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Immigration Policy Evaluation for Technology Professionals Immigrants in the United States

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Immigration Policy Evaluation for Technology Professionals Immigrants in the United States

by

Angel Contreras Cruz

A dissertation submitted in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy
in
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Dissertation Committee:
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ABSTRACT

The U.S. Immigration System is complex for technology professionals seeking to relocate to the United States for employment or education. The United States relies on its employment-based immigration to attract and select the best talent to fill the shortage of skilled jobs. Technology professionals, a stream of highly skilled immigrants, tend to contribute and be more beneficial to the U.S. economy, which is one of the principles of U.S. immigration policies. Although U.S. immigration policies are constantly updating, policymakers, experts, and scholars suggest that the United States needs significant immigration reform to solve current issues, such as improving technological capabilities to process applications, backlog, paths for permanent residence, numerical limits per visa category, and others.

Therefore, this research aims to develop a Hierarchical Decision Model (HDM) to evaluate U.S. immigration policies for technology professionals. Moreover, this research can guide policymakers to fix current U.S. immigration issues. The research process of this dissertation is organized as follows: (1) a systematic literature review was conducted to identify gaps, research questions, objectives, and an initial four-level HDM. The second level of the model includes five criteria: Technological, Regulatory Landscape, Economic, Political Interpretation & Proposals, and Social. The third level includes twenty-one sub-criteria, and the fourth level includes five alternatives: Permanent Residence and visas H-1B, O-1, F-1 STEM OPT, and L-1. (2) 60 experts working in some vein in U.S. immigration policies participated in this study to validate the HDM criteria, sub-criteria,

and alternatives and quantify the HDM criteria, sub-criteria, and alternatives using a pairwise comparison technique to provide their judgment. The last sections of this dissertation include (1) a sensitivity analysis to demonstrate the HDM's flexibility and (2) policy guide recommendations for decision-makers based on the HDM results.

DEDICATION

"A book, like a journey, begins with joy and ends with melancholy."

- Jose Vasconcelos

In the loving memory of my dad, Miguel Contreras Flores, thank you for always loving me and guiding me.

To my always-remembered friend Roland Richard, thank you for all the cherished memories.

This research is dedicated to my beloved wife, Karen, and daughters, Vania and Genesis, for their unconditional love and countless hours of support during this journey. I could not have done this without you beautiful ladies.

This research is also dedicated to my family in Mexico, my mom, Teresa Cruz Nuñez, and my siblings, Laura, Norma, Miguel, and Luis, to my family in Portland, Mario, Mariana, Berenice, and nieces and nephews, and to my friends and peers in Mexico and the United States.

Lastly, it is dedicated to all international students in the United States and skilled immigrants in the world.

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CHAPTER 1. INTRODUCTION

The first chapter of the dissertation provides the groundwork for this study. The research scope is defined, and the study's relevance is explained, along with why immigration policies should be evaluated during the research phase. This research focuses on technology professionals who are part of the broader stream of immigration, also called highly skilled immigration, in the United States. This study aims to evaluate the current issues of immigration policies that allow technology professional immigrants to study, work, or relocate in the United States. Since the contributions of technology-skilled immigrants help increase competitiveness and innovation in host countries, this topic has receipt greater attention from scholars.

International migration of technology professionals is a well-known phenomenon that has been studied from different perspectives, such as economics, political science social sciences, and innovation (Borjas, 1989; Cipolla, 1972; Hilaire-Pérez, 2008). There is no question that immigration is a topic that divides people's opinions. However, highly skilled immigrants tend to be more accepted by local residents than low-skilled immigrants mainly because of the positive outcomes they bring to the economy of host countries, such as reducing labor shortages and their economic and non-economic contributions (Hainmueller and Hiscox, 2010; OECD Secretariat, 2023). In a highly competitive labor market, technology professional immigrants often encounter numerous challenges shaped by immigration policies, labor market competition, lack of support of organizations, lack of professional networks, employment equity issues relative to the native population, and

anti- immigrant concerns (Borjas, 2011; Syed, 2008; Weinar and Klekowski von Koppenfels, 2020a).

International immigration is a geographic relocation process that involves several , challenges for all immigrants, including technological professional, such as language barriers, recertification procedures, probability of success, and cultural adaptation (Hall et al., 2011; Weinar and Klekowski von Koppenfels, 2020b). Scholars suggest countries have fierce global competition for highly skilled talent. Thus, the main drivers of this phenomenon are (1) the increasing number of people willing to relocate (Constant, 2014), (2) the increasing education levels in developing countries (Connor and Ruiz, 2019; Ferrucci, 2020), and (3) the attractiveness of host countries (Stiftung, 2019).

Because of the rapid development of novel technologies, the required skills for technology professional immigrants are changing faster than ever (Stiftung, 2019). New policies and programs are developed and implemented worldwide to receive the increasing number of technology-skilled migrants (Tani, 2014). All these factors have created a complex labor marker for immigrants who must learn to navigate barriers, such as geographical, technological, political, and economic issues (Glaeser, 2013; Gould and Moav, 2016; Xu et al., 2016; Xu. 2017). For the most part, scholars agree that technology professional immigrants can positively benefit host countries by increasing innovation (Bahar et al., 2020; Turner, 2022), scientific knowledge (Breschi et al., 2020; Weinar and Klekowski von Koppenfels, 2020), and knowledge economy (Kerr et al., 2017).

1.1 Research Scope

Lowell (2003) describes the United States as the "*world's largest skills magnet*." Hence, every year, millions of people seek to immigrate to the United States through employment or higher education. According to a report conducted by the Pew Research Center (2019), there are about 45 million immigrants living in the United States, up to 15 % of the U.S. population, which gives it the title of the country with the largest immigrant population worldwide (Abby Budiman, 2020; Batalova and Levesque, 2021). A report conducted by World Population Review estimates a 50.6 million immigrant population in the United States ranking first among the top countries (World Population Review, 2024).

The United States started to generate its first official immigration data during the 1850s U.S. Census. From 1850 to 1930, the foreign population in the United States grew sustainably from 2.2 million to 14.2 million (Gibson and Lennon, 1999). However, in the following years, there was a decline in the foreign population until it reached levels close to 10 million (1950s). This trend continued until the 1970s when immigrants reached 9.6 million (Gibson and Lennon, 1999). After this period, the United States's foreign population rapidly grew, reaching more than 40 million people (2010). Historically, immigrants have accounted for 10 to 15 % of the share of the U.S. population (Batalova and Levesque, 2021).

The general trends in U.S. immigration have changed over the years. In the last century, immigration was predominantly from Europe, while now the largest immigrant groups are from Latin America and Asia (Mexico 24%, India and China 6%, Philippines 5%, El Salvador, Vietnam, Cuba, and the Dominican Republic 3%, Guatemala, and Korea

2%) (Batalova and Levesque, 2021; Cohn, 2015). Budiman (2020) suggests that more of the immigrant population live legally in the United States (77%), including groups of low-skilled, skilled, and high-skilled individuals, while the rest live without the proper legal documentation. The immigration of high-skilled individuals receives better levels of acceptance from residents than the immigration of low-skilled individuals (Connor and Ruiz, 2019). According to the Pew Research Center (2015), countries such as Sweden, the UK, Canada, Germany, Australia, and the United States have higher public support for highly skilled immigrants.

Even though the U.S. Immigration System constantly updates its policy regimes, individuals pursuing work or higher education can emigrate following the U.S. immigration laws. Those skilled individuals valuable to the U.S. economy can qualify for entry, employment, or education visas to seek permanent or temporary residence (American Immigration Council, 2021). According to the literature review, the most suitable legal options for highly skilled workers to enter the United States are (1) Permanent Residence cards for employment, (2) H-1B visas, (3) O-1 visas for Individuals with Extraordinary Ability or Achievement, and (4) F-1 student visas. Even though a significant percentage of undocumented immigrants hold at least a bachelor's degree (Asia 64%, South America 20%, Northern Triangle of Central America 5%, and Mexico 4%), this stream of immigrants is out of the scope of this research (Passel and D'Vera, 2019). Usually, undocumented immigrants with a bachelor's degree become permanent residents through Family Preference Immigrant petitions or marriage with a U.S. citizen.

Permanent Residence Card for Employment

The U.S. government grants about one million permanent resident cards, also known as green cards, every year for individuals seeking entry to the United States for family, humanitarian, or employment reasons (Gelatt, 2020). About 65 percent of those green cards are for family applications (immediate relatives of U.S. citizens or family-sponsored), and 13 percent of those applications are for humanitarian reasons (refugees and asylum seekers). Lastly, 14 percent of the remaining applications are for employment (USCIS, 2020). The application process opens in October for individuals seeking employment in the United States. One of the options that immigrants have to become U.S. lawful permanent residents is through employment (USCIS, 2021). Because of each individual's skills, only specific individuals can qualify to become permanent residents (see Table 1). Then, solicitors of permanent resident cards might be eligible to apply for the EB-1 category for individuals with extraordinary abilities, the EB-2 for individuals with advanced degrees, or the EB-3 for skilled individuals (USCIS, 2021).

Table 1. Permanent Residence Categories

Category	Description	Evidence	Numerical limit per fiscal year
EB-1	Foreign nationals with extraordinary abilities include outstanding professors, researchers, executives, and managers of multinational companies. No offer of employment or labor certification is required.	Foreign nationals should provide evidence of a one-time achievement (i.e., Pulitzer, Oscar, Olympic Medal) or three of the ten listed criteria: - Membership in associations in the field - Publications - Judge the work of others - Scientific or business-related contributions - Authorship of scholarly articles - Role in recognized organizations - High salary in the field or commercial success	40,040
EB-2	Include those foreign nationals with advanced	Foreign nationals must include supporting evidence of two of the six listed criteria:	40,040

	degrees or who graduated in sciences, arts, or business degrees.	- Official academic record showing the degree, diploma, or certificate - Ten years of full-time experience - Evidence of high salary - Recognition for the achievements and contributions in the industry or field of application	
EB-3	Skilled workers are foreign nationals capable of performing skilled labor requiring at least two years of experience.	Skilled workers should demonstrate the following: - Two years of job experience, education, or training in labor certification - U.S. baccalaureate or foreign equivalent degree	40,040

Source: USCIS, 2020

H-1B Visa

High-skilled immigrants looking for an employment route to work in the United States can pursue the H-1 B visa program (H-1B for specialty occupations and H-1B2 for researcher and development project workers). This program offers temporary visas for specialty occupations. Sponsoring companies must provide documentation to H-1B candidates, such as job offer letters and foreign labor certifications (USCIS, 2022a). Once the candidates are granted a visa, the employees must remain with their sponsoring employer to continue working in the United States. Sometimes, the H-1B holder can be accompanied by family members. The H-1B visa gives admitted employees into the United States three years of residency, which can be extended up to six years. The numerical limit of these visas is 65,000 applications each fiscal year (Semotiuk, 2023; USCIS, 2022a). An additional 20,000 visas are available to holders of a master's degree or advanced degree from U.S. universities.

Figure 1 shows the number of 2021 H-1B visa applications in the United States (USCIS, 2022a). Some states, such as California (78,141), Texas (44,604), New York

(33,485), Washington (28,217), and Georgia (14,015), lead the number of H1-B visa applications. Figure 1 is consistent with the regional trends suggested by Moretti's book "The New Geography of Jobs," where high-skilled workers tend to concentrate in metropolitan areas hosting technological hubs (Glaeser, 2013).

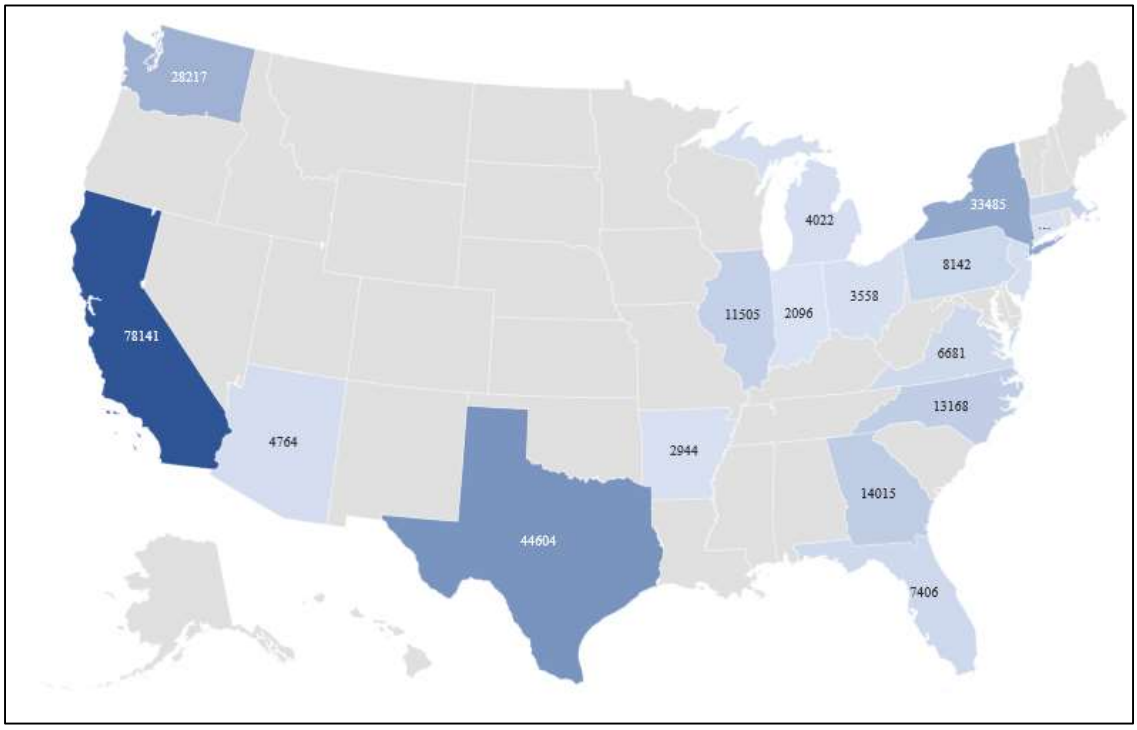

Figure 1. Number of H1-B Applications 2021

Source: self-elaborated with data retrieved from USCIS, 2022a

Figure 2 shows the 2021 leading companies and the average salary of employees requesting H-1B visas for foreign individuals. These companies are Cognizant Technology Solutions, Amazon, Tata Consulting Services, Google, Infosys, Ernest and Young, Deloitte, Microsoft, IBM, and Accenture (My Visa Jobs, 2022).

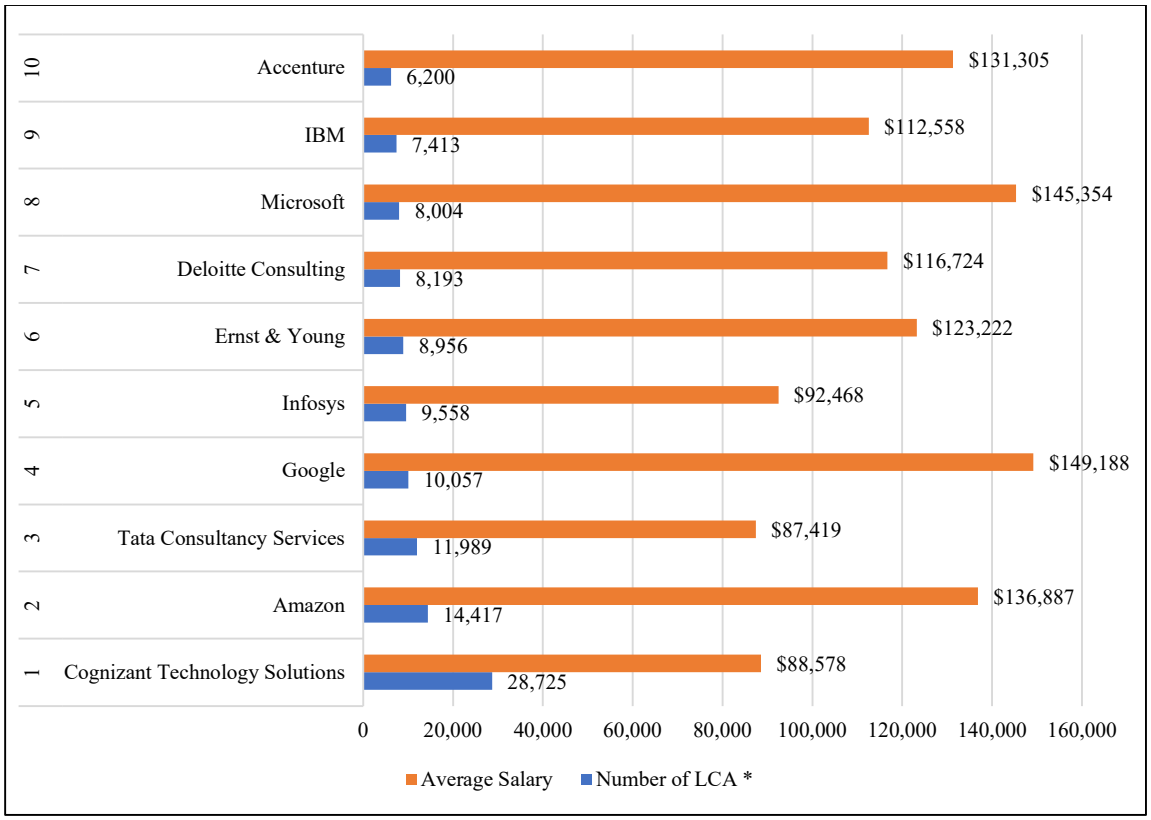

Figure 2.Top 10 H-1B Sponsors and Average Salary 2021

Source: self-elaborated with data retrieved from USCIS, 2022a

In the United States, there is a significant shortage of workers in specific occupations, particularly in information technology, management, and education sectors. Figure 3 shows the need for specialty occupations in the following jobs: software engineer, software developer, senior systems analyst, manager, senior software engineer, assistant professor, senior software developer, architect, software development engineer, and analyst (My Visa Jobs, 2022). These occupations will likely grow in the United States for future demand beyond 2030, especially jobs related to education, engineering, research, management, and business operations (Bakhshi et al., 2017; Bauer and Kunze, 2004). Other

engineering areas of interest in the U.S. labor market are biology, mathematics, physical sciences, and medicine (Cerna, and Chou, 2019).

