was a significant hold back for foreigners during the immediate time around the 2012 Cypriot banking crisis. Back then, foreign-born workers represented almost one third of the Cypriot workforce. The proportion of foreign-born workers has been slowly recovering since 2015, and it would be expected to continue to uptrend considering that most of Cyprus' population growth in the upcoming years is estimated to come from immigrants.

Figure 75

Percentage of Foreigners in Cyprus' Workforce from 2000 to 2019.



Note. The workforce data for Cyprus is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Chile. Chile had a 6.7% population growth from 2013 to 2020, 67% occurring in 2020 ([Cornell University, INSEAD & WIPO, 2013; 2019; 2020]). Table 21 shows the details year by year.

Table 21

Total Population of Chile for Years in Scope.

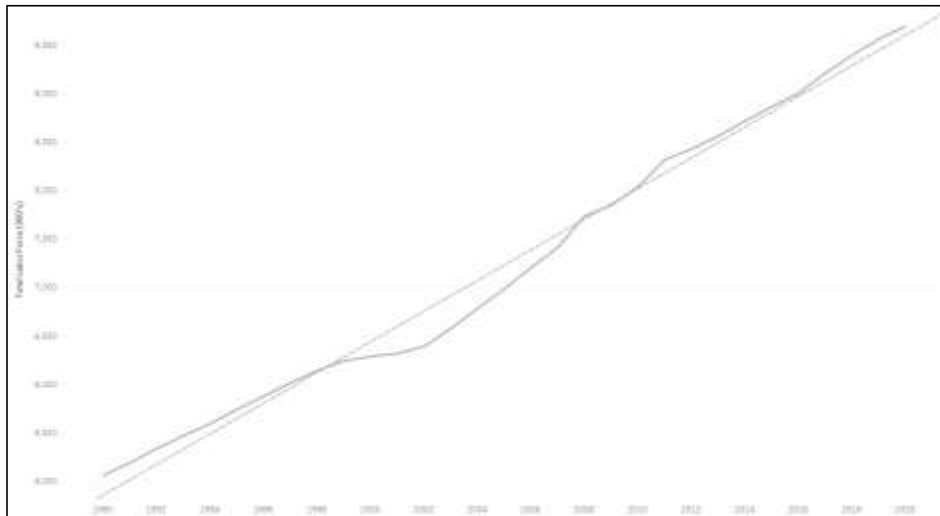
Country	Source	Year	Total Population (millions)	Year over Year Growth
Chile	Cornell University, INSEAD & WIPO (2013, p. 156)	2013	17.8	Base
	Cornell University, INSEAD & WIPO (2014, p. 167)	2014	17.5	-1.7%
	Cornell University, INSEAD & WIPO (2015, p. 187)	2015	17.8	1.8%
	Cornell University, INSEAD & WIPO (2016, p. 198)	2016	17.9	0.6%
	Cornell University, INSEAD & WIPO (2017, p. 208)	2017	18.1	1.1%
	Cornell University, INSEAD & WIPO (2018, p. 240)	2018	18.1	0.0%
	Cornell University, INSEAD & WIPO (2019, p. 241)	2019	18.2	0.6%
	Cornell University, INSEAD & WIPO (2020, p. 238)	2020	19.0	4.5%

Note. Year over Year Growth is the percentage difference from a previous year calculated by the researcher from the population numbers in the Global Innovation Index reports.

Data for Chilean workforce is not available through the International Labor Organization. Gender diversity data for Chile's workforce was accessed from the World Bank database. Figure 76 shows the trends for the Chilean total workforce.

Figure 76

Chile's Total Workforce in Thousands for 1990 to 2020.



Note. The workforce data for Chile is from “[Labor Force, Total - Chile]”, by The World Bank, n.d., (<https://data.worldbank.org/indicator/SL.TLF.TOTL.IN?locations=CL>). Copyright 2021 by The World Bank Group.

The data shows a reduction in the growth rate of the Chilean workforce commencing in 1998 and extending to 2002. It was a reaction in the labor market as a consequence of the Asian economic crisis of 1998. Chile had very limited export diversification, basically exporting one third to the United States, one third to Europe, and the remaining third to Japan. The reduction in exports driven by the crisis led to a 10% rise in unemployment (*Crisis Económica en Chile: La Evidencia de Problemas*, 2009).

Gender diversity in the Chilean workforce. Chile is not doing very well in catching up with equal gender representation in its workforce. The proportion of female workers rose above

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the 40% threshold in 2010, and since then it has only increased about two percentage points as shown in Figure 77.

Figure 77

Chile's Percentage of Female Workers in the Workforce from 1990 to 2020.



Note. The female workforce data for Chile is from “[Labor Force, Female (% of Total Labor Force)]”, by The World Bank, n.d., (<https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS?locations=CL>). Copyright 2021 by The World Bank Group.

Although off by one to two years, the reduction in the total workforce matches the reduced proportion of women in the workforce observed in Figure 77 around 2001. This indicates that female workers exited the workforce in greater proportion than men. What might account for this occurrence?

Data from 2006 for Chilean workers between ages 20 and 44 revealed that gender participation in the labor force is polarized. For example, close to 90% of men within the

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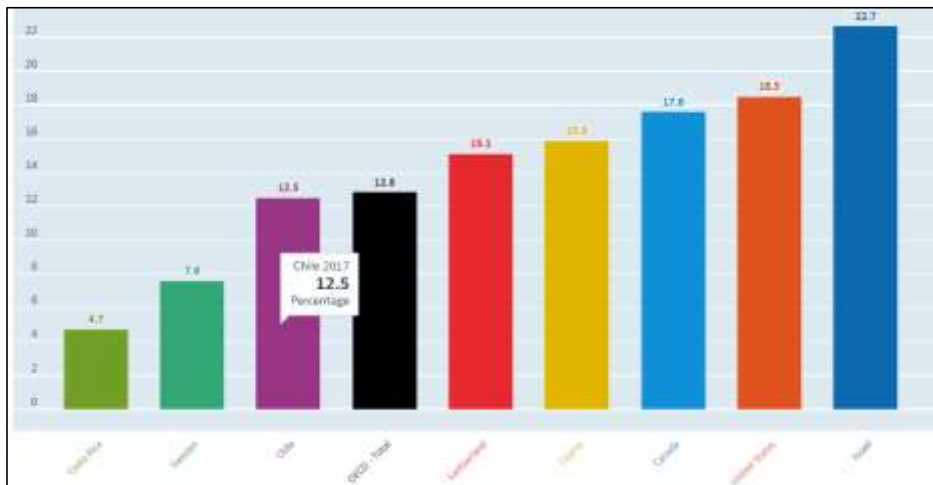
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aforementioned age bracket entered the workforce permanently. In the case of women, only 35% joined the workforce permanently, 25% had a late start in entering the workforce, 20% had a premature or early retirement, and about 20% never participated in the workforce. In addition, in 2011, 55.7% of married women with children younger than six and 38.9% of married women without children younger than six were not participating in the labor force (Piras & Rucci, 2014).

These statistics reflect traditional gender roles in masculine societies. Surprisingly, Hofstede Insights (n.d.) categorizes Chile as a feminine society with a score of 28 in Hofstede's masculinity societal dimension. The report clarifies that the femininity of Chilean society is "difficult to detect" (Hofstede Insights, n.d.). Although this seems to contradict the observations for Chile and the proportion of women in its workforce, other measures such as the gender wage gap put Chile in a better position than their counterparts in the study.

Figure 78

Gender Wage Gap for Employed Women – Chile Highlight for 2017.



Note. Adapted from “Gender Wage Gap (Indicator)” by OECD, 2021.

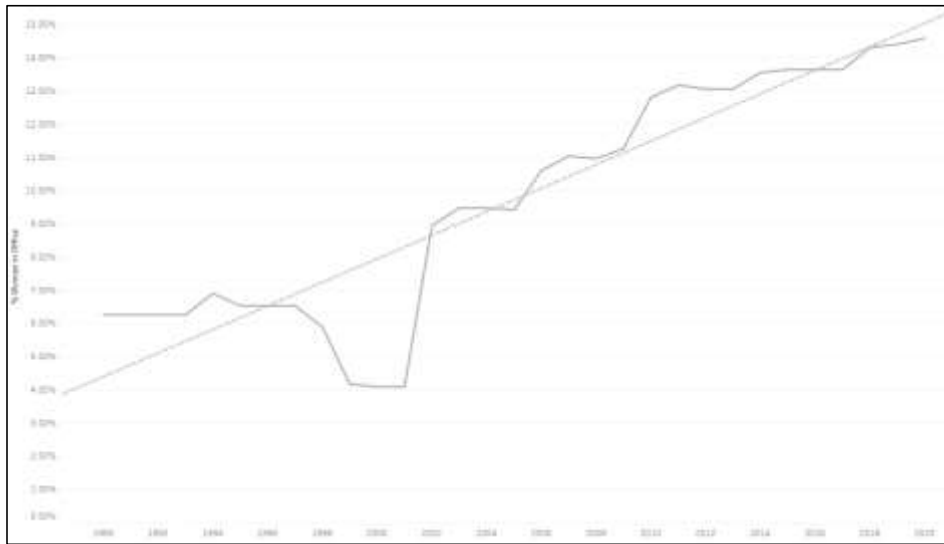
(<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by Organization for Economic Co-operation and Development.

Women in Chilean Politics. Another contradicting measure with the status of a feminine society is female representation in Chile’s parliament, very scarce during the 1990s but growing since the beginning of this century. In the 2020 elections, women won 22.7% of the parliament seats as an incremental result of a recent policy implemented in 2018 that requires a 40% quota of female candidates in all political parties (Roman, 2020).

Commented [DAG103]: 1990 has

Figure 79

Percentage of Women in the Chilean Parliament 1990 to 2020.



Note. Adapted from “[Senadores]” by Senado República de Chile, n.d., (<https://www.senado.cl/appsenado/index.php?mo=senadores&ac=periodos&tipo=2>), and “[Diputados Periodo Colección]” by Congreso Nacional de Chile, n.d., (opendata.camara.cl/camaradiputados/WServices/WSDiputado.aspx/retornarDiputadosXPeriodo).

Age diversity in the Chilean workforce. Generational data Chile’s workforce was not available for this study to analyze age diversity changes with time. Nonetheless, some common themes have been found regarding older workers remaining active in the workforce. DNA Outplacement (2020) reported that in 2019 the number of active workers over 65 increased by 95% versus 2010. Similarly, the number of workers in the 55 to 64 age band, which includes retired women since they can retire at 60 while men at 65, increased by 69% versus 2010. In fact, this last group represented 23% of the employed workforce. That proportion is expected to grow as life expectancy in 2019 was estimated to be 80.6 years.

In January 2020, the Chilean Congress approved legislation inspired by the International Labor Organization's Recommendation No. 162, containing the following content (*Aprueban Proyecto que Establece Jornada Laboral para Mayores de 60 Años*, 2020):

1. Establishment of specific regulations that ensure older workers' rights are honored beyond retirement age so they can continue working under simplified labor contracts that foster their participation in the labor market.
2. Empowerment of older workers over 60 to voluntarily negotiate with employers a flexible work schedule with a maximum number of hours to be distributed over a period longer than 3 months but less than a year.
3. Daily working schedules can be five to eight hours long without exceeding six days a week.
4. Monthly payments to be issued for the number of hours worked in that period.
5. The agreement does not cover tasks that may be considered a health risk.
6. Workers will not lose government benefits acquired or any other benefits they are, or will be, entitled to.

The legislation aims to create a labor-friendly market for the elderly and increase current retention rates.

Ethnic/Nationality diversity in the Chilean workforce. Birthplace data for Chile's workforce was not available for this study to analyze ethnic or nationality diversity changes with time. However, Urria Yáñez (2020), researched the impact of immigrants in Chile's workforce from 2010 to 2019 and some of his findings are outlined below:

1. Immigrants represented about 1.2% of the population in 2002, estimated to have increased to at 7.8% of the total population by 2019.

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2. Immigrants have a higher labor market participation rate than native workers: 77% versus 57%.
3. Immigrants have a higher level of education than native Chileans. About 40% of immigrants had post-secondary or graduate studies versus less than 30% of Chileans.
4. Immigrants are working in lower paid jobs not related to their academic preparation. However, the occupations with a higher concentration of immigrants have experienced a rise in average salaries.
5. Commerce, hosting and the food industry, and construction were the occupations with highest concentration of immigrants in 2019.

Commented [DAG105]: Chilean does.

Based on these findings, the proportion of immigrants in Chile's workforce is estimated to be relatively low in comparison to the other countries in this study.

Costa Rica. The total population of Costa Rica has not changed much from 2013 to 2020 with a total growth for the period of 2.0% 2020 ([Cornell University, INSEAD & WIPO, 2013; 2020]). Table 22 shows details of the total population per year.

Table 22

Total Population of Costa Rica for Years in Scope.

Country	Source	Year	Total Population (millions)	Year over Year Growth
Costa Rica	Cornell University, INSEAD & WIPO (2013, p. 159)	2013	4.9	Base
	Cornell University, INSEAD & WIPO (2014, p. 170)	2014	4.8	-2.0%
	Cornell University, INSEAD & WIPO (2015, p. 190)	2015	4.9	2.0%
	Cornell University, INSEAD & WIPO (2016, p. 201)	2016	4.8	-2.0%
	Cornell University, INSEAD & WIPO (2017, p. 211)	2017	4.9	2.0%
	Cornell University, INSEAD & WIPO (2018, p. 243)	2018	4.9	0.0%

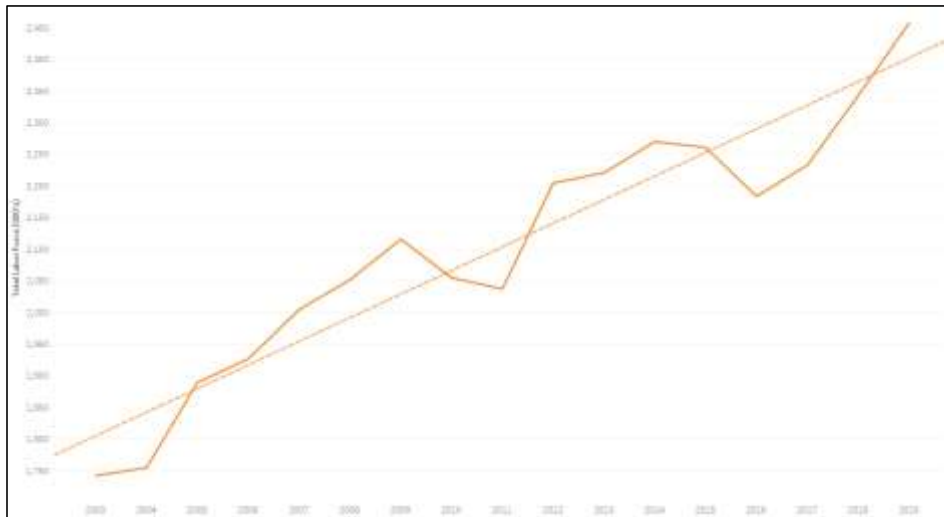
Cornell University, INSEAD & WIPO (2019, p. 244)	2019	5.0	2.0%
Cornell University, INSEAD & WIPO (2020, p. 241)	2020	5.0	0.0%

Note. Year over Year Growth is the percentage difference from a previous year calculated by the researcher from population numbers in the Global Innovation Index reports.

For the same period, the Costa Rican workforce grew by 10.6%, which is more than five times the rate of growth of the total population. Figure 80 shows how the workforce has changed since 2003.

Figure 80

Costa Rica's Total Workforce in Thousands for 2003 to 2019.



Note. The workforce data for Costa Rica is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

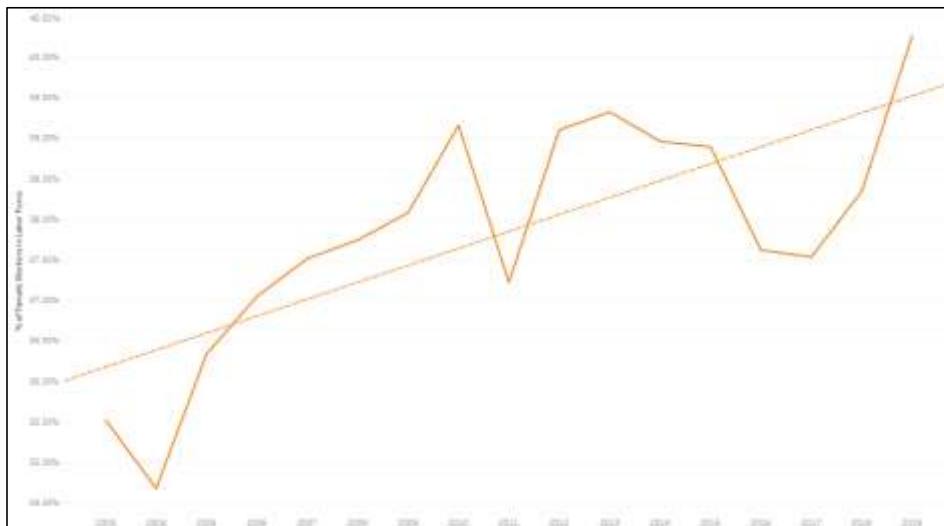
Temporary periods of workforce contraction can be seen from 2009 to 2011 and in 2015. Jiménez Mata (2018), citing the work of Hernán Rojas, explains that the impact of the 2008

global recession arrived in Costa Rica in 2009, when banks started experiencing a credit crunch and a high concentration of liabilities. In 2015, the workforce received the direct impact of an economic contraction that had been building up for a while, with firms fleeing out of the country causing higher unemployment. The manufacturing sector suffered the highest contraction (*La Economía de Costa Rica se Desmorona*, 2015).

Gender diversity in the Costa Rican workforce. Figure 81 depicts the proportion of female workers in the workforce.

Figure 81

Costa Rica Percentage of Female Workers in the Workforce for 2003 to 2019.



Note. The workforce data for Costa Rica is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

The drop in the 2009 workforce can be seen in the proportion of women in the labor force a year later. A similar lagging relationship between workforce contraction and the proportion of

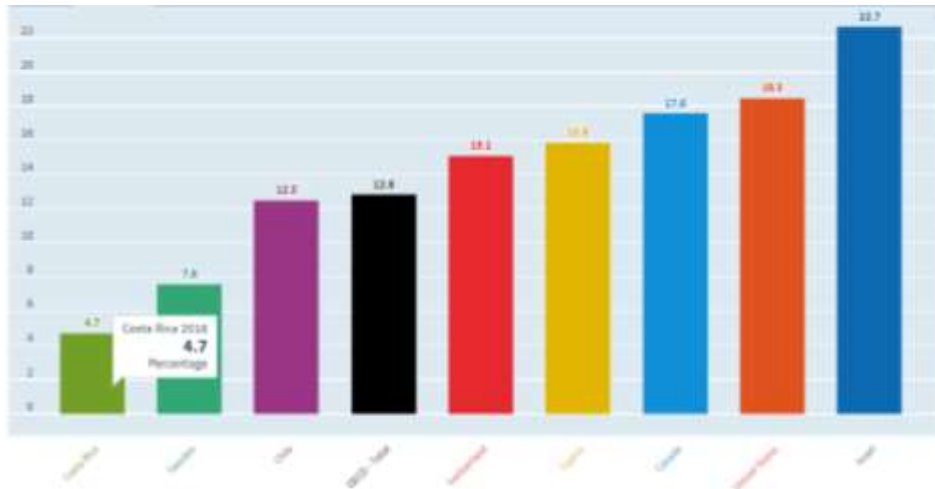
women in the labor force was observed in Chile in 2001, in Cyprus in 2015, and in Sweden 2008. Chile and Sweden are very feminine societies (Hofstede Insights, n.d.) as is Costa Rica which scored 21 in Hofstede's masculinity societal dimension (Hofstede Insight, n.d.).

However, the proportion of female workers in Costa Rica is not at the high end. At its highest diversity in 2019, the ratio of men to women in the workforce was 60:40. In 2020, 52.1% of the total female population of working age participated in the labor market, compared to 74.7% of males (Ministerio de Trabajo y Seguridad Social, 2020). Salazar Murillo (2017) reported that the low participation of women in the labor market is not by choice as 76% of women would prefer to work: 30% would like to do it full time and 46% in combination with domestic duties.

Is the gender wage gap driving women out of the workforce? Probably not. It happens to be that Costa Rica has the lowest gap for employed women among all the countries in this study (see Figure 82). Therefore, it is very unlikely that the existing gap is the main driver keeping women out of the labor market. Rodriguez (2016) estimates that around 396,000 women in Costa Rica were unable to integrate into the labor force due to family care responsibilities. If the women had been able to integrate in the labor force that would have netted a 48.6% proportion of women in the workforce, competing with Sweden and Singapore.

Figure 82

Gender Wage Gap for Employed Women – Costa Rica Highlight for 2018.



Note. Adapted from “Gender Wage Gap (Indicator)” by OECD, 2021.

(<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by the Organization for Economic Co-operation and Development.

The Costa Rican government has implemented policies in different areas to incentivize the participation of women in the labor force. *Observatorio de Igualdad de Género de América Latina y el Caribe* (n.d.) provides a list of the most recent laws. Some of the most relevant are listed below.

1. Family care laws.
 - a. 2014 – Law 9.220 to create a national network of affordable childcare services.
 - b. 2009 – Law 8.726 redefining benefits for domestic workers.
 - c. 1996 – Law 7.621 reforming maternity and adoption benefits for women to ensure paid leave for one month prior to birth date and three months after.

- d. 1990 – Law 7.142 to guarantee gender equity, granting working parents benefits to access childcare services and prohibiting unlawful separation of work for pregnant or nursing women.
2. Quota and parity laws.
- a. 2009 – Law 8.765 to mandate gender parity in political structures, political parties' candidate selection, general elections, and equal training.
 - b. 2001 – Electoral Supreme Court Resolution 1544-E-2001 to promote female representation as candidates for the general election.
 - c. 2001 – Electoral Supreme Court Resolution 1543-E-2001 to establish the incorporation of mechanisms to guarantee electoral quota in party statutes.
 - d. 2000 – Electoral Supreme Court Resolution 918-E-2000 to establish the inclusion of women in the lists of candidates and deputies, fostering them to be appointed to positions with a higher possibility for election.
 - e. 1996 – Law 7.653 to require that political parties have a 40% female representation minimum quota in the party structure, which would be considered compliant only if met with 40% of electable positions.
3. Violence protection laws.
- a. 2020 – Law 9.877 to define street harassment as unilateral sexually charged behaviors with the potential of causing discomfort, intimidation, humiliation, insecurity, or fear.
 - b. 2019 – Law 9.692 to authorize the government to seize weapons used for intimidating or attacking the victim, or any other weapon under the control of the attacker.

- c. 2018 – Decree 41.240 to prioritize as public interest the intervention, attention, and prevention of violence against women.
 - d. 2016 – Law 9406 to strengthen the legal protection of teenagers who are victims of gender violence and to increase penalties for sexual offenders of minors.
 - e. 2010 – Law 8.805 to prohibit and sanction sexual harassment as a form of gender discrimination.
4. Birth control laws.
- a. 2011 – National Policy on Sexuality to guarantee and respect the right to exercise a safe sexuality as a basic human right.
 - b. 1998 – Law 7739 to empower the Ministry of Health to guarantee the creation and development of sexual health educational and prevention programs targeted to children and teenagers.
 - c. 1970 – Law 4.573 to establish that abortions will only be allowed under situations in which the life, physical health, or mental health of the woman are at risk.
5. Gender parity laws.
- a. 2018 – National Policy for Effective Gender Equality in Costa Rica 2018-2030 to improve gender equality in four strategies: cultural transformation, time distribution, wealth distribution, and power distribution.
 - b. 2007 – National Policy for Gender Equality to develop a ten-year plan for the advancement of equal rights and opportunities for women and men.

Women in Costa Rican politics. Costa Rica has made an incredible progress increasing female representation in its parliament. Since 2002, Costa Rica has had the second highest proportion of women in parliament from the countries in this study, superseded only by Sweden.

Figure 83 shows a rapid increase in female representation in 2002 and 2003 as a direct result of the aforementioned quota and parity legal provisions.

Figure 83

Percentage of Women in Costa Rica's Parliament.



Note. Adapted from “[Histórico de Diputados y Diputadas por Administración]” by *Asamblea Legislativa República de Costa Rica*, 2021, (http://www.asamblea.go.cr/Centro_de_informacion/Consultas_SIL/Pginas/Hist%C3%B3rico%20de%20diputadas%20y%20diputados%20por%20administraci%C3%B3n.aspx).

Age diversity in Costa Rica's workforce. The generational data for Costa Rica's workforce follows the same trend observed in most of the countries in this study. The variation in the proportion of workers in the workforce from different age bands is narrowing. However, the variation in the proportion of workers from age groups 15 to 24, and 65 and older is the highest of all countries. Figures 84 and 85 show the downtrends, with a sudden displacement of the curves around 2012 when the Costa Rican economy started recovering after the 2009.

ElEconomista.net (2012) reported that close to 400,000 new jobs were created between 2011 and 2012, which incentivized more people to participate in the labor force. Figure 86 shows that young workers between 15 to 34 reacted more avidly to these incentives than other generations, producing the leap in variation seen in Figures 84 and 85.