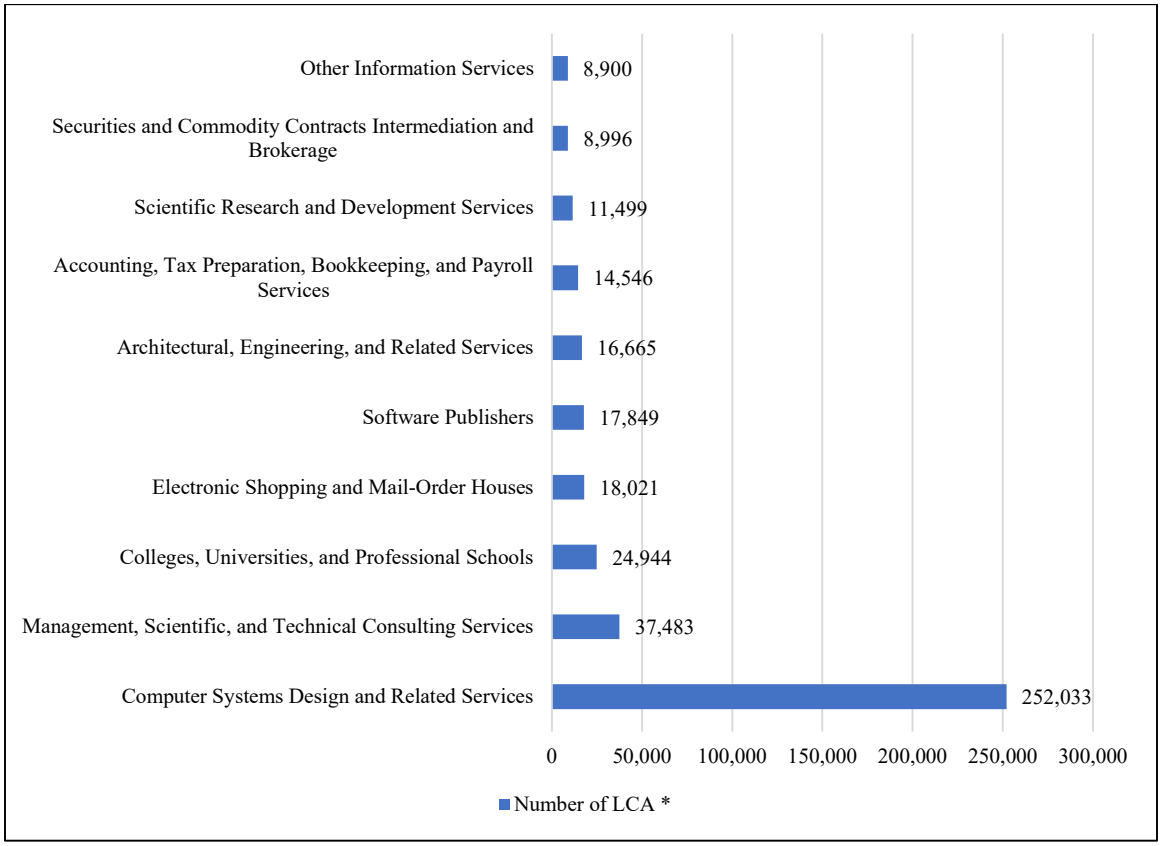

Figure 3. Top 10 Industry Applications for H1-B Visas 2021

Source: self-elaborated with data retrieved from USCIS, 2022a

O-1 Individuals with Extraordinary Ability or Achievement Visa

The O-1 visa allows individuals with extraordinary abilities in science, art, athletics, education, and business to work in the United States (USCIS, 2022b). The non-immigrant visa applicants must provide evidence of extraordinary achievements at the national or international level. Similar to the EB-1 permanent residence category, the O-1 visa attracts individuals working in the same professional fields. The main difference between these two options is that the O-1 visa provides temporary work authorization in

the United States while the EB-1 gives permanent residence to applicants. Additionally, O-1 visa holders need sponsorship to become permanent residents.

The O-1A visa is the right fit for individuals with extraordinary abilities in sciences, education, or business (USCIS, 2022b). Along with employer sponsorship, O-1A applicants need to provide documentation of nationally or internationally recognized prizes or awards, membership in recognized organizations, publications, judging the work of others, academic or business contributions, and evidence of high salary in the field of application, among others (Code of Federal Regulation, 2022; USCIS Policy Manual, 2022). The O-1A visa holders must possess critical or high skills and recognized experience to perform a job for which U.S. workers require assistance. The period of stay for O-1A visa holders goes from one to three years, depending on the nature of the activity (USCIS, 2022b). Moreover, the O-1 visa has no numerical limit or cap per year.

L1- Intracompany Transferee Visa

The L1 visa allows intra-company transfers for executives and managers employed by international firms (USCIS, 2022a). This visa is classified into two categories: (1) L-1A for managers or executives and (2) L-1B for workers with unique skills. The L1 visa grants work authorization for up to seven years, primarily for Science, Technology, Engineering, and Mathematics (STEM) professionals. The intracompany transferee visa has no numerical cap as the H1-B visa. Therefore, some scholars suggest that this program only benefits large corporations, companies specializing in offshore outsourcing (Hira, 2023), specific occupations and nationalities (Kirkegaard, 2005), and also works as a tool to circumvent the U.S. immigration system (Moscato and Moscato, 2005). On the other

side, foreign nationals working with this type of visa have restrictions on job mobility (Hunt and Bin, 2019) and tend to face precarity in earlier years of work authorization (Connor et al., 2013).

F-1 STEM Optional Practical Training Visa

The United States is one of the most popular destinations for those pursuing higher education. Ruiz (2014) describes the United States as "*the most outstanding global hub for academic training.*" According to the Student and Exchange Visitor Program report, up to one million international students were enrolled at U.S. educational institutions (ICE, 2015). The F-1 visa permits foreign nationals to study at an accredited U.S. institution (ICE, 2015). Moreover, F-1 visa holders can obtain work authorization in the following categories: On-campus Employment, Curricular Practical Training (CPT), Optional Practical Training (OPT), STEM OPT Extension, Severe Economic Hardship, and International Organizations (USCIS, 2022b).

Almost all the above categories allow F-1 visa holders to work off-campus while pursuing their degrees. Optional Practical Training (OPT) and STEM OPT Extension enable students to work after graduation. Initially, the OPT program allowed all graduates seeking employment in the U.S. to work for up to one year. Later, in 2008, OPT regulations expanded the STEM work period by an additional 24-month extension (Miano, 2017). Upon graduation, it is estimated that at least half of international students seek employment to remain in the U.S. in areas related to science, technology, engineering, and mathematics fields (Ruiz and Budiman, 2018). The STEM OPT program has worked as a medium for

applying for an H-1B work authorization visa (Ruiz, 2017). This program, however, has yet to be designated to replace full- or part-time U.S. workers (USCIS, 2022b).

Because of rapid technological advances, new jobs, such as cyber security analysts and artificial intelligence, are emerging and are expected to grow by 30 % in the next decade. Therefore, filling all these jobs will be challenging for the United States without international talent. There is a need to develop retention strategies for international talent, representing up to 70% of engineering university programs (U.S. Bureau of Labor Statistics, 2023).

To conclude this section, the facts and statistics presented above about the current state of technology-professional immigrants in the United States set up the guidelines for this dissertation, which aims to guide policy decision-makers in addressing current U.S. immigration policy issues.

1.2. Research Motivation

Relocation for technology professionals / high-skilled individuals to the United States is a complex process with limited legal options available. The motivation for this research is to understand the complexity of navigating current U.S. immigration policies from an engineering management perspective. Therefore, this dissertation proposes a novel methodology to evaluate U.S. immigration policies since there is a lack of studies combining quantitative and qualitative studies.

Each year, thousands of highly educated foreigners seek to work in the United States (Connor and Ruiz, 2019). Although the U.S. Immigration System is complex, there are legal paths for skilled immigrants to work or study. One of the principles of U.S.

immigration policies is the admission of immigrants with valuable skills to the economy (American Immigration Council, 2021). Thus, according to the U.S. Citizenship and Immigration Services (2021), some of the legal paths for technology professionals/highly -skilled workers to come to the U.S. are through (1) Permanent Residence, (2) H-1B Visa for Specialty Occupations, (3), O-1 Visa for Individuals with Extraordinary Ability or Achievement, (4) F-1 visa, (5) L1 visa and others such as TN visa for Canadian and Mexican professionals, Specialty Occupation Workers from Australia, and H-1B1 Visa for Chileans/Singaporeans (USCIS, 2022a; USCIS, 2022b; USCIS, 2022c). Technology professional immigrants' contributions increase host countries' competitive advantage (Bernstein et al., 2018; Hanson et al., 2018; Hart and Acs, 2011; Hunt and Gauthier-Loiselle, 2010; Yeaple, 2018). Hence, this dissertation aims to conduct comprehensive research to evaluate U.S. immigration policies. In doing so, this study can identify the factors that attract, select, and retain technology professionals whose contributions will help the United States increase innovation and economic growth. Additionally, this study aims to understand their motivations for settling and integrating into the United States, contributing to the country's competitiveness as a leader in technological development in both the short and long term.

1.3 Problem Statement

Historically, U.S. immigration policies have focused on attracting and selecting immigrant populations rather than promoting their retention and settlement over the years (Cohn, 2015; Ewing, 2012). The scenario is similar for highly skilled immigrants, including technology professionals (see Figure 4). The last significant immigration change

in U.S. immigration policies was the Immigration Reform and Control Act. This general amnesty gave permanent residency to almost 1 million immigrants, primarily those in the agricultural sector (Briggs, 2006). Therefore, scholars and experts suggest that the U.S. immigration policy system is strained and needs a comprehensive reform to cope with current problems and also to ensure and increase competitiveness and innovation (Hunt and Gauthier-Loiselle, 2010; Kerr and Frederic, 2020; Kerr & Lincoln, 2010; Ortega and Peri, 2014; Papademetriou and Madeleine, 2011). These problems include but are not limited to, annual caps and a skyrocketed number of applications for work visas, backlogs for adjustment of status, longer times to process applications, difficulties in changing jobs for visa holders, and lack of job opportunities for graduate international students, among others (American Immigration Council, 2021; Chaurey et al., 2024; Gelatt, 2020; Kandel et al., 2022). For example, an estimate by Forward U.S. (2022) suggests that 100,000 international students would like to live permanently in the United States after graduation, helping to reduce the shortage of talent in STEM jobs and contributing to the U.S. economy. Consequently, the loss of talent directly affects the return on investment from higher education since the federal and local governments fund universities, particularly public universities (Jaafar et al., 2021).

Additionally, the loss of international talent affects U.S. innovation metrics such as the Global Innovation Index and the filling and granting of patents (WIPO, 2021). Although the United States is one of the leading countries in all these respects, during the last few years, some countries have been systematically catching up and have the potential to change the innovation ecosystem (Dutta et al. 2021). For instance, between 2010 and

2017, China was not among the top countries on the Global Innovation Index. However, in 2018, China appeared among the 20 leading countries, and now it is escalating rapidly over the top (2018 - 17th, 2019 and 2020 - 14th, 2021 - 12th). The United States can remain a global economic leader in generating new knowledge by updating immigration policies that ease the residence and work of technology professional immigrants (Rinne, 2012). In summary, highly skilled immigrants should demonstrate their extraordinary abilities to the U.S. government for an opportunity to live, work, and settle in the United States.

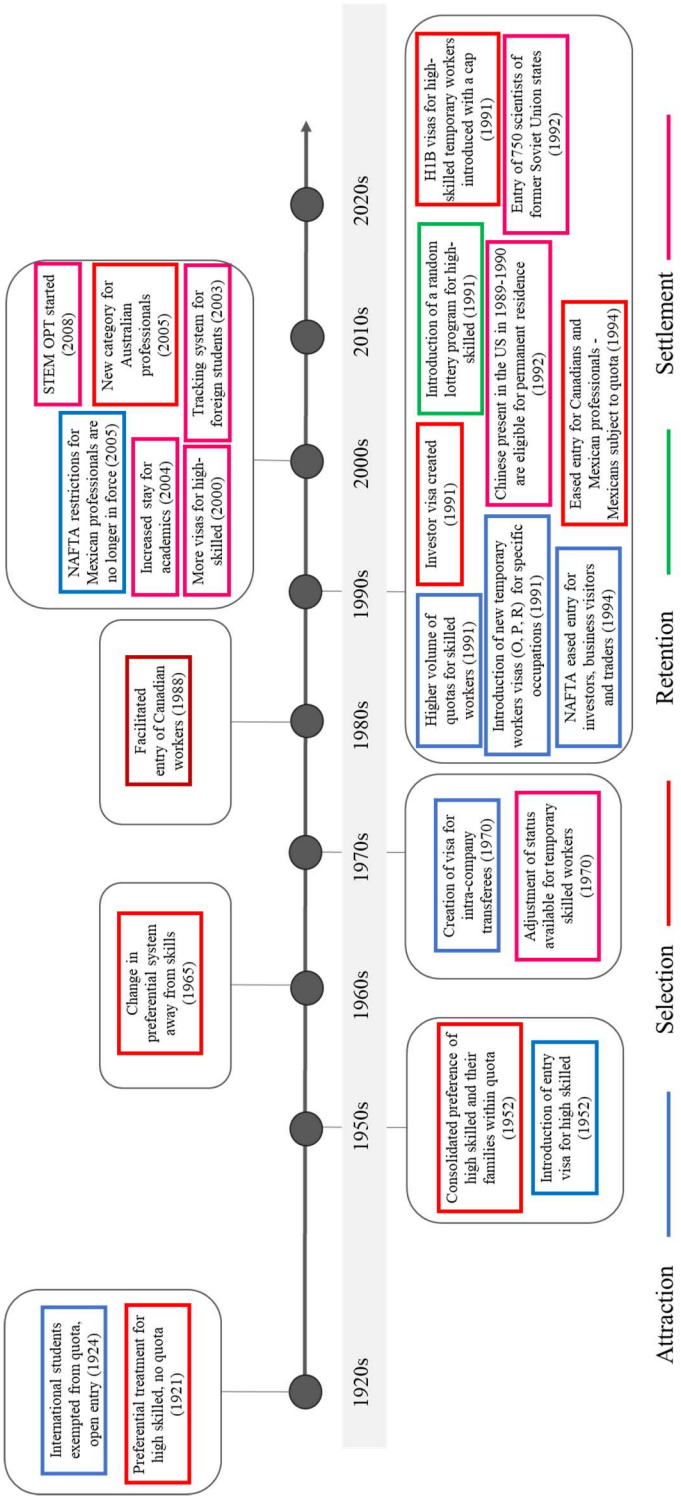

Figure 4. Overview of Immigration Policies in the United States 1920 – 2020

Source: self-created based on DEMIG Policy (2015)

1.4 Overview of the Structure of the Dissertation

The introduction includes a brief description of technology professional immigrants in the United States, highlighting the significance of this topic for the research objective. Each section of this dissertation adds context and significance to the study (see Fig. 5).

Section 2 provides the literature review, which covers the main topics associated with this research: international migration, brain drain, benefits of technology professional immigrants in host countries, an overview of high-skilled immigration and point-based policies around the world, and innovation of technology-skilled immigrants. A review of the most recognized multi-criteria decision-making (MCDM) methodologies is also conducted. Hierarchical Decision Modeling, an MCDM method, will be used as the primary approach for this study. This section ends up with a gap analysis, which leads to formulating the research questions, objectives, and research approach.

Section 3 describes and justifies the methodology chosen to carry out this study. A hierarchical decision model is proposed to assess the current immigration policy that allows technology professionals to work in the United States. This section explains a comprehensive research process overview, such as selecting expert panels, quantification measures, inconsistency, and disagreement thresholds. A case study and sensitivity analysis are presented to further the research.

Section 4 explains the development of the research model from validation to quantification of the model, criteria, sub-criteria, and alternatives. Section 5 defines the quantification of the model and the research instruments used to help collect expert

judgment and quantify the values to build the intended model. A description of the results is also included in this section.

Section 6 describes the case study and sensitivity analysis to demonstrate the model's flexibility. Finally, Section 7 explains this study's research limitations and expected contributions.

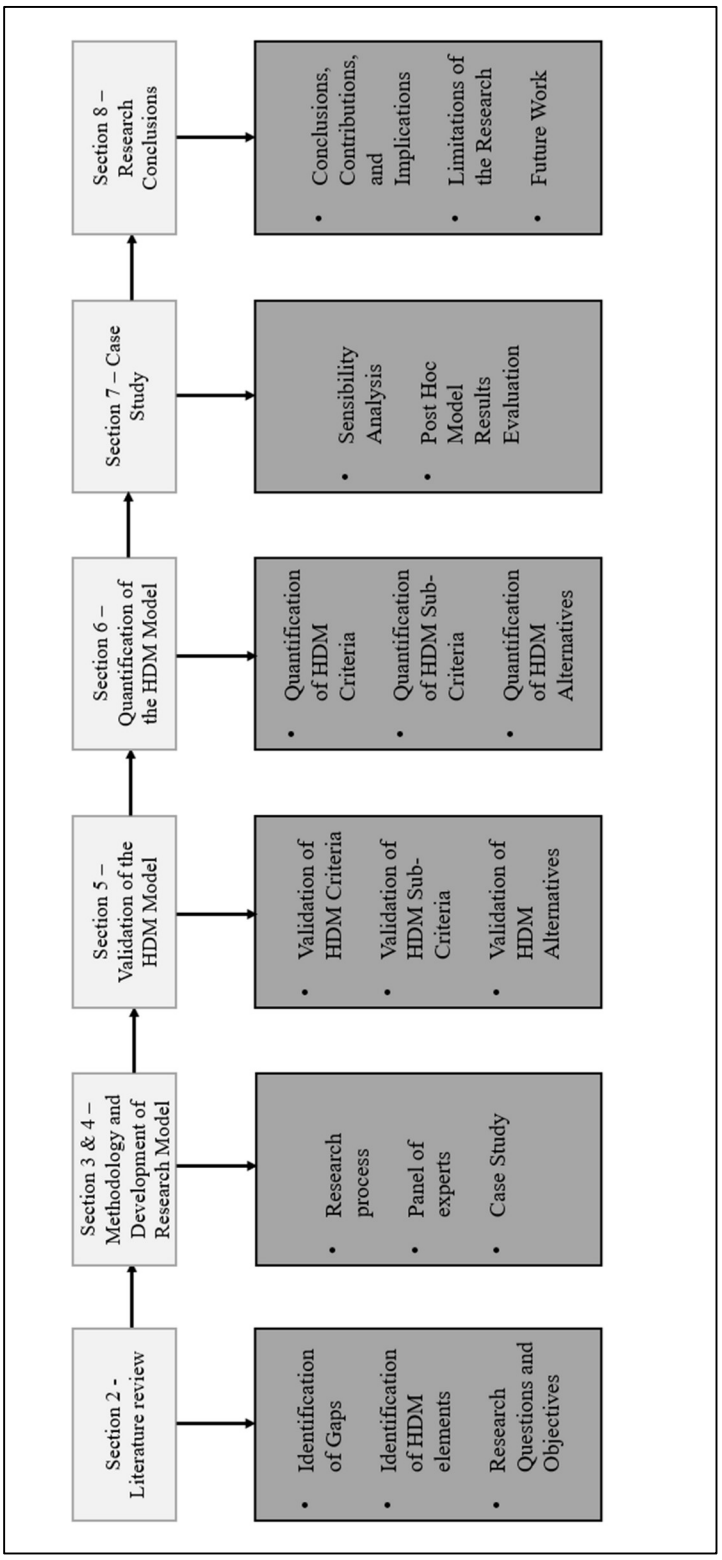

Figure 5. Research Process Inputs and Outputs

Source: self-elaborated

CHAPTER 2: LITERATURE REVIEW

This chapter examines how literature describes the various aspects of immigration policy assessment.