Figure 84

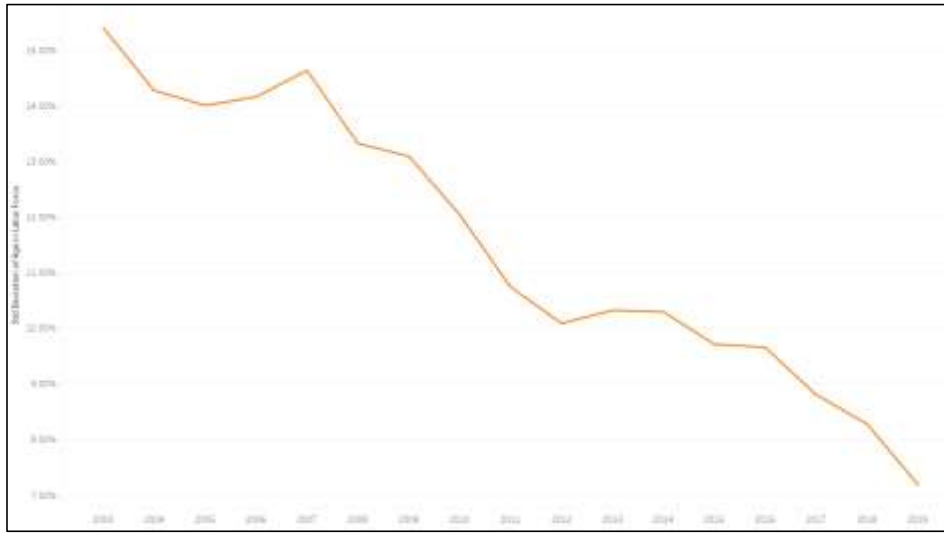
Standard Deviation of the Percentage of Workers in the Costa Rican Workforce from Age Bands Within 25 to 64 Years from 2003 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Costa Rica from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 85

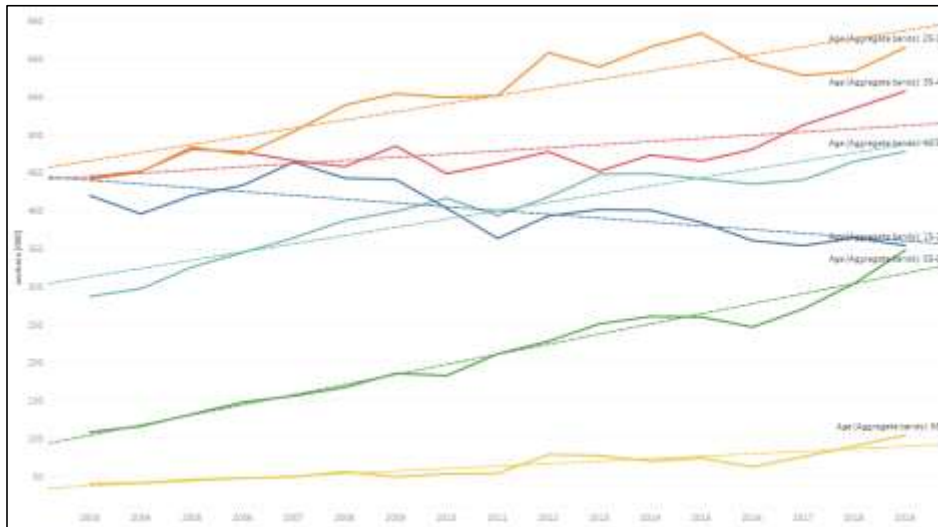
Standard Deviation of the Percentage of Workers in the Costa Rican Workforce from Age Bands 15 to 24, and 65 and Over from 2003 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Costa Rica from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo org data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 86

Costa Rican Workers from Different Age Bands from 2003 to 2019.

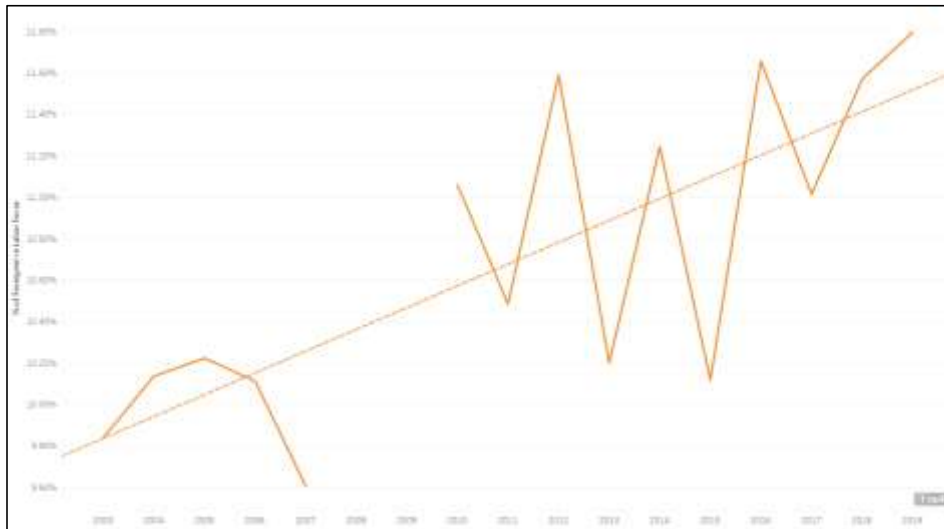


Note. The workforce data for Costa Rica is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Ethnic/Nationality in Costa Rica’s Workforce. Costa Rica has a considerably low proportion of foreign-born workers in its labor force. At barely over 10%, it has one of the lowest proportions of foreign workers among the countries in this study, varying every year as shown in Figure 87.

Figure 87

Percentage of Foreigners in Costa Rica's Workforce from 2003 to 2019.



Note. The workforce data for Costa Rica is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Relationship Between Workforce Demographics and Innovation

This study sought to understand the relationship, if any, between countries’ workforce demographics and results of their innovation competitiveness as measured by the Global Innovation Index. In addition to the general measure of the Global Innovation Index, the researcher made an arbitrary selection of the Innovation Input and Innovation Output sub-indices, and some of the pillars, sub-pillars, and indicators to develop the relationship analysis.

Selected Measures. The following were the innovation indicators selected by the researcher for analysis and their definitions based on the 2020 Global Innovation Index Report (Cornell University, INSEAD & WIPO, 2020):

1. Global Innovation Index – calculated as the simple average of the Input and Output sub-indices.
 - a. Innovation Input Sub-Index – based on five pillars that encompass elements of the country's economy that enable innovative activities.
 - i. Institution pillar – measures how well the country's institutional framework attracts and protects businesses and fosters growth through good governance and incentives.
 1. Political environment sub-pillar – measures political, legal, operational or security risks for operating business in a country, as well as the quality of public services and policy making.
 2. Business environment sub-pillar – measures how easy it is to start a business and the resolution of insolvency.
 - ii. Human capital and research pillar – measures the level and the standards for educational and research activities.
 1. Education sub-pillar – measures primary and secondary education achievements levels.
 - iii. Infrastructure pillar – measures the quality, environmental sustainability, and efficiency of the country's physical infrastructures that enable communication and access to utilities for production.

1. ICT access indicator – measures population access to information, communication, and technologies.
- iv. Market sophistication pillar – measures access to credit, ease and protection of investments; access to international markets; and competition.
 1. Ease of getting credit indicator – measures how laws facilitate lending and protect borrowers and lenders.
 2. Investment sub-pillar – measures the protections for minority investors, and how well the market size matches its dynamism.
- v. Business sophistication pillar – measures how well human capital and research assets, such as qualified professionals and technicians, are potentialized for optimum productivity and competitiveness.
 1. Knowledge workers sub-pillar – measures employment in knowledge-intensive services and females employed with advanced degrees.
- b. Innovation Output Sub-Index – based on two pillars that encompass the results of innovative activities.
 - i. Knowledge and technology outputs pillar – measures the traditional outputs of innovation.
 1. Knowledge creation sub-pillar – measures the results of inventive and innovative activities, such as patents, scientific and technical articles, and citable documents.

- a. Scientific and technical publications indicator – measures the number of scientific and technical articles in peer-reviewed journals.
- ii. Creative outputs pillar – measures the creative part of an innovative culture.

Methodology. To explore if the workforce diversity measures for gender, age, and national origin have an impact to the Global Innovation Index or any of its components, the researcher plotted the combined available workforce data from the ten countries in this study against the results for the countries in the selected measures using the Tableau software. Relationships between each workforce diversity measure and each innovation measure were analyzed independently. Trend analyses were performed for the resulting plots and the best adjusted models were selected for each relationship (see Table 23). The selection criteria for the models were based on an arbitrary selection of $\alpha=.01$ and the recommended guidance of Hair et al. (2017) cited by Martínez Ávila and Fierro Moreno (2018) that a model that has $R^2 \geq 0.75$ is substantially good to predict results. Microsoft Excel Solver was used as optimizer to estimate the ideal workforce diversity measure value delivering the highest score for each innovation measure.

Longitudinal analysis. The researcher wanted to understand the fluid nature of any potential relationship between workforce diversity measures and the selected innovation measures. To achieve this, the researcher plotted diversity measures versus innovation measures at different time perspectives.

1. Zero years lag – relates diversity and innovation measures in the same year.

2. Five years lag – relates innovation measures in a year with diversity measures from five years prior.
3. Ten years lag – relates innovation measures in a year with diversity measures from ten years prior.
4. Fifteen years lag – relates innovation measures in a year with diversity measures from fifteen years prior.
5. Twenty years lag – relates innovation measures in a year with diversity measures from twenty years prior.

Results. Sixteen substantially good models were identified to explain the relationships between workforce diversity measures and innovation measures at different time lags. Because relationships are based on single-variable models and do not consider complex interactions of other variables, these results are intended solely to provide general guidance for scoping of policy making related to workforce diversity. Models are not intended to predict actual results in the Global Innovation Index or any of its components.

Zero years lag. One relationship was identified between workforce diversity measures and innovation measures with zero years lag.

Workforce gender diversity. Considering the proportion of women in the workforce as the standard measure for gender diversity, no relationships with any innovation measures were found at zero years lag.

Workforce age diversity. Age diversity in the workforce was measured with two separate variables. The first one considers the standard deviation for the proportion of workers in different age bands between 25 and 64. The second variable considers the standard deviation for the

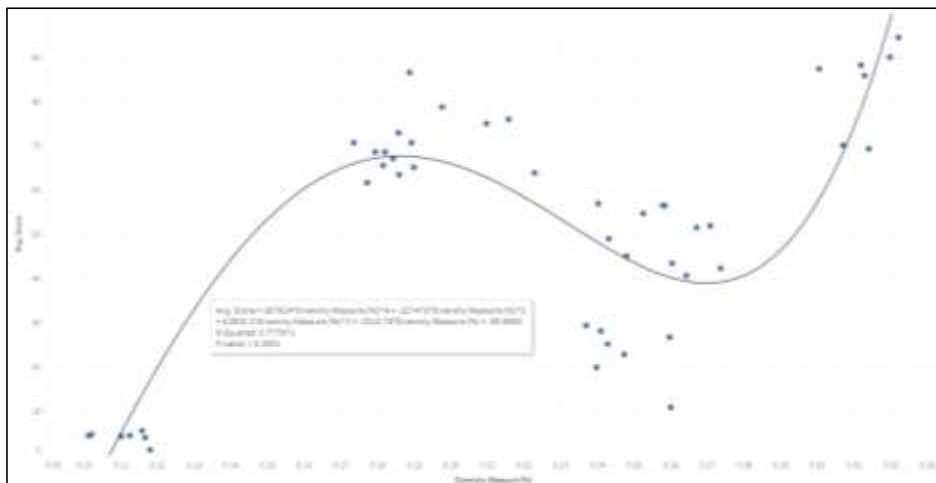
proportion of workers in age bands 15 to 24, and 65 and older. At zero years lag, age diversity was not found to be related to any innovation measure.

Workforce ethnic/nationality diversity. Considering the proportion of foreign-born workers in the workforce as the standard measure for workforce ethnic/nationality diversity, it was found to have a relationship with the following innovation measure at zero years lag:

1. Knowledge creation – The relationship is explained by a fourth-degree polynomial model: $357614 x^4 - 227475 x^3 + 42805.1 x^2 - 1513.76 x - 95.9863$. The resulting model indicates that optimally, a proportion of foreign-born workers in a country's workforce around 32.0% would have an expected score of 100 in Knowledge creation. Figure 88 shows the graphical representation of the relationship between the two variables.

Figure 88

Relationship Between the Proportion of Foreign-Born Workers in a Country's Workforce and the Country's Score in the Knowledge Creation Sub-Pillar of the Global Innovation Index with Zero Years Lag.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of foreign-born workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. Data for Singapore, Hong Kong, and Chile was excluded due to insufficiency of data about foreign-born workers in the countries’ workforce.

Five years lag. No relationships were identified between workforce diversity measures and innovation measures with five years lag.

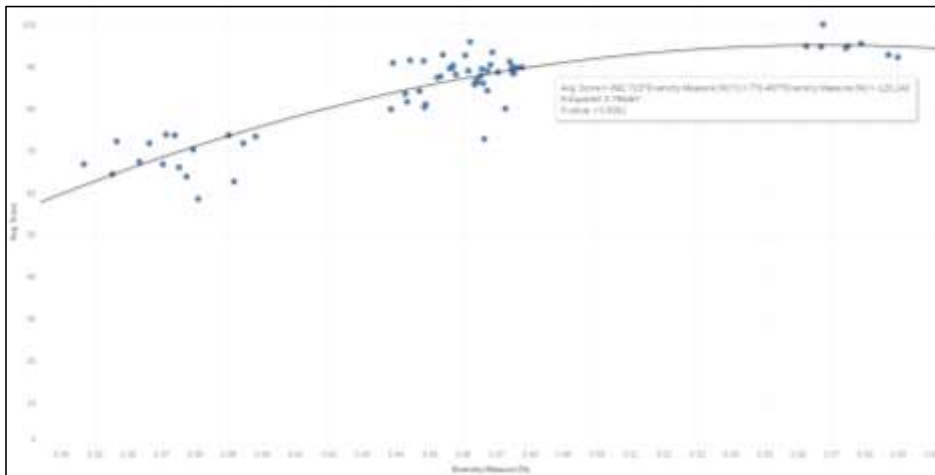
Ten years lag. Three different relationships were identified between workforce diversity measures and innovation measures with ten years lag.

Workforce gender diversity. Considering the proportion of women in the workforce as the standard measure for gender diversity, it was found to have relationships with the following innovation measures at ten years lag:

1. Institutions – The relationship is explained by a second-degree polynomial model: $-682.723 x^2 + 775.467 x - 125.142$. The resulting model indicates that optimally, a proportion of women in a country's workforce around 56.8% would have an expected score of 95 in Institutions. Figure 89 shows the graphical representation of the relationship between the two variables.

Figure 89

Relationship Between the Proportion of Female Workers in a Country's Workforce and the Country's Score in the Institutions Pillar of the Global Innovation Index with Ten Years Lag.



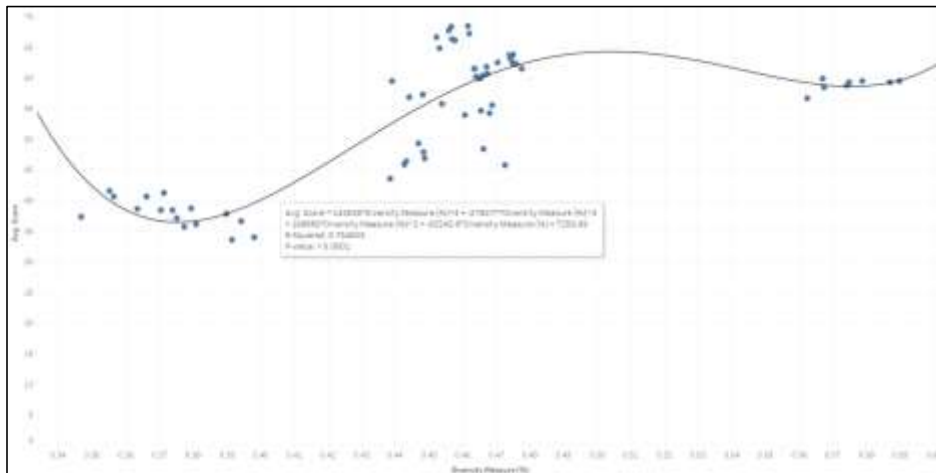
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[Labor, Employment, Wages and Productivity]”, by Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data>). Copyright 2021 by the

Government of Singapore. The values for the proportion of female workers for Hong Kong were adapted from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by the Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and Government of the Hong Kong Special Administrative Region. The values for the proportion of female workers for Chile were adapted from “[Labor Force, Female (% of Total Labor Force)]”, by The World Bank, n.d., (<https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS>). Copyright 2021 by The World Bank Group.

2. Global Innovation Index – The relationship is explained by a fourth-degree polynomial model: $143528x^4 - 278477x^3 + 199660x^2 - 62543.6x + 7259.99$. The resulting model indicates that optimally, a proportion of women in a country’s workforce around 64.6% would have an expected score of 100 in the Global Innovation Index. Figure 90 shows the graphical representation of the relationship between the two variables.

Figure 90

Relationship Between the Proportion of Female Workers in a Country's Workforce and the Country's Score in the Global Innovation Index with Ten Years Lag.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[Labor, Employment, Wages and Productivity]”, by the Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data>).

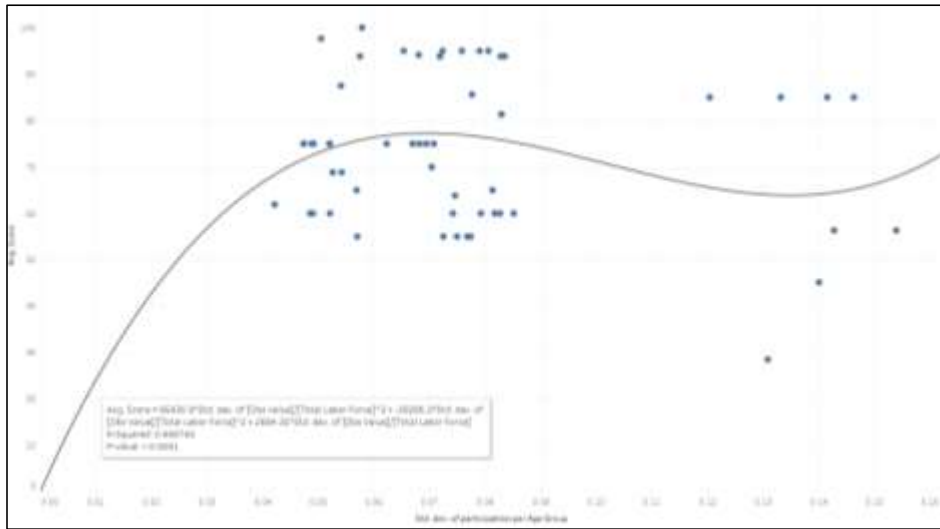
Copyright 2021 by the Government of Singapore. The values for the proportion of female workers for Hong Kong were adapted from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by the Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and Government of the Hong Kong Special Administrative Region. The values for the proportion of female workers for Chile were adapted from “[Labor Force, Female (% of Total Labor Force)]”, by The World Bank, n.d., (<https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS>). Copyright 2021 by The World Bank Group.

Workforce age diversity. Age diversity in the workforce was measured with two separate variables. The first one considers the standard deviation for the proportion of workers in different age bands between 25 and 64. The second variable considers the standard deviation for the proportion of workers in age bands 15 to 24, and 65 and older. Workforce age diversity was found to have relationship with the following innovation measure at ten years lag:

3. Ease of credit – The relationship is explained by a third-degree polynomial model: $95430.9 x^3 - 29266.3 x^2 + 2684.35 x$. The resulting model indicates that optimally, a standard deviation of 6.9% for the proportion of workers from age bands 15 to 24, and 65 and older in a country’s workforce would have an expected score of 77 in Ease of credit. Figure 91 shows the graphical representation of the relationship between the two variables.

Figure 91

Relationship Between the Standard Deviation for the Proportion of Workers from Age Bands 15 to 24, and 65 and Older in a Country's Workforce and the Country's Score in the Ease of Credit Indicator with Ten Years Lag.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[Labor, Employment, Wages and Productivity]”, by the Singapore

Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data>).

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Workforce ethnic/nationality diversity. Considering the proportion of foreign-born workers in the workforce as the standard measure for workforce ethnic/nationality diversity, it was found to have no relationship with innovation measures at ten years lag.

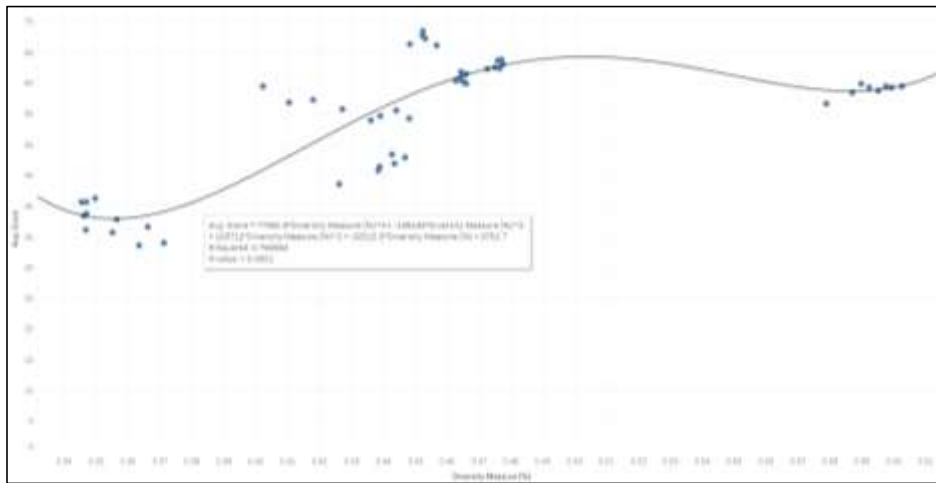
Fifteen years lag. Two different relationships were identified between workforce diversity measures and innovation measures with fifteen years lag.

Workforce gender diversity. Considering the proportion of women in the workforce as the standard measure for gender diversity, it was found to have relationships with the following innovation measure at fifteen years lag:

1. Global Innovation Index – The relationship is explained by a fourth-degree polynomial model: $77360.6x^4 - 149149x^3 + 105712x^2 - 32515.5x + 3702.7$. The resulting model indicates that optimally, a proportion of women in a country's workforce around 27.2% would have an expected score of 100 in Global Innovation Index. Figure 92 shows the graphical representation of the relationship between the two variables.

Figure 92

Relationship Between the Proportion of Female Workers in a Country's Workforce and the Country's Score in the Global Innovation Index with Fifteen Years Lag.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[Labor, Employment, Wages and Productivity]”, by the Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data>).

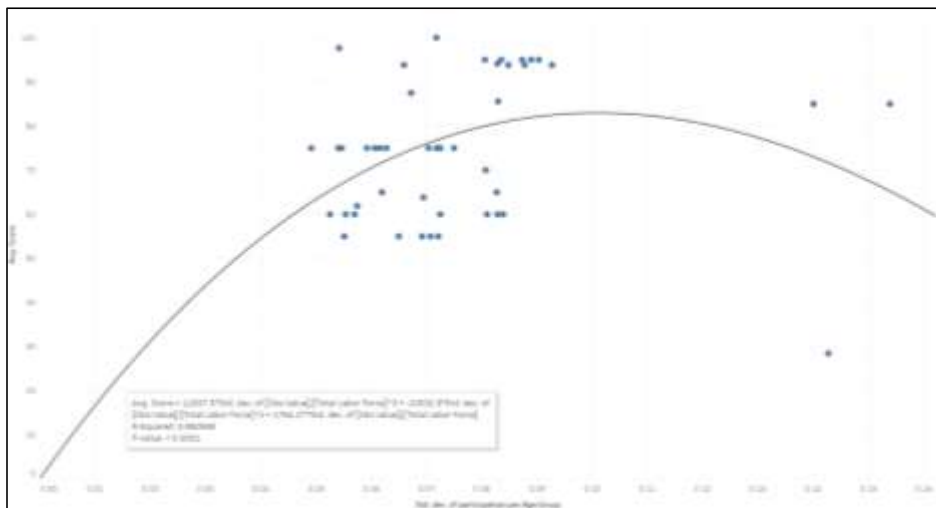
Copyright 2021 by the Government of Singapore. The values for the proportion of female workers for Hong Kong were adapted from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by the Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and the Government of the Hong Kong Special Administrative Region. The values for the proportion of female workers for Chile were adapted from “[Labor Force, Female (% of Total Labor Force)]”, by The World Bank, n.d., (<https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS>). Copyright 2021 by The World Bank Group.

Workforce age diversity. Age diversity in the workforce was measured with two separate variables. The first one considers the standard deviation for the proportion of workers in different age bands between 25 and 64 years; the second the standard deviation for the proportion of workers in age bands 15 to 24 and 65 and older. Workforce age diversity was found to have relationship with the following innovation measure at fifteen years lag:

2. Ease of credit – The relationship is explained by a third-degree polynomial model: $11837.5 x^3 - 10532.8 x^2 + 1764.27 x$. The resulting model indicates that optimally, a standard deviation of 10.0% for the proportion of workers from age bands 15 to 24, and 65 and older in a country’s workforce would have an expected score of 83 in Ease of credit. Figure 93 shows the graphical representation of the relationship between the two variables.

Figure 93

Relationship Between the Standard Deviation for the Proportion of Workers from Age Bands 15 to 24, and 65 and Older in a Country's Workforce and the Country's Score in the Ease of Credit Indicator with Fifteen Years Lag.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[Labor, Employment, Wages and Productivity]”, by the Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find->

[data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data](https://data.gov.hk/en-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data)).

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Workforce ethnic/nationality diversity. Considering the proportion of foreign-born workers in the workforce as the standard measure for workforce ethnic/nationality diversity, it was found to have no relationship with innovation measures at fifteen years lag.

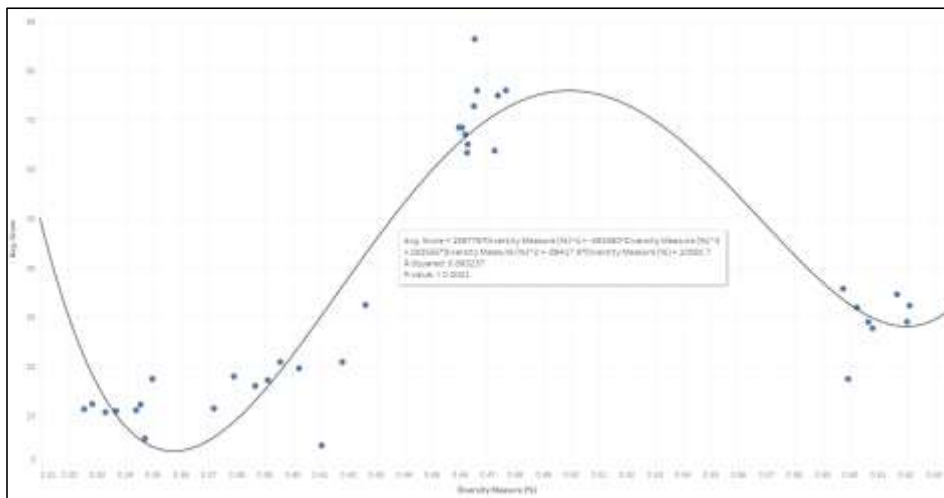
Twenty years lag. Ten different relationships were identified between workforce diversity measures and innovation measures with twenty years lag.