2.1 International Migration

One of the first attempts to understand migration theories is Ernst Georg Ravenstein's work dated 1885 (Lee, 1966). Ravenstein proposed eleven laws or rules, some of which merited further research, such as migration and distance, technology and migration, and growth of cities (Grigg, 1977). However, this proposal work was the starting point for developing migration theories (Grigg, 1977; Lee, 1966). Only some authors contributed after that to the body of migration knowledge. Several decades later, Thomas (1938) conducted migration research in Europe and the United States and concluded that young adults tend to migrate internally rather than externally. Bogue and Hagood (1953) proposed the theory of differential migration. Duncan (1940) studied the consequences of the mobility of the U.S. population living on farms. In 1960, Stouffer conducted a study proposing that the number of migrants from a specific place to a destination is directly proportional to the number of opportunities at the host destination (Wadycki, 1975). A few decades later, Massey et al. (1994) grounded the twenty-first-century theory of international migration. Before World War II, Western European countries were known for sending migrants to immigrant-receiving countries (Masley et al., 1993). After 1965, international immigration patterns began to swap. Countries from Asia, Africa, and Latin America increased exponentially the number of immigrants going to immigrant-receiving

countries, taking over Western European countries. In the meantime, these European countries began receiving international immigrants (Masley et al., 1993).

International labor migration has been described as “a new geography of centrality and marginality” because immigrants face wide economic gaps and employment issues in host countries compared to locals (Schaeffer, 1998). Contemporary migration flows are influenced by several factors, such as place of origin, place of destiny, socio-economical characteristics of host countries, diverse and multi-ethnic societies, political decisions, legal obstacles to obtaining employment, and obstacles to obtaining legal status (Lee, 1966; Masley et al., 1993).

International migration can be classified into three main categories: (1) legal immigration, (2) undocumented immigration, and (3) refugee immigration (Murphy, 2018). At the same time, international legal immigration is divided into professional, commercial, technical, and highly skilled individuals (Batalova, 2017; International Organization for Migration, 2004). Several scholars agree that high-skilled immigration, technology professional immigration included, provides endless benefits to host countries, such as economic growth, science development, technology and innovation, entrepreneurship, and others (Hajro et al., 2021; Hanson and Liu, 2018; Kozanoglu et al., 2021; Nathan, 2014; Orefice, 2010; Ozden et al., 2017). Therefore, the scope of this research focuses on the immigration of technology professionals in the United States.

2.2 Brain Drain

Incorporating the brain-drain concept into the migration literature comes from the UK and dates from the 1960s (Dumitru, 2012). This concept is highly associated with the

immigration of high-skilled individuals. Early studies focused on the increasing loss of skilled workers from Europe to the United States, explicitly referring to the emigration of British scientists to North America (Freitas et al., 2012). Several scholars suggest that sending skilled immigrants is an economic loss that negatively affects sending countries; meanwhile, receiving countries benefit from it positively (Dumitru, 2014; Lowell, 2003). From the sending countries' perspective, brain drain harms these nations due to losing their ability to increase technological advances (Dumitru, 2012; Srivastava, 2018). Brain drain also involves the loss of skilled intellectual and technical labor through the voluntary movement of individuals to more promising opportunities (Sahay, 2006). Dumitru (2012) argued that high-skilled immigrants should not compensate for the potential economic loss in their countries of origin since the flow of high-skilled immigration is voluntary. On the other side, scholars suggest that the positive effect of brain drain is reflected in both receiving and sending countries (Dumitru, 2014; Lowell, 2003; Sahay, 2006; Srivastava, 2018). Concepts such as brain gain, reverse brain drain, or migration talent suggest that the immigration of high-skilled individuals benefits host and sending countries. Johnson (1968) proposes that the free movement of individuals would increase world output and compensate for the loss of sending countries. However, scholars are less optimistic about this proposal.

According to Sahay (2006), "*brain drain can be converted into a brain gain,*" lessening the loss of high-skilled individuals moving among countries. The main gains for sending countries can be reflected in remittances, the number of returning migrants, and migration networks. Remittances are direct or indirect money transfers from the host to the

origin countries. Skilled individuals can send back remittances to source countries through knowledge acquired by working in host countries. Fackler et al. (2020) propose that knowledge remittances can reduce the negative impact of the brain drain on sending countries by eliminating the technological frontier, compensating for the loss of skilled individuals, and increasing innovation. White and Inku (2008) suggest that the high growth of high-skilled individuals in sending countries would increase the return of migrants. Additionally, returning migration can benefit sending countries by increasing patent activity and innovation (Choudhury, 2016; Kerr, 2008). Several scholars find that teams with international members positively affect cross-border knowledge flows and invention (Fackler et al., 2020; Foley and Kerr, 2013; Kerr and Kerr, 2015; Miguelez, 2016; Miguelez and Fink, 2013). Without hesitation, brain drain has both positive and negative effects on sending and receiving countries. Returning skilled individuals can take back new knowledge, experience, and a network of collaboration to continue developing positive outcomes, but this time in their countries of origin.

2.3 Benefits of Technology Professional Immigration in Host Countries

Every immigration movement involves an origin, a destination, and a set of obstacles (Lee, 1965). Suppose the immigration movement or relocation is at an international level. In that case, there are other factors to consider, such as distance, policies, the attractiveness of the host country, and salary, among others (Batalova, 2017; United Nations, 2013). Despite all these challenges, high-skilled immigrants overcome the difficulties they face to positively contribute to host countries (Hanson and Liu, 2018). High-skilled immigrants contribute to host countries through innovation, economics,

employment, entrepreneurship, and aging (Canello, 2016; Hawthorne, 2014; Kozanoglu et al., 2021; Libaers, 2007). Whetton and Cebulla (2017) conducted a study in Australia and suggested that immigration positively affects local demography. Agrawal et al. (2019) concluded that U.S. universities recruiting foreign-trained scientists are more likely to increase their productivity and knowledge diffusion. Cooke and Kemeny (2017) tested a hypothesis that strongly supports the idea that increasing immigration diversity among the leading U.S. metropolitan areas fosters creativity, innovation, and problem-solving capabilities. Bernstein et al. (2018) found that immigrant scientists in the United States are more productive than their local counterparts, measured by their number of patents, patent citations, and economic value. Moreover, immigrants account for only 16% of inventors, but they have generated up to 30% of U.S. innovation since 1976 (Bernstein et al., 2018). Also, entrepreneur immigrants in the United States account for up to 20% of the founders of high-tech ventures (Brown et al., 2019; Hart and Acs, 2011). These companies outdid their counterparts in 15 out of 16 dimensions of innovation (Brown et al., 2019). Crown et al. (2020) found a positive economic impact on immigrants who work after graduation from Australian universities. Considering all the potential benefits of high-skilled immigrants to host countries, exploring this topic in the United States will help expand the current body of knowledge.

2.4 High-Skilled Immigration Policies Around the World

Immigrants generally relocate to host countries where they expect the highest net gain (Massey et al., 1993; Massey et al., 1994). The neoclassical theory further explains the concept of the highest net gain, which states: "*flows of labor move from low-wage to*

high-wage countries, and capital (including human capital) moves in the opposite direction" (Massey et al., 1993; Todaro, 1969). Thus, immigration has two sides to the story. On one side, there are some traditional immigrant-receiving countries such as the United States, Canada, Germany, Great Britain, and Australia (Batalova and Lowell, 2007; Massey et al., 1993). Conversely, there are well-known immigrant-sending countries such as India, China, and Mexico (White and Inku, 2008). Therefore, flows of labor move from immigrant-sending countries to places such as the United States, Canada, Germany, Great Britain, and Australia. To relocate to the destination country, individuals need to comply with the regulations of the immigration system according to the host destination, following their motivations to do so. These motivations vary depending on factors such as country of origin, age, marital status, and gender. However, the most common factors for immigrating to another country are economic downturns in host countries, family reunification, humanitarian reasons, availability of jobs, economic gains, safety, access to better education, family reunification and attractiveness of host countries (Duncan and Waldorf, 2010; Geva-May, 2000; Goodman, 2018; Melo et al., 2014; Sahay, 2006).

Several countries have adopted a highly skilled point-based immigration system, such as Canada in 1967, Australia in 1989, New Zealand in 1991, and more recently, the U.K. in 2021 (Beaglehole, 2005; Kelley and Trebilcock, 1998; Miller, 1999; Walsh, 2021) while the United States relies on its employment-based immigration system to attract international talent (see Table 2).

Point-Based Immigration Policies Around the World

A point-based immigration policy system sets out the initial requirements that immigrants need to prove to work, study, or do any other economic activity in their host countries. This restricting type of immigration favors mainly young and skilled immigrants who can demonstrate financial stability (Tani, 2014). Despite its contributions, such increasing population growth in host countries(Kozanoglu et al., 2021), point-based systems cannot resolve labor shortages of skilled labor, especially in the short term, if host governments prioritize some visa categories (Tani, 2014). A point-based system scores a combination of different criteria such as age, education, language, and professional experience, whose origins come from Canada in 1967 (Yale-Loehr and Eason, 2020). Generally, the existing point-based immigration systems worldwide share similarities in assessing applicants, also known as high-skilled immigrants. The main similarities are education, age, language, and employment experience. Table 3 shows a summary of the different point-based immigration systems around the world. Nevertheless, some particularities vary from one host country to another. For instance, in the United Kingdom, the proposed salary for new applicants must be at least £20,480 yearly. Some countries, such as Canada, Australia, and New Zealand, provide additional points if the applicant's partner speaks English at the same level as the applicant. In Germany, companies use a fast-track procedure, or talent pool, to engage with skilled workers. Moreover, a factor in Canada called adaptability measures the likelihood of high-skilled immigrants settling in a new place. Scholars suggest this approach to immigration be more widely adopted worldwide, especially in the United States (Gelatt, 2020; Kandel, 2020; Roach and Skrentny, 2019; Yale-Loehr and Eason, 2020).

Table 2. Comparison of Policy Visa / Cards for Technology Professional Immigrants

Type of visa / permanent residence card	Immigrant intent	Cap Limit	Selection Approach	Is a job offer needed?	Per-country ceiling /Queue	Duration of Status	Possible upgrade	Grace period after visa expiration
H1-B visa	Dual intent	85,000	Employer system approach	Yes	Yes	3-year initial approval + one 3-year extension	Permanent ResidenceH1-B yearly renewals	Up to 60 consecutive calendar days
F-1 STEM OPT Visa	Non-immigrant	No	Hybrid system approach / Employer system approach	No (for initial 12 months) /Yes (for STEM extension)	No	>Up to 12 months post-completion OPT + 24-month STEM OPT extension	H1-B visaO1-B visaPermanent Residence	Up to 60 consecutive calendar days
O1-B visa	Dual intent	No	Employer system approach	Yes	No	Up to 3-year initial approval + 1-year extensions	Permanent Residence	Up to 60 consecutive calendar days
L-1 visa	Dual intent	No	Employer system approach	Yes	No	3-year initial approval + 2-year extensions up to a total of 7 years.	Permanent Residence	Up to 60 consecutive calendar days
Permanent Residence card	Intent	140,000	Hybrid system approach / Employer system approach	No (for self-petition) /Yes (for employment-based)	Up to 7% per country * / India (692,563) China(106,74)	The candidate may be able to live permanently in the United States	U.S. Citizenship	Not applicable

Source: self-elaborated based on literature review

Table 3. Summary of Point-Based Immigration Policies in Developed Countries

Country and Start of Program	Scheme/ Program	Education	Language Testing	Work Experience	Funds	Job Offer	Age	Additional Points	Penalties	Minimum score	Reference
Australia (1979)	General Skilled Migration program	B.S. or higher	IELTS, TOEFL	1 to 8 years	✓	✓	18 to 39	Fluent in one of Australia’ s languages	NEF	60/100	(Australian Government, 2022)
Austria (2011)	Skilled Worker in a Shortage Profession	B.S. or higher	German/ English A1 level	1 to 10 years	NEF	✓	18 to 40	Salary, managerial experience, awards	NEF	70/100	(Migration, Austria, 2022)
Canada (1967)	Federal Skilled Worker program	B.S. or higher	IELTS (English) TEF (Canada)	1 to 6 years	✓	✓	18 to 35	French or English languages, age	NEF	67/100	(Government of Canada, 2022)
Germany (2016)	Skilled Immigration Act	Higher education	German B1 level	✓	✓	X	NEF	NEF	NEF	100 points	(The German Federal Government, 2022)
Japan (2012)	Highly skilled professional visa	B.S. or higher	Japanese-Language Proficiency Test level N1	✓	✓	✓	NEF	Salary, managerial work experience, international	NEF	70/100	(Immigration Bureau of Japan, 2017)
New Zealand (1991)	Skilled Migrant Visa	B.S. or higher	IELTS, TOEFL	✓	✓	✓	18 to 55	Partner’ s applicant speaks English	NEF	100 points	(New Zealand Immigration, 2022)
South Korea (2010)	Points-based system (PBS) for highly skilled foreigners.	High-school or higher	Korean language ability	✓	✓	✓	✓	Volunteering job, Korean degree, tax payments,	Penalties for offenses and fines	80/120	(OECD, 2019)
United Kingdom (2021)	UK's points-based system	Ph.D. or STEM Ph.D.	✓	✓	✓	✓	NEF	High salary	Overwith an expired visa	70/130	(Government UK, 2022)

Source: self-elaborated based on literature review, NEF = Not Evidence Found

2.5 High-Skilled Immigrants and Technological Innovation

The literature review suggests that several scholars agree on the positive contributions of high-skilled immigrants in host countries (Caviggioli et al., 2020; Kahn & MacGarvie, 2020; Laursen et al., 2020; Miguelez and Fink, 2013; Mosbah et al., 2018). The United States hosts the world's highest number of technological clusters, where the contribution of high-skilled and technology professional immigrants can boost fields such as economics, innovation, scientific publication, and patent activity (Dutta et al., 2021). Kerr and Frederic (2020) define fifteen consolidated technological hubs or tech-metro areas with the highest rates of venture capital investment, patents granted, technology professional workers, and industries with more considerable R&D investment. All these factors positively contribute to innovation. Carlino et al. (2012) suggest that innovation firms tend to cluster according to their research field. For instance, Seattle, Washington, hosts the software cluster, which includes companies such as Amazon and Microsoft. Moretti's study (2021) about high-tech clusters says the geographical concentration of these companies is not a coincidence, and this concentration has important implications for cities. The presence of a tech cluster has been demonstrated to be a driver of economics and innovation (Buera and Kaboski, 2012; Glaeser and Saiz, 2004; Moretti, 2021). Thus, combining all these factors makes tech clusters the perfect scenario for technology professional individuals to increase innovation and further technological progress.

2.6 Multi-Criteria Decision-Making Methodologies

In the field of multi-criteria decision-making (MCDM), several methodologies are widely used for product design, product development, and preventive or predictive

maintenance, among others (Marugán & Garcia Marquez, 2017). These methodologies aim to reduce uncertainty by using logical functions and considering a whole set of factors to choose the best possible alternatives. Therefore, decision-makers and scholars have used these approaches for numerous decades now. A few examples of MCDM methodologies are Multi-Attribute Utility Theory (MAUT), Analytic Network Process (ANP), Measuring Attractiveness by a Categorical-Based Evaluation (MACBETH), Analytic Hierarchy Process (AHP), Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), and Bayesian Network (BN) models (Cinar and Kayakutlu, 2010). In the following paragraphs, a brief review of these methodologies is provided.

Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS)

TOPSIS is a multicriteria decision methodology developed by Yoon and Hwang (Ding et al., 2016). The principle of TOPSIS dictates that alternative solutions are selected based on the distance between them and the positive ideal solution (see Fig. 6), with the shortest distance being the nearest to the perfect solution and the farthest away being the less ideal solution (Rahim, 2018). TOPSIS compares alternatives versus criteria using a similar scale to the Likert measure. These values are normalized and then provide a rank of possible solutions. This approach offers recommendations to decision-makers to make the best possible final decision.

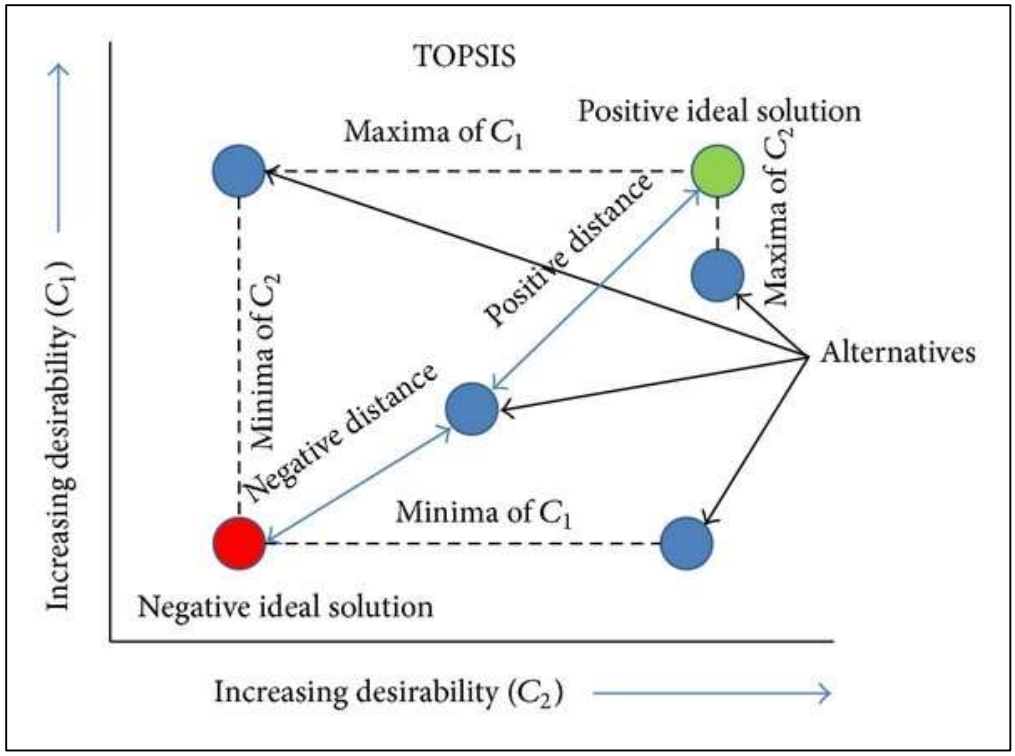

Figure 6. Graphical representation of TOPSIS

Source: (Chauhan and Vaish, 2014)

Preference Ranking Organization Method for Enrichment Evaluation

PROMETHEE is a decision-making method for assessing alternatives concerning multiple criteria following a hierarchy (see Fig. 7). For assigning differences between alternatives in judgments, it uses two types of preference functions (Abdullah et al., 2019). PROMETHEE uses pairwise comparison to rank a finite set of criteria and alternatives (Bilsel et al. 2006). Additionally, this method can break down alternatives, as Brans et al. (1986) proposed. These authors suggest that PROMETHEE-I obtains partial ranking while PROMETHEE-II is used to complete ranking using at least six types of generalized functions (Abdullah et al., 2019).

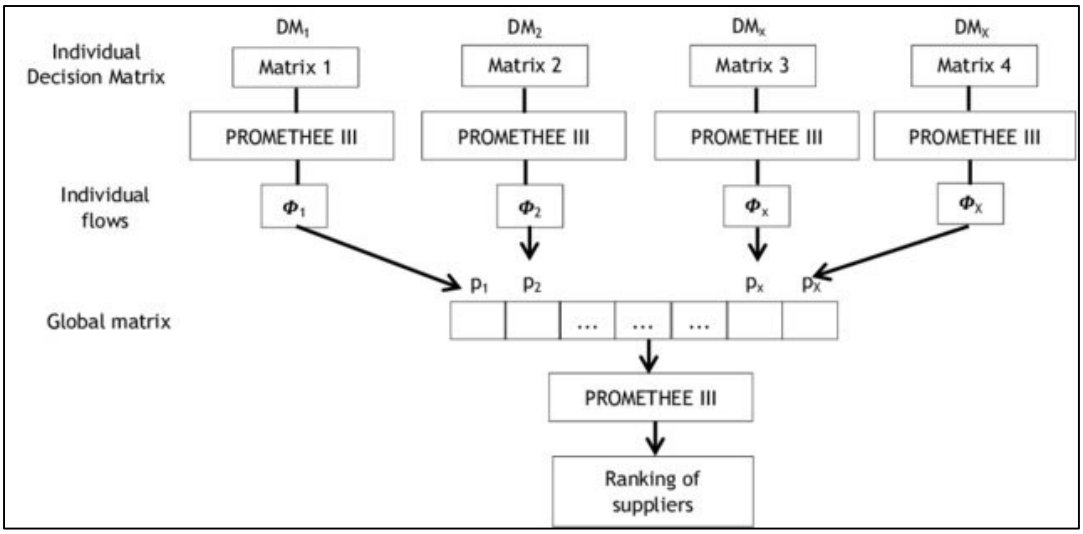

Figure 7. PROMETHEE Group Model

Source: (Araújo and Alencar, 2015)

Analytic Hierarchy Process

In the 1980s, Thomas L. Saaty (1980), at the Wharton Business School, developed the Analytic Hierarchy Process (AHP), which is widely used in the field of Decision-Making (Kostagiolas, 2012; Ramanathan, 2004). AHP is used to rank a set of alternatives or to select the best possible solution by using pairwise comparisons to create a matrix of judgments (see Fig. 8) showing the preference between each pair of options for each attribute (Hopkins, 2001). AHP converts comparative judgment into numerical values. After normalizing these values, a set of priorities is created for an objective (Ramanathan, 2004). To validate the results, AHP established a judgment consistency test. According to experts, AHP is a user-friendly approach, flexible, and allows decision-makers to incorporate quantitative and qualitative criteria (Hopkins, 2001; Pecchia et al., 2020; Ramanathan, 2004; Rauscher & Reynolds, 2003).

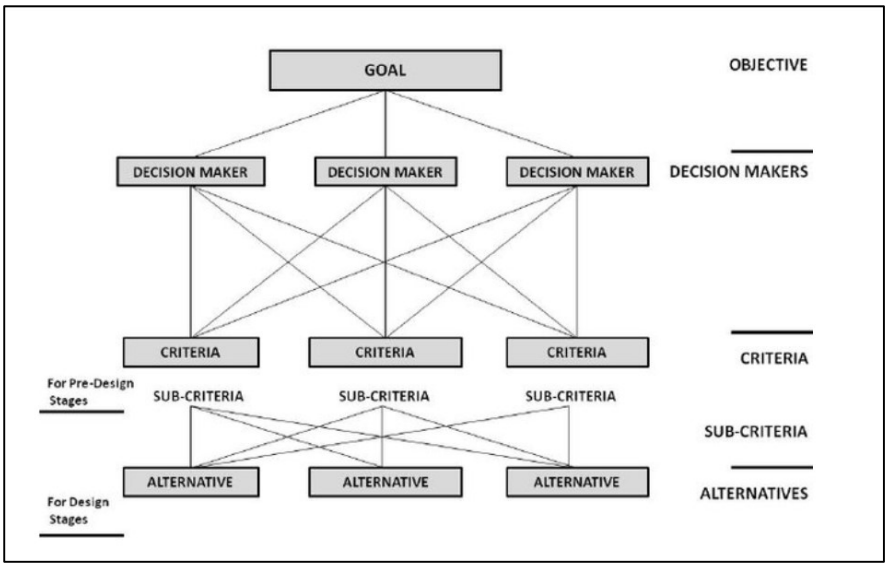

Figure 8. AHP Hierarchy Sample Model

Source: (Saaty, 1980)

Analytic Network Process

Analytic Network Process (ANP) is a mathematical model developed by Thomas L. Saaty (Zare et al., 2018). ANP and AHP share similar steps, such as selecting criteria, sub-criteria, alternatives, and pairwise comparison to identify the model's weights. ANP differentiates from AHP because it does not follow a hierarchical relationship between elements (Golubic, 2009). Instead, ANP integrates all the interactions and relationships among decision-making levels (see Fig. 9), resulting in a network structure (De Bacquer et al., 2009). One of AHP's limitations is that it does not allow the assessment of the interrelationship among elements (Tran et al., 2004). However, experts suggest that ANP is a more robust network-based system approach to making wise decisions in uncertain environments (Rao, 2004).

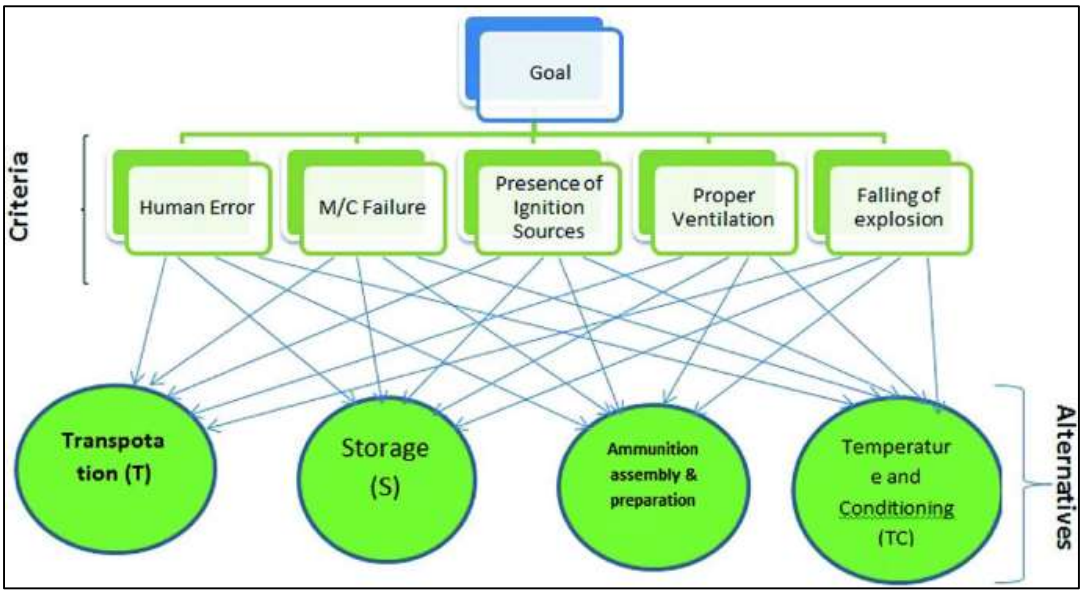

Figure 9. ANP Sample Model

Source: (Thakkar, 2021)

Elimination and Choice Expressing Reality

ELECTRE is also considered one of the multi-criteria decision analysis methodologies (Figueira et al., 2013). Bernard Roy developed the ELECTRE approach in 1968 (Mary and Suganya, 2016). ELECTRE relies on its ability to recommend the most favorable alternatives to decision-makers by removing the least suitable ones. This methodology uses a panel of experts as a decision-making group to select the most proper solution to different scenarios (Akram et al., 2020). ELECTRE's main idea is to correctly utilize its outranking relations to rank a set of alternatives (see Fig. 10), which models the binary relations (Fei et al., 2019). The outranking relation counts on two main aspects: (1) concordance index and (2) discordance index (Mary and Suganya, 2016). The concordance index is validated by the panel of experts, where most of the criteria should favor the assertion. On the other side, the discordance index is held when none of the requirements

in the minority should oppose the assertion (Fei et al., 2019). After that, a credibility matrix is built to obtain a degree of trustworthiness. Finally, concordance and discordance values are prioritized by experts (Mary and Suganya, 2016).

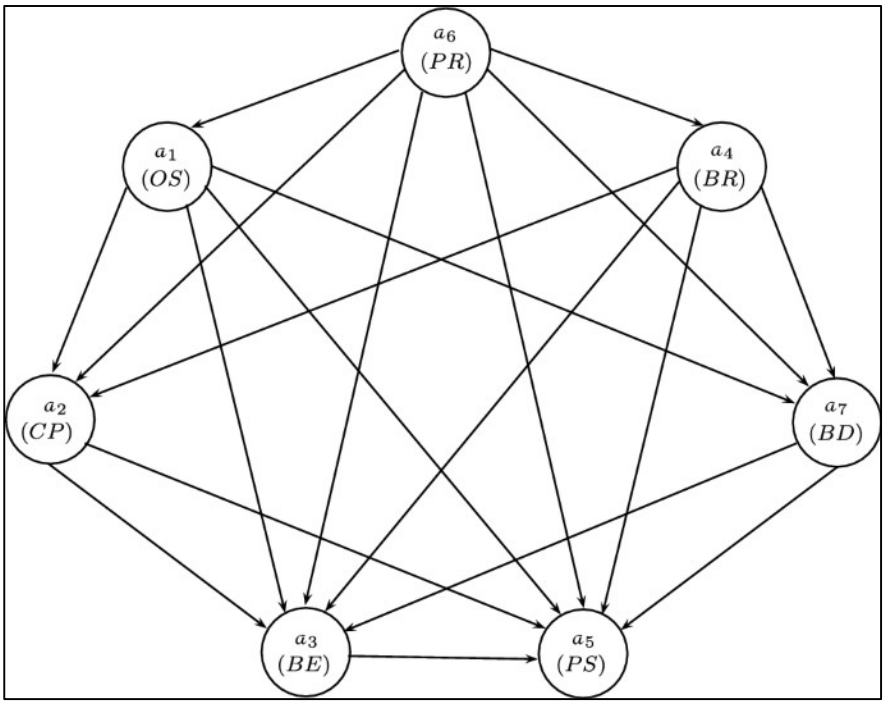

Figure 10. ELECTRE Sample Model

Source: (Akram et al., 2020)

Multi-Attribute Utility Theory

Multi-Attribute Utility Theory (MAUT) is another approach in the field of Multi-Criteria Decision-Making methodologies. MAUT provides a framework for analyzing objective trade-offs to make wise decisions (Kailiponi, 2010). This approach identifies, characterizes, and compares the variables that affect a decision (see Fig. 11). Schumacher (1991) recommends ten steps of the MAUT approach as follows:

1) determine the viewpoint of the decision-makers,
2) identify the decision alternatives,

3) identify the attributes to be evaluated,
4) identify the factors to be used in evaluating the attributes,
5) establish a utility scale for scoring each factor,
6) transform the values for each factor to its utility scale,
7) determine weights for each attribute and factor,
8) calculate the total utility score for each decision alternative,
9) determine which decision alternative has the most meaningful total score, and
10) perform a sensitivity analysis.

The MAUT values are combined with the higher-ranked weights and aggregated into a multi-attribute utility for each alternative. The alternative or alternatives with the highest multi-attribute utility are or are expected to be the most favorable option(s) (Jansen, 2011).

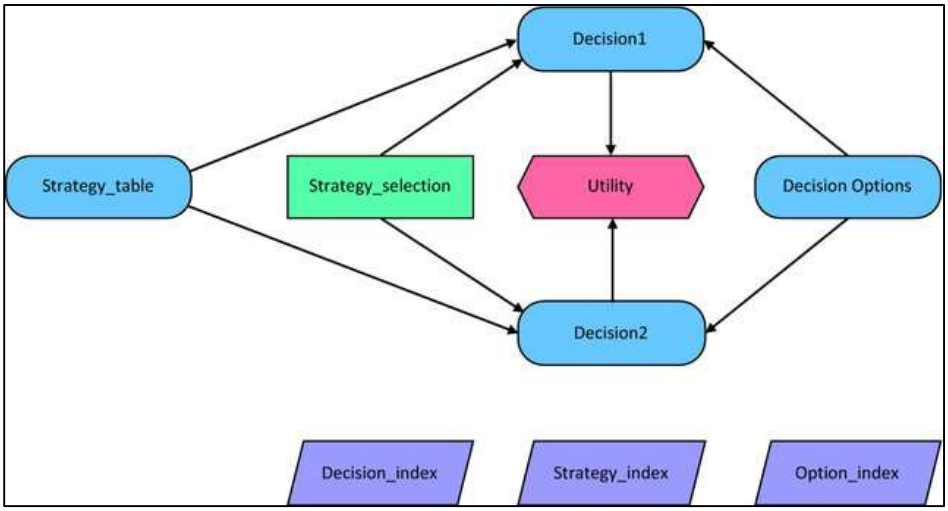

Figure 11. MAUT Model Sample

Source: (Jenkins and Keisler, 2022)

After reviewing several Multi-Criteria Decision-Making methodologies, Table 4 summarizes the strengths and weaknesses of each approach, as mentioned earlier.

Table 4. Strengths and Weaknesses of Multi-Criteria Decision Approaches

Methodology	Strengths	Weaknesses
TOPSIS	• Ease of application (Linkert scale) • Universality • Consideration of the distance to an ideal solution	• High subjectivity among experts • A lower number of scientific publications
PROMETHEE	• User-friendly outranking • Real-life planning problems method • Completeness of ranking	• Guidance to define weights to criteria • Complexity when the number of criteria increases • Possibility for constructing a decision tree
AHP	• Universality • Hierarchical structure of decisions • Reduction of subjectivity • Inconsistency test	• High labor input quantification • A large amount of initial data • Assessment scale
ANP	• Universality • Ideal methodology to gain a deeper understanding of problems • Inconsistency test	• A large amount of initial data • Software • Verification of results • Complex methodology
ELECTRE	• Concordance and discordance index • Can handle both quantitative and qualitative data for outranking alternatives	• Weakness of average ranking • An additional threshold to rank the alternatives
MAUT	• Takes uncertainty into account • Evaluate a large number of quantitative and qualitative factors • Complex methodology • Sensitivity analysis	• Complex methodology • Identification of the overall best performer • It does not break down metrics.
HDM	• Universality • Hierarchical structure of decisions • Reduction of subjectivity • Inconsistency test • Disagreement test • Sensitivity analysis	• High labor input quantification • A large amount of initial data • Software

In general, all the Multi-Criteria Decision-Making methodologies share similarities. Those are, but are not limited to, pairwise comparison, creation of a panel of experts, decision-making structure, sensitivity analysis, and uncertainty reduction. Since other methodologies represent additional challenges to conducting this research, and after carefully analyzing all the pros and cons, hierarchical decision modeling will be used as the primary research approach for this study. Further explanation is provided in section 4, which justifies the selection of this methodology.

2.7 Gap Analysis

The literature review collects information from primary sources -chapter books, scientific articles, and other relevant sources- to demonstrate knowledge and comprehension of a specific topic. Then, it is mandatory to identify gaps in the literature that justify the research. Gap analysis is a methodology that managers and decision-makers use to compare the current state (starting point) with the desired future or outcome (Sridharan, 2022). Hamdani and Daim (2020) state that gap analysis helps to define a problem with the minimum number of requirements. One of the critical elements of gap analysis is the ease of identifying a series of actions to bridge the "gaps." Gap analysis is widely used in areas such as communication, finance, productivity, management, R&D, and others. By way of explanation, gap analysis possibilities are endless. Kim and Ji (2018) suggest that gap analysis consists of four steps:

1) identification of critical needs of the current state,
2) visualization of the desired future,
3) emphasizing the identified gaps that need to be fulfilled, and

4) a strategic plan to bridge the gaps.