Workforce gender diversity. Considering the proportion of women in the workforce as the standard measure for gender diversity, it was found to have relationships with the following innovation measures at twenty years lag:

1. Knowledge creation – The relationship is explained by a fourth-degree polynomial model: $199776 x^4 - 393380 x^3 + 283555 x^2 - 88417.8 x + 10082.7$. The resulting model indicates that optimally, a proportion of women in a country’s workforce around 49.9% would have an expected score of 76 in Knowledge creation. Figure 94 shows the graphical representation of the relationship between the two variables.

Figure 94

Relationship Between the Proportion of Female Workers in a Country's Workforce and the Country's Score in the Knowledge Creation Sub-Pillar of the Global Innovation Index with Twenty Years Lag.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[*Labor, Employment, Wages and Productivity*]”, by the Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find->

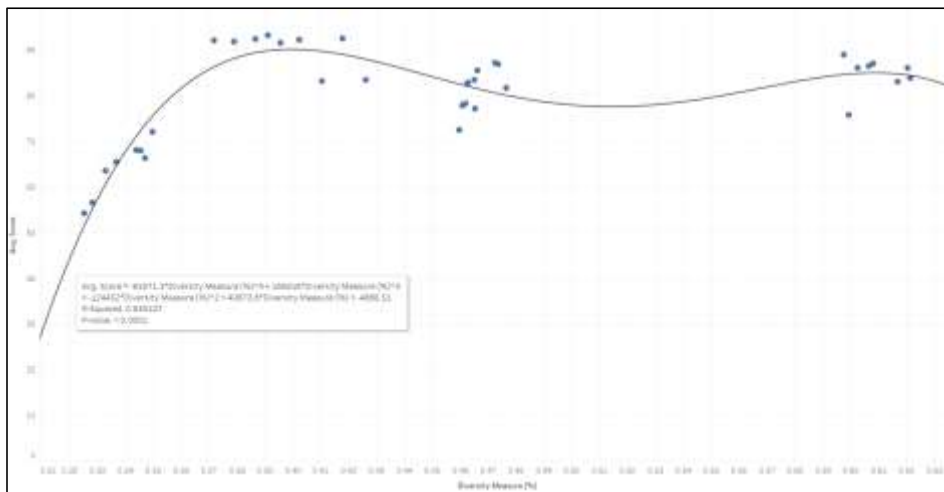
[data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data](#)).

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2. ICT access – The relationship is explained by a fourth-degree polynomial model: $-81671.3x^4 + 165816x^3 - 124452x^2 + 40873.6x - 4868.51$. The resulting model indicates that optimally, a proportion of women in a country’s workforce around 39.9% would have an expected score of 90 in ICT access. Figure 95 shows the graphical representation of the relationship between the two variables.

Figure 95

Relationship Between the Proportion of Female Workers in a Country's Workforce and the Country's Score in the ICT Access Indicator of the Global Innovation Index with Twenty Years Lag.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[Labor, Employment, Wages and Productivity]”, by the Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find->

[data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data](#)).

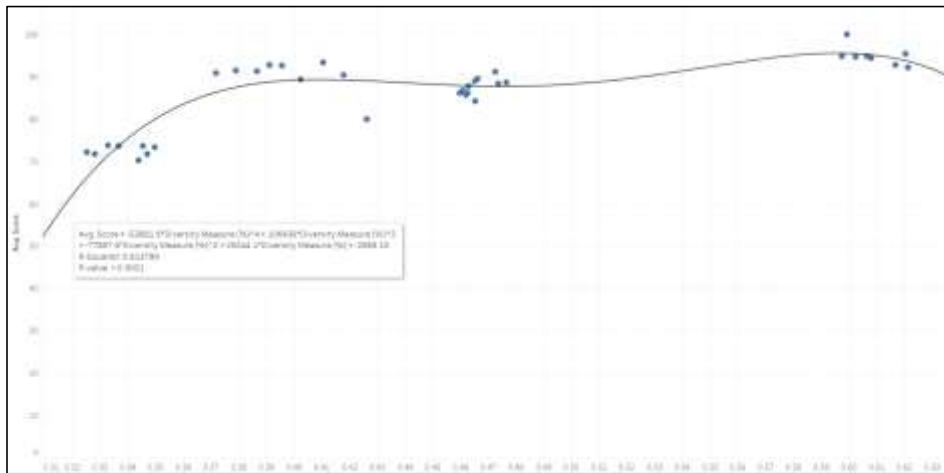
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3. Institutions – The relationship is explained by a fourth-degree polynomial model:

$-53881.6x^4 + 106439x^3 - 77887.6x^2 + 25044.1x - 2899.15$. The resulting model indicates that optimally, a proportion of women in a country’s workforce around 59.6% would have an expected score of 95 in Institutions. Figure 96 shows the graphical representation of the relationship between the two variables.

Figure 96

Relationship Between the Proportion of Female Workers in a Country's Workforce and the Country's Score in the Institutions Pillar of the Global Innovation Index with Twenty Years Lag.



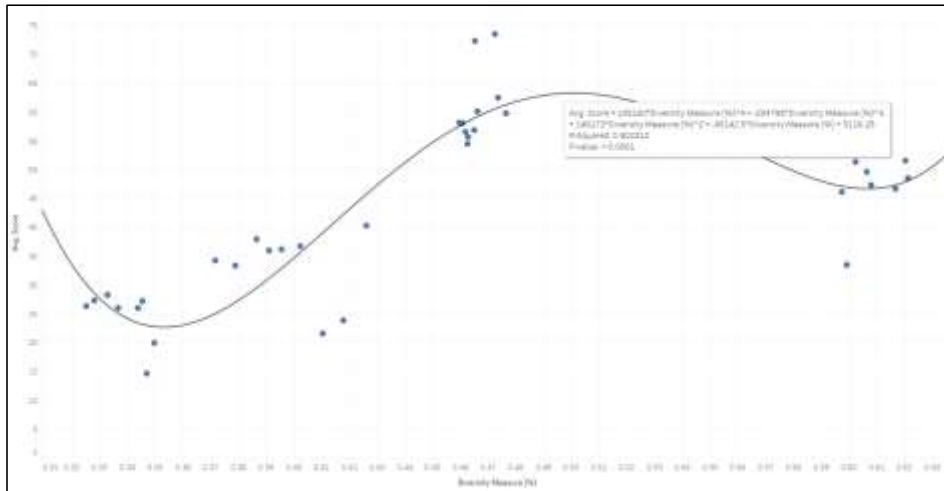
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[Labor, Employment, Wages and Productivity]”, by Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data>). Copyright 2021 by the

Government of Singapore. The values for the proportion of female workers for Hong Kong were adapted from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by the Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and the Government of the Hong Kong Special Administrative Region. The values for the proportion of female workers for Chile were adapted from “[Labor Force, Female (% of Total Labor Force)]”, by The World Bank, n.d., (<https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS>). Copyright 2021 by The World Bank Group.

4. Knowledge and technology outputs – The relationship is explained by a fourth-degree polynomial model: $105150x^4 - 204798x^3 + 146172x^2 - 45142.5x + 5119.25$. The resulting model indicates that optimally, a proportion of women in a country’s workforce around 50.1% would have an expected score of 63 in Knowledge and technology outputs. Figure 97 shows the graphical representation of the relationship between the two variables.

Figure 97

Relationship Between the Proportion of Female Workers in a Country's Workforce and the Country's Score in the Knowledge and Technology Outputs Pillar of the Global Innovation Index with Twenty Years Lag.



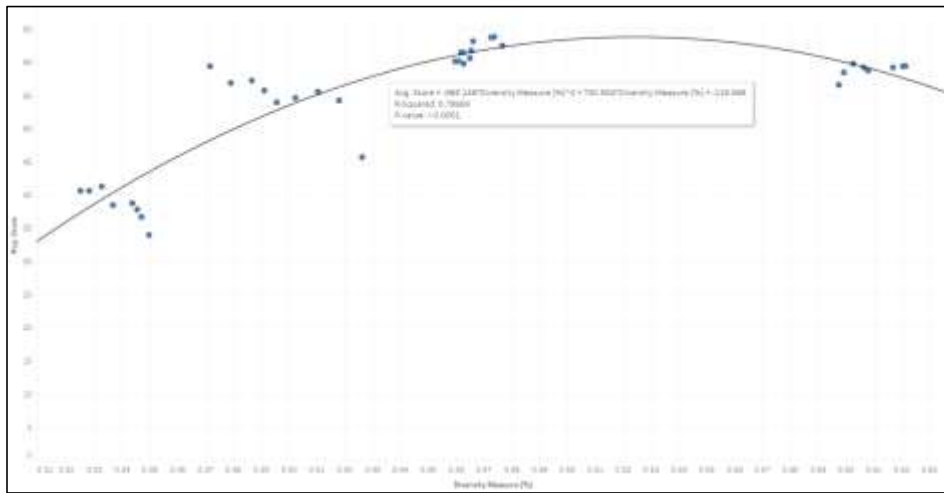
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[Labor, Employment, Wages and Productivity]”, by Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find-data/search-by->

[theme/economy/Labor-employment-wages-and-productivity/latest-data](#)). Copyright 2021 by Government of Singapore. The values for the proportion of female workers for Hong Kong were adapted from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by the Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and Government of the Hong Kong Special Administrative Region. The values for the proportion of female workers for Chile were adapted from “[Labor Force, Female (% of Total Labor Force)]”, by The World Bank, n.d., (<https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS>). Copyright 2021 by The World Bank Group.

5. Global Innovation Index – The relationship is explained by a second-degree polynomial model: $-668.146x^2 + 700.584x - 119.868$. The resulting model indicates that optimally, a proportion of women in a country’s workforce around 52.4% would have an expected score of 63 in Global Innovation Index. Figure 98 shows the graphical representation of the relationship between the two variables.

Figure 98

Relationship Between the Proportion of Female Workers in a Country's Workforce and the Country's Score in the Global Innovation Index with Twenty Years Lag.



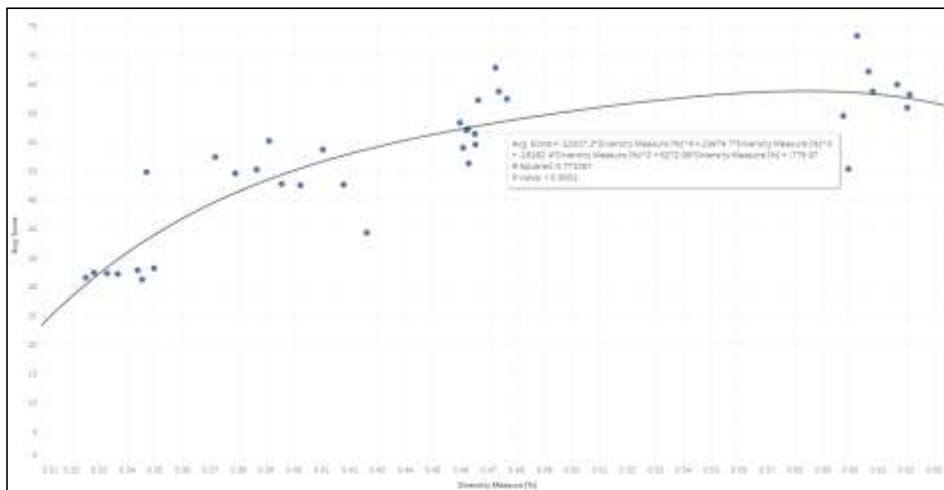
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[Labor, Employment, Wages and Productivity]”, by the Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data>).

Copyright 2021 by the Government of Singapore. The values for the proportion of female workers for Hong Kong were adapted from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by the Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and Government of the Hong Kong Special Administrative Region. The values for the proportion of female workers for Chile were adapted from “[Labor Force, Female (% of Total Labor Force)]”, by The World Bank, n.d., (<https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS>). Copyright 2021 by The World Bank Group.

6. Human capital and research – The relationship is explained by a fourth-degree polynomial model: $12007.2 x^4 + 23974.7 x^3 - 18182.4 x^2 + 6272.99 x - 776.97$. The resulting model indicates that optimally, a proportion of women in a country’s workforce, around 58.4%, would have an expected score of 63 in Human capital and research. Figure 99 shows the graphical representation of the relationship between the two variables.

Figure 99

Relationship Between the Proportion of Female Workers in a Country's Workforce and the Country's Score in the Human Capital and Research Pillar of the Global Innovation Index with Twenty Years Lag.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[Labor, Employment, Wages and Productivity]”, by the Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find->

[data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data](https://data.gov.sg/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data)).

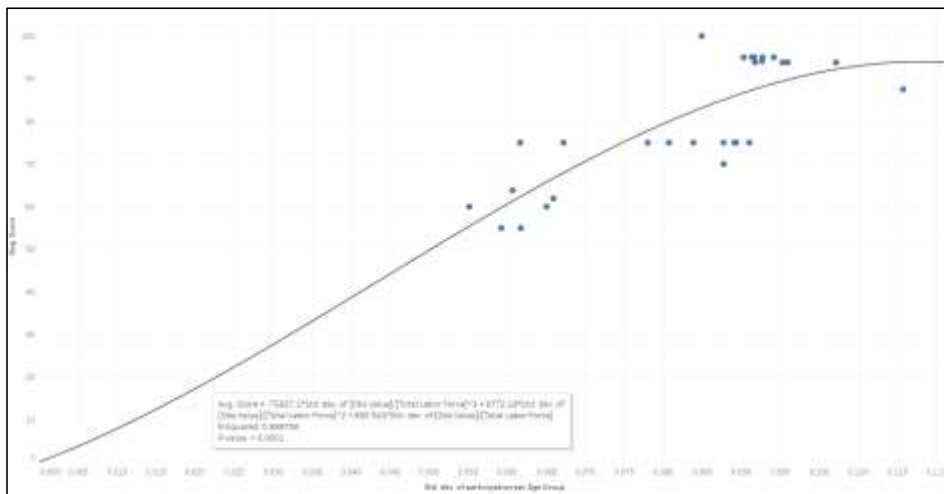
Copyright 2021 by the Government of Singapore. The values for the proportion of female workers for Hong Kong were adapted from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by the Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and the Government of the Hong Kong Special Administrative Region. The values for the proportion of female workers for Chile were adapted from “[Labor Force, Female (% of Total Labor Force)]”, by The World Bank, n.d., (<https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS>). Copyright 2021 by The World Bank Group.

Workforce age diversity. Age diversity in the workforce was measured with two separate variables. The first one considers the standard deviation for the proportion of workers in different age bands between 25 and 64. The second variable considers the standard deviation for the proportion of workers in age bands 15 to 24, and 65 and older. Workforce age diversity was found to have relationship with the following innovation measure at fifteen years lag:

7. Ease of credit – The relationship is explained by a third-degree polynomial model: $-75827.1 x^3 + 9772.19 x^2 + 695.543 x$. The resulting model indicates that optimally, a standard deviation of 11.3% for the proportion of workers from age bands 15 to 24, and 65 and older in a country’s workforce would have an expected score of 93 in Ease of credit. Figure 100 shows the graphical representation of the relationship between the two variables.

Figure 100

Relationship Between the Standard Deviation for the Proportion of Workers from Age Bands 15 to 24, and 65 and Older in a Country's Workforce and the Country's Score in the Ease of Credit Indicator of the Global Innovation Index with Twenty Years Lag.



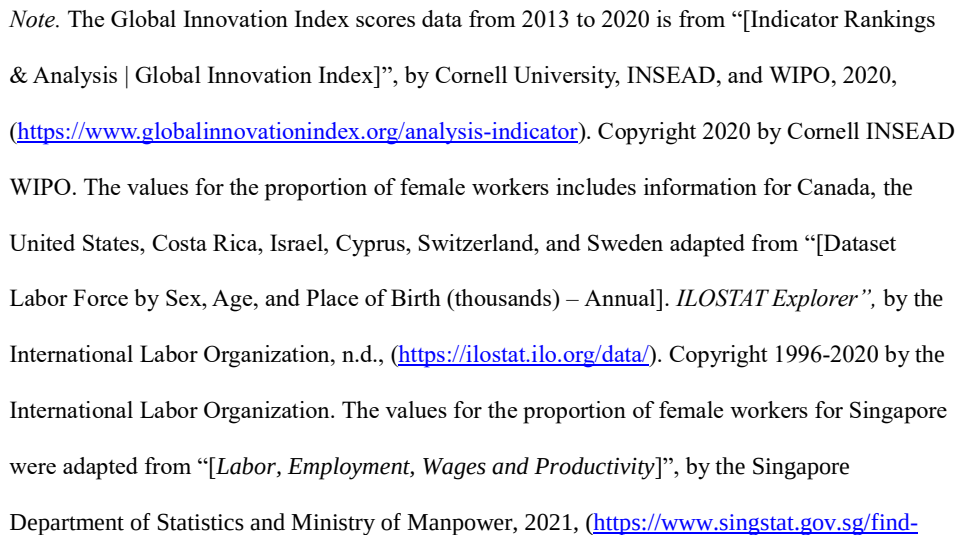
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of female workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The values for the proportion of female workers for Singapore were adapted from “[Labor, Employment, Wages and Productivity]”, by the Singapore Department of Statistics and Ministry of Manpower, 2021, (<https://www.singstat.gov.sg/find->

[data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data](https://data.gov.hk/en-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data)).

Copyright 2021 by the Government of Singapore. The values for the proportion of female workers for Hong Kong were adapted from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by the Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and the Government of the Hong Kong Special Administrative Region. Data for Chile was not available for this analysis.

8. Knowledge creation – The relationship is explained by a fourth-degree polynomial model: $-2416330 x^4 + 1567360 x^3 - 369008 x^2 + 37821.6 x - 1404.57$. The resulting model indicates that optimally, a standard deviation of 22.2% for the proportion of workers from age bands between 25 and 64 years in a country’s workforce would have an expected score of 85 in Knowledge creation. Figure 101 shows the graphical representation of the relationship between the two variables.

Relationship Between the Standard Deviation for the Proportion of Workers from Age Bands 25-64 in a Country's Workforce and the Country's Score in the Knowledge Creation Sub-Pillar of the Global Innovation Index with Twenty Years Lag.

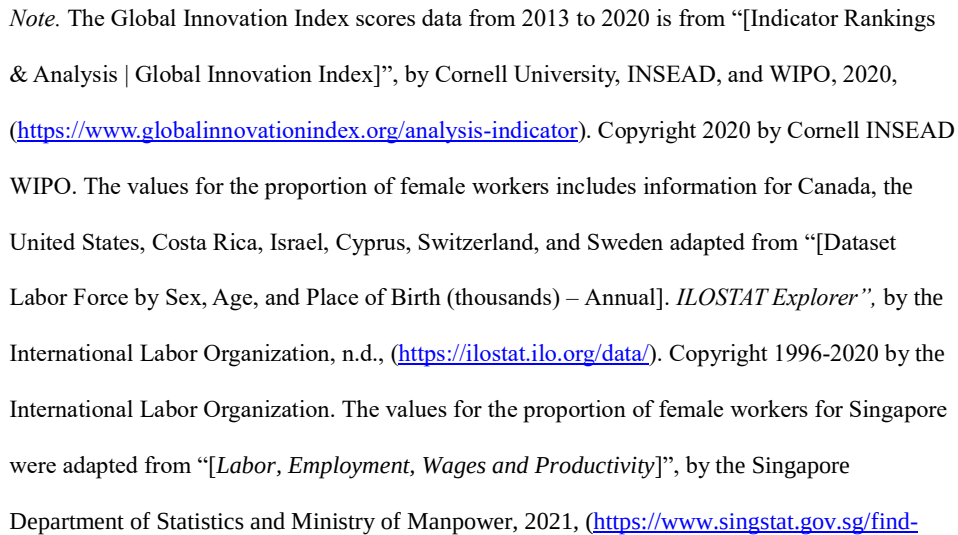


[data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data](https://data.gov.hk/en-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data)).

Copyright 2021 by the Government of Singapore. The values for the proportion of female workers for Hong Kong were adapted from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by the Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and the Government of the Hong Kong Special Administrative Region. Data for Chile was not available for this analysis.

9. Knowledge and technology outputs – The relationship is explained by a fourth-degree polynomial model: $1990410 x^4 + 1360900 x^3 - 341249 x^2 + 37358 x - 1460.32$. The resulting model indicates that optimally, a standard deviation of 22.1% for the proportion of workers from age bands between 25 and 64 in a country’s workforce would have an expected score of 70 in Knowledge and technology outputs. Figure 102 shows the graphical representation of the relationship between the two variables.

Relationship Between the Standard Deviation for the Proportion of Workers from Age Bands 25-64 in a Country's Workforce and the Country's Score in the Knowledge and Technology Outputs Pillar of the Global Innovation Index with Twenty Years Lag.



[data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data](https://data.gov.hk/en-data/search-by-theme/economy/Labor-employment-wages-and-productivity/latest-data)).

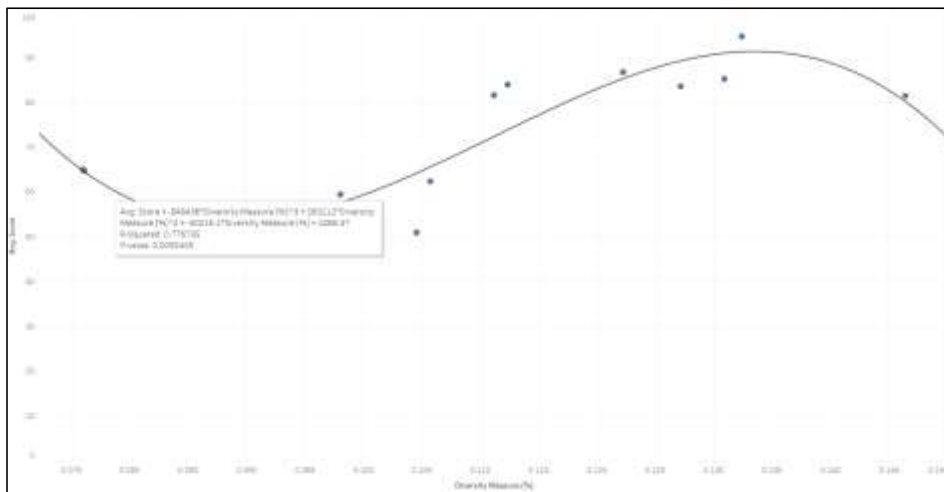
Copyright 2021 by the Government of Singapore. The values for the proportion of female workers for Hong Kong were adapted from “[*Statistics of Labor Force, Unemployment and Underemployment*]”, by the Census and Statistics Department, 2021, (<https://data.gov.hk/en-data/dataset/hk-censtatd-tablechart-statistics-on-Labor-force-unemployment-and-underemployment>). Copyright by DATA.GOV.HK and the Government of the Hong Kong Special Administrative Region. Data for Chile was not available for this analysis.

Workforce ethnic/nationality diversity. Considering the proportion of foreign-born workers in the workforce as the standard measure for workforce ethnic/nationality diversity it was found to have relationship with the following innovation measure at twenty years lag:

10. Market sophistication – The relationship is explained by a third-degree polynomial model: $-848436 x^3 + 283112 x^2 - 30219.1 x + 1098.47$. The resulting model indicates that optimally, a proportion of foreign-born workers in a country’s workforce around 6.4% would have an expected score of 100 in Market sophistication. Figure 103 shows the graphical representation of the relationship between the two variables.

Figure 103

Relationship Between the Proportion of Foreign-Born Workers in a Country's Workforce and the Country's Score in the Market Sophistication Pillar of the Global Innovation Index with Twenty Years Lag.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO. The values for the proportion of foreign-born workers includes information for Canada, the United States, Costa Rica, Israel, Cyprus, Switzerland, and Sweden adapted from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. Data for Singapore, Hong Kong, and Chile was excluded due to unavailability of data about foreign-born workers in the countries’ workforce.

Comments About Results. Sixteen relationships were highlighted in the analysis, filtered considering substantially good models with R^2 greater than or equal to 0.75, and p-value less than $\alpha = 0.01$. Multiple findings can be deducted from the analysis of these relationships.

The impact of workforce diversity in innovation measures is more relevant in the long-term. Ten out of the sixteen relationships reflect long-term impact of workforce diversity in innovation measures. Meanwhile, five out of sixteen have an impact in the mid-term, and only one in the immediate future.

Gender diversity has the most impact in innovation measures. Nine out of the sixteen relationships highlighted were tied to gender diversity in the workforce. However, the impact is mid to long-term. Also, gender diversity is the only workforce diversity measure that has a direct relationship to the final score of the Global Innovation Index and with the Institutions pillar.

Knowledge and technology outputs is the pillar most impacted by workforce diversity. Including relationships with its sub-pillar Knowledge creation, the Knowledge and technology outputs pillar is impacted by five of the sixteen relationships identified. All categories of workforce diversity in the study would have a relationship with this pillar or its Knowledge creation sub-pillar.

Ethnic/Nationality diversity has the least impact in innovation measures. The proportion of foreign-born workers in country's workforce is included in two of the sixteen relationships identified. However, the proportion of foreign-born workers is the only diversity measure impacting an innovation measure in the immediate future. It is also the only diversity measure impacting the Market sophistication pillar.