Kannan et al. (2017) suggest using sources such as literature reviews, technical reports, and surveys to gather information. Additionally, gap analysis can use feature tools, including benchmarking, SWOT analysis, and brainstorming (Kannan et al., 2017).

Table 5. Literature Review Gaps and Future Work

Topic	Title	Source and Region of Study	Gaps and Future Work	Reference
Business innovation	Catching up or lagging behind? The long-term business and innovation potential of subsidized start-ups out of unemployment	Research Policy - Germany	Skilled immigrants may benefit from additional support measures such as coaching, counseling, mentoring, or training during the pre- or early start-up phase. These measures can potentially enhance their business potential and contribute to their long-term development.	(Caliendo et al., 2020)
Climate change	Attitudes towards climate change migrants	Springer - Germany	Understand the outlooks towards climate change migrants and the conditions and standards under which people are prepared to welcome them. Additional research is required to demonstrate the extent to which the outcomes of this study can be duplicated in other locations.	(Helbling, 2020)
	How do host–migrant proximities shape attitudes toward internal climate	Global Environmental Change - Bangladesh	There is a lack of research on the communities that are likely to bear the effect of receiving large numbers of internal climate migrants in the next few decades if the forecasts of millions of people being forced to flee their homes and lands due to climate change come to fruition.	(Lujala et al., 2020)
	Climate Change, Inequality, and Human Migration	Journal of the European Economic Association - Worldwide	Future research will encourage policymakers and citizens to take proactive measures to alleviate the grim scenarios of widespread loss of skilled labor due to significant global warming.	(Burzyński et al., 2021)
Economic Benefits of High-Skilled Immigrants	The broader economic impacts of high-skilled migrants: a survey of the literature for receiving countries	IZA Journal of Migration - Worldwide	The literature on the broader effects of high-skilled immigration is of great importance, but is not yet well-established. There are considerable gaps in knowledge, even within the United States. In order to advance the field, future research should prioritize studying the economic effects of skilled individuals.	(Nathan, 2014)
	High-Skilled Migration and Agglomeration	Harvard Library - United States	Additional research is necessary to fully comprehend the role of high-skilled immigration in the economic growth and development of both the origin and host countries, particularly as creators and transmitters of knowledge. Therefore, improving the integration of high-skilled	(Kerr et al., 2017b)

			migration and productivity data at the firm and sector levels is imperative.	
Economic Benefits of High-Skilled Immigrants	Cities, immigrant diversity, and complex problem-solving	Research Policy - United States	The relationship between wages and immigrant diversity can be further studied to understand how diversity can boost productivity by introducing heuristic heterogeneity.	(Cooke and Kemeny, 2017)
	Skilled Migration from China, India, and Mexico to the United States	Norteamérica Journal - United States	In the future, immigration of highly skilled individuals may act as a form of subsidy or contribution to the receiving countries, leading to the continuation of existing historical imbalances, particularly in countries like China, India, and Mexico.	(Aragonés and Salgado, 2019)
	Do low-skilled workers gain from high-tech employment growth? High technology multipliers, employment, and wages in Britain	Research Policy - United Kingdom	Low-skilled residents benefit from innovative, high-tech industries. However, there is limited evidence to support this claim.	(Lee and Clarke, 2019)
Imigration policy upgrade	The Employment-Based Immigration Backlog	Congressional Research Service - United States	Proposing a switch from the current system that depends on employer sponsorship to a merit-based system that would evaluate and accept aspiring immigrants according to their labor market attributes and anticipated contributions to the U.S. economy.	(Kandel, 2020)
	Immigration Policy Levers for U.S. Innovation and Startups	Harvard Business School - United States	The current US immigration structure challenges the growth of US invention and entrepreneurship through immigrant contributions. This is mainly due to numerical caps at crucial transition points, particularly the size of the H-1B program and the country caps on the rate at which employment-based green cards are awarded. Additionally, the United States does not have a startup visa similar to those introduced by many peer countries in the past decade.	(Kerr et al., 2020)
	Recruiting for the Future: A Realistic Road to a Points-Tested Visa Program in the United States	Cornell Law Faculty Publications - United States	Enacting a separate law that allows 50,000 more skilled, trained, and educated foreign workers to come to the United States through a clear and open selection process would be a positive move in changing the perception of immigration within the country.	(Yale-Loehr and Eason, 2020)
	(Un)settled sojourners in cities: the scalar and temporal dimensions of migrant precarity	Journal of Ethnic and Migration Studies - United States	All categories of temporary migrants, including highly skilled ones, can experience precarity despite being typically perceived as protected and secure. This emphasizes that the status of temporary migrants is constantly characterized by ambiguity and uncertainty.	(Chacko and Price, 2020)
	Getting The Best Of Us: Multinational Corporate Networks And The Diffusion Of Skill-Selective	Publicly Accessible Penn Dissertations - United States	IT multinational corporations support immigration policies that aim to promote the enrollment of international students.	(Born, 2019)

Immigration policy upgrade	Immigration Policies			
	Majority of U.S. Public Supports High-Skilled Immigration	Pew Research Center - United States	The proportion of immigrants in the US who have completed some college education has increased from 17% in 1970 to 47% in 2010. This upward trend in education among immigrants may continue in the future. Therefore, members of the US Congress have proposed a new immigration policy that prioritizes highly educated migrants through a merit-based system.	(Connor and Ruiz, 2019)
	Why foreign STEM PhDs are unlikely to work for US technology startups	PNAS - United States	Understanding the potential impact of visa policies on the employment prospects of foreign Ph.D. graduates seeking employment in technology startups. A significant disparity exists between the employment outcomes of foreign and US STEM Ph.D. holders who have earned their degrees from US universities, particularly in the startup industry. Specifically, foreign STEM Ph.D. holders who require visa sponsorship are only half as likely as their US counterparts to secure employment in technology startups as their first job in the industry.	(Roach and Skrentny, 2019)
	Employment and Earnings of International Science and Engineering Graduates of U.S. Universities: A Comparative Perspective	Journal of International Students - United States	It is recommended that the government provide a clearer and more feasible pathway to immigration to ensure the recruitment and retention of skilled foreign workers in the fields of science and engineering. Additional research needs to be conducted to determine whether employers prefer foreign-born graduates with higher credentials over American-born graduates with lower levels of education.	(Campbell et al., 2018)
Impact of High-Skilled Immigrants on Innovation	High-Skilled Migration and Global Innovation	Stanford Institute for Economic Policy Research - United States	It is suggested to conduct further research using empirical data to accurately determine the effects of high-skilled immigrants on the growth and knowledge diffusion in both host and home countries.	(Xu, 2016)
	Skilled Immigration, Innovation, and the Wages of Native-Born Americans	Journal of Economy and Society - United States	Future research area to examine how publications conducted in specific fields contribute to technological advancements and innovations.	(Islam et al., 2017)
	Foreign-Born graduates and innovation: Evidence from an Australian skilled visa program	Australia	Although there has been research on the influence of foreign-born workers in promoting innovation, there is still a significant gap in the literature that evaluates the contribution of foreign-born graduates to innovation. In the future, using datasets that connect employees with their employers could offer novel perspectives on the	(Crown et al., 2020)

Impact of High-Skilled Immigrants on Innovation			involvement of foreign-born graduates in fostering innovation at the firm level.	
	Highly skilled migrants and technological diversification in the US and Europe	Technological Forecasting & Social Change - US and Europe	The existing literature should focus more on examining the precise impact of the international mobility of inventors on the technological diversification of innovation output. This is because it is a significant factor in driving regional economic growth and contributing to the emergence of new technologies.	(Caviggioli et al., 2020)
	Inventor migration and knowledge flows: A two-way communication channel?	Research Policy - United States	The number of inventors who immigrate to different countries impacts the diffusion of knowledge across borders through patent citations. Although this type of research is not novel, there is still a lack of worldwide empirical data.	(Miguelez and Noumedem, 2020)
	Knowledge remittances: Does emigration foster innovation?	Research Policy - Germany	Efforts to share knowledge can help reduce the adverse effects of immigration; additional research is necessary to clarify the nature and formation of these knowledge flows.	(Fackler et al., 2020)
	Migrant inventors and the technological advantage of nations	Research Policy - United States	The literature lacks sufficient evidence on immigrants and innovation, particularly on how immigrants contribute to the transfer of knowledge across borders.	(Bahar et al., 2020)
	Migration, innovation, and technological diversion: German patenting after the collapse of the Soviet Union	Research Policy - Germany	The proportion of highly skilled immigrants involved in innovation is increasing in both Europe and the US. However, it is still unclear whether they have the ability to enhance innovation rates, which is a topic of ongoing debate.	(Ferrucci, 2020)
	Mounting corporate innovation performance: The effects of high-skilled migrant hires and integration capacity	Research Policy - Dutch region	Knowledge about the influence of high-skilled immigrants on firm-level innovation output is still limited, particularly regarding the factors that moderate this relationship. Future research could address the investments made by firms in integrating high-skilled immigrants into the innovation process.	(Laursen et al., 2020)
	STEM migration, research, and innovation	Research Policy - Europe and the United States	Understanding how people moving between countries impacts innovation patterns is important, which encourages further research on this subject. In the future, researchers can explore novel ways to track the movement of individuals across different countries. Social media platforms like LinkedIn can provide valuable insights into career histories, enabling researchers to map and measure movements, roles, and experiences between countries and enhance the comprehension of brain circulation.	(Breschi et al., 2020)

	The impact of permanent residency delays for STEM PhDs: Who leaves and why	Research Policy - United States	Designing a policy that considers the need for skilled workers while distributing permanent residency visas would lead to superior innovation outcomes for the US compared to a policy that sets quotas based on country of origin.	(Kahn and MacGarvie, 2020)
	Does scientist immigration harm US science? An examination of the knowledge spillover channel	Research Policy - United States	Further research is required to comprehend the process of assimilating foreign-trained scientists into knowledge networks in the United States, along with the development of policies that facilitate and encourage this integration by society.	(Agrawal et al., 2019)
	Transition Of International STEM Students to the US Labor Market: The Role of Visa Policy	Economic Inquiry - United States	Future work will further knowledge on how alterations made to work permission programs for student visas impact the behavior of international and domestic students. Such research could explore how these changes affect innovation activities and other relevant outcomes.	(Demirci, 2019)
Quantitative models	A data-driven computational model on the effects of immigration policies	PNAS - Worldwide	Future research on computational models may determine the impact of policy changes and explain how different scenarios are (more liberal or more restrictive).	(Simon, 2018)
	High-Skilled Migration in Times of Global Economic Crisis	Worldwide	Further research is needed to understand bilateral migrant flows, categorized by skill level.	(Czaika and Parsons, 2016)
Relocation of High-Skilled Immigrants	Why and how international students choose Mainland China as a higher education study abroad destination	Springer - China	Determining the intentions of international students is crucial to understand whether they plan to pursue further education, secure long-term employment, or return to their home countries after finishing their international study programs.	(Jiani, 2017)
	High-Skilled Immigration and the Comparative Advantage of Foreign-Born Workers across US Occupations	University of Chicago Press - United States	Future studies about job search networks specific to ethnic groups of high-skilled immigrants in the US.	(Hanson and Liu, 2018)
	Mobility of Highly Skilled Individuals and Local Innovation Activity	University Library of Munich - Europe	Future research on the work of companies and the movement of skilled personnel it is recommended to determine effectiveness of immigration policies.	(Drivas et al., 2018)
	Moving for Prosperity: Global Migration and Labor Markets	World Bank - Worldwide	Converting economic gains into practical benefits for both the source and destination countries can be achieved through political mechanisms.	(World Bank, 2018)

	"Us versus them": Sensemaking and identity processes in skilled migrants' experiences of occupational downgrading'	Journal of World Business - United Kingdom	Future studies can help to understand how cities affect people's way of processing information. Migration is often linked to cities, and some cities are more welcoming to migrants than others. Therefore, it might be relevant to explore how living in different cities influences individuals' understanding of their career paths.	(Fernando and Patriotta, 2020)
	Highly Skilled Migration: Between Settlement and Mobility	IMISCOE Research Series, Springer - Worldwide	Conducting extensive qualitative and quantitative research on the structures that promote international mobility outside the immigration process.	(Weinar, 2020 b)
	Migrants in the High-Tech and Engineering Sectors: An Emerging Research Area	IEEE Conference on Systems, Process, and Control - United States	The United States is losing its competitive edge in attracting STEM professionals as other destinations become more attractive. This competition between countries is intensifying, causing the US to fall behind in the race.	(Mosbah et al., 2018)
	Mobile practices and the production of professionals on the move: Filipino highly skilled migrants in Singapore	Geoforum - Singapore	Further studies can investigate the aspects of mobile practices such as age, gender, and ethnicity in different groups.	(Liao, 2019)
Salary inequality	Cities, immigrant diversity, and complex problem-solving	Research Policy - United States	Future research can help to understand whether the presence of immigrants in the job market leads to intensified competition, which could result in longer working hours, affecting wages and labor fairness.	(Cooke and Kemeny, 2017)
	Immigrant Earnings Assimilation in the United States: A Panel Analysis	Journal of Labor Economics - United States	Further research is needed to determine whether deferred entry into the job market and non-random employment contribute to unbalanced income comparisons between other groups of immigrants and native-born individuals and comprehend the experience of immigrant workers in the United States.	(Rho and Sanders, 2021)
Talent attraction and	I don't care about the city: the role of connections in job-related mobility decisions of skilled professionals	Regional Studies, Regional Science - Europe	Future studies in immigration policy-making are needed to emphasize the associations between employers and institutions that demand and attract skilled professionals.	(Tippel et al., 2017)
	The Innovation Activities of Multinational Enterprises and the Demand for Skilled-Worker, Nonimmigrant Visas	University of Chicago Press - United States	Future work can identify the duties for relocating foreign individuals, with a particular emphasis on companies with significant research and development involvement.	(Yeaple, 2018)

retention of high-skilled immigrants	They are modernizing America's high-skilled immigration system—barriers to recruiting and retaining global talent in the U.S.	FWD - United States	Future studies to measure and ensure that the United States is attracting suitable workers for all industries that require them, who can perform both current and future job roles.	(FWD, 2019)
	Mitigating High-Skill Brain Drain in Low-Growth Economies: An Examination of Existing Brain-Drain Threats in New Mexico and Strategy and Policy Alternative to Address Them	Portland International Conference on Management of Engineering and Technology - United States	Discussions about the brain drain challenge in low-growth economies can be initiated by policymakers, technologists, and economic development professionals.	(Cowan et al., 2019)
	Coming to America: work visas, international diversity, and organizational attractiveness among highly skilled Asian immigrants	The International Journal of Human Resource Management - United States	There is a lack of studies in the field of management that focuses on immigration-related concerns regarding organizational attraction and recruitment. Future research can explore the association between the factors affecting the attraction of foreign-born job seekers towards organizations.	(Lambert et al., 2019)
Talent attraction and retention of high-skilled immigrants	Where science, technology, engineering, and mathematics (STEM) graduates move	Population, Space, and Place - United States	Future research should explore the attractivity and retentivity of high-skilled immigrants.	(Wright and Ellis, 2019)
	Should the U.S. Adopt a Merit-Based Immigration System?	SHRM.org - United States	Fields such as high-skilled jobs require long-term channels to retain workers, while the potential of immigrant entrepreneurs is often ignored.	(Gelatt, 2020)
	How do OECD countries compare in their attractiveness for talented migrants?	Migration Policy Debates OECD - Worldwide	Disaggregating talent mobility by dimension can offer policymakers distinct and novel insights into their ability to attract foreign talent. Such analyses should be considered to gain new information about their performance in this topic.	(Stiftung, 2019)
	Skilled migration and innovation in European industries	Europe	Further investigation is required to comprehend the ground-breaking influence of specific measures implemented to draw in foreign-skilled individuals. Moreover, it is crucial to examine the influence of these measures on the mobility of skilled workers.	(Fassio et al., 2019)

	Becoming 'the Internationals'— how Place Shapes the Sense of Belonging and Group Formation of High-Skilled Migrants	Journal of International Migration and Integration - United Kingdom	Study the relationship between relocation and the politics of belonging. Access and social status determine the politics of belonging, which influences personal experiences and the capacity to establish a sense of belonging. Cities and corporations adopt a competitive approach to attract skilled workers, but they frequently overlook the importance of the politics of belonging and how neglecting them can impede their objectives.	(Plöger and Kubiak, 2018)
	Unraveling the Dynamics of Immigrant Engineers' Full-Utilization in Australia	IEEE Transactions on Engineering Management - Australia	The issue of underutilizing skilled immigrants is a worldwide problem that requires policymakers to pay attention to post-arrival policies.	(Kozanoglu et al., 2021)

Source: self-created based on literature review

Table 5 shows the literature review organized by themes, which help to identify the research gaps, and then the set of criteria and sub-criteria to develop a multi-criteria decision-making model. Each article provides a different perspective on how to address current immigration policy issues depending on the method or country subject to be studied. Several scholars have studied highly skilled immigration from an economic perspective, exploring the contributions of this stream of immigration. Several agree that high-skilled immigration contributes to U.S. economic growth (Caviggioli et al., 2020; Kerr et al., 2017; Nathan, 2014; World Bank, 2018). However, and to the best of the author's knowledge, there is still a lack of comprehensive, qualitative, and quantitative studies to address current issues of immigration policies that allow technology professionals to come, settle, and flourish in the United States (Kahn and MacGarvie, 2020; Miguelez and Temgoua; 2020; Mosbah et al., 2018; Weinar, 2020). Addressing these gaps will shed new light on the field of immigration policies.