Case Studies

The relationships identified were challenged using case studies for two polarized countries based in the Global Innovation Index scoring. The first country was selected from Europe, the region with the best performance observed in the overall score of the Global Innovation Index. The second country was selected from Latin America and the Caribbean, the region with the poorest performance. To ensure viability for a full analysis of the relationships identified, the researcher pre-screened the countries with workforce diversity data available for most of the period and selected the next best performer from each region. With workforce diversity data available since 1995, Finland was the country selected from the European region. From the Latin America and the Caribbean region, Mexico was selected from workforce diversity data available since 2002.

Finland.

Gender diversity in the Finnish workforce. Culturally, Finland is cataloged by Hofstede Insights (n.d.) as a feminine society, scoring a 26 in Hofstede's masculinity societal dimension. As previously highlighted, Hofstede (2014) explains that a feminine society deviates from traditional gender roles. In this study, most of the feminine societies demonstrated a lower gender wage gap than masculine societies. However, Finland has the second largest gender wage gap in this analysis (excluding Singapore and Hong Kong for which gender wage gap information is not available in the OECD database). The only country with a higher gender wage gap in the study is Israel, which is also described by Hofstede Insights (n.d.) as a feminine society. Figure 104 highlights how Finland's gender wage gap compares to the other countries in this study.

Figure 104

Gender Wage Gap for Employed Women – Finland Highlight for 2018.



Note. Stars identify feminine societies in this study based on information from “Country Comparison” by Hofstede Insights, n.d.. (<https://www.hofstede-insights.com/country-comparison/>). Copyright 2021 by Hofstede Insights. Gender wage gap data adapted from “Gender Wage Gap (Indicator)” by OECD, 2021. (<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by the Organization for Economic Co-operation and Development.

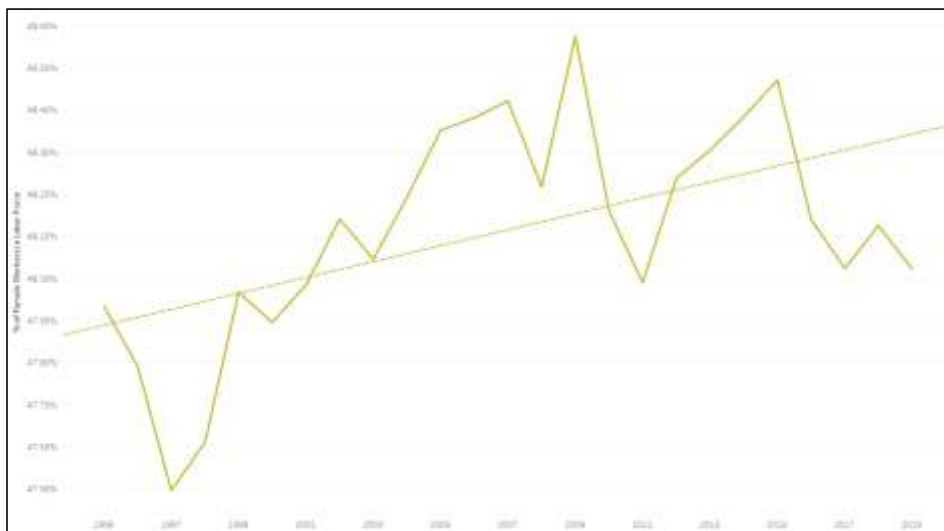
What are some of the contributors to Finland’s gender wage gap? The article *Work and Income* (2020) reveals certain gender-based segregations in the workforce that affect the average income for workers. Women are more likely to be employed in part-time and fixed-term jobs compared to men and have shorter working weeks than men; their occupations are typically more stable and less risky. Very few women make it to managerial roles, and those that make it are usually involved in supporting functions such as human resources and communications.

However, this gender-based segregation does not discourage women from participating in the Finnish workforce. Male and female participation rates are similar; in 2019 the employment

rate was 73.3% for men and 71.8% for women (*Work and Income*, 2020). Figure 105 shows how the proportion of female workers in the Finnish workforce has evolved with time. Finland has one of the top three highest proportions of female workers in the group of countries in this study throughout the years in scope, and the highest from all western countries.

Figure 105

Finland's Percentage of Female Workers in the Workforce for 1995 to 2019.



Note. The workforce data for Finland is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

The article *Milestones for Gender Equality* (2021) summarizes key historical facts that have contributed to or show gender parity in Finland. Here are some of the milestones that may have directly or indirectly contributed to the high proportion of female workers in the Finnish workforce.

1. 1864 – Unmarried women recognized as legally competent at age 25.

2. 1883 – The first Finnish mixed-gender school is founded.
3. 1897 – The age for legal competency of women is reduced to 21, thereby matching the men's.
4. 1901 – Women obtain equal rights for higher education.
5. 1906 – Finland becomes the first European country to grant women voting rights in a general election and the first in the world to grant them the right to stand as/be candidates.
6. 1907 – Nineteen women are elected for parliament.
7. 1917 – Women and men are granted equal rights for universal suffrage.
8. 1919 – Married women are allowed to do paid work without the consent of the husband.
9. 1926 – The first female minister in government holds office in the Social Affairs Ministry.
10. 1930 – The guardianship of a husband over his wife is abolished.
11. 1937 – Maternity rights are granted.
12. 1950 – Legalization of therapeutic abortion.
13. 1961 – Approval of contraceptive pills.
14. 1970 – Women are elected to more than 20% of parliamentary seats.
15. 1970 – Legalization of abortion for social reasons.
16. 1971 – Decriminalization of homosexual acts.
17. 1972 – Contraceptive treatments are ensured by law.
18. 1973 – Government funded day-care is provided.
19. 1978 – Rights for parents to split parental leave among themselves.
20. 1982 – First woman candidate for president.

21. 1983 – Women occupy more than 30% of parliamentary seats.
22. 1986 – Married women can keep their surname and children can be given the surname of either parent.
23. 1986 – Women obtain the right to be ordained as priests.
24. 1990 – First woman appointed as Minister of Defense.
25. 1991 – Fathers obtain a paternity leave of six days, separate from the established shareable parental allowance.
26. 1992 – First woman to hold directorship of the Bank of Finland.
27. 1994 – First woman elected as the Speaker of the Parliament.
28. 1995 – Women are granted the right to voluntary military service.
29. 2003 – The “Daddy Month” is introduced incentivizing male involvement in newborn childcare.
30. 2006 – First woman Chief Justice of the Supreme Court.
31. 2007 – More than 40% share of parliamentary seats are held by women.
32. 2017 – Introduction of the Equal Marriage Act.
33. 2019 – The Maternity Act recognizes both women in a same-sex relationship as mothers of a child since before birth (*Finnish Parliament Passes Bill on New Maternity Act, 2018*).

To date, Finnish parental leave benefits are divided in three sections. Maternity leave extends for 105 working days that can start from 50 to 30 working days before the estimated due date. Paternity leave extends up to 54 working days after the birth of the child, of which 18 working days can be concurrent with maternity leave. Parental leave extends for 158 working days starting after maternity leave and can be taken by any of the parents (*Finland – Maternity*

and Paternity, n.d.). Although Finnish policies for parental leave after the birth of a child are much more gender-balanced than in most countries in this study, Sweden's policies are more progressive and have returned better results closing the gender pay gap.

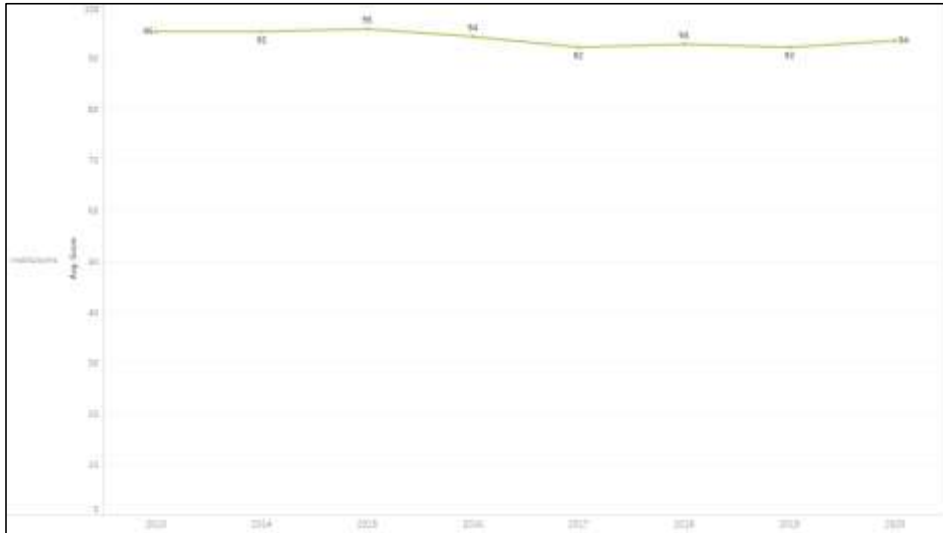
The high female representation in the Finnish Parliament is only comparable with Sweden's. Both countries reached and passed the 40% threshold of female representation in parliament over a decade ago while other countries are still struggling to reach 30%.

Proving the relationships between workforce gender diversity and innovation in the case of Finland. The researcher found nine relationships between workforce gender diversity and different innovation measures lagging ten, fifteen, and twenty years. Next, each of the identified relationships will be challenged against Finland's case.

Proportion of female workers in the country's workforce and the country's score in the Institutions pillar of the Global Innovation Index at ten years lag. Female workers in Finland represented between 48.0–48.6% of the total workforce from 2003 to 2010 (Figure 105). Based on the model graphically described in Figure 89, the score in the Institutions pillar of the Global Innovation Index for the years 2013 to 2020 should have been approximately 80 to 95. The actual scores are shown in Figure 106 and align with what was expected, based on the relationships observed in this study.

Figure 106

Finland's Scores in the Institutions Pillar of the Global Innovation Index for Years 2013 to 2020.

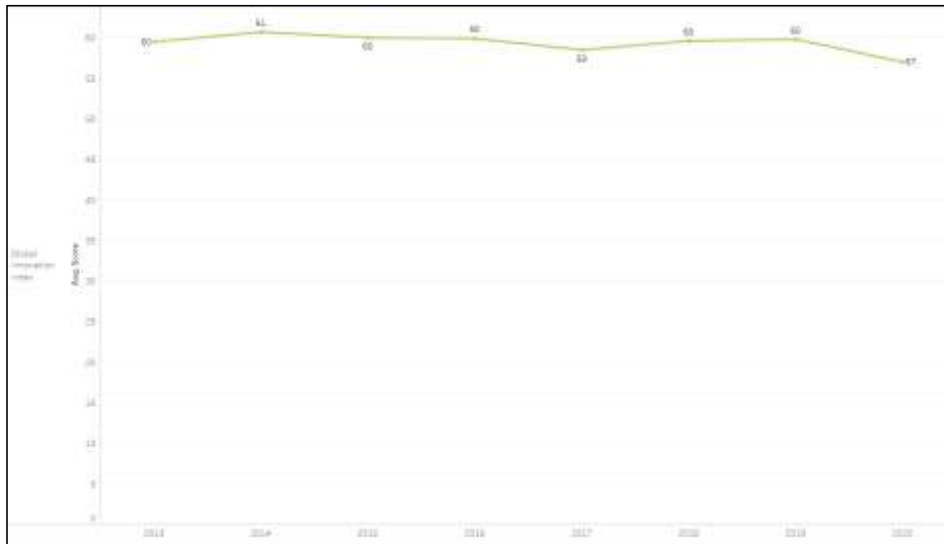


Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Proportion of female workers in the country's workforce and the country's score in the Global Innovation Index at ten years lag. Based on the model graphically described in Figure 90, the score in the Global Innovation Index for years 2013 to 2020 should have been around 45 to 70, considering that the proportion of female workers in the Finnish workforce was between 48.0–48.6% for the years 2003 to 2010 (Figure 105). The actual scores for Finland in the Global Innovation Index for years 2013 to 2020 are shown in Figure 107 and align with what was expected, based on the relationships observed in this study.

Figure 107

Finland's Scores in the Global Innovation Index for Years 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

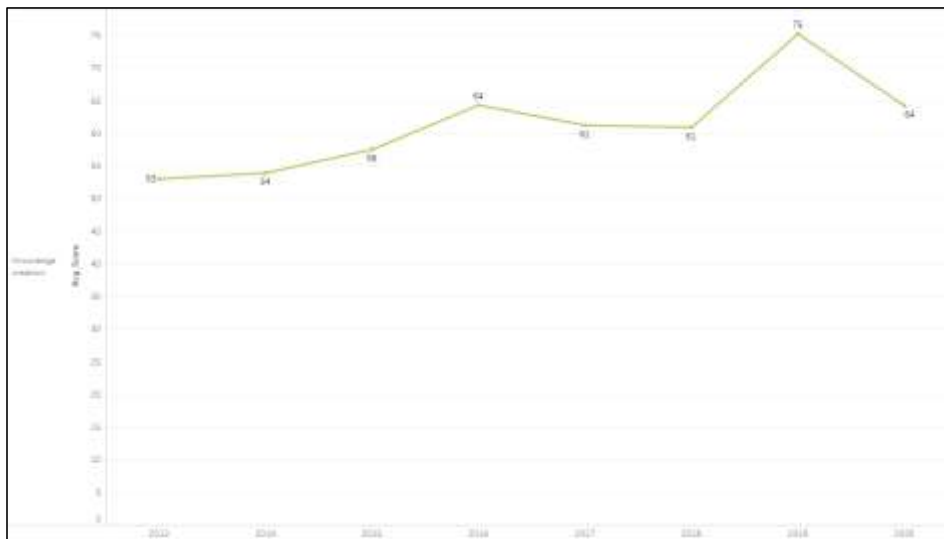
Proportion of female workers in the country's workforce and the country's score in the Global Innovation Index at fifteen years lag. Based on the model graphically described in Figure 92 the score in the Global Innovation Index for years 2013 to 2020 should have been around 58 to 65, considering that the proportion of female workers in the Finnish workforce was between 47.6–48.4% for years 1998 to 2005 (Figure 105). The actual scores for Finland in the Global Innovation Index for years 2013 to 2020 are shown in Figure 107 and align with what was

expected, based on the relationships observed in this study. The score for 2020 was marginally below the expected score.

Proportion of female workers in the country's workforce and the country's score in the Knowledge creation sub-pillar of the Global Innovation Index at twenty years lag. Based on the model graphically described in Figure 94 the score in the Knowledge creation sub-pillar of the Global Innovation Index for years 2015 to 2020 should have been around 70 to 75, considering that the proportion of female workers in the Finnish workforce was between 47.5–48.0% for years 1995 to 2000 (Figure 105). The actual scores for Finland in the Knowledge creation sub-pillar of the Global Innovation Index for years 2015 to 2020 are shown in Figure 108.

Figure 108

Finland's Scores in the Knowledge Creation Sub-Pillar of the Global Innovation Index for Years 2013 to 2020.



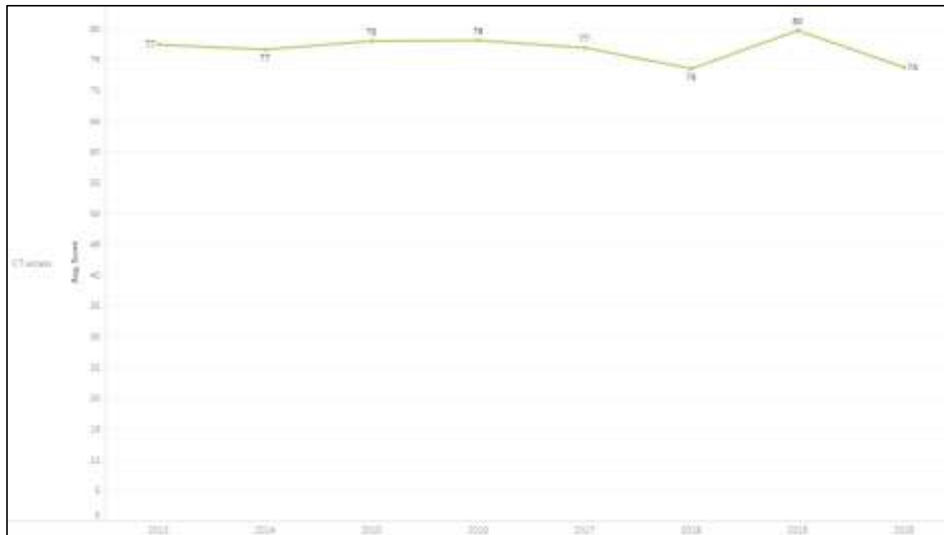
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Finland’s actual scores in Knowledge creation for 2015 to 2020 are more aligned with what would have been expected from a country with two percentual points less in the proportion of female workers in its workforce, based on the model shown in Figure 94.

Proportion of female workers in the country’s workforce and the country’s score in the ICT access indicator of the Global Innovation Index at twenty years lag. Based on the model graphically described in Figure 95, the score in the ICT access indicator of the Global Innovation Index for years 2015 to 2020 should have been around 80, considering that the proportion of female workers in the Finnish workforce was between 47.5–48.0% for years 1995 to 2000 (Figure 105). The actual scores for Finland in the ICT access indicator of the Global Innovation Index for years 2015 to 2020 are shown in Figure 109 and align with the expected values for most years.

Figure 109

Finland's Scores in the ICT Indicator of the Global Innovation Index for Years 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

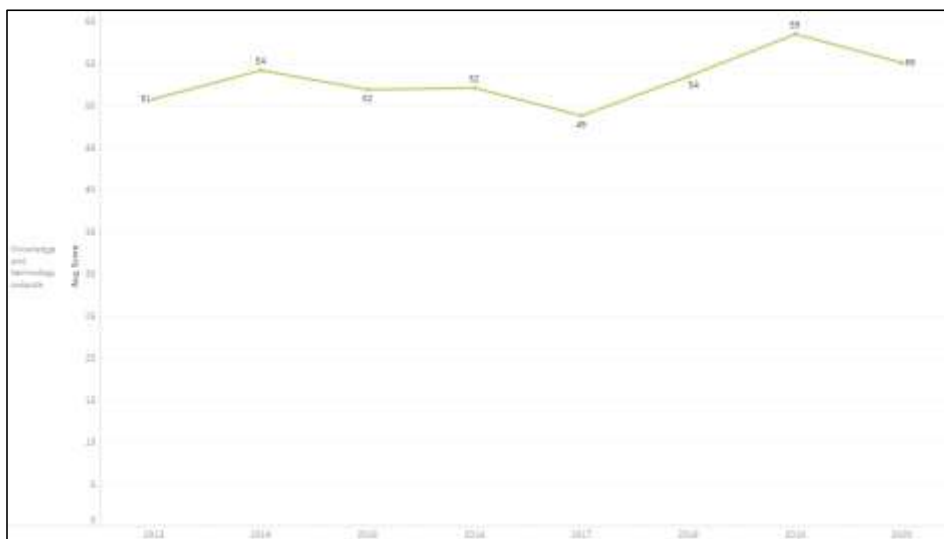
Proportion of female workers in the country's workforce and the country's score in the Institutions pillar of the Global Innovation Index at twenty years lag. Female workers in Finland represented between 47.5–48.0% of the total workforce from 1995 to 2000 (Figure 105). Based on the model graphically described in Figure 96, the score in the Institutions pillar of the Global Innovation Index for years 2013 to 2020 should have been around 85 to 90. The actual scores for Finland in the Institutions pillar of the Global Innovation Index for years 2015 to 2020 are shown in Figure 106 and are approximately five points higher than what was expected, based on the relationship observed in this study.

Proportion of female workers in the country's workforce and the country's score in the Knowledge and technology outputs pillar of the Global Innovation Index at twenty years lag.

Based on the model graphically described in Figure 97, the score in the Knowledge and technology outputs pillar of the Global Innovation Index for years 2015 to 2020 should have been around 60 to 65, considering that the proportion of female workers in the Finnish workforce was between 47.5–48.0% for years 1995 to 2000 (Figure 105). The actual scores for Finland in the Knowledge and technology outputs pillar of the Global Innovation Index for years 2015 to 2020 are shown in Figure 110. Actual scores are around five to ten points less than expected.

Figure 110

Finland's Scores in the Knowledge and Technology Outputs Pillar of the Global Innovation Index for Years 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020,

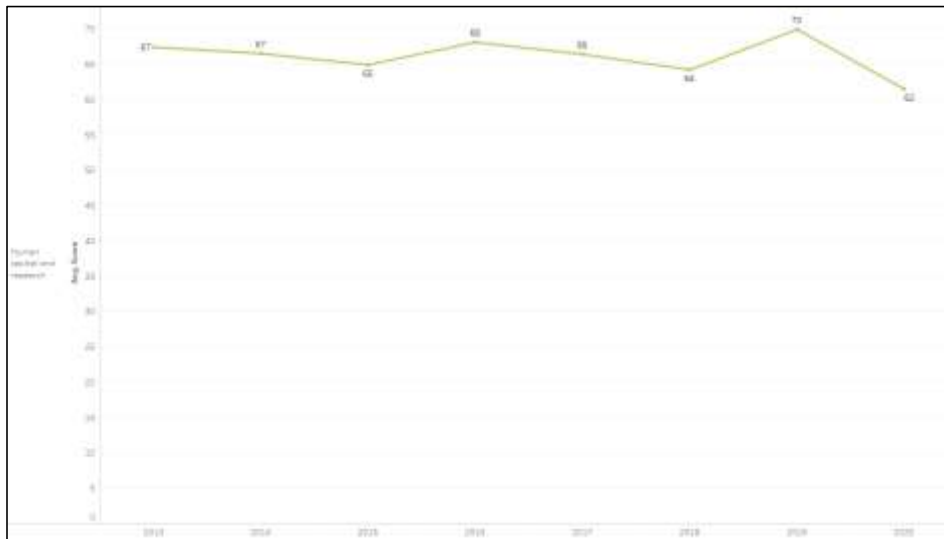
(<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Proportion of female workers in the country's workforce and the country's score in the Global Innovation Index at twenty years lag. Based on the model graphically described in Figure 98, the score in the Global Innovation Index for years 2015 to 2020 should have been around 60 to 65, considering that the proportion of female workers in the Finnish workforce was between 47.5–48.0% for years 1995 to 2000 (Figure 105). The actual scores for Finland in the Global Innovation Index for years 2015 to 2020 are shown in Figure 107 and align with what was expected, based on the relationships observed in this study. The actual score for 2020 was around three points lower than expected.

Proportion of female workers in the country's workforce and the country's score in the Human Capital and research pillar of the Global Innovation Index at twenty years lag. Based on the model graphically described in Figure 99, the score in the Global Innovation Index for years 2015 to 2020 should have been around 55 to 70, considering that the proportion of female workers in the Finnish workforce was between 47.5–48.0% for years 1995 to 2000 (Figure 105). The actual scores for Finland in the Global Innovation Index for years 2015 to 2020 are shown in Figure 111 and align with what was expected, based on the relationships observed in this study.

Figure 111

Finland's Scores in the Human Capital and Research Pillar of the Global Innovation Index for Years 2013 to 2020.



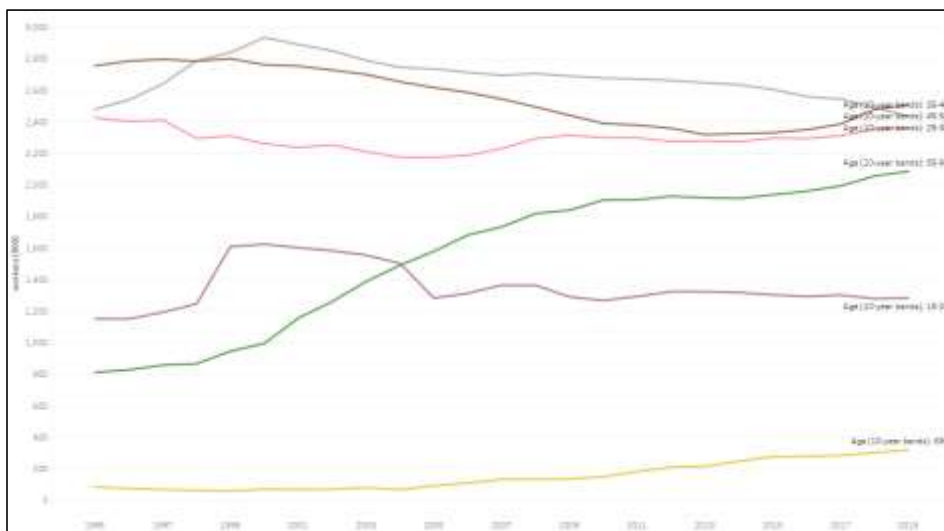
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Age diversity in Finnish workforce. The Finnish workforce is evolving into a more age-balanced community. As shown in Figure 112, the numbers of workers from the different age groups between 25 and 64 are getting closer, as are the numbers of workers under 25, and 65 and older. The most significant change in the number of workers has been the increase in age groups 55 to 64, and 65 and older that can be appreciated particularly after the year 2000. The standard deviation for the proportion of workers from age bands between 25 to 64 is shown in Figure 113,

while Figure 114 shows the same metric for age bands 15 to 24, and 65 and older. The downtrends observed in both graphs demonstrate the increased age diversity in the Finnish workforce.

Figure 112

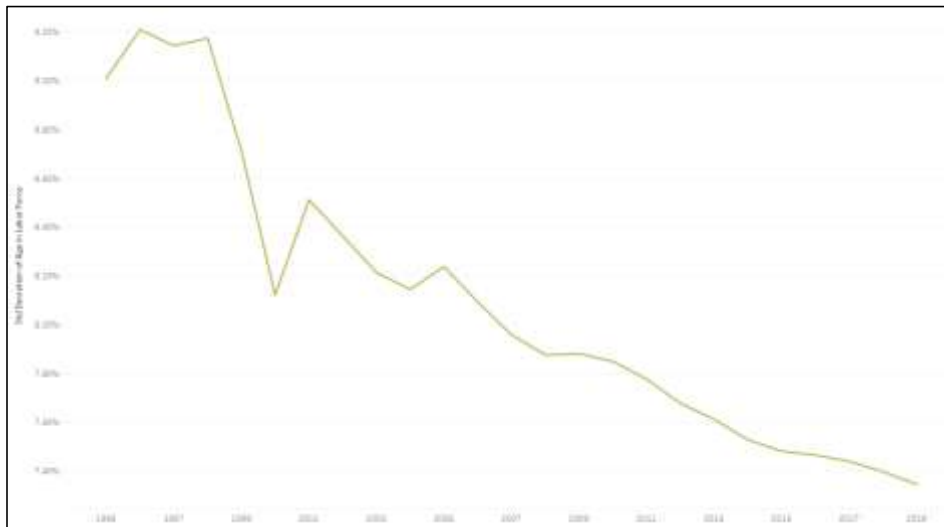
Finnish Workers from Different Age Bands from 1995 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Finland from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo org data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 113

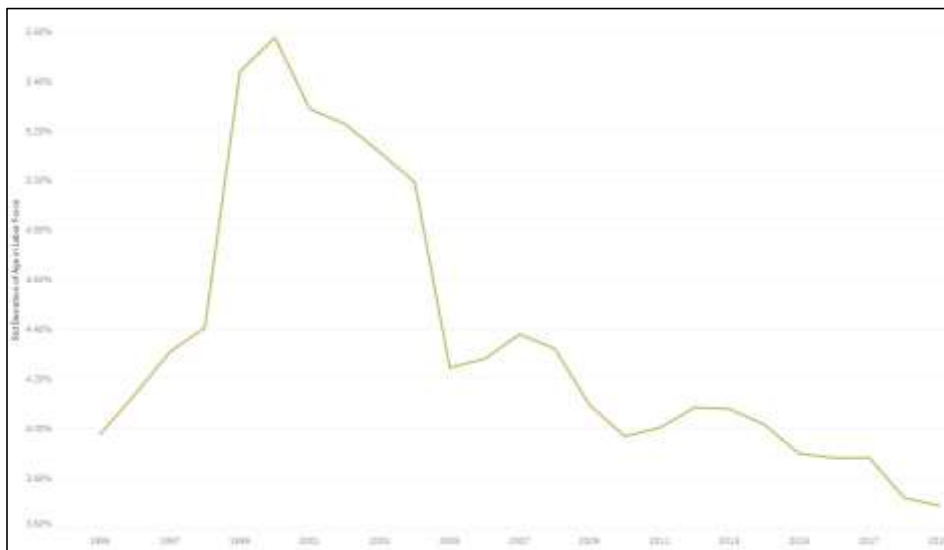
Standard Deviation for the Proportion of Workers from Age Bands 25 to 64 in the Finnish Workforce from 1995 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Finland from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 114

Standard Deviation for the Proportion of Workers from Age Bands 15 to 24, and 65 and Older in the Finnish Workforce from 1995 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Finland from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

The increase in the proportion of older workers in the Finnish workforce has been the result of thoughtful government orchestration of the labor market. The economic recessions of the early 90s uncovered the unsustainable cost of an aging population with a very low participation of older workers in the labor market and motivated the government to establish goals to avoid a future economic collapse. The article *Finland’s National Programme for Aging Workers* (2018) describes the Finnish government actions towards six fundamental goals.

1. Increase the employment rate of older workers.
2. Raise the average pension age.
3. Increase the proportion of older workers in the Finnish workforce.
4. Enhance the abilities of older workers.
5. Enable part-time and other flexible working time models for workers collecting pensions.
6. Reduce age discrimination.

It can be deduced from Figure 112 that the program was effective in increasing the average retirement age due to the significant increase in workers within the 55 to 64 age band. Increasing the number of workers 65 and older through part-time pensions has also been effective.

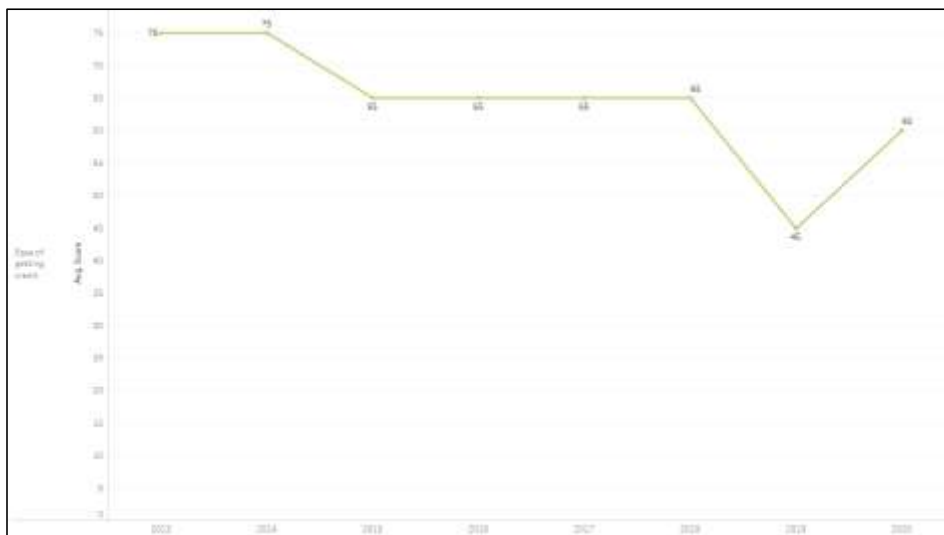
Proving the relationships between workforce age diversity and innovation in the case of Finland. The researcher found five relationships between workforce age diversity and different innovation measures lagging ten, fifteen, and twenty years. Next, each of the identified relationships will be challenged against Finland's case.

Standard deviation for the proportion of workers from age bands 15 to 24, and 65 and older, and the country's score in the Ease of credit indicator of the Global Innovation Index at ten years lag. Based on the model graphically described in Figure 91, the score in the Ease of credit indicator of the Global Innovation Index for years 2013 to 2020 should have been around 60 to 80, considering that the standard deviation for the proportion of workers in age bands 15 to 24, and 65 and older in the Finnish workforce was between 4.0–5.1% for years 2003 to 2010 (Figure 114). The actual scores for Finland in the Ease of getting credit indicator of the Global Innovation Index for years 2013 to 2020 are shown in Figure 115 and align with what was expected, based on the relationships observed in this study. The downtrend in the actual scores was expected based on what can be observed in Figure 91, namely that going below 6% in

standard deviation for the proportion of workers from age bands 15 to 24, and 65 and older would result in a decreased score in the Ease of getting credit indicator.

Figure 115

Finland's Scores in the Ease of Getting Credit Indicator of the Global Innovation Index for Years 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Standard deviation for the proportion of workers from age bands 15 to 24, and 65 and older, and the country's score in the Ease of credit indicator of the Global Innovation Index at fifteen years lag. Based on the model graphically described in Figure 93, the score in the Ease of credit indicator of the Global Innovation Index for years 2013 to 2020 should have been around

50 to 90, considering that the standard deviation for the proportion of workers in age bands 15 to 24, and 65 and older in the Finnish workforce was between 4.2–5.6% for years 1998 to 2005 (Figure 114). The actual scores for Finland in Ease of getting credit of the Global Innovation Index for years 2013 to 2020 are shown in Figure 115 and align with what was expected, based on the relationships observed in this study. The downtrend in the actual scores was expected based on what can be observed in Figure 93, namely that going below 9.5% in standard deviation for the proportion of workers from age bands 15 to 24, and 65 and older would result in a decreased score in the Ease of getting credit indicator.

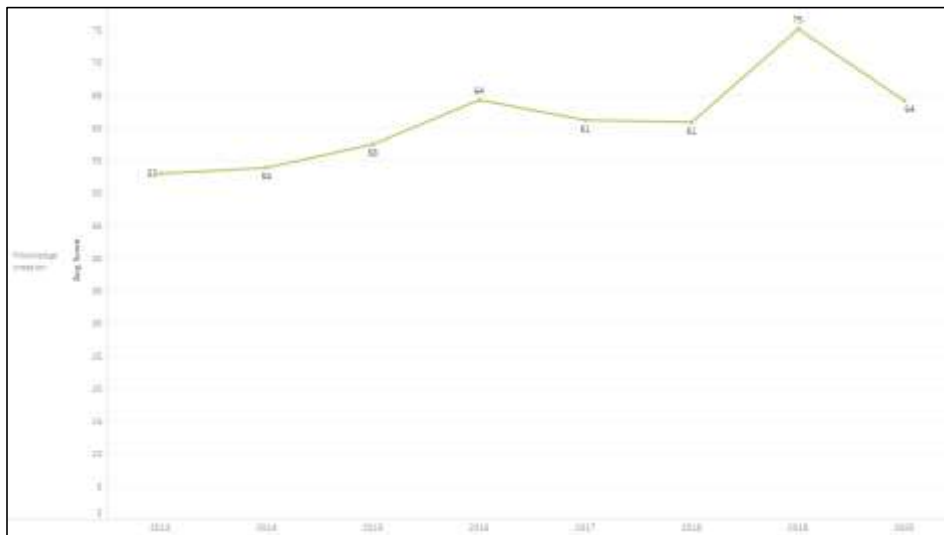
Standard deviation for the proportion of workers from age bands 15 to 24, and 65 and older, and the country's score in the Ease of credit indicator of the Global Innovation Index at twenty years lag. Based on the model graphically described in Figure 100, the score in the Ease of credit indicator of the Global Innovation Index for years 2015 to 2020 should have been around 35 to 60, considering that the standard deviation for the proportion of workers in age bands 15 to 24, and 65 and older in the Finnish workforce was between 4.0–5.6% for years 1995 to 2000 (Figure 114). The actual scores for Finland in Ease of getting credit of the Global Innovation Index for years 2013 to 2020 are shown in Figure 115 and do not align with what was expected, based on the relationships observed in this study. Finland's Ease of getting credit score was 10 to 20 points over the expected value. However, the downtrend in the actual scores was expected based on what can be observed in Figure 100, namely that going below 10.5% in standard deviation for the proportion of workers from age bands 15 to 24, and 65 and older would result in a decreased score in the Ease of getting credit indicator.

Standard deviation for the proportion of workers from age bands 25 to 64 and the country's score in the Knowledge creation sub-pillar of the Global Innovation Index at twenty

years lag. Based on the model graphically described in Figure 101, the score in the Knowledge creation sub-pillar of the Global Innovation Index for the years 2015 to 2020 cannot be explained, considering that the standard deviation for the proportion of workers in age bands 25 to 64 in the Finnish workforce was between 8.1–9.2% for years 2003 to 2010 (Figure 113), which goes outside the model’s range. The actual scores for Finland in the Knowledge creation sub-pillar of the Global Innovation Index for the years 2015 to 2020 are shown in Figure 116.

Figure 116

Finland’s Scores in the Knowledge Creation Sub-Pillar of the Global Innovation Index for Years 2013 to 2020.

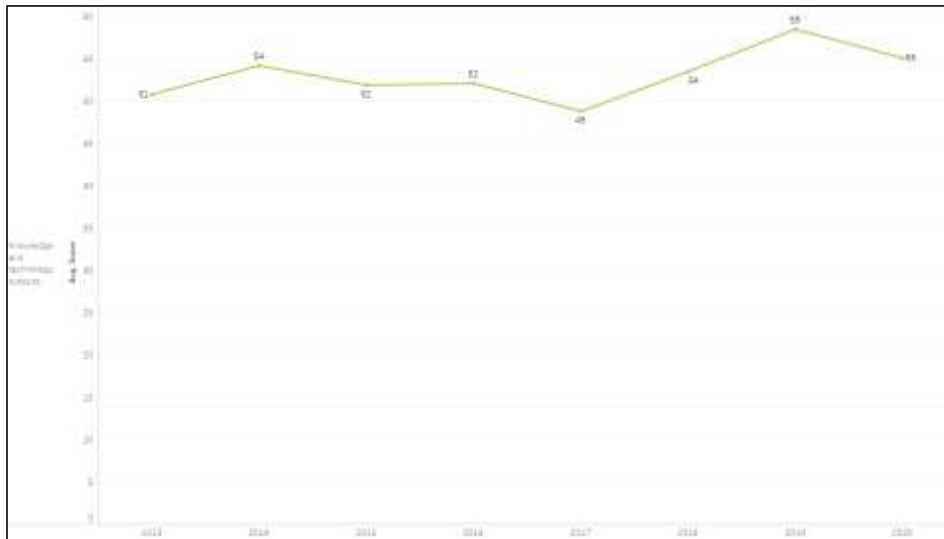


Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Standard deviation for the proportion of workers from age bands 25 to 64 and the country's score in the Knowledge and technology outputs pillar of the Global Innovation Index at twenty years lag. Based on the model graphically described in Figure 102, the score in the Knowledge and technology outputs pillar of the Global Innovation Index for the years 2015 to 2020 cannot be explained, considering that the standard deviation for the proportion of workers in age bands 25 to 64 in the Finnish workforce was between 8.1–9.2% for the years 2003 to 2010 (Figure 113), which goes outside the model's range. The actual scores for Finland in the Knowledge and technology outputs pillar of the Global Innovation Index for the years 2015 to 2020 are shown in Figure 117.

Figure 117

Finland's Scores in the Knowledge and Technology Outputs Pillar of the Global Innovation Index for Years 2013 to 2020.

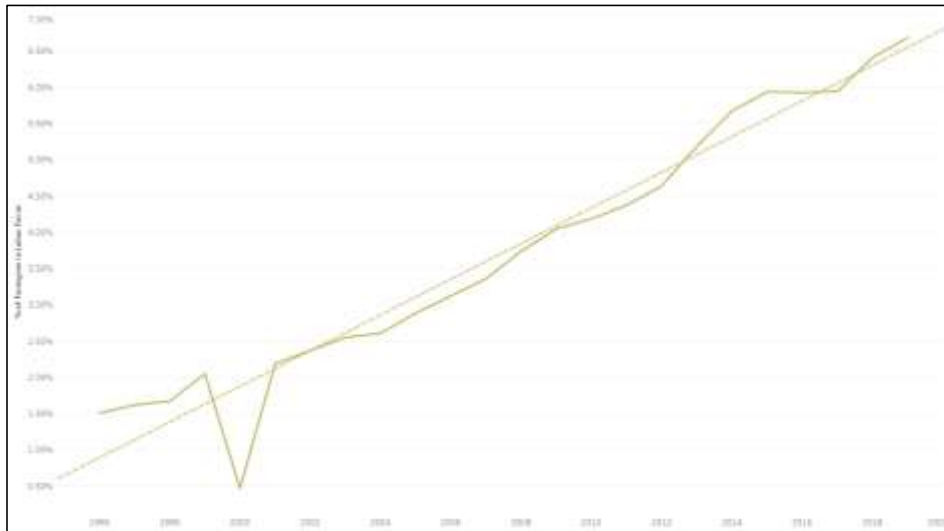


Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Ethnic/Nationality diversity in Finnish workforce. Finland has the lowest proportion of foreign workers from the countries previously discussed, excluding Singapore, Hong Kong, and Chile for which nationality data in the workforce was not available. Nonetheless, foreign workers represented close to 7.0% of the total workforce in 2019, increasing from 0.5% in 2000. Figure 118 shows the proportion of foreigners in the Finnish workforce from 1995 to 2019.

Figure 118

Foreign Workers in the Finnish Workforce from 1995 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Finland from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the

International Labor Organization, n.d., (<https://ilostat ilo org data/>). Copyright 1996-2020 by the International Labor Organization.

Satonen (2020) describes immigration in Finland as a fairly new concept that started in the 1990's with the collapse of the Soviet Union. Nonetheless, it will become key to source much needed talent to sustain certain Finnish industries such as ICT, agriculture, high-tech, and healthcare, he adds. At the current rate, by 2030 the Finnish workforce will have 170,000 fewer workers. Finnish businesses are trying to lure foreign talent in non-traditional ways. Still, the government discussion on immigration is polarized.

The Helsinki Business Hub opened a contest during the end of 2020 for foreign talent that wanted to try out living in Helsinki during 90 days for free. The contest included cultural training, Finnish experiences, remote work facilities, networking events, and the facilitation of immigration documentation (Johanson, 2021).

Proving the relationships between workforce ethnic/nationality diversity and innovation in the case of Finland. The researcher found two relationships between workforce ethnic/nationality diversity and different innovation measures lagging zero and twenty years. Next, each of the identified relationships will be challenged against Finland's case.

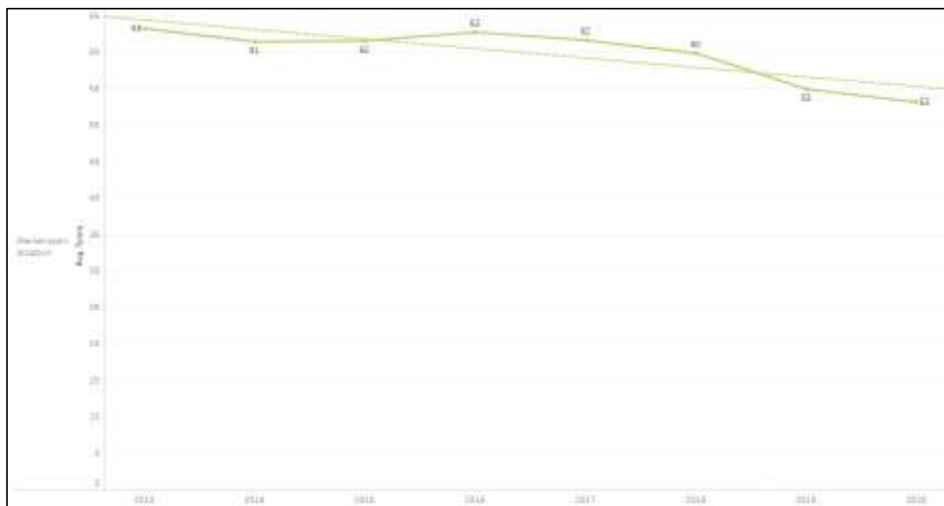
Proportion of foreign workers and the country's score in the Knowledge creation sub-pillar of the Global Innovation Index at zero years lag. Based on the model graphically described in Figure 88, the score in the Knowledge creation sub-pillar of the Global Innovation Index for years 2013 to 2020 cannot be explained, considering that the proportion of foreign workers in the Finnish workforce was between 5.2–6.7% for years 2013 to 2020 (Figure 118), which goes outside the model's range. The actual scores for Finland in the Knowledge creation sub-pillar of

the Global Innovation Index for years 2013 to 2020 are shown in Figure 113. The scores show a slight uptrend, aligned with the uptrend in the proportion of foreign workers.

Proportion of foreign workers and the country's score in the Market sophistication pillar of the Global Innovation Index at twenty years lag. Based on the model graphically described in Figure 103, the score in the Market sophistication pillar of the Global Innovation Index for years 2015 to 2020 cannot be explained, considering that the proportion of foreign workers in the Finnish workforce was between 0.5–2.1% for the years 1995 to 2000 (Figure 118), which goes outside the model's range. The actual scores for Finland in the Market sophistication pillar of the Global Innovation Index for years 2013 to 2020 are shown in Figure 119. The scores show a slight downtrend, which aligns with the suggested downtrend in the Market sophistication score in the model in Figure 103 as the proportion of foreign workers grows to 9.0%.

Figure 119

Finland's Scores in the Market Sophistication Pillar of the Global Innovation Index for Years 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Mexico.

Gender diversity in Mexican workforce. Culturally, Mexico is cataloged by Hofstede Insights (n.d.) as a masculine society, scoring a 69 in Hofstede’s masculinity societal dimension. As previously highlighted, Hofstede (2014) explains that a masculine society abides by the rules of traditional gender roles. In this study, most of the feminine societies demonstrated a lower gender wage gap than masculine ones. However, Mexico’s gender wage gap is even a bit lower than Finland’s. Still, Mexico has the largest gap among the masculine societies in this study (excluding Hong Kong, for which data is not available in the OECD database). Figure 120 highlights how Mexico’s gender wage gap compares to the other countries in this study.

Figure 120

Gender Wage Gap for Employed Women – Mexico Highlight for 2019.



Note. Stars identify masculine societies in this study based on information from “Country Comparison” by Hofstede Insights, n.d.. (<https://www.hofstede-insights.com/country-comparison/>). Copyright 2021 by Hofstede Insights. Gender wage gap data adapted from “Gender Wage Gap (Indicator)” by OECD, 2021. (<https://data.oecd.org/earnwage/gender-wage-gap.htm>). Copyright 2021 by the Organization for Economic Co-operation and Development.

What are some of the contributors to Mexico’s gender wage gap? In a study by Orraca, Cabrera, and Iriarte (2016) considering a sample of wages data from 2000 and 2010, researchers found that, in contrast to Finland, the gender wage gap in Mexico is not driven by occupational segregation. The largest contributor to the gender wage gap is the “unexplained component” that keeps women underpaid relative to their male counterparts. The researchers consider that it might be related to sub-categories within occupations, as well as the tendency to have males at senior level positions while females remain subordinates.

The wage disadvantage of women versus men is not due to insufficient education. Statistics reported in the article *Women in the Workforce – Mexico: Quick Take* (2020) revealed that in 2018–2019, women represented 49.5% of students enrolled in bachelor’s degree programs and 52.1% of postgraduate students. Women in the age band 25 to 34 are 4% more likely to attain tertiary degrees versus their male counterparts. However, only 14.5% of women with college degrees had education in STEM, versus 37.6% of their male counterparts. In the end, 75% of women that graduate from college do not have a paying job. That results in a significantly lower participation rate of women in the Mexican workforce. In 2019, only 44.2% of women were active in the workforce compared to 78.5% of men.

Women still do not reach 40% of the Mexican workforce. As shown in Figure 121, there was an acceleration in the increase of the proportion of women in Mexico’s workforce after 2003

to 2007. The global recession of 2008 appears to have had impacted women in the workforce disproportionately. Different from other countries in this study that experienced a reduction in the proportion of women in their workforce with an offset of one year, Mexico's female workers were impacted almost immediately. The same thing happened in Costa Rica where the global recession hit in 2009.

Figure 121

Mexico's Percentage of Female Workers in Workforce for 1990 to 2019.



Note. The 2002-2019 workforce data for Mexico is from “[Dataset Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization. The 1990-2001 workforce data for Mexico is from “[Labor Force, Total - Chile]”, by The World Bank, n.d., (<https://data.worldbank.org/indicator/SL.TLF.TOTL.IN?locations=MX>), and “[Labor Force, Female (% of Total Labor Force)]”, by The World Bank, n.d.,

(<https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS?locations=MX>). Copyright 2021 by The World Bank Group.

Gómez-Galvarriato and Madrigal (2016) found in their research that in Mexico the participation of women in the workforce diminishes during the reproductive years, and is influenced by variables such as marriage, education, and fertility. This is different for men, for whom participation rates remain constant until age 50 when it starts decelerate.

The late increase in the proportion of female workers in Mexico's workforce correlates with the reduction in fertility rates. In the same study, Gómez-Galvarriato and Madrigal (2016) highlighted that combining maternity and paid labor is a difficult decision for many women in Mexico, and that deciding how many children to have, and when to have them, directly impacts their ability to enter the workforce.

Carmona (2015) describes some of the Mexican government efforts to promote gender equality in a society where gender disparities were evident socially, culturally, economically, institutionally, and within the family. These disparities were reflected in the dependence, subordination, exclusion, discrimination, and violence against women. The response of the government came through the foundation of the Instituto Nacional de las Mujeres and the Program for the Institutionalization of Gender Perspective as a mean for promoting gender equality and eliminating stereotypes and discrimination.

Efforts from the Mexican government are still lagging when compared to progressive countries, particularly in the topic of shared parenthood. Because maternity has proven to be a decisive factor in the participation of women in the workforce, Mexico must pay more attention to implement better parenthood policies that promote equal gender involvement in childcare. Based on Blog OCCMundial (2021), male parents in Mexico are entitled to a paid leave of five

working days after the birth or adoption of their child, while women can have a total of twelve weeks. Inherently, the government is supporting the bias that women are responsible for childcare while men are responsible for earning household income. This may continue prevent women from joining the workforce and advancing their careers during their reproductive years.

Women in Mexican Politics. As of 2018, Mexico was at the top of OECD members with the highest proportion of women in parliament (Centro de Investigación en Política Pública, 2018). According to Corona (2018), a political reform in 2014 obliged political parties to include 50% female candidates in their tickets. As a result, in the 2018 elections women won 48% of the seats in the Mexican Congress. Nonetheless, men continue to have the Congressional power. The presidents of both chambers are men, and the delegates of the different parties of the Junta de Coordinación Política, which is the organization that filters the topics to be discussed at Congress, are also men.

Other indicators also show that there is still a long way to have true gender equality in the country's decision making. According to *Centro de Investigación en Política Pública* (2018), only 14% of municipal presidents, 26% of syndics, and 39% of judges are women.

Proving the relationships between workforce gender diversity and innovation in the case of Mexico. The researcher found nine relationships between workforce gender diversity and different innovation measures lagging ten, fifteen, and twenty years. Next, each of the identified relationships will be challenged against Mexico's case.

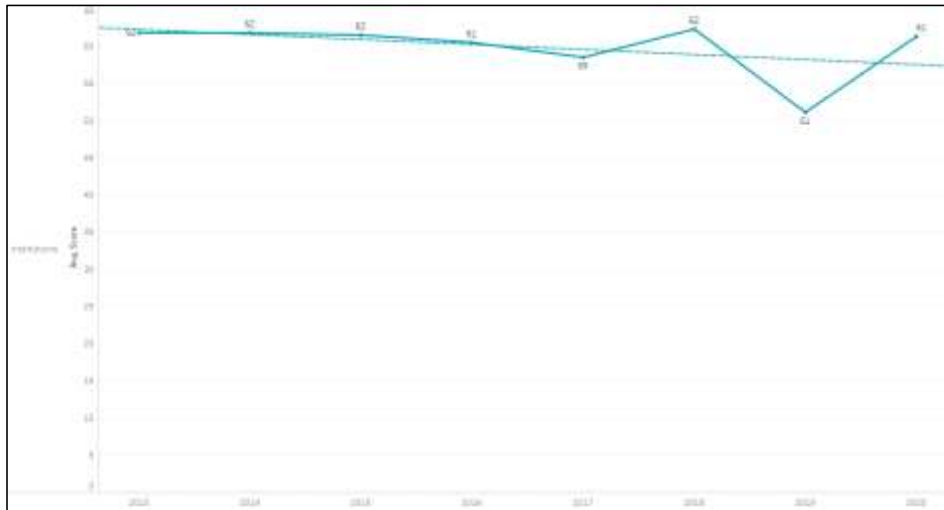
Proportion of female workers in the country's workforce and the country's score in the Institutions pillar of the Global Innovation Index at ten years lag. Female workers in Mexico represented between 35.0–37.5% of the total workforce from 2003 to 2010 (Figure 121). Based on the model graphically described in Figure 89, the score in the Institutions pillar of the Global

Innovation Index for the years 2013 to 2020 should have been around 60 to 80. The actual scores for Mexico in the Institutions pillar of the Global Innovation Index for the years 2013 to 2020 are shown in Figure 122 and align with the lower end of the expected range of values, based on the relationships observed in this study.