This research aims to fill three research gaps identified during the literature review. These gaps are described as follows:

1. The impact of technology professional immigrants on innovation, patenting, diffusion, and generation of scientific and technical knowledge and their contributions to the United States is a topic that needs to receive more attention. The priority to better understand this topic is simply conducting more research (Bahar et al., 2020; Breschi et al., 2020; Ferrucci, 2020; Islam et al., 2017; Kerr et al., 2017a; Miguelez and Noumedem, 2020; Nathan, 2014; Parey et al., 2017; Xu, 2016).

2. U.S. immigration policies are out of step with the needs of today's innovative firms. Even though companies and employees have achieved innovation, entrepreneurship, and economic growth in the United States, improving these opportunities will enable the United States to remain a worldwide economic leader (USCIS, 2022a). Additional studies are needed to expand the body of knowledge (Born, 2019; Chacko and Price, 2021; Connor and Ruiz, 2019; Kandel, 2020; Kerr et al., 2017b; Kerr and Frederic, 2020; Yale-Loehr and Eason; 2020; Yeaple, 2018).

3. There is a lack of studies using Multi-Criteria Decision-Making methodologies to assess immigration policies (Czaika and Parsons, 2016; Nathan, 2014; Simon et al., 2018).

CHAPTER 3: RESEARCH OBJECTIVES, QUESTIONS, AND METHODOLOGY

The purpose of this chapter is to outline the framework for analyzing research gaps.

3.1 Research Objectives

In the previous chapter, research gaps in immigration policies for technology professionals were identified from the literature. There is a need to evaluate U.S. immigration policies comprehensively by following the principles of a multicriteria decision-making approach. According to scholars, the proposed research topic has not received enough attention (Bahar et al., 2020; Born, 2019; Breschi et al., 2020; Chacko and Price, 2021; Connor and Ruiz, 2019; Islam et al., 2017; Kandel, 2020; Kerr and Frederic, 2020; Kerr et al., 2017a; Kerr et al., 2017b; Miguelez and Noumedem, 2020; Parey et al., 2017; Xu, 2016; Yale-Loehr and Eason; 2020; Yeaple, 2018). After identifying the gaps found in the literature review, it is essential to set up the objectives of this study.

Since research results are ultimately meant to be applied, it is critical to understand how this research can be most effectively used. Therefore, the general objective of this research is to develop a score model based on a comprehensive approach to address current U.S. immigration policy issues. Decision makers will use the score model to identify current U.S. immigration issues related to technology professionals and how these issues can be solved. Thus, the goals of this study are:

1. Identify the factors that boost the innovation of technology-professional immigrants in the United States.
2. Identify the factors to develop immigration policies and,

3. Suggestions to resolve complexities and inefficiencies in U.S. immigration policies.

By doing that, the general objective can be achieved, which is to propose a hierarchical decision model to evaluate immigration policies for technology professionals to boost economic growth and innovation and wellbeing of technology professionals.

3.2 Research Questions

The identified research gaps lead to the proposal of the following: (1) the research objective and (2) the research questions (see Table 6).

Table 6. Research Gaps from the Literature Review

Research Gap	Research Objective	Research Questions	Approach
Gap 1: Lack of studies integrating factors related to technology professional immigrants in the United States. Instead, current studies focused on the economic benefits of technology professionals to host countries.	Evaluation of Immigration Legal Paths for Technology Professionals in the United States using a comprehensive decision-making model.	RQ1: What are the criteria for evaluating the effectiveness of immigration policies in increasing the attraction and retention of technology professionals?	Hierarchical Decision Model
Gap 2: Lack of studies on immigration policy-based assessments		RQ2: Which policy instrument does have the highest effect on accelerating the attraction and retention of technology professional immigration?	
Gap 3: Lack of comprehensive multi-criteria decision-making models on technology professional immigration		RQ3: What are the levels and weights of criteria and sub-criteria associated with the attraction and retention of technology professional immigration?	

Research Gaps

Based on *High-Skilled Immigration* studies and considering the benefits in host countries and the current political scenario in the United States, the gaps identified in the literature are as follows:

Gap 1 - Lack of studies integrating factors related to technology professional immigrants in the United States. Instead, current studies focused on the economic benefits of technology professionals to host countries. There need to be more studies about contributions to the innovation of technology professional immigrants in the United States. The literature emphasizes that the immigration of technology professionals to host countries has recently gained scholars' attention since this highly skilled population increases innovation and economic growth. Additionally, this topic has been studied more broadly from the perspectives of economics and society. Therefore, this study intends to fill this gap by integrating several factors such as technological, regulatory landscape, economic, political, and social (Bahar et al., 2020; Breschi et al., 2020; Ferruci, 2020; Islam et al., 2017; Kerr et al., 2017a; Miguelez and Noumedem, 2020; Nathan, 2014; Parey et al., 2017; Xu, 2016;).

Gap 2- Lack of studies on immigration policy-based assessments. The U.S. immigration policies are constantly changing, affecting the attraction and retention of technology professional immigrants. Scholars agree that U.S. policies are out of line with the necessities of tech companies. Although visa caps are continually upgrading, the shortage of skilled workers in the U.S. affects innovative firms' operations. Thus, there is a need for a study that proposes a methodology to assess current U.S. immigration policies

to boost the legal paths technology professional individuals have to immigrate to the United States (Born, 2019; Chacko and Price, 2021; Connor and Ruiz, 2019; Kandel, 2020; Kerr and Frederic, 2020; Kerr et al., 2017b; Yale-Loehr and Eason; 2020; Yeaple, 2018).

Gap 3 - Lack of studies using multi-criteria decision-making approaches. There is a lack of comprehensive multi-criteria decision-making models that evaluate immigration policies in the United States. This study aims to fill this gap by proposing a novel hierarchical decision model for policymakers who seek to create or upgrade immigration policies in the United States. This approach will develop a quantitative model, which will be later tested with case studies (Czaika and Parsons, 2016; Nathan, 2014; Simon et al., 2018).

Then, this study follows a research process that includes seven phases, further explained in the next sections (see Figure 12).

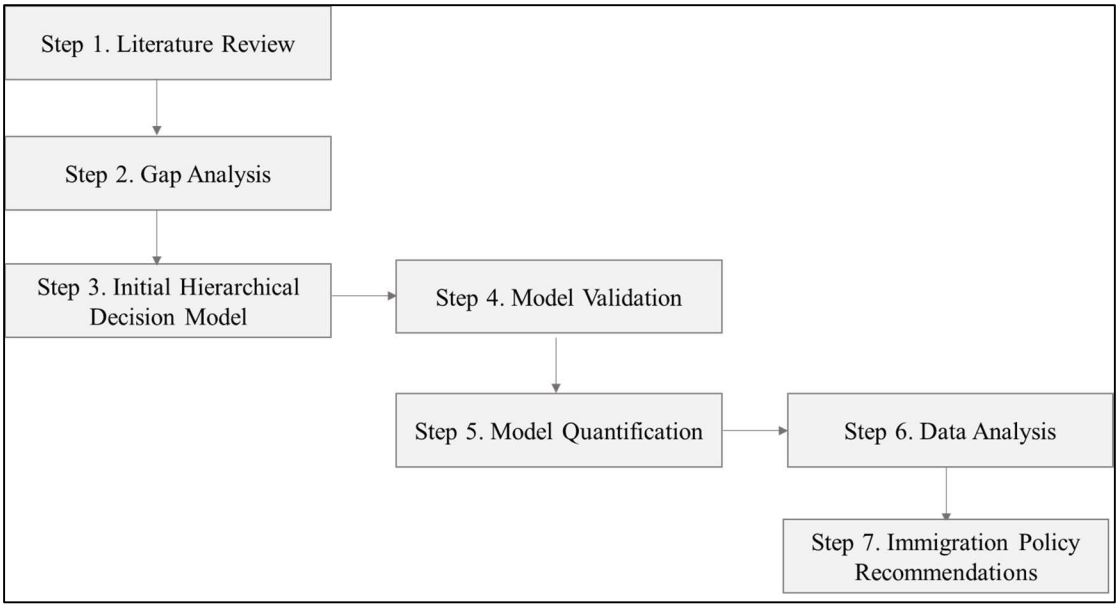

Figure 12. Research Process

Source: self- elaboration

3.3 Research Methodology

The main objective of this dissertation is to evaluate immigration policies and the factors that impact technology professional immigration to boost innovation in the United States. The alternatives that skilled individuals have to come to the United States are limited since these legal paths are employment-based. Therefore, to provide a comprehensive assessment, this study should use an approach that considers a whole set of perspectives. According to the proposed conceptual model, the relationship and interaction between the different levels influence the primary research objective. By conducting a systematic literature review, 21 attributes across five perspectives were identified and were used to build the research model. Hence, the hierarchical decision model (HDM) is selected as the approach to fulfill the objective of this research.

3.3.1 Hierarchical Decision Modeling (HDM)

HDM is a multi-criteria decision-making (MCDM) approach developed by Dundar F. Kocaoglu (Iskin and Daim, 2016). HDM is widely used in the field of MCDM methodologies. HDM helps with decision-making by breaking down complex problems into smaller sub-problems (see Fig. 13) and providing several decision alternatives (Iskin and Daim, 2016). The decision-making process is complex, and when multiple criteria take part, the process is even more complicated. Using tools, techniques, or methods to select the best possible solution is essential to making wiser decisions for technology managers and decision-makers (Osorio and Orejuela, 2008). Decision-making problems that engage several stakeholders can be managed using HDM, which provides essential information

and reduces uncertainty for the decision-making group. Thus, the Hierarchical Decision Model (HDM) is a methodology used to analyze strategic decisions in a hierarchical structure (Shaygan and Daim, 2019). The HDM is a mathematical method created to evaluate alternatives when considering multi-criteria. Properly selecting the group of experts is crucial in assessing and validating the HDM. Therefore, the main objective of HDM is to formulate a consensus among the group of experts. The process begins with setting an objective. Then, the alternatives are evaluated by expert judgment, which is converted into numerical values by using pairwise comparisons. Finally, the most suitable option is chosen by incorporating qualitative and quantitative elements (Daim et al., 2018 b). Additionally, HDM can be used in a wide range of applications such as renewable energy (Sheikh, 2013), energy efficiency (Iskin, 2014), technology adoption (Hogaboam, 2018), project evaluation (Garces, 2020; Giadedi, 2020), technology assessment (Alshareef, 2017; Khalifa, 2019), policy adoption (Abotah, 2014), technological innovation (Chan, 2013), and technology transfer (Lavoie, 2019).

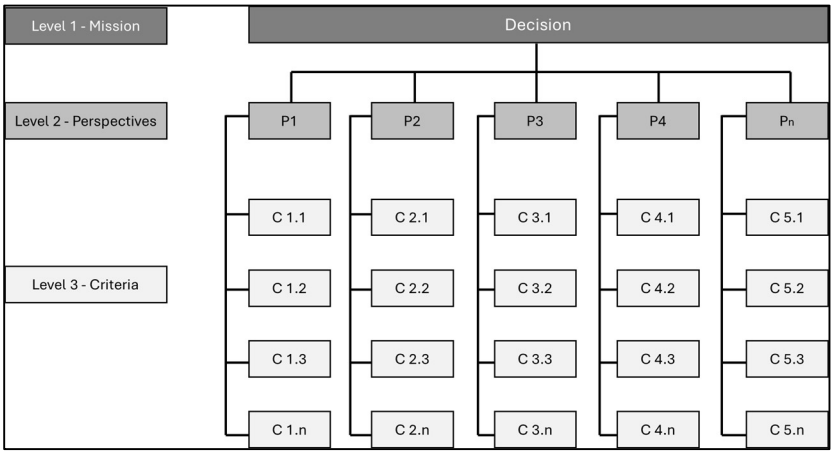

Figure 13. HDM Conceptual Framework

Source: Shaygan and Daim (2019)

HDM is built using pairwise comparison analysis. This method analyzes multiple means in pairs to determine if these values have considerable differences (Salkind, 2010). Pairwise comparison represents the number of decisions required from the experts. Equation 1 is used to calculate the pairwise comparison values:

$$PWC = \frac{n(n-1)}{2} \text{ where } n>0 \qquad \textit{Equation 1}$$

PWC: Pairwise comparison
n: Number of decision elements

Each comparison uses matrix analysis or linear algebra to examine the difference between a pair of mean values. Then, the pairwise comparison rates and ranks alternatives based on decision-making criteria. Since each criterion is assigned a numerical weight, the level of importance is based on its quantitative weight. Later, the pairwise comparison results are used to create the hierarchical decision model. Kocaoglu (2016) describes the HDM methodology as follows:

1. Completion of the pairwise comparison matrix: Two alternatives are evaluated simultaneously regarding their relative importance. The weights of each pair of criteria are derived from pairwise comparisons and split a 100 value between the options. As a result, HDM needs to make comparisons among objectives (level 1), criteria (level 2), sub-criteria (level 3), and alternatives (level 4).

2. Calculating the criteria weights. The weights of each pair of criteria are calculated in terms of the mean values. Each criterion has a final objective of achieving a value between 0 and 1.

3. Assessment of the consistency matrix. A final score for each alternative is given based on the results from the matrix. Therefore, the HDM shall target the values of disagreement (0.1) and inconsistency (0.1). These values support robustness and should be included in the final model (Daim et al., 2018 b).

As mentioned earlier, several Multi-Criteria Decision-Making methodologies have common elements, such as the use of pairwise comparison, the participation of experts in the research process, the decision-making framework, and anticipated changes in the future. The central important aspect is reducing uncertainty among decision-makers. Using other Multi-Criteria Decision-Making methodologies is a pragmatic approach that avoids further challenges for this research, such as learning new software and getting familiar with the methodology guidelines.

Disagreement Test

The intraclass correlation coefficient obtains the HDM disagreement value among expert judgments. This coefficient describes the degree to which the total number of experts agree on the relative importance of n subjects (Phan, 2013; Phan, and Kocaoglu, 2014). Equation 2 is used to calculate the coefficient of intraclass correlation:

$$r_{\text{ic}} = \frac{MS_{BS} - MS_{res}}{MS_{BS} + (k-1)\,MS_{\text{res}} + k/n\,(MS_{BJ} - MS_{res})} \qquad \textit{Equation 2}$$

ric: Coefficient of intraclass correlation

MSBJ: Mean square between experts,

MSBS: Mean square between decision elements,

MSres: Mean square residual,

k: Number of experts,

n: Number of decision elements,

The coefficient of intraclass correlation should be between 0 and 1. If the coefficient is close to 0, there is absolute agreement among experts. On the other side, the closer the coefficient is to 1, the higher the level of disagreement is (Phan, 2013). In short, acceptable disagreement has a value of 0.1 or less (Estep, 2017). According to Estep (2017), if the disagreement value is unacceptable, the researcher needs to do a follow-up to solve this issue. The disagreement can be explained because the experts did not understand/follow instructions correctly or did not complete/do the pairwise comparisons correctly. The researcher must identify the root cause of the disagreement and fix it to move forward with the study.

Inconsistency Test

Inconsistency can be defined as the disagreement between one or more individual evaluations (Estep, 2017). Inconsistency values are calculated through the Root Sum of the Variance using Equation 3:

$$RSV = \sqrt{\sum_{i=1}^{n}(ri - rij)^2} \qquad \textit{Equation 3}$$

RSV: Root Sum of the Variance

$\bar{r}i$*: mean relative value of the ith element for that expert*

rij: relative value of the ith element in the jth orientation for an expert

n: Number of decision elements,

For the Hierarchical Decision Model (HDM), inconsistency values are fundamental to validate expert judgment quantification and are calculated using a variance-based approach (Abbas, 2016). Cleland and Kocaoglu recommend an inconsistency value below a limit of 0.10 to consider the inconsistency value reliable (Cleland and Kocaoglu, 1981). Since the HDM software calculates the individual inconsistency value of each expert, it considers two inconsistency measures: (1) ordinal inconsistency and (2) cardinal inconsistency. Ordinal inconsistency is calculated in order of preference, while cardinal inconsistency is calculated based on the relative degree of preference (Abbas, 2016). If inconsistency values violate the test value (below 0.10), it can be more challenging to fix. After processing the data, the researcher must evaluate the inconsistent values generated from expert judgment. If one or more values exceed 0.10, the expert (s) must resubmit their judgment quantification. The researcher should kindly explain the inconsistency threshold to the expert (s) and invite them to resubmit their judgment. If the expert (s) do not complete the pairwise comparisons correctly, it will result in creating inconsistency values above the threshold (<0.10).

Data Collection

The data used in this research will be collected according to the HDM process (Garces, 2020; Lavoie, 2019; Phan, 2013). Therefore, the HDM creation process is described as follows: (1) literature review data collection, (2) development of the initial

HDM, (3) validation and quantification of the HDM, (4) analysis of the results, and (5) discussion and conclusion of findings. In the last stage, a final literature review is suggested to compare the findings with similar academic publications. Additionally, policymakers and experts can use the model to recommend immigration policy updates.

Expert Identification and Panel Selection

Experts suggest that Multi-Criteria Decision-Making methods deal with three types of problems: (1) choice, (2) ranking, and (3) sorting (Arandarenko et al., 2020). Considering expert choice as one of the main problems, forming the panel of experts represents a challenge since their judgment will be critical to the research objective. The panel of experts will evaluate a set of criteria, sub-criteria, and alternatives according to their area of expertise. For this reason, selecting experts is a critical task that will ensure the research's success. Therefore, Social Network Analysis technique is used for panel selection (Garces, 2020). Additionally, experts will be invited to participate in this research at the suggestion of the dissertation committee and professional LinkedIn contacts.

Further issues forming an expert panel are willingness to participate, response delay, and time commitment. Participation as an expert is entirely voluntary. There is no obligation to complete the whole set of activities. The experts can participate in one or more activities during the validation or quantification phase. The researcher plays a crucial role in engaging all the experts to increase expert participation. Although experts positively express interest in participating, their activities can overlap the research dates. It would take more work for experts to complete the activities on time.

Every research project should include a literature review that begins with identifying relevant keywords (Tranfield et al., 2003). Then, identifying experts is the next activity, which will involve selecting the most current literature on the research topic "Immigration Policy Evaluation for Technology Professionals." In the initial research phase, bibliometrics is used for several purposes, such as for ideas, projects, data gathering, and documentation, which are closely interconnected (Andersen, 2018). Thus, a Bibliometric Social Network Analysis (SNA) is used to identify the most relevant literature and expert identification. SNA is used to develop a two-mode network and analyze elements from any field or area of study (Gibson et al., 2018; Jones, 2016;). Bibliometrics, also known as scientometrics, quantitatively evaluates scientific publications and searches for the number of articles, journals, published articles, and citations (Jones, 2016). Also, it helps to create citation statistics every time one author cites another in their research publications (Andersen, 2018). These methods are used for patent analysis, mining, and citation analysis (Behkami and Daim, 2012; Daim et al., 2018 a).

Several academic databases can be used to search for scientific papers or citations. These databases include Web of Knowledge, Scopus, Google Scholar, and Web of Sciences (Toom, 2018). Data from Scopus is retrieved since it is one of the two largest database libraries for technology intelligence analysis and helps provide disciplinary classification methods (Calof et al., 2022; Dwivedi et al., 2023; Roca, 2022). The Scopus data is used to perform a SNA (see Figure. 14) using the powerful software VOSviewer, version 1.6.18 (Van Eck and Waltman, 2010) to create a beginner-friendly map based on

bibliographic data (Roca, 2022). The SNA can recreate a map based on bibliographic data using circles or frame representation. This map suggests two main assertions: (1) networks of co-authorship relations between researchers and (2) networks of co-occurrence relations between keywords obtained from frequency and centrality (Van Eck and Waltman, 2014).

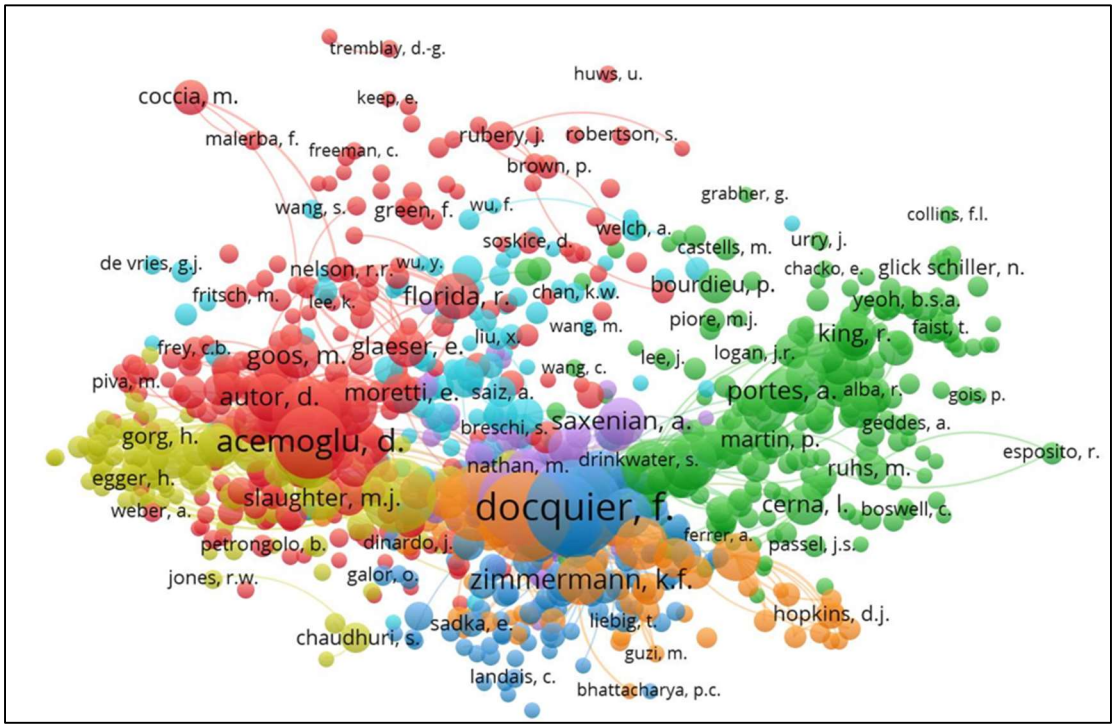

Figure 14. Social Network Map by Authors

Source: self-elaborated using VOSviewer

The SNA process is described as follows:

1) Search for keywords on the Scopus database “High-skilled,” “Migrants,” “US,” “innovation,” “STEM,” and “Employment.”
2) Search for results under Scopus and Web of Sciences.

3) Select the items that fit the research, such as “authors,” “organizations,” “countries,” and so on.
4) Export the results into a CVS file to analyze later using the software.
5) Open the VOS Viewer software.
6) Read data from database files (Scopus).
7) Choose data.
8) Select Co-Authorship / Unit of analysis: Authors.
9) Criteria: Minimum number of documents (2 publications) 156 authors identified.
10) Save the results.

The keyword search shows 934 documents from 2012 to 2022, including at least one keyword in the paper's title, abstract, or keyword section (see Table 7).

Table 7. Keyword Search in Scopus

Results	Keywords
Scopus Time Span: 2012-2022 Scholarly data	[TITLE-ABS-KEY (high-skilled) AND TITLE-ABS-KEY (immigrants OR stem OR US OR innovation OR employment)]

Among other details, the keyword search shows author names, subject areas, document types, source titles, publication stage, keywords, affiliations, countries or territories, source types, and languages. This information helps identify trends, lead publishers, country of origin, and author identification. The SNA identified this topic's prominent authors based on the number of articles and citations in Scopus (see Table 8). Additional criteria to include authors are: (1) having at least a minimum number of papers

>two and (2) a minimum number of citations >50. However, this criterion does not apply to all experts.

Table 8. Expert Identification Panel

Panel	Expert	Affiliation	Type of Work	Sector
Technological	Expert 1	Pew Research Center	Director	Non-governmental organization
	Expert 2	U.S. Department of Homeland Security	Managerial	Government
	Expert 3	Miller Mayer, LLP	Lawyer	Industry
	Expert 4	U.S. Citizenship and Immigration Service	Managerial	Government
	Expert 5	U.S. Department of Homeland Security	Managerial	Government
	Expert 6	University of South Florida	Professor	Academia
	Expert 7	Cato Institute	Director	Non-governmental organization
	Expert 8	U.S. Department of Homeland Security	Managerial	Government
	Expert 9	Pew Research Center	Researcher	Non-governmental organization
	Expert 10	Migration Policy Institute	Managerial	Non-governmental organization
	Expert 11	U.S. Department of Homeland Security	Managerial	Government
	Expert 12	Pew Research Center	Director	Non-governmental organization
Regulatory Landscape	Expert 13	Cornell Law School	Professor	Academia
	Expert 14	ASML	Human Resources	Industry
	Expert 15	University of Notre Dame	Professor	Academia
	Expert 16	Princeton School of Public and International Affairs	Professor	Academia
	Expert 17	Intel	Director	Industry
	Expert 18	Cornell Law School	Professor	Academia
	Expert 19	University of California, San Diego	Professor	Academia
	Expert 20	Donau-Universitat Krems, Austria.	Professor	Academia

	Expert 21	Migration Policy Institute	Director	Non-governmental organization
	Expert 22	University of Michigan	Professor	Academia
	Expert 23	Harvard Business School	Professor	Academia
	Expert 24	Lam Research	Human Resources	Industry
Economic	Expert 25	Harvard Kennedy School	Professor	Academia
	Expert 26	University of California, Berkeley	Professor	Academia
	Expert 27	Université de Bordeaux	Researcher	Academia
	Expert 28	Hewlett Packard	Managerial	Industry
	Expert 29	SHPE	Director	Non-governmental organization
	Expert 30	ITESM	Professor	Academia
	Expert 31	Harvard Business School	Professor	Academia
	Expert 32	The University of Oxford, Centre on Migration, Oxford, United Kingdom	Professor	Academia
	Expert 33	The University of Oxford, Centre on Migration, Oxford, United Kingdom	Professor	Academia
	Expert 34	Migration Policy Institute	Director	Non-governmental organization
	Expert 35	Institute for Economic Research	Researcher	Non-governmental organization
	Expert 36	Institute of Labor Economics	Researcher	Non-governmental organization
Social	Expert 37	Harvard Kennedy School	Professor	Academia
	Expert 38	Intel	Managerial	Industry
	Expert 39	Boston University	Researcher	Academia
	Expert 40	OECD	Analyst	Non-governmental organization
	Expert 41	Morgan State University	Professor	Academia
	Expert 42	Institute of Labor Economics	Researcher	Non-governmental organization
	Expert 43	Center for Research and Analysis of Migration	Researcher	Non-governmental organization
	Expert 44	George Washington University	Professor	Academia

	Expert 45	Institute of Economic and Social Research	Researcher	Non-governmental organization
	Expert 46	OECD	Researcher	Non-governmental organization
	Expert 47	World Development	Professor	Non-governmental organization
	Expert 48	National Foundation for American Policy	Director	Non-governmental organization
Guidelines (before validation)	Expert 49	Pew Research Center	Researcher	Non-governmental organization
	Expert 50	Migration Policy Institute	Analyst	Non-governmental organization
	Expert 51	Webber Law Firm	Attorney	Industry
	Expert 52	Business Immigration Attorney	Attorney	Industry
	Expert 53	MIT Sloan School of Management	Professor	Academia
	Expert 54	National Foundation for American Policy	Researcher	Non-governmental organization
	Expert 55	Berry Appleman & Leiden	Lawyer	Industry
	Expert 56	Congressional Office	Managerial	Government
	Expert 57	Pew Research Center	Researcher	Non-governmental organization
	Expert 58	Congressional Office	Managerial	Government
	Expert 59	National Foundation for American Policy	Lawyer	Non-governmental organization
	Expert 60	National Bureau of Economic Research	Researcher	Non-governmental organization

The Social Network Analysis also suggests a list of potential organizations where the researcher can seek additional resources (see Tables 9 and 10). The main criteria used to rank the organizations is the number of citations.

Table 9. Organizations from Panel Identification

#	Organization	Country	Documents	Citations	Total Link Strength
1	University of Oxford	United Kingdom	5	342	10
2	University of Michigan	United States	1	264	0

3	Macarthur Foundation	United States	2	208	4
4	World Bank	United States	4	190	8
5	Department of Policy Studies	United States	1	170	2
6	University of California, Davis	United States	5	152	8
7	Department of Geography	United States	2	135	2
8	National Bureau of Economic Research	United States	1	129	2
9	Berkeley roundtable	United States	1	127	3
10	Scheller College of Business, Georgia	United States	1	127	3
11	NBER	United States	3	113	27
12	Institute of Labor Economics	Germany	14	225	17
13	Cesifo	Germany	5	32	19
14	London School of Economics	United Kingdom	3	64	6
15	University of Sidney	Australia	3	43	1
16	Migration and Globalization	Austria	3	30	1
17	World Intellectual Property	Switzerland	3	5	1

Additional organizations to look for collaborations are shown in the following table.

Table 10. Additional Organizations Panel Identification

#	**Organization**	**Country**
19	Congressional Research Service	United States
20	National Science Foundation	United States
21	American Immigration Council	United States
22	FWD	United States
23	Pew Research Center	United States
24	Department of State	United States
25	U.S. Citizenship and Immigration Services	United States
26	Office of Congress	United States

27	Department of Homeland Security	United States
28	Organization for Economic Co-operation and Development	France
29	United Nations	United States
30	Macarthur Foundation	United States
31	Department of Policy Studies	United States
32	Department of Geography	United States
32	Scheller College of Business, Georgia	United States

The panel of experts will be designed, but not limited by, using the results of the Social Network Analysis. Additionally, other resources to invite experts will be (1) researcher personal connections, (2) committee recommendations, and (3) LinkedIn experts.

CHAPTER 4. DEVELOPMENT OF THE RESEARCH MODEL

This chapter describes the criteria for the selection of experts and panel formation. Additionally, there is an explanation of the research process, including validation of the initial model, expert judgment quantification, and a description of the research tools (see Appendices A through F).

4.1 Expert Panel Formation

Since this study follows a multicriteria decision-making methodology, the judgment of experts is critical to successfully identify the main perspectives and attributes helpful to solving the research problem. Considering the challenges and limitations explained in the previous chapter, seven panels were formed that included 60 experts. The panels were created according to the area of knowledge of each expert. It is noted that some experts participated in one or more panels.

One of the main barriers to this research is expert engagement and willingness to complete all activities since expert participation is voluntary. Additionally, the engagement of experts identified through the Social Network Analysis results could have been much higher. Most of the experts that participated in this research were found on LinkedIn, and through connections with professionals working in some vein with U.S. immigration policy.

To increase the likelihood of success, the NSF established guidelines for the selection of experts while conducting research, which include:

- *Remarkable knowledge of the science and engineering subfields involved in the research.*

- *More generalized knowledge of the science and engineering subfields involved in the research.*
- *Broad knowledge of the infrastructure of science and engineering research and its educational activities to evaluate contributions to societal goals, scientific and engineering personnel, and*
- *To the extent possible, diverse representation within the review group balances various characteristics such as organization represented, reviewer diversity, age distribution, geographic balance, and immigration status* (The National Science Foundation, 2018).

Furthermore, Estep (2017) recommends key attributes that experts must possess to qualify for this type of research, such as having an advanced degree, the quality of their research, having meaningful publications and patents, demonstrating work evidence within the area of study, receiving relevant awards, and playing a pivotal role with society memberships or organizations.

Following the above criteria for expert selection, the panels were formed to validate and quantify the research model (see Table 11). The panels include experts from the immigration policy area, industry, research labs, and universities. Experts from Panel P_0 validated the initial Hierarchical Decision Model built through an extensive literature review. The experts were selected based on their expertise in U.S. immigration policies. Panel P_1 was formed to quantify the criteria level of the Hierarchical Decision Model, where most selected experts have at least senior-level positions within their organizations.

Panels P_2 through P_6 quantified the third level of the Hierarchical Decision Model, also identified as a sub-criteria and the alternatives.

Table 11. Summary of Expert Panels

Panel	Panel Focus	Data Collection Tool
P_0	Model Validation	Qualtrics® survey software
P_1	Criteria Level Quantification	HDM Software
P_2	Technological Quantification	HDM Software
P_3	Regulatory Landscape Quantification	HDM Software
P_4	Economic Quantification	HDM Software
P_5	Political Interpretation and Proposals Quantification	HDM Software
P_6	Social	HDM Software

Every expert was initially contacted via email or LinkedIn to invite them to participate in this research (see Appendix A). Estep (2017) recommends having in-person, phone, or virtual meetings to explain the role of experts while participating in the research. Therefore, a 20-minute virtual meeting was offered to experts, using the Zoom® software: Version 5.15.10 (Zoom Video Communications Inc, 2023) to describe the research objective and approach and to clarify any additional questions with the goal to meet the inconsistency and disagreement values. Table 12 describes the expert panels, their backgrounds, and affiliations.

Table 12. Expert Panels

Expert	Background	P_0	P_1	P_2	P_3	P_4	P_5	P_6
Expert 1	Industry Analyst, Industry	✓	✓	✓		✓		
Expert 2	Immigration Lawyer, Paralegal	✓						
Expert 3	Full-Time Professor, University	✓	✓	✓				
Expert 4	Full-Time Professor, University	✓		✓				
Expert 5	Immigration Lawyer, Paralegal	✓		✓				

Expert 6	Immigration Lawyer, Paralegal	✓	✓	✓				
Expert 7	Strategy Manager, Industry		✓	✓		✓		
Expert 8	LTD Industrial Engineer, Industry	✓		✓				
Expert 9	Senior Manufacturing Engineer, Industry		✓	✓				
Expert 10	Executive Director & Cofounder, NGO		✓					
Expert 11	Systems Application Analyst, Industry		✓	✓				
Expert 12	SAP Product Manager, Industry			✓				
Expert 13	Senior Project Engineer, Industry	✓	✓					
Expert 14	Mechanical Engineer, Industry			✓				
Expert 15	Senior Statistical Analyst, Industry			✓				✓
Expert 16	Director, Research & Innovation, NGO	✓	✓					
Expert 17	Immigration Lawyer, Paralegal				✓			
Expert 18	International Student Specialist, University	✓	✓		✓			
Expert 19	Immigration Lawyer, Paralegal	✓			✓			
Expert 20	Director of International Student Office, University	✓	✓					
Expert 21	Director, Immigration Services, University	✓	✓		✓		✓	
Expert 22	Graduate International Student, University	✓	✓		✓			✓
Expert 23	UX Designer & Movie Director, Industry	✓	✓		✓			
Expert 24	Associate Director ISSS, NGO	✓	✓		✓		✓	
Expert 25	Business Immigration Attorney, Paralegal				✓			
Expert 26	Policymaker & Immigration Specialist, NGO		✓		✓			
Expert 27	Business Immigration Attorney, Paralegal	✓	✓			✓		
Expert 28	Full-Time Professor, University	✓	✓					
Expert 29	Business Analyst, Industry	✓	✓		✓	✓		
Expert 30	Full-Time Professor, University	✓						
Expert 31	Senior Manager Immigration Services, NGO	✓	✓			✓	✓	
Expert 32	Full-Time Professor, University					✓		
Expert 33	Technology Journalist, Media							
Expert 34	System Engineering Expert, Industry			✓		✓		
Expert 35	New Americans Job Coach, NGO		✓			✓		
Expert 36	Public Relationship & Marketing, Industry					✓		
Expert 37	Financial Analyst, Industry					✓		
Expert 38		✓						
Expert 39	Immigration Attorney, Paralegal	✓						
Expert 40	Immigration Writer, Paralegal				✓		✓	
Expert 41	Immigration Attorney, Paralegal	✓						
Expert 42	Immigration Attorney, Paralegal						✓	

Expert 43	Operations Manager, Industry	✓						
Expert 44	Immigration Advisor, Paralegal						✓	
Expert 45	Subscription Platform Expert, Industry						✓	
Expert 46	Autonomous Technical Specialist, Industry						✓	
Expert 47	Public Policy Director, NGO						✓	
Expert 48	International Student Advisor, University						✓	
Expert 49	Immigration Specialist, Paralegal						✓	
Expert 50	Executive Director, NGO		✓					✓
Expert 51	Coordinator Intercultural Affairs, University	✓						✓
Expert 52	Career Coach	✓						
Expert 53	Policy and Advocacy Manager, NGO	✓					✓	✓
Expert 54	Robotics Project Engineer, Industry							✓
Expert 55	Principal Product Manager, Industry	✓						✓
Expert 56	International Student Advisor, University		✓					✓
Expert 57	CRM Support Engineer, Industry							✓
Expert 58	Ph.D. International Student, University							✓
Expert 59	Accounting Intern, Industry							✓
Expert 60	Instructive Innovation Technician, Industry							✓
	TOTAL	**28**	**23**	**13**	**11**	**10**	**12**	**12**

4.2 Conceptual Hierarchical Decision Model

The initial Hierarchical Decision Model (see Figure 15) is a four-level model based on a literature review, which includes (1) objective, (2) criteria, (3) sub-criteria, and (4) outcomes. The criteria level encompasses five immigration policy attributes: Technological, Regulatory Landscape, Economic, Guidelines (before validation), and Social. Then, each criterion grouped its corresponding sub-criteria. Lastly, the suggested alternatives are the options for technology professional immigrants to relocate to the United States. Policy and Decision makers can use this model when developing or upgrading immigration policies.