The proportion of female workers in Mexico's workforce for the period from 2003 to 2010 is around 10 points lower than Finland's. Then, as expected, Finland performed much better in the ten years lagging results in the Institutions pillar of the Global Innovation Index. Finland performed in the high end of the expected range while Mexico performed in the lower end of the expected range. Figure 123 compares the results of both countries.

Figure 122

Mexico's Scores in the Institutions Pillar of the Global Innovation Index for Years 2013 to 2020.



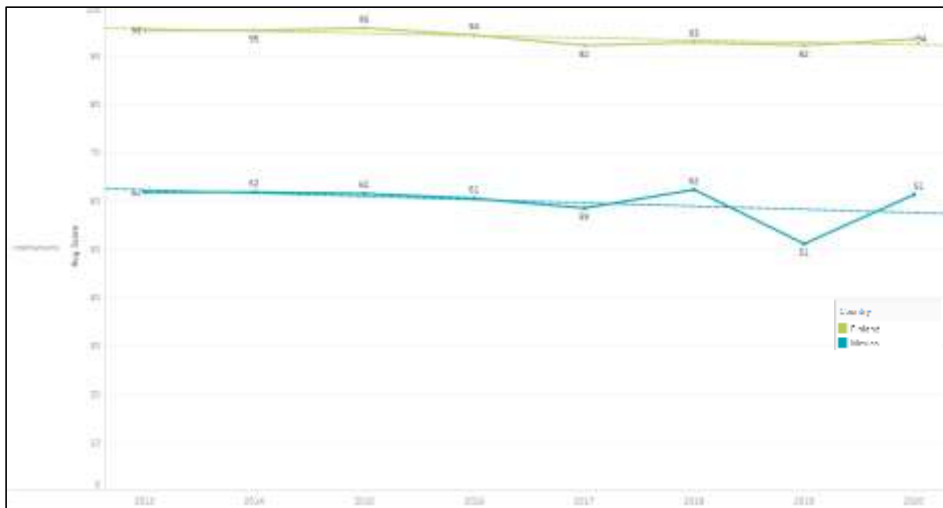
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020,

(<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD

WIPO.

Figure 123

Scores in the Institutions Pillar of the Global Innovation Index for Years 2013 to 2020: Finland versus Mexico.



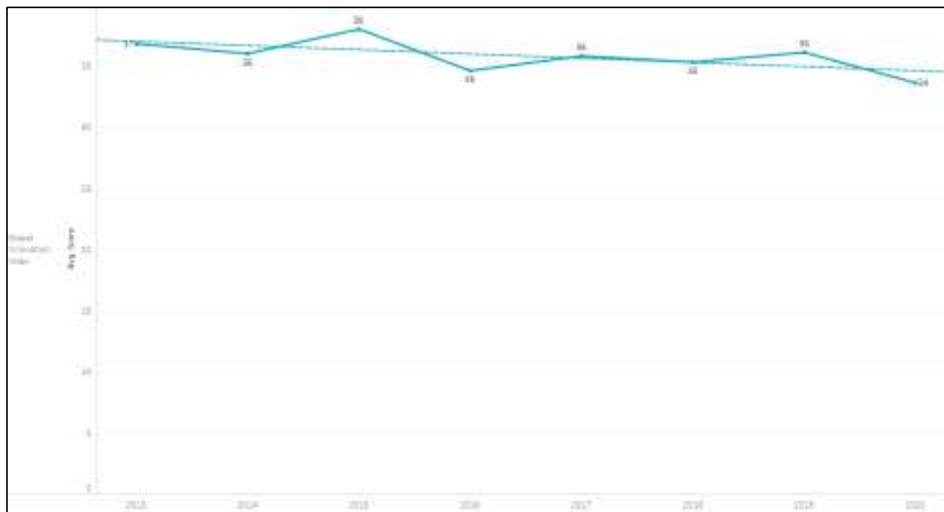
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Proportion of female workers in the country’s workforce and the country’s score in the Global Innovation Index at ten years lag. Based on the model graphically described in Figure 90, the score in the Global Innovation Index for the years 2013 to 2020 should have been around 30 to 45, considering that the proportion of female workers in the Mexican workforce was between 35.0–37.5% for the years 2003 to 2010 (Figure 121). The actual scores for Mexico in the Global

Innovation Index for the years 2013 to 2020 are shown in Figure 124 and align with what was expected, based on the relationships observed in this study.

Figure 124

Mexico's Scores in the Global Innovation Index for Years 2013 to 2020.

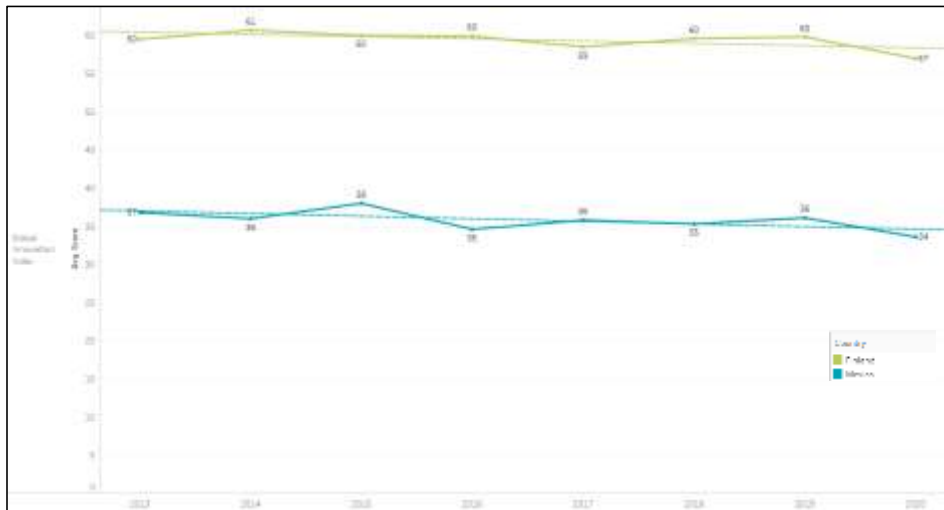


Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Figure 125 compares the results in the Global Innovation Index from 2013 to 2020 of Finland and Mexico. On average Finland outperformed Mexico by over twenty points.

Figure 125

Scores in the Global Innovation Index for Years 2013 to 2020: Finland and Mexico.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Proportion of female workers in the country’s workforce and the country’s score in the Global Innovation Index at fifteen years lag. Based on the model graphically described in Figure 92, the score in the Global Innovation Index for years 2013 to 2020 should have been approximately 33 to 43, considering that the proportion of female workers in the Mexican workforce was between 33.5–36.7% for the years 1998 to 2005 (Figure 121). The actual scores are shown in Figure 124 and align with what was expected, based on the relationships observed in this study.

Proportion of female workers in the country's workforce and the country's score in the Knowledge creation sub-pillar of the Global Innovation Index at twenty years lag. Based on the model graphically described in Figure 94, the score in the Knowledge creation sub-pillar of the Global Innovation Index for the years 2013 to 2020 should have been approximately 8 to 50, considering that the proportion of female workers in the Mexican workforce was between 30.9–33.6% for the years 1993 to 2000 (Figure 121). The actual scores for Mexico in the Knowledge creation sub-pillar of the Global Innovation Index for the years 2013 to 2020 are shown in Figure 126 and align to the lower end of the expected range of values.

Figure 126

Mexico's Scores in the Knowledge Creation Sub-Pillar of the Global Innovation Index for Years 2013 to 2020.



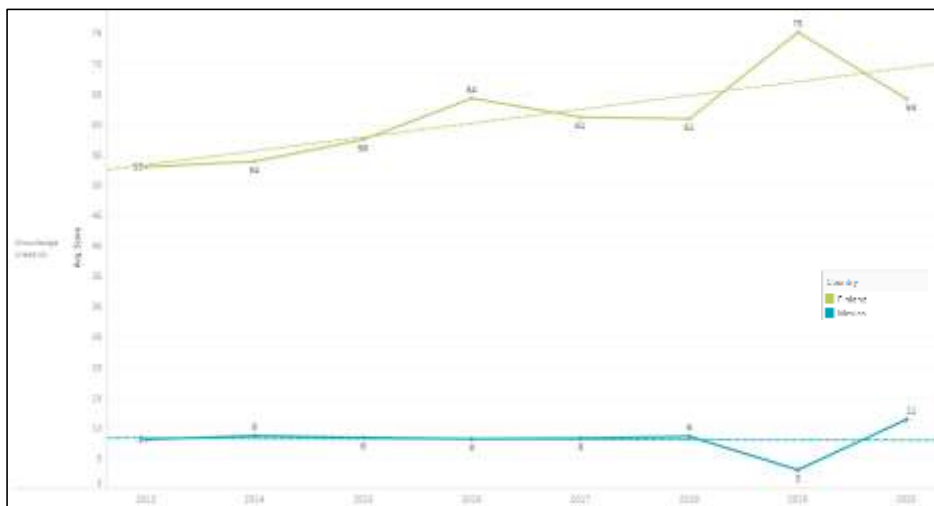
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020,

(<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Figure 127 shows how Finland and Mexico compare in the Knowledge creation sub-pillar score of the Global Innovation Index for 2013 to 2020. In this lagging relationship, the gap between both countries in the proportion of female workers in their workforces is almost six times the gap in the resulting scores.

Figure 127

Scores in the Knowledge Creation Sub-Pillar of the Global Innovation Index for Years 2013 to 2020: Finland and Mexico.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Proportion of female workers in the country's workforce and the country's score in the ICT access indicator of the Global Innovation Index at twenty years lag. Based on the model graphically described in Figure 95, the score in the ICT access indicator of the Global Innovation Index for years 2013 to 2020 should have been around 27 to 67, considering that the proportion of female workers in the Mexican workforce was between 30.9–33.6% for the years 1993 to 2000 (Figure 105). The actual scores for Mexico in the ICT access indicator of the Global Innovation Index for the years 2015 to 2020 are shown in Figure 128 and align with the expected values, trending to the higher end of the expected range. Figure 129 shows the comparison between of results from Finland and Mexico.

Figure 128

Mexico's Scores in the ICT Indicator of the Global Innovation Index for Years 2013 to 2020.



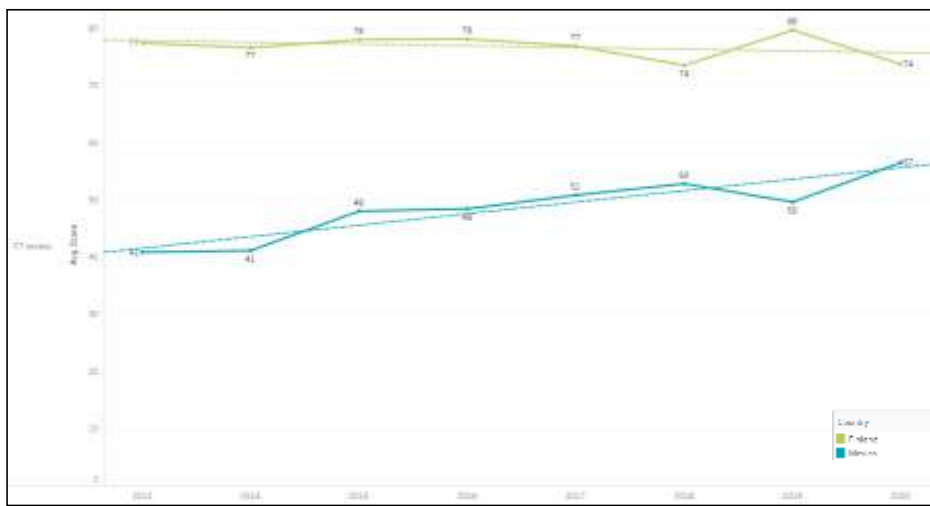
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020,

(<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD

WIPO.

Figure 129

Scores in the ICT Indicator of the Global Innovation Index for Years 2013 to 2020: Finland and Mexico.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Proportion of female workers in the country’s workforce and the country’s score in the Institutions pillar of the Global Innovation Index at twenty years lag. Female workers in Mexico represented between 30.9–33.6% of the total workforce from 1993 to 2000 (Figure 121). Based on the model graphically described in Figure 96, the score in the Institutions pillar of the Global Innovation Index for the years 2013 to 2020 should have been approximately 52 to 75. The actual scores for Mexico in the Institutions pillar of the Global Innovation Index for the years

2013 to 2020 are shown in Figure 122 and align with the lower end range of the expected values, based on the relationship observed in this study.

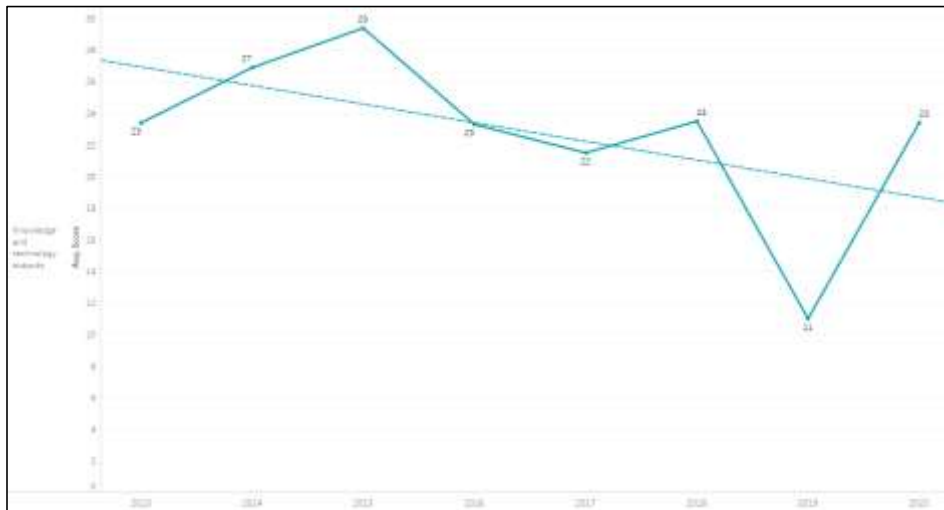
Proportion of female workers in the country's workforce and the country's score in the Knowledge and technology outputs pillar of the Global Innovation Index at twenty years lag.

Based on the model graphically described in Figure 97, the score in the Knowledge and technology outputs pillar of the Global Innovation Index for the years 2013 to 2020 should have been approximately 22 to 43, considering that the proportion of female workers in the Mexican workforce was between 30.9–33.6% for the years 1993 to 2000 (Figure 121). The actual scores for Mexico in the Knowledge and technology outputs pillar of the Global Innovation Index for years 2013 to 2020 are shown in Figure 130 and align with the lower end of the expected range of values.

Figure 131 shows how Finland and Mexico compare in the score of the Knowledge and technology outputs pillar of the Global Innovation Index for 2013 to 2020. In this lagging relationship, the gap between both countries in the proportion of female workers in their workforces is almost three times the gap in the resulting scores.

Figure 130

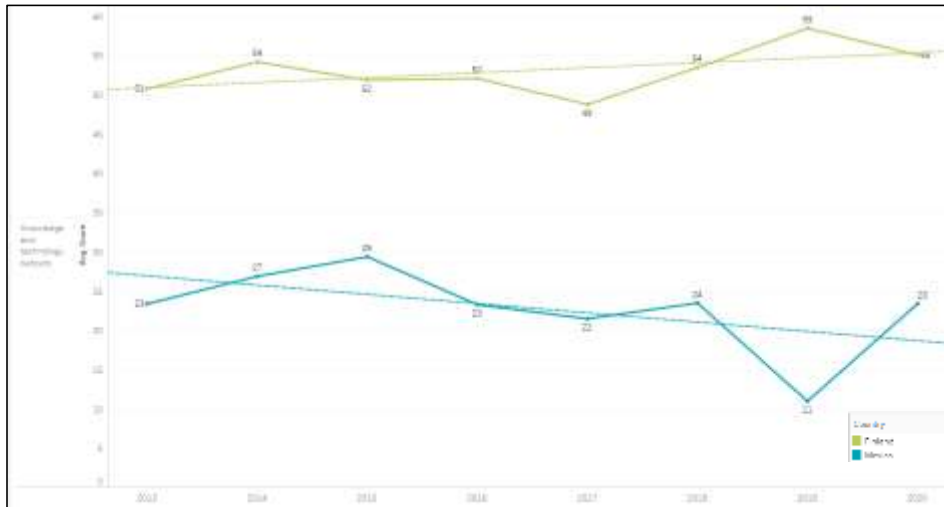
Mexico's Scores in the Knowledge and Technology Outputs Pillar of the Global Innovation Index for Years 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Figure 131

Scores in the Knowledge and Technology Outputs Pillar of the Global Innovation Index for Years 2013 to 2020: Finland and Mexico.



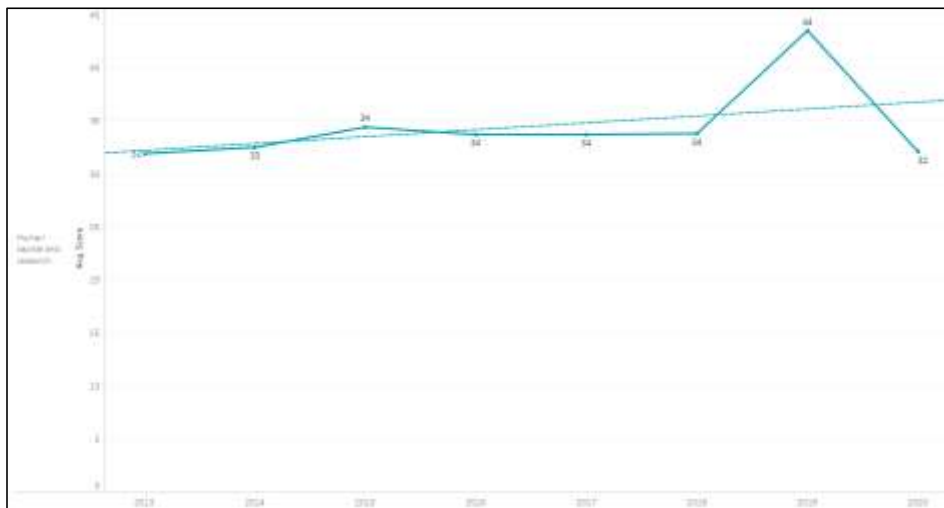
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Proportion of female workers in the country’s workforce and the country’s score in the Global Innovation Index at twenty years lag. Based on the model graphically described in Figure 98, the score in the Global Innovation Index for the years 2013 to 2020 should have been approximately 33 to 39, considering that the proportion of female workers in the Mexican workforce was between 30.9–33.6% for the years 1993 to 2000 (Figure 121). The actual scores for Mexico in the Global Innovation Index for years 2013 to 2020 are shown in Figure 124 and align with what was expected, based on the relationships observed in this study.

Proportion of female workers in the country's workforce and the country's score in the Human capital and research pillar of the Global Innovation Index at twenty years lag. Based on the model graphically described in Figure 99, the score in the Global Innovation Index for the years 2013 to 2020 should have been approximately 24 to 35, considering that the proportion of female workers in the Mexican workforce was between 30.9–33.6% for the years 1993 to 2000 (Figure 121). The actual scores for Mexico in the Global Innovation Index for the years 2015 to 2020 are shown in Figure 132 and align with what was expected, based on the relationships observed in this study. The score for 2019 was close to ten points higher than expected.

Figure 132

Mexico's Scores in the Human Capital and Research Pillar of the Global Innovation Index for Years 2013 to 2020.



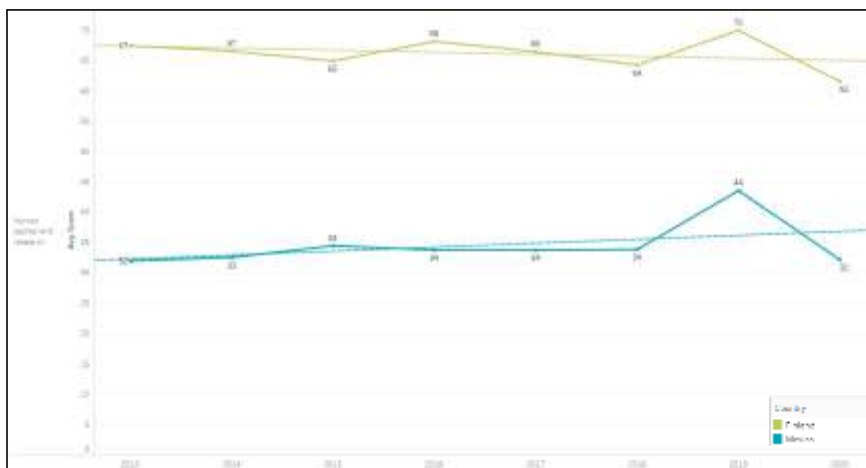
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020,

(<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Figure 133 shows how Finland and Mexico compare in the Human capital and research pillar score of the Global Innovation Index for 2013 to 2020. In this lagging relationship, the gap between both countries in the proportion of female workers in their workforces is almost three times the gap in the resulting scores.

Figure 133

Scores in the Human Capital and Research Pillar of the Global Innovation Index for Years 2013 to 2020: Finland and Mexico.



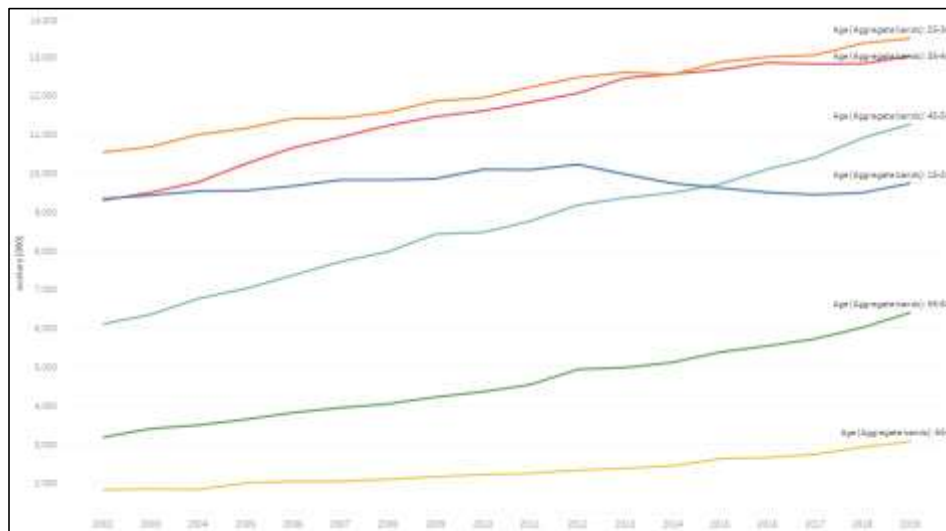
Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Age diversity in the Mexican workforce. The Mexican workforce shows a traditional pattern with a higher proportion of workers between ages 15 to 44, and a lower proportion of older workers as shown in Figure 134. Around 2012, the proportion of workers 15 to 24 started

trending downward, most likely resulting from the increase in people enrolled in tertiary education (see Figure 135).

Figure 134

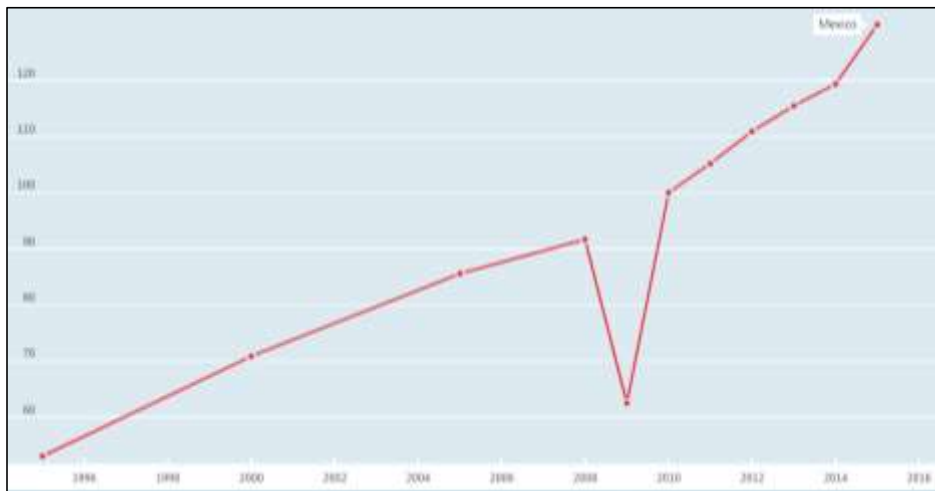
Mexican Workers from Different Age Bands from 2002 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Mexico from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo org data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 135

Number of Students with Tertiary Education from 1995 to 2016 – Mexico.



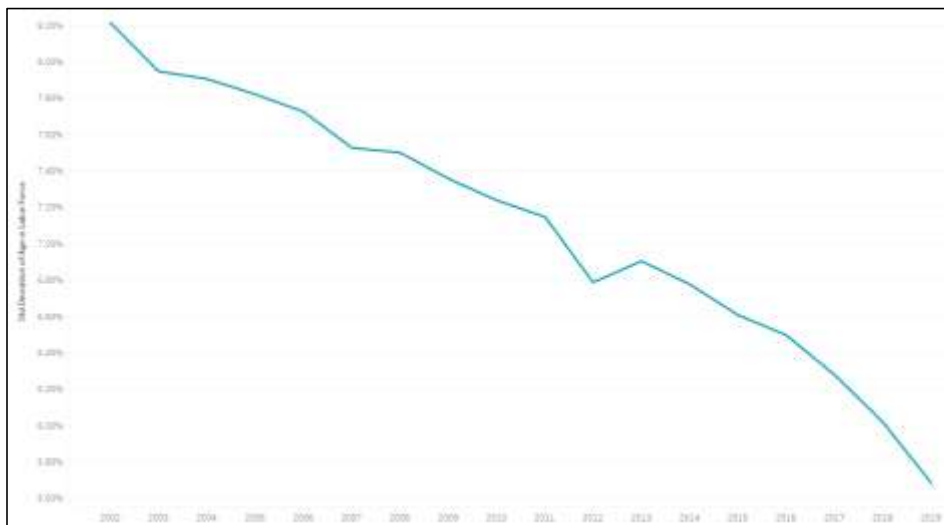
Note. Adapted from “Number of Students” by OECD, 2021.

(<https://data.oecd.org/students/number-of-students.htm#indicator-chart>). Copyright 2021 by the Organization for Economic Co-operation and Development.

Mexico’s workforce is evolving into a more age-balanced community. The number of workers from the different age groups between 25 and 64 are closing, as are the number of workers under 25, and 65 and older. The standard deviation for the proportion of workers from age bands between 25 to 64 is shown in Figure 136, while Figure 137 shows the same metric for age bands 15 to 24, and 65 and older. The downtrends observed in both graphs demonstrate the increased age diversity in the Mexican workforce.

Figure 136

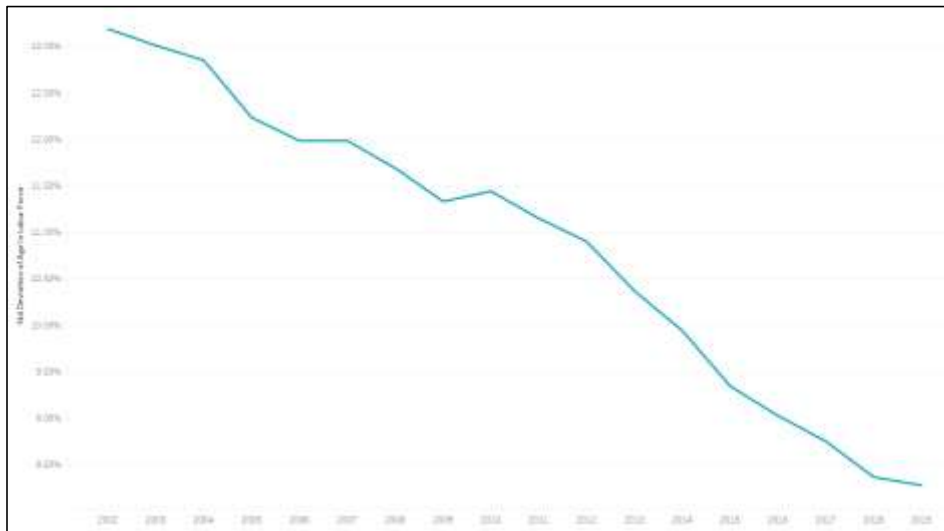
Standard Deviation for the Proportion of Workers from Age Bands 25 to 64 in the Mexican Workforce from 2002 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Mexico from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat.ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

Figure 137

Standard Deviation for the Proportion of Workers from Age Bands 15 to 24, and 65 and Older in the Mexican Workforce from 1995 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Mexico from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

The researcher could not find any specific government action towards leveling the abilities of older workers to facilitate participation in the Mexican workforce in parity with other age groups. Nonetheless, the number of workers 55 and older continues to increase. According to Montoya-Arce and Montes-de-Oca-Vargas (2009) workers may continue working beyond retirement age out of necessity because they may not be entitled to a pension. In fact, they highlight that 85% of adults in retirement age that worked all their lives do not meet the

requirements to be entitled to a retirement pension; 36% continue working. One of the requirements is to have had a formal job for at least 30 years. Women are at a disadvantage because of the difficulty of sustaining a formal and household duties.

Proving the relationships between workforce age diversity and innovation in the case of Mexico. The researcher found five relationships between workforce age diversity and different innovation measures lagging ten, fifteen, and twenty years. Next, each of the identified relationships will be challenged against Mexico's case.

Standard deviation for the proportion of workers from age bands 15 to 24, and 65 and older, and the country's score in the Ease of credit indicator of the Global Innovation Index at ten years lag. Based on the model graphically described in Figure 91, the score in the Ease of credit indicator of the Global Innovation Index for the years 2013 to 2020 should have been approximately 65 to 85, considering that the standard deviation for the proportion of workers in age bands 15 to 24, and 65 and older in the Mexican workforce was between 11.3–13.0% for the years 2003 to 2010 (Figure 137). The actual scores for Mexico in the Ease of getting credit indicator of the Global Innovation Index for years 2013 to 2020 are shown in Figure 138. Actual results are higher than what was expected, based on the relationships observed in this study. In comparison with Finland, Mexico had better scores in the same indicator, except for an abnormal data point in 2019, as shows in Figure 139. These results support the trend of the model in Figure 91 that projects that with less balance between the proportion of workers in these age groups will return better scores in the Ease of getting credit indicator.

Commented [DAG106]: Thirty-six percentage

Figure 138

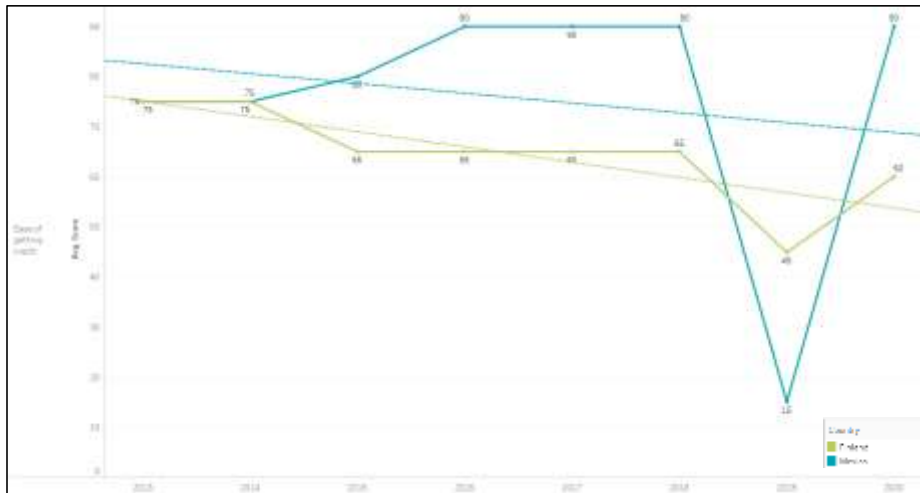
Mexico's Scores in the Ease of Getting Credit Indicator of the Global Innovation Index for Years 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Figure 139

Scores in the Ease of Getting Credit Indicator of the Global Innovation Index for Years 2013 to 2020: Finland and Mexico.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Standard deviation for the proportion of workers from age bands 15 to 24, and 65 and older, and the country's score in the Ease of credit indicator of the Global Innovation Index at fifteen years lag. Based on the model graphically described in Figure 93, the score in the Ease of credit indicator of the Global Innovation Index for the years 2017 to 2020 should have been approximately 75 to 90, considering that the standard deviation for the proportion of workers in age bands 15 to 24, and 65 and older in the Mexican workforce was between 12.2–13.2% for the years 2002 to 2005 (Figure 137). The actual scores for Mexico in Ease of getting credit of the

Global Innovation Index for the years 2013 to 2020 are shown in Figure 138 and align with the higher end of the range of expected values, based on the relationships observed in this study.

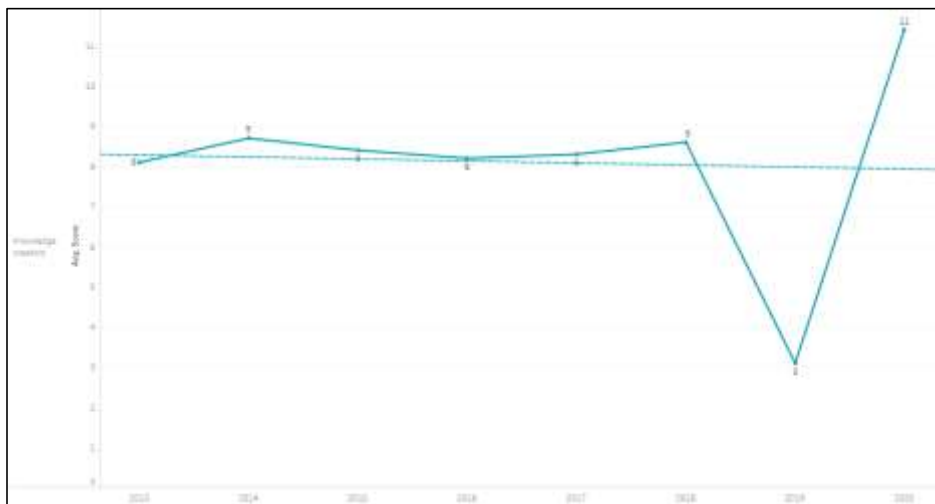
Standard deviation for the proportion of workers from age bands 15 to 24, and 65 and older, and the country's score in the Ease of credit indicator of the Global Innovation Index at twenty years lag. The researcher could not find age diversity data for Mexico before 2002.

Therefore, relationships at twenty years lag were unable to be tested with Mexico.

Standard deviation for the proportion of workers from age bands 25 to 64 and the country's score in the Knowledge creation sub-pillar of the Global Innovation Index at twenty years lag. The researcher could not find age diversity data for Mexico before 2002. Therefore, relationships at twenty years lag were unable to be tested with Mexico. Figure 140 is shown for reference.

Figure 140

Mexico's Scores in the Knowledge Creation Sub-Pillar of the Global Innovation Index for Years 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Standard deviation for the proportion of workers from age bands 25 to 64 and the country’s score in the Knowledge and technology outputs pillar of the Global Innovation Index at twenty years lag. The researcher could not find age diversity data for Mexico before 2002. Therefore, relationships at twenty years lag were unable to be tested with Mexico. Figure 141 is shown for reference.

Figure 141

Mexico’s Scores in the Knowledge and Technology Outputs Pillar of the Global Innovation Index for Years 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020,

(<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Ethnic/Nationality diversity in the Mexican workforce. Mexico has the absolute lowest proportion of foreign workers from all countries in this study, excluding Singapore, Hong Kong, and Chile for which nationality data in the workforce was not available. Historically, foreign workers have been less than 0.5% of the total workforce. This is significantly lower than what is allowed by Article 7 of the Federal Labor Law, which establishes a maximum of 10% (Sanchez, 2015). Figure 142 shows the trend for foreign workers in the Mexican workforce from 2002 to 2019.

Figure 142

Foreign Workers in the Mexican Workforce from 2002 to 2019.



Note. The age diversity data was an adaptation of the workforce data for Mexico from “[Dataset: Labor Force by Sex, Age, and Place of Birth (thousands) – Annual]. *ILOSTAT Explorer*”, by the

International Labor Organization, n.d., (<https://ilostat ilo.org/data/>). Copyright 1996-2020 by the International Labor Organization.

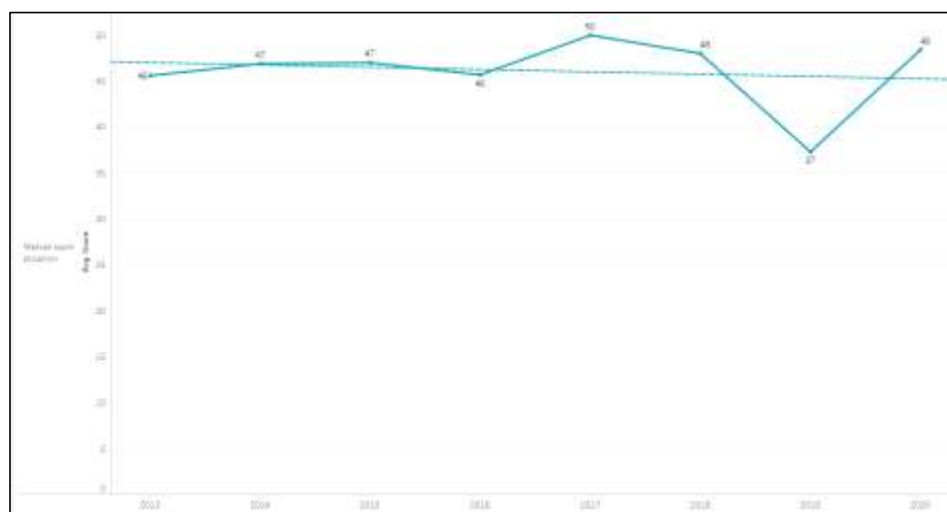
Proving the relationships between workforce ethnic/nationality diversity and innovation in the case of Mexico. The researcher found two relationships between workforce ethnic/nationality diversity and different innovation measures lagging zero and twenty years. Next, each of the identified relationships will be challenged against Finland's case.

Proportion of foreign workers and the country's score in the Knowledge creation sub-pillar of the Global Innovation Index at zero years lag. Based on the model graphically described in Figure 88, the score in the Knowledge creation sub-pillar of the Global Innovation Index for the years 2013 to 2020 cannot be explained, considering that the proportion of foreign workers in the Mexican workforce was between 0.4–0.5% for the years 2013 to 2020 (Figure 142), which goes outside of the model's range. The actual scores for Mexico in the Knowledge creation sub-pillar of the Global Innovation Index for the years 2013 to 2020 are shown in Figure 140.

Proportion of foreign workers and the country's score in the Market sophistication pillar of the Global Innovation Index at twenty years lag. The researcher could not find ethnic/nationality diversity data for Mexico before 2002. Therefore, relationships at twenty years lag were unable to be tested with Mexico. Figure 143 is shown for reference.

Figure 143

Mexico's Scores in the Market Sophistication Pillar of the Global Innovation Index for Years 2013 to 2020.



Note. The Global Innovation Index scores data from 2013 to 2020 is from “[Indicator Rankings & Analysis | Global Innovation Index]”, by Cornell University, INSEAD, and WIPO, 2020, (<https://www.globalinnovationindex.org/analysis-indicator>). Copyright 2020 by Cornell INSEAD WIPO.

Summary of Findings on Workforce Diversity and Innovation

Sixteen substantially good models were developed using longitudinal data from the ten original countries in scope. The models describe relationships in the short, medium, and long terms, with zero years lag, five to ten years lag, and fifteen to twenty years lag. The models identified were challenged against the case studies for Finland and Mexico. Seven of the sixteen models were confirmed through the case study validation. Six of them are related to gender diversity in the country’s workforce, while one is related to age diversity in the country’s

workforce. None of the models with ethnicity/nationality diversity metric was confirmed. Table 23 summarizes the results of the test.

Table 23

Models for Workforce Diversity versus Innovation and Case Study Validation

Workforce Diversity Variable	Innovation Measure	Model	Finland Validation Result	Mexico Validation Result
Zero Years Lag				
Proportion of foreign-born workers	Knowledge Creation	$357614 x^4 - 227475 x^3 + 42805.1 x^2 - 1513.76 x - 95.9863$	Out of range	Out of range
Ten Years Lag				
Proportion of female workers	Institutions	$-682.723 x^2 + 775.467 x - 125.142$	Confirmed	Confirmed
	Global Innovation Index	$143528 x^4 - 278477 x^3 + 199660 x^2 - 2543.6 x + 7259.99$	Confirmed	Confirmed
Standard deviation for the proportion of workers in age groups 15 to 24, and 65 and older	Ease of getting credit	$95430.9 x^3 - 29266.3 x^2 + 2684.35 x$	Confirmed	Failed
Fifteen Years Lag				
Proportion of female workers	Global Innovation Index	$77360.6 x^4 - 149149 x^3 + 105712 x^2 - 32515.5 x + 3702.7$	Confirmed	Confirmed
Standard deviation for the proportion of workers in age groups 15 to 24, and 65 and older	Ease of getting credit	$11837.5 x^3 - 10532.8 x^2 + 1764.27 x$	Confirmed	Confirmed
Twenty Years Lag				
Proportion of female workers	Knowledge creation	$199776 x^4 - 393380 x^3 + 283555 x^2 - 88417.8 x + 10082.7$	Failed	Confirmed
	ICT access	$-81671.3 x^4 + 165816 x^3 - 124452 x^2 + 40873.6 x - 4868.51$	Confirmed	Confirmed
	Institutions	$-53881.6 x^4 + 106439 x^3 - 77887.6 x^2 + 25044.1 x - 2899.15$	Failed	Confirmed
	Knowledge and technology outputs	$105150 x^4 - 204798 x^3 + 146172 x^2 - 45142.5 x + 5119.25$	Failed	Confirmed
	Global Innovation Index	$-668.146 x^2 + 700.584 x - 119.868$	Confirmed	Confirmed

	Human capital and research	$12007.2 x^4 + 23974.7 x^3 - 18182.4 x^2 + 6272.99 x - 776.97$	Confirmed	Confirmed
Standard deviation for the proportion of workers in age groups 15 to 24, and 65 and older	Ease of getting credit	$-75827.1 x^3 + 9772.19 x^2 + 695.543 x$	Failed	No data to test
Standard deviation for the proportion of workers in age groups 25 to 64	Knowledge creation	$-2416330 x^4 + 1567360 x^3 - 369008 x^2 + 37821.6 x - 1404.57$	Out of range	No data to test
Standard deviation for the proportion of workers in age groups 15 to 24, and 65 and older	Knowledge and technology outputs	$1990410 x^4 + 1360900 x^3 - 341249 x^2 + 37358 x - 1460.32$	Out of range	No data to test
Proportion of foreign-born workers	Market sophistication	$-848436 x^3 + 283112 x^2 - 30219.1 x + 1098.47$	Out of range	No data to test

Note. An “Out of range” validation result corresponds to a non-testable value due to the

limitations of the model. A “No data to test” validation result is driven by missing data points. A “Failed” result corresponds to a model that was unable to predict the actual value observed in the case study, based on the graphical representation. A “Confirmed” result corresponds to a model that was able to predict the actual value observed in the case study, based on the graphical representation.

Gender diversity in the workforce of countries and innovation. The graphical representations of the relationships between gender diversity and the different innovation measures show that for most cases a proportion of female workers between 45% and 55% will deliver the best results in the impacted innovation metrics. Nine of the twelve countries studied were within that range in the latter years. Three countries were below that range: Chile, Costa Rica, and Mexico. The three countries were also at the bottom of the overall Global Innovation Index results from 2013 to 2020, from the list of countries analyzed.

The researcher identified multiple connections that influence a higher proportion of female workers in country workforces, and therefore, better scoring in certain indicators of the Global Innovation Index.

1. Progressive parenthood: comes in multiple forms and varies depending on the context of the society; nine of the countries in the research reached the 45% threshold for the proportion of female workers in the workforce at some point between 1990 to 2019. The other three countries have been consistently increasing the proportion of female workers as well. Progressive parenthood policies have been key in most of these countries to increase and sustain a high number of female workers. For example:
 - a. Access to birth control methods – mentioned in the case of Sweden, Finland, the United States, Canada, Costa Rica, and Mexico. Childcare is one of the principal reasons for women abandoning the workforce. Having access to birth control methods provides women with alternatives to decide if they want to have a family, when to have it, and how big will it be.
 - b. Gender neutral parenthood – countries like Sweden and Finland lead the way with labor laws that incentivize equal involvement of both parents of a newborn, regardless of the gender. Israel is also evaluating the general reduction of working hours so both parents have more time for their family. Also, legislation for affordable childcare has been approved in Finland and Costa Rica to ease the parental burden and to prevent them, traditionally the mother, from sacrificing their career for child rearing.
 - c. Working-mothers sponsorship measures – countries that still embrace more traditional gender roles have opted for alternatives to ease the load of the

mother so she can perform dual responsibilities as parent and worker. The most common alternative has been to normalize flexible working schedules like in Switzerland, Singapore, Canada, and Hong Kong. Singapore has also eased its immigration policies for household helpers to support Singaporean women in the workforce and has implemented measures for retraining female professionals for reinsertion into the workforce after maternity leave.

2. Growing female representation in law making. Except for Singapore, in the other countries the growth in the proportion of female workers in the workforce goes hand in hand with the growth of female representation in law making political bodies. Finland, Sweden, Switzerland, Canada, Costa Rica, and Mexico have exceeded the 30% female representation in their parliaments and congresses. All others have shown a steady but slower growth.
 - a. Gender quotas have turned out to be an effective method for increasing female representation in political party candidacy, as seen in Costa Rica, Mexico, and Chile.
 - b. More political parties increase the potential of more female candidates. In combination with gender quotas, having more political options increases the chance for women to get elected. This has been seen in Sweden, Switzerland, Mexico, and Costa Rica. On the contrary, having limited options has been holding the United States back in progressing with female representation in law making.
3. The gender wage gap is not a leading indicator for the proportion of female workers in the workforce. Very progressive countries with high participation of women in the

workforce, such as Finland, still have a high gender wage gap, while others with lower participation of women in the workforce, like Costa Rica, have a low gender wage gap. The gender wage gap may be caused by occupational segregation, like in Finland, Israel, and Canada, or by flexible working schedules, like in Switzerland. In other countries, like United States and Honk Kong, the gender wage gap was very much correlated to maternity penalties, and it can be addressed through progressive parenthood policies.

Age diversity in the workforce of countries and innovation. The graphical representations of the relationships between age diversity and the different innovation measures show that a standard deviation for the proportion of workers in age groups 15 to 24, and 65 and older between 5% and 12% will deliver the best results in the Ease of getting credit indicator. This is achieved by striking the right balance of progressive transitions in and out of the workforce through thoughtful orchestration. The researcher identified common ground that helps maintain a healthy combination of young and old workers.

1. Young adults stay longer in school. The countries in this study have managed to incentivize tertiary education among young adults, some of them through promising better wages, or simply by increasing the chances of getting hired.
2. Elderly-friendly workforce. Retaining older workers cannot be solely driven by the potential collapse of retirement funding systems. Older workers must be appreciated as a valuable source of labor, innovation, and competitive advantage. Investments to help the elderly to stay competitive through training and development have been made in Finland and Singapore. Other countries like Chile, have empowered older workers to negotiate simplified labor contracts that meet their needs for a smooth

transition out of the workforce. Chile also allows older workers to keep or acquire government benefits applicable to their age while they keep active in the labor force. Sweden provides tax credits that are more attractive for older workers than retiring. Israel's proposal to reduce the total working hours for all workers can extend the span of the productive life of workers. A variant to this could be the flexibilization of labor laws to incorporate pauses along workers' careers. Taking two to three breaks of six months to a year could contribute to multiple objectives like avoiding health risk factors such as stress, rectify gender disparity and motherhood-related disadvantages, and boost creativity through rested minds.

Ethnic/Nationality diversity in country workforce and innovation. The results of the connection between ethnic/nationality diversity in the workforce and innovation were inconclusive because the workforce's ethnic/nationality diversity profile of the countries used for confirmation through case studies were very distinct from those used to build the models. Data availability related to ethnic/nationality categorization of the workforce was very limited.

Two new theories have emerged from this research with implications to the world of practice. In the next chapter the researcher explains how these results answer the research questions.

Chapter 5: Discussion

Introduction

This study intended to fill a void in theory related to the relationship between the workforce demographic diversity in a country and its innovation competitiveness. Understanding the clear benefits of diverse teams for boosting innovation at the micro level, the researcher wanted to confirm if the social dynamics in a country related to workforce demographic diversity have any effects in its innovation competitiveness. Workforce demographic diversity was defined in the context of gender, age, and ethnicity or nationality. Innovation competitiveness was defined in the context of the Global Innovation Index. Gender diversity was measured as the proportion of female workers in the country's workforce. Age diversity was measured as the standard deviation between the proportion of workers in the country's workforce from different age groups, divided in age groups 25 to 64, 15 to 24, and 65 and older. Ethnic or nationality diversity was measured as the proportion of foreign-born workers in the country's workforce. A combined methodology of grounded theory and case studies helped with delivering and testing new theories based on data analysis and provide answers to ontological research questions.

Ten countries were selected within the scope of this study: Canada, Chile, Costa Rica, Cyprus, Hong Kong, Israel, Singapore, Sweden Switzerland, and the United States. Two additional countries were case studied to test the findings. Longitudinal analyses covering from 1990 to 2019 helped identify and test relationships between workforce diversity and innovation measures.

Seven research questions guided this study through the grounded theory methodology to discover common connections between workforce diversity and innovation that could be confirmed following the case study methodology. Research questions were the following:

1. What is the innovation competitiveness profile of the country?
2. How has the innovation competitiveness profile of the country changed over time?
3. What is the demographic diversity profile of the country's workforce?
4. How has the demographic diversity profile of the country's workforce evolved over time?
5. What diversity fostering policies have been implemented in the country over time?
6. What has been the effect of these policies in the demographic diversity profile of the country's workforce?
7. What relationship between workforce demographic diversity and innovation competitiveness can be abductured from the data collected?

Research Questions #1 and #2

A snapshot of the innovation performance of the countries in the study based on the Global Innovation Index was taken. The countries were ranked using the average score in the Global Innovation Index from 2013 to 2020: Switzerland, Sweden, United States, Singapore, Hong Kong, Israel, Canada, Cyprus, Chile, and Costa Rica.

A longitudinal analysis of the innovation profile of each country was performed to determine how these countries were evolving. It was found that the Switzerland and Sweden were consistently the top performers for the period, while Chile and Costa Rica remained at the bottom for the entire period. Chile and Costa Rica also had more variability in the Global Innovation Index score in comparison to the European countries.

For each country, strengths and weaknesses at the pillar and sub-pillar level were highlighted as presented in the Global Innovation Index reports. The strengths and weaknesses ratio was developed to monitor if there was a relationship between overall performance and the balance between strengths and weaknesses. It was found that the ratio of strengths and

weaknesses is not directly related to overall performance. The first five countries analyzed—Switzerland, the United States, and Hong Kong—ranked first, third, and fifth, respectively; they had better ratios than Sweden and Singapore who ranked second and fourth. It was later found that the best scores in the strengths and weaknesses ratio were countries with masculine societies. It was also found that Market Sophistication was a common strength identified in most of the countries in the study with masculine societies: the United States, Hong Kong, Canada, and Cyprus. Meanwhile, Business Sophistication was a common strength identified in most of the higher performing countries with feminine societies: Sweden, Singapore, and Israel.

Research Questions #3 and #4

The total population for each country as presented in the Global Innovation Index reports was longitudinally analyzed. Trends in population growth were calculated using year-over-year ratios, and the sources of growth were identified. Understanding the source of the population growth helped connect government postures regarding policies such as immigration, birth control, retirement, etc.

Next, the total workforce for each country was analyzed in a longitudinal view, identifying patterns and turning points that helped pinpoint economic recessions. This information was valuable to determine if recessions that impacted the overall workforce had different impact in diversity measures. For example, it was found that in most countries with masculine societies the proportion of female workers in the workforce increased during recessions, and then decreased after the economy stabilized. Meanwhile, in countries with feminine societies, the proportion of women in the workforce had a delayed impact of about one year after the recession hit.

Diversity of the total workforce was analyzed from three perspectives: gender diversity, age diversity, and ethnic/nationality diversity. Gender diversity was measured using the proportion of female workers in the workforce. Age diversity was measured using two calculations: the standard deviation for the proportion of workers in age groups between 25 and 64, and the standard deviation for the proportion of workers in age groups between 15 to 24, and 65 and older. The reason that two calculations were used to measure age diversity is that naturally, it is expected that the proportions of workers transitioning in and out of the workforce are significantly lower than the proportions of workers between 25 and 64. Ethnic/nationality diversity was measured using the proportion of foreign-born workers in the workforce.

The diversity measures were longitudinally analyzed to identify patterns and turning points that could trigger research for underlying policies or societal factors that may have driven the change. The researcher found that in some countries recessions triggered different results for the different diversity measures, like the aforementioned impact to the proportion of female workers, younger workers, and foreign workers. The researcher also found a general uptrend in the proportion of women in the workforce, a general trend to a more age-balanced workforce, a general trend to more parity between workers transitioning in and out of the workforce, and different patterns with regards to the proportion on foreign-born workers in the workforce.

Research Questions #5 and #6

Countries have implemented different policies overtime, and culture has been a key determinant in the type of policies implemented. Feminine societies such as Sweden, Finland, Singapore, and Costa Rica have been pioneering policy-making that have empowered women to actively participate in the country's economy and in the political decision-making. Policies such as voting rights for women and legal emancipation of married women were first implemented in

Finland and Sweden. Tax reforms that avoid a marriage penalty, gender quotas for political candidacies, and gender-neutral parenthood are other examples of policies implemented in these countries that have had an impact on the amount of women that participate in their workforce. Masculine societies such as Switzerland, the United States, Hong Kong, Canada, Cyprus, and Mexico have opted for alternatives such as birth control and flexible working schedules that have also been very effective to increase the proportion of female workers.

Aging workforces is an issue for most countries. Several have been implementing measures to retain older workers active in the workforce for longer, mostly because it would be economically unviable for governments to support such a large population, most of them with health conditions. The most common strategy has been to delay the retirement age and make it less attractive for workers through the reduction of benefits. More progressive countries are looking at the elderly as a source of talent that is capable of producing. Countries like Singapore and Finland have established programs to provide training and development to older workers so they can be equally equipped as younger generations to contribute to today's workforce. Others, like Chile and Sweden, have empowered older workers with flexible working schedules, parallel government support, and tax credits that help make retirement smoother.

Policies around immigration and foreign workers are very distinct for each country. Canada, for example, has a very aggressive posture to attract more foreign workers as one of its main sources of labor. Cyprus also foresees that immigration will be the primary sources of population growth for the upcoming years and is looking for alternatives to source labor from immigrants. Finland is in a similar situation. With a steady population that is growing older, immigration is a fairly new concept for Finland, and attracting educated foreign workers is a challenge for policy makers. Other countries, like the United States and Israel have implemented

policies that will reduce the number of foreign workers in the country. The United States has the largest population in this study, and Israel has high fertility rates. Neither of these countries would have labor scarcity that would force them to source labor from overseas.

However, the United States had significant benefits from its openness to educated foreign workers that arrived in the country in the 2000s. These highly educated immigrants are more likely to have a background in science, technology, engineering, or mathematics than U.S. born workers with a college education, so it was very beneficial for generating economic growth from immigration (Peri, 2017). In summary, there is not a standard for sourcing labor from overseas. It should be well orchestrated to ensure that foreign-sourced labor does not cannibalize opportunities for women and the elderly and that it fits the tactical and strategic needs of the country.

Research Question #7

Gender diversity and age diversity were found to have a relationship with multiple components of the Global Innovation Index in the mid and long terms. Ethnic or nationality diversity could not be confirmed to have a relationship with the Global Innovation Index or any of its components.

A proportion of female workers in a country's workforce between 45% and 55% was graphically identified as ideal to maximize the multiple relationships with the Global Innovation Index and some of its components. The related innovation measures are: Institutions pillar lagging ten years, Global Innovation Index lagging ten years, Global Innovation Index lagging fifteen years, ICT access indicator lagging twenty years, Global Innovation Index lagging twenty years, and Human capital and research pillar lagging twenty years.

Progressive parenthood policies such as birth control, gender neutral parenthood, and working-mothers sponsorship measures, as well as increased female representation in law making bodies through gender quotas and increased number of political parties have been found to positively impact the proportion of female workers. The gender wage gap was found to be irrelevant to the proportion of women in the workforce because, for some countries, the underlying causes for the gap could be, in fact, incentivizing the participation of women in the workforce, such as flexible working schedules.

A standard deviation for the proportion of workers in age groups 15 to 24, and 65 and older between 5% and 12% was graphically identified to deliver the best results in the Ease of getting credit indicator lagging fifteen years. Countries that continue to retain young adults at school for longer, while creating elderly-friendly workforces are hitting the right diversity balance between workers of these two age groups. Smoother transitions in and out of the workforce are beneficial for innovation in the mid-term.

Conclusions and Implications

This study is the first attempt to develop theory that connects diversity and innovation at the macro level, looking at relationships between countries' workforce diversity and the Global Innovation Index. Two new theories emerged from this research: the first proposes that progressive parenthood policies and increased female representation in law making bodies have a positive impact in the gender diversity of a country's workforce, and a consequent mid to long-term positive impact in the Global Innovation Index and some sub-measures: the second proposes that countries that retain young adults at school for longer, while creating elderly-friendly workforces, are more likely to have the right diversity balance between workers

transitioning in and out of the workforce and will consequently have better mid-term results in the Ease of getting credit indicator.

Implications for practice. This research builds over the foundations of theories that connect diversity and innovation at the micro level. It strengthens the business case for more diverse workforces, not just because it is the right thing to do, but because it fosters the innovation-based global competitiveness of countries. The proposed theories have implications for policy makers ruling the global labor markets. Countries must remove social barriers that limit the equal participation of genders in the workforce and must create labor markets that can adjust to the needs of its participants, regardless of gender and age.

The emerging theories may be used to create new indicators or strengthen existing indicators in the calculation of the Global Innovation Index. Understanding the mid- to long-term impact of progressive parenthood policies, increased female representation in law making bodies, and elderly-friendly workforces in the Global Innovation Index and some of its sub-measures, justifies to consider adding them as indicators within the Innovation Input Sub-index. This may incentivize countries to progress workforce diversity fostering policies.

Implications for future research. There are several potential areas for further research that were unable to be covered in this study. The results on the connection between ethnic/nationality diversity in workforce and innovation were inconclusive because the workforce's ethnic/nationality diversity profile of the countries used for confirmation through case studies were very distinct from the profiles of the countries used to build the models. Data availability related to ethnic/nationality categorization of workforce was very limited. It is encouraged to expand on the initial results by incorporating a larger scope of countries and limiting the analysis to ethnic/nationality workforce diversity. Incorporating better ethnic

diversity measures such as race, ethnicity, and second-generation immigrants would be enriching for developing new theories applicable to workforce ethnic diversity and innovation at the macro level.

The emerging theories are grounded on and confirmed for analyses covering the overall workforce. Applicability on specific industries and job categories were not tested in this research. A second opportunity for further research would be to scope the analyses for specific industries and job categories, particularly within STEM occupations.

In this research, all variables were isolated and models were built with single independent variables. A third opportunity for research would be to develop multi variable models that consider the interaction of the multiple diversity measures. This may help answer, among other questions, an emerging inference that foreign-sourced labor may cannibalize opportunities for women and older workers.

Finally, Hair et al. (2017) cited by Martínez Ávila and Fierro Moreno (2018) that a model that has $R^2 \geq 0.75$ is substantially good, and a model that have $R^2 \geq 0.50$ is good to predict results. This study scoped the analysis only in sixteen substantially good models. There are 107 additional models with $R^2 \geq 0.50$ that could be analyzed further to confirm through case studies if the relationships are valid or not. These models are compiled in Appendix I for reference for further research.

Appendix I: Substantially Good Models with $R^2 \geq 0.50$ and < 0.75

Diversity Variable	GII Measure	Model	R2	P-Value
<i>Zero Years Lag</i>				
% Women in Labor Force	GII	$-1411.18x^2 + 1460.3x - 318.049$	0.557568	<.0001
% Women in Labor Force	Institutions	$-566.54x^2 + 717.153x - 127.451$	0.598093	<.0001
% Women in Labor Force	Business Environment	$-966.165x^2 + 1075.32x - 207.55$	0.616156	<.0001
% Foreigners in Labor Force	Business Environment	$12581.7x^3 - 9567.31x^2 + 2311x - 92.4673$	0.671236	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Business Environment	$-1606870x^4 + 277069x^3 - 18923.9x^2 + 432.996x - 88.2092$	0.661661	<.0001
% Women in Labor Force	Human Capital and Research	$-1101.11x^2 + 1227.3x - 279.984$	0.545984	<.0001
% Foreigners in Labor Force	Human Capital and Research	$-136772x^4 + 142108x^3 - 52848.7x^2 - 412.874$	0.617318	<.0001
% Women in Labor Force	ICT Access	$-1290x^2 + 1371.16x - 278.476$	0.557491	<.0001
% Foreigners in Labor Force	ICT Access	$21252.4x^3 - 13966.6x^2 + 2975.17x - 125.591$	0.700681	<.0001
% Women in Labor Force	Market Sophistication	$-2135.01x^2 + 2215.35x - 498.823$	0.630168	<.0001
% Foreigners in Labor Force	Market Sophistication	$-147421x^4 + 156322x^3 - 59589.8x^2 + 9632.27 - 483.79$	0.66208	<.0001
% Women in Labor Force	Investment	$-2120.24x^2 + 2305.73x - 550.92$	0.574159	<.0001
% Foreigners in Labor Force	Investment	$-468506x^4 + 439000x^3 - 149645x^2 + 21881.1x - 1087.95$	0.594752	<.0001

% Women in Labor Force	Business Sophistication	$844365x^4 - 1552790x^3 + 1064420x^2 - 322168x + 36356.7$	0.514033	<.0001
% Foreigners in Labor Force	Business Sophistication	$323183x^4 - 252348x^3 + 69078.5x^2 - 7682.68x + 334.312$	0.530555	<.0001
Std dev of % of workers from Age Groups 25-64	Business Sophistication	$19906.6x^3 - 11685.4x^2 + 1739.15x + 20.3236$	0.522872	<.0001
% Foreigners in Labor Force	Knowledge Workers	$39872.3x^3 - 26012.5x^2 + 5424.2x - 294.485$	0.51887	<.0001
% Foreigners in Labor Force	Knowledge & Technology Outputs	$555623x^4 - 435406x^3 + 120361x^2 - 13659.3x + 570.835$	0.715454	<.0001
% Women in Labor Force	Knowledge Creation	$3592350x^4 - 6580270x^3 + 4487870x^2 - 1350500x + 151310$	0.608573	<.0001
Std dev of % of workers from Age Groups 25-64	Knowledge Creation	$63315.7x^4 - 7681.35x^3 - 12489.5x^2 + 2856.22x - 45.0213$	0.504971	<.0001
% Women in Labor Force	Scientific and Technical Publications	$1422540x^4 - 2632000x^3 + 1810970x^2 - 548881x + 61841.4$	0.513402	<.0001
% Foreigners in Labor Force	Scientific and Technical Publications	$315121x^4 - 245115x^3 + 66317.6x^2 - 6942.45x + 251.255$	0.5772	<.0001
% Foreigners in Labor Force	Creative Outputs	$44709x^4 - 18386.8x^3 - 647.993x^2 + 960.721x - 40.5476$	0.643384	<.0001
<i>Five Years Lag</i>				
% Women in Labor Force	GII	$452830x^4 - 841725x^3 + 581697x^2 - 176999x + 20044.8$	0.657838	<.0001
% Foreigners in Labor Force	GII	$157931x^4 - 102364x^3 + 20930.8x^2 - 1235.97x + 36.4806$	0.671594	<.0001
% Foreigners in Labor Force	Innovation Inputs	$32357.2x^3 - 20528.6x^2 + 4158.94x - 207.071$	0.597517	<.0001

% Women in Labor Force	Institutions	$-850.77x^2 + 966.792x - 180.07$	0.723394	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Institutions	$-2165.93x^2 + 22.026x + 94.1724$	0.565517	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Political Environment	$7447280x^4 - 2291470x^3 + 244430x^2 - 10844.2x + 255.939$	0.501195	<.0001
% Women in Labor Force	Business Environment	$-1075.64x^2 + 1168.61x - 225.937$	0.66568	<.0001
% Foreigners in Labor Force	Business Environment	$-4770.63x^3 + 1421.39x^2 + 89.5965x + 51.0018$	0.574589	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Business Environment	$2327610x^4 - 706550x^3 + 70197.3x^2 - 2876.65x + 129.79$	0.651156	<.0001
% Women in Labor Force	Human Capital and Research	$-1040.48x^2 + 1164.17x - 263.038$	0.583907	<.0001
% Foreigners in Labor Force	Human Capital and Research	$152523x^4 - 98109.3x^3 + 19541x^2 - 1033.01x + 24.0012$	0.546046	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Human Capital and Research	$6462800x^4 - 2050460x^3 + 220920x^2 - 9582.21x + 195.132$	0.520148	<.0001
% Women in Labor Force	ICT Access	$-1450.82x^2 + 1513.02x - 307.743$	0.633984	<.0001
% Foreigners in Labor Force	ICT Access	$87102x^4 - 54952.4x^3 + 10690.3x^2 - 503.835x + 54.502$	0.511216	<.0001
Std dev of % of workers from Age Groups <25 and >=65	ICT Access	$3322830x^4 - 1034370x^3 + 106658x^2 - 4367.3x + 142.729$	0.504612	<.0001
% Women in Labor Force	Market Sophistication	$-1961.77x^2 + 2039.47x - 453.388$	0.59303	<.0001
% Foreigners in Labor Force	Market Sophistication	$193451x^4 - 132331x^3 + 28474.9x^2 - 1764.89x + 40.576$	0.607055	<.0001

Std dev of % of workers from Age Groups <25 and >=65	Market Sophistication	$128023x^3 - 35573.3x^2 + 2578.1x + 20.8542$	0.52043	<.0001
% Women in Labor Force	Investment	$-1966.44x^2 + 2147.67x - 509.505$	0.560101	<.0001
Std dev of % of workers from Age Groups 25-64	Investment	$208593x^4 - 136023x^3 + 27056.4x^2 - 1878.17x + 116.539$	0.547314	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Investment	$11830000x^4 - 3747910x^3 + 406701x^2 - 18083.8x + 344.358$	0.520003	<.0001
% Women in Labor Force	Business Sophistication	$404844x^4 - 756555x^3 + 526234x^2 - 161297x + 18412.9$	0.53471	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Knowledge Workers	$1555160x^4 - 4897810x^3 + 532073x^2 - 23478.8x + 416.213$	0.531608	<.0001
% Foreigners in Labor Force	Knowledge & Technology Outputs	$251658x^4 - 162265x^3 + 33255.8x^2 - 2036.27x + 29.271$	0.60341	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Knowledge & Technology Outputs	$13342300x^4 - 4030110x^3 + 411875x^2 - 16512.5x + 259.715$	0.527967	<.0001
% Foreigners in Labor Force	Knowledge Creation	$470175x^4 - 299925x^3 + 60194.5x^2 - 3500.15x + 2.44164$	0.645863	<.0001
Std dev of % of workers from Age Groups 25-64	Knowledge Creation	$290488x^4 - 191964x^3 + 36870.5x^2 - 1909.28x + 48.7304$	0.507619	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Knowledge Creation	$21651600x^4 - 6598150x^3 + 675796x^2 - 26819.2x + 375.679$	0.589359	<.0001
<i>Ten Years Lag</i>				
Std dev of % of workers from Age Groups <25 and >=65	GII	$6782.58x^2 + 1131.53x + 14.0536$	0.62044	<.0001

% Women in Labor Force	Innovation Inputs	$210390x^4 - 397991x^3 + 279141x^2 - 85871.1x + 9816.48$	0.586304	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Innovation Inputs	$2820300x^4 - 973203x^3 + 111523x^2 - 4948.14x + 132.14$	0.555367	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Institutions	$-3153.2x^2 + 336.649x + 80.4948$	0.686173	<.0001
% Women in Labor Force	Political Environment	$-15235.4x^3 + 20904.5x^2 - 9271.46x + 1410.69$	0.660998	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Political Environment	$5266770x^4 - 2014530x^3 + 271794x^2 - 15393.5x + 396.739$	0.533557	<.0001
% Women in Labor Force	Business Environment	$-737.299x^2 + 814.409x - 133.333$	0.650288	<.0001
% Foreigners in Labor Force	Business Environment	$182114x^4 - 118187x^3 + 24537.9x^2 - 1596.13x + 79.3309$	0.597017	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Business Environment	$-2307.46x^2 + 148.705x + 86.7944$	0.666459	<.0001
% Women in Labor Force	Human Capital and Research	$-848.037x^2 + 957.784x - 206.574$	0.688048	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Human Capital and Research	$3866010x^4 - 1504720x^3 + 202283x^2 - 11130.3x + 267.268$	0.527546	<.0001
% Women in Labor Force	ICT Access	$-1132.35x^2 + 1183.64x - 221.286$	0.688311	<.0001
Std dev of % of workers from Age Groups <25 and >=65	ICT Access	$1374860x^4 - 495017x^3 + 57311.7x^2 - 2481.3x + 114.632$	0.592317	<.0001
% Women in Labor Force	Market Sophistication	$-1422.87x^2 + 1488.93x - 311.398$	0.621907	<.0001
% Foreigners in Labor Force	Market Sophistication	$220000x^4 - 138909x^3 + 27521x^2 - 1516.76x + 37.3137$	0.584668	<.0001

Std dev of % of workers from Age Groups <25 and >=65	Market Sophistication	$167684x^3 - 53224.9x^2 + 4889.95x - 62.6983$	0.648433	<.0001
% Women in Labor Force	Investment	$-1302.96x^2 + 1466.27x - 334.425$	0.566587	<.0001
Std dev of % of workers from Age Groups 25-64	Investment	$331239x^4 - 222470x^3 + 47954.8x^2 - 3863.4x + 179.039$	0.536405	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Investment	$7498630x^4 - 2900450x^3 + 389505x^2 - 21587.2x + 483.377$	0.535293	<.0001
% Women in Labor Force	Business Sophistication	$-15120.4x^3 + 20712.2x^2 - 9136.58x + 1346.51$	0.618401	<.0001
Std dev of % of workers from Age Groups 25-64	Business Sophistication	$346858x^4 - 210937x^3 + 39972.4x^2 - 2487.73x + 100.478$	0.583844	<.0001
% Women in Labor Force	Knowledge Workers	$80600.4x^4 - 176283x^3 + 139947x^2 - 47753.9x + 5968.51$	0.546809	<.0001
Std dev of % of workers from Age Groups 25-64	Knowledge Workers	$483691x^4 - 301613x^3 + 58913.9x^2 - 3829.03x + 135.208$	0.542981	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Knowledge & Technology Outputs	$10374000x^4 - 3873110x^3 + 503254x^2 - 26687.1x + 533.967$	0.594935	<.0001
% Women in Labor Force	Knowledge Creation	$313119x^4 - 615707x^3 + 445944x^2 - 140771x + 16357.2$	0.503491	<.0001
Std dev of % of workers from Age Groups 25-64	Knowledge Creation	$955313x^4 - 617054x^3 + 129012x^2 - 9524.56x + 240.681$	0.57887	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Knowledge Creation	$15928000x^4 - 6044030x^3 + 791965x^2 - 41786x + 788.377$	0.684898	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Creative Outputs	$3881310x^4 - 1404340x^3 + 173305x^2 - 8452.27x + 183.973$	0.581416	<.0001

% Foreigners in Labor Force	Video Uploads on YouTube	$-4680270x^4 + 2937490x^3 - 661720x^2 + 63986.7x - 2172.15$	0.653446	0.0085242
<i>Fifteen Years Lag</i>				
Std dev of % of workers from Age Groups <25 and >=65	GII	$-7017.15x^2 + 1210.82x + 8.91731$	0.580985	<.0001
% Women in Labor Force	Innovation Inputs	$103580x^4 - 192679x^3 + 132180x^2 - 39504.6x + 4384.37$	0.526266	<.0001
% Women in Labor Force	Institutions	$-502.953x^2 + 575.523x - 69.9054$	0.718008	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Institutions	$-4825.34x^2 + 681.042x + 65.6602$	0.633352	<.0001
% Women in Labor Force	Political Environment	$-106916x^4 + 195432x^3 - 132593x^2 + 39709.6x - 4358.8$	0.56548	<.0001
% Women in Labor Force	Human Capital and Research	$-597.249x^2 + 684.641x - 132.277$	0.612546	<.0001
% Women in Labor Force	ICT Access	$-762.987x^2 + 797.707x - 120.697$	0.552681	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Market Sophistication	$-67745.6x^3 + 8564.45x^2 + 220.453x + 39.4665$	0.531171	<.0001
% Women in Labor Force	Business Sophistication	$-7289.04x^3 + 9650.46x^2 - 4008.98x + 569.334$	0.648241	<.0001
Std dev of % of workers from Age Groups 25-64	Business Sophistication	$485092x^4 - 326125x^3 + 72967.7x^2 - 6169.09x + 225.035$	0.512802	<.0001
% Women in Labor Force	Knowledge Workers	$88639x^4 - 190211x^3 + 148551x^2 - 49915x + 6142.11$	0.639189	<.0001
% Women in Labor Force	Knowledge & Technology Outputs	$193744x^4 - 382485x^3 + 278030x^2 - 87973.2x + 10247.2$	0.641048	<.0001

Std dev of % of workers from Age Groups 25-64	Knowledge & Technology Outputs	$212834x^4 - 163737x^3 + 38615.6x^2 - 2997.11x + 98.4156$	0.504014	<.0001
% Women in Labor Force	Knowledge Creation	$326591x^4 - 657391x^3 + 486030x^2 - 156128x + 18401.1$	0.682311	<.0001
Std dev of % of workers from Age Groups 25-64	Knowledge Creation	$-100075x^4 - 21841.3x^3 + 20592.9x^2 - 2534.43x + 103.204$	0.650677	<.0001
<i>Twenty Years Lag</i>				
Std dev of % of workers from Age Groups 25-64	GII	$-1490360x^4 + 1004500x^3 - 244656x^2 + 25474x - 902.615$	0.700611	<.0001
Std dev of % of workers from Age Groups 25-64	Institutions	$-1239770x^4 + 846749x^3 - 208213x^2 + 21694x - 718.62$	0.749202	<.0001
% Women in Labor Force	Political Environment	$-96524.7x^4 + 181279x^3 - 125876x^2 + 38363.4x - 4250.54$	0.685811	<.0001
% Women in Labor Force	Business Environment	$-26229.4x^4 + 56362x^3 - 44538.9x^2 + 15343.8x - 1857.04$	0.660269	<.0001
% Foreigners in Labor Force	Education	$-309.757x + 93.4891$	0.559403	0.0051536
% Women in Labor Force	Market Sophistication	$-2369.1x^4 + 16521x^3 - 20931.8x^2 + 9571.1x - 1398.31$	0.528251	<.0001
Std dev of % of workers from Age Groups <25 and >=65	Market Sophistication	$-499280x^3 + 114141x^2 - 8000.91x + 241.186$	0.580809	<.0001
% Foreigners in Labor Force	Ease of Credit	$727.263x - 1.68078$	0.714551	0.0005348
% Women in Labor Force	Investment	$-119149x^4 + 232224x^3 - 167819x^2 + 53324.6x - 6217.96$	0.54744	<.0001
% Women in Labor Force	Business Sophistication	$-1290.41x^3 + 1235.74x^2 - 176.732x + 6.2774$	0.712195	<.0001

Std dev of % of workers from Age Groups 25-64	Business Sophistication	$-67387.3x^3 + 24514.9x^2 - 2084.85x + 79.9364$	0.601874	<.0001
% Women in Labor Force	Knowledge Workers	$25881.2x^4 - 58726.8x^3 + 47346.8x^2 - 16035.2x + 1986.7$	0.691864	<.0001

Appendix II: Certification of Edition

I hereby certify that I have read and edited, according to the guidelines established by the Publication Manual of the APA, seventh edition, the dissertation titled *DIVERSITY AND INNOVATION: A GROUNDED THEORY FROM THE MICRO TO THE MACRO PERSPECTIVE*, authored by Nelcar Rivera Martínez, as requisite to obtain a degree of DOCTOR OF PHILOSOPHY IN BUSINESS ADMINISTRATION, to be awarded by the Inter American University of Puerto Rico, San Germán, Puerto Rico.



May 3, 2021

—
Eliud Ramos

Date

ABOUT THE EDITOR

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