4.2.1 Mission Level

The objective of this research is included at the mission level, which is to develop a technological assessment model for immigration policies. Therefore, the HDM can be used to design or upgrade immigration policies in the United States. The HDM model will be validated with a sensitivity case analysis. Even though this model focuses on U.S. immigration policies, the model can be customized for other governments and countries with employment-based policies, such as point-based immigration programs.

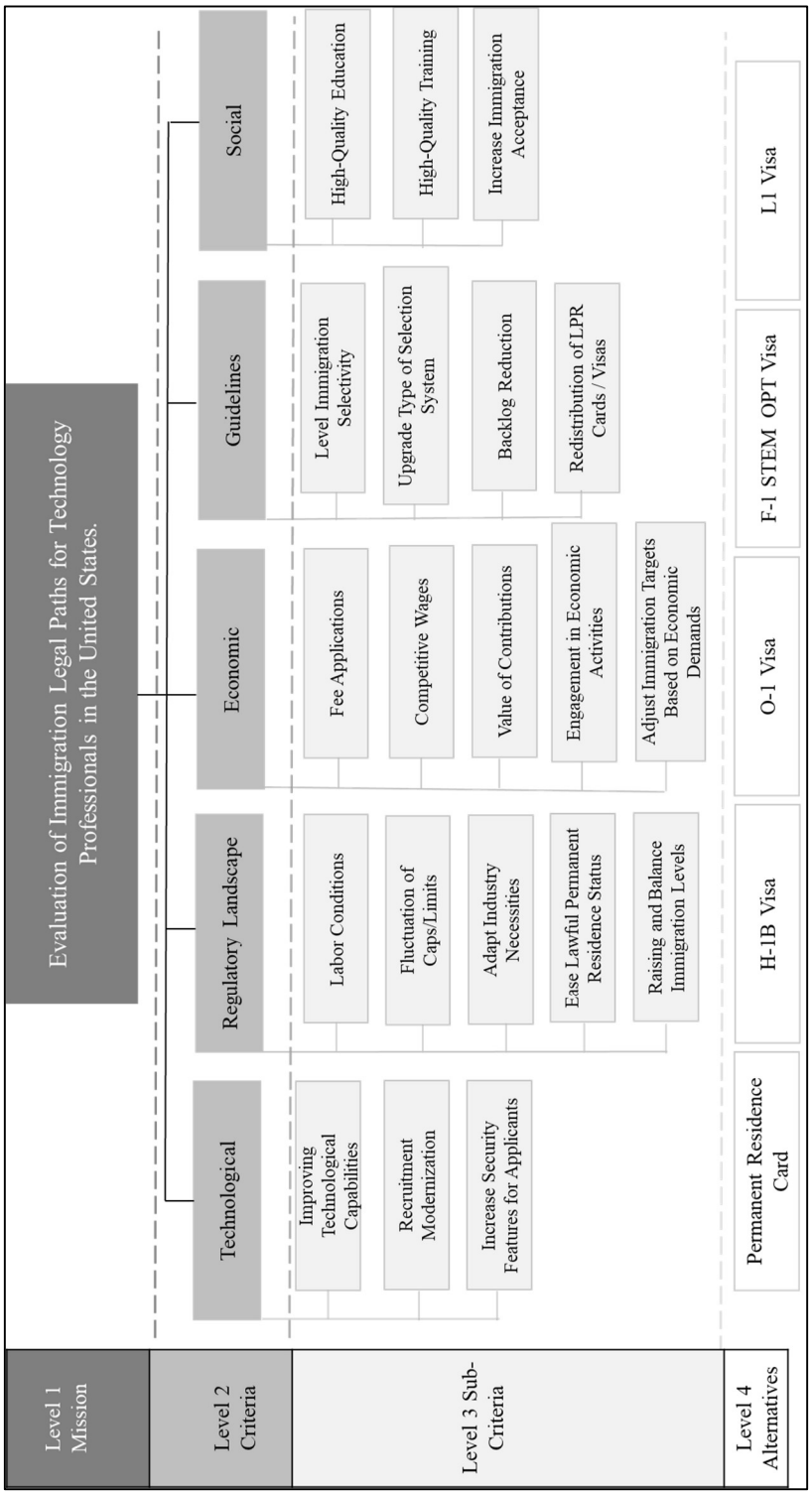

Figure 15. Initial Hierarchical Decision Model

Source: self-elaborated based on Literature Review

4.2.2 Criteria Level

The five criteria included in the HDM were identified after conducting a systematic literature review. Each criterion is described below:

- The Technological criterion encompass the management, processing, and authorization of applications of technology professional immigrants by upgrading technological capabilities that the U.S. Government is responsible for managing through the United States Citizenship and Immigration Services agency. By upgrading these capabilities, the U.S. Government will be able to improve the process of the applications of technology to professional immigrants (Demig Policy, 2015; Hunt and Gauthier-Loiselle, 2010; Parey et al., 2017; USCIS, 2019; USCIS, 2022c).
- The Regulatory Landscape criterion set the ground for attracting, selecting, and retaining technology professional immigrants in the United States. It also ensures that technology-skilled immigrants have the same rights as U.S. citizens but also the opportunity to extend their stay or obtain permanent residence (Demig Policy, 2015; Hunt and Gauthier-Loiselle, 2010; Parey et al., 2017; USCIS, 2019; USCIS, 2022b).
- The Economic criterion incorporate micro and macroeconomic aspects to benefit the U. S economy through the contributions of technology professional immigrants. The suggested economic benefits for the U.S. economy are fees, taxes, and the financial value of the innovations made by technology professional immigrants (Czaika and Parsons, 2015; Demig Policy, 2015; Duncan and

Waldorf, 2010; Ferrucci, 2020; Kandel, 2020; Melo et al, 2014; Ruyssen et al., 2017; Schotel, 2012; Simon et al., 2018; USCIS, 2019;Yale-Loehr and Eason, 2020).

- The Guidelines criterion, which was renamed as Political Interpretation and Proposal after validation, define priority proposals to eliminate/reduce current immigration issues for technology professionals and helps to identify the best profiles of technology professional immigrants who are willing to relocate to the United States with a lesser number of barriers (Czaika and Parsons, 2016; Duncan and Waldorf, 2010; Melo et al., 2014; Ruyssen et al., 2017; Schotel, 2012; Simon et al., 2018; USCIS, 2019; USCIS, 2022c; Yale- Loehr and Eason, 2020).
- Finally, the Social criterion help build community support for technology professionals with their relocation process to the United States. It ensures that technology professional immigrants have access to settlement policies to ease the adaptation to a new culture and increase the likelihood of positive contributions to the U.S. economy (Czaika and Parsons, 2016; Duncan and Waldorf, 2010; Ferruci et al., 2020; Kandel, 2020; Melo et al., 2014; Ruyssen et al., 2017; Schotel, 2012; Simon et al., 2018; USCIS 2019; Yale-Loehr and Eason, 2020;)

4.2.3. Sub-Criteria Level

Each criterion included in the HDM encompasses a set of sub-criteria. Table 13 describes the HDM sub-criteria associated with the research topic "Technology Professional Immigrants in the United States."

Table 13. Sub-Criteria Description

Criteria	Sub-criterion	Definitions for Model	References
Technological	Improving Technological Capabilities	Ensure compliance of applications with government regulations.	(CRS, 2018; Gelb and Krishnan, 2018; Reinsch and Denamiel, 2023; USCIS, 2019; USCIS; 2022c; Zielinski, 2020)
	Digital Transformation of Application Processes	Accelerate the application process to adopt digital transformation strategies.	(Hunt and Gauthier-Loiselle, 2010; U.S. Government Accountability Office, 2007; USCIS, 2019; USCIS, 2022c; US Department of Homeland Security, 2019)
	Increase Security Features for Applicants	Improve the security features of online applications, physical applications, and checkpoint entrees.	(Buresh, 2021; Poster, 2022; USCIS, 2019; U.S. Department of Homeland Security, 2020; U.S. Department of Homeland Security, 2023)
Regulatory Landscape	Labor Conditions	Design of policies to ensure the labor conditions of technology professional immigrants match those of native workers.	(Czaika and De Haas, 2013; Macaluso, 2022; Perez, 2015; Romer, 1990)
	Fluctuation of Caps/Limits	Economic growth and labor market conditions will determine the cap of LPR cards/visas available each fiscal year for technology professional immigrants.	(Borjas et al., 2019; Kandel et al., 2022; Kerr and Kerr, 2020)
	Adapt Industry Necessities	Agile bureaucracy will update regulatory instruments to align the objectives of industry necessities.	(Aydemir, 2020; Borjas, 2000; Kandel et al., 2022; Yeaple, 2018)

	Ease Lawful Permanente Resident Status (LPR)	Ease of the pathway to LPR of technology professional individuals, STEM professionals, Ph.Ds. Graduated from U.S. universities who have lived/worked at least five years in the U.S.	(Anderson, 2011; Kandel et al., 2022)
	Raising and Balance Immigration Levels	Immigration of technology professionals will increment annually and redistribute the per-country ceiling (7% per country).	(Born, 2019; Kandel et al., 2022)
Economic	Fee Applications	Visa fees and costs for education and employment authorizations.	(Kandel et al., 2022; Moynihan et al., 2022; Simpson, 2022)
	Competitive Wages	The differential income between the home country and the host country.	(Anderson, 2021; Moynihan et al., 2022; Papademetriou et al., 2009)
	Value of Contributions	Define the value of contributions of technology professional immigration towards innovation, U.S. economic growth, and the labor market.	(Blau and Mackie, 2017; Burchardi et al., 2020; Hanson and Slaughter, 2016; Kandel et al., 2022)
	Actively Engagement	Define the level of participation of technology professional immigration to measure the value of economic/knowledge contribution.	(CRS, 2021; Hiebert, 2019;)
	Adjust Immigration Targets Based on Economic Demands	Yearly adjustment of technology professional immigration targets to meet the country's economic demands.	(Hawthorne, 2014; Kandel et al., 2022; Lofgren, 2021)
Guidelines	Increase Immigration Selectivity	Make the eligibility criteria of technology professional immigrants more selective for LPR cards/ visas.	(Anderson, 2021; Kandel et al., 2022; Matloff, 2013; Papademetriou et al., 2019)
	Hybrid System for Dual Selection and Verification	A combination of a point-based system and current U.S. employment-based system to	(Gest, 2020; Kandel et al., 2022;

		improve the scores of labor demand.	Holtz-Eakin and Varas, 2019;)
	Backlog Reduction	Improve agencies' resources to reduce waiting time because of administrative processing.	(Kandel 2020; Kandel et al., 2022)
	Redistribution of LPR Cards / Visas	Ensure the distribution of LPR cards and employment-based visas based on occupation.	(Bier, 2020; Kandel 2020, Kandel et al., 2022; USCIS, 2022c)
Social	High-Quality Education	Improve the ability of institutions to offer specialized education to high-skilled immigrants.	(Connor and Ruiz, 2019; Desjardins, 2019; Int. Labour Office, 2010; Rho and Sanders, 2021; Weinar and von Koppenfels, 2020b)
	High-Quality Training	Developing and continual improvement of skills offered to high-skilled immigrants.	(Insight, 2020; Kerr et alt., 2014; Papademetriou and Sumption, 2013; Zients, 2014)
	Increase Immigration Acceptance	Public support of the native population toward high-skilled immigration.	(Connor and Ruiz, 2019; Perez, 2015; Weina and Klekowski von Koppenfels., 2020 a)

4.2.4. Alternative Level

U.S. Visas are legal documents allowing individuals to travel to a port of entry, airport, or land border crossing requesting access to the United States (U.S. Department of State, 2024). U.S. Federal Agencies Department of Homeland Security (DHS) and Customs and Border Protection (CBP) will determine the authorization to access U.S. territory. The U.S. Federal Government can achieve the aim of its immigration policies by controlling the visa process (Cornell Law School, 2024). Then, the following visas

(see Table 14) are the alternatives included in the HDM model: Permanent Residence (intent), H-1B, O-1, L-1 (dual intent), and F-1 STEM OPT (non-immigration).

Table 14. Alternative Description

Alternative	Description	References
Permanent residence	Permanent resident cards are for employment reasons (EB-1) category for immigrants with extraordinary abilities and for individuals that hold advanced degrees (EB-2).	(Borjas, 2019; USCIS, 2022c; U.S. Department of Homeland Security, 2020; Yeaple, 2018)
H-1B visa	H-1B offers temporary visas for workers in specialty occupations, and H-1B2 for researchers and development project workers.	
O-1 visa	O-1 visa provides work authorization to individuals with extraordinary abilities in areas such as science, art, athletics, education, and business.	
F-1 STEM OPT visa	F-1 STEM OPT visa provides work authorization permits to recent graduates from STEM programs to work up to 36 months without work sponsorship.	
L-1 visa	L-1 offers intra-company transfers for executives and managers employed by international firms.	

4.3 Data Collection

After having the proposal HDM model, the next step is to collect data through a Qualtrics® survey software Version: XM 2023 (Qualtrics software, 2023) and Hierarchical Decision Model Software® Version: Beta 2.0 (ETM, 2016). Table 15 describes the HDM activities and an estimated time that experts need to be committed to while participating in this study. Email invitations were sent to experts to validate and quantify the model (see Appendices B through E).

Table 15. Activities and Time Commitment for Validation and Quantification for the HDM Model

Activity	Task	Tool	Time Commitment
Activity 1	Validation of Model's Criteria	Qualtrics® survey software	5 minutes

Activity 2	Validation of Model's Sub-Criteria:	Qualtrics® survey software	10 minutes
Activity 4	Quantification of Model's Criteria:	HDM software	5 minutes
Activity 5	Quantification of Model's Sub-Criteria	HDM software	20 to 25 minutes

CHAPTER 5. RESULTS OF MODEL VALIDATION

This chapter aims to validate and analyze the judgment from experts in the field of U.S. immigration policies collected by the Hierarchical Decision Software Version 2.0 (ETM, 2016). By using pairwise comparisons, all experts quantified the model. As a result, the following model is presented with the values of the criteria, sub-criteria, and alternatives. Besides, inconsistency and disagreements values between the experts that do not meet the threshold were examined using a cluster analysis.

5.1 Criteria Validation

Experts were invited to validate the model criteria shown in black.

5.1.1 Criteria Level

A total of 28 experts composed panel P0 and were invited to validate the criteria identified in the literature review. Table 16 below shows a summary of the expert panel responses.

Table 16. Criteria Validation – Experts' Responses

Criteria		Agreed	Disagreed	Threshold	Decision
1	Technological	26	2	92.9 %	Included
2	Regulatory Landscape	27	1	96.4 %	Included
3	Economic	24	4	85.7 %	Included
4	Political Interpretation and Proposals	23	5	82.1 %	Included
5	Social	25	3	89.3 %	Included

These experts have senior careers and broad knowledge of U.S. immigration policies. The experts were asked if they agreed or disagreed with the identified factors in order to validate them: (1) Technological, (2) Regulatory Landscape, (3) Economic, (4)

Guidelines, and (5) Social. The data was gathered by using a Qualtrics® survey software Version: XM 2023 (Qualtrics software, 2023) as the Research Instrument (Appendix F). Previous research suggests that the minimum threshold for validation should be 67% or above to include each criterion within the final model (Estep, 2017; Garces, 2020). After validation, all five criteria were included in the final model. Notably, due to the experts' recommendations, criteria (4) Guidelines will now be titled as "Political Interpretation and Proposals."

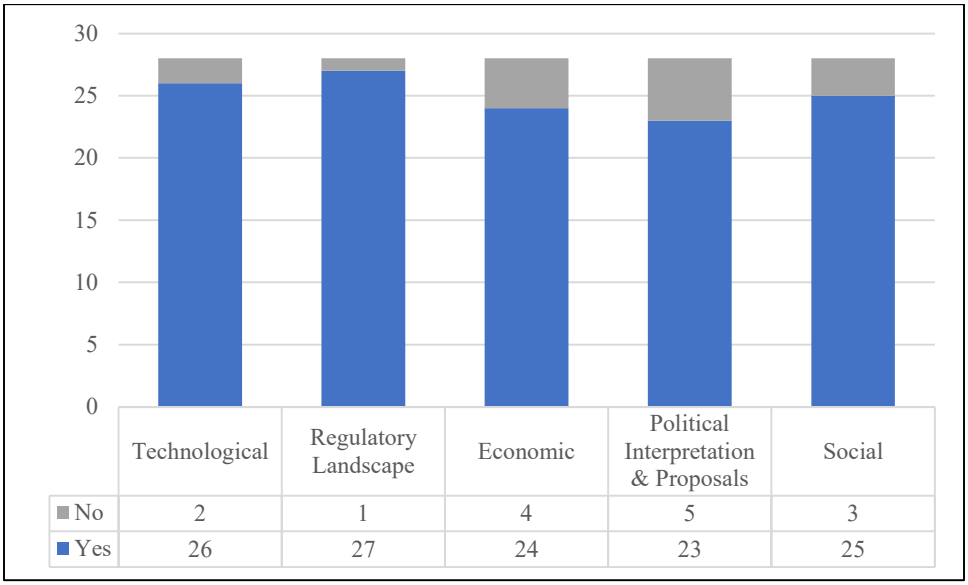

Figure 16. Criteria Validation Results

5. 2 Sub-criteria Validation

5.2.1 Technological Sub-Criteria

The following panel was composed of fourteen experts who validated the Technological sub-criteria using the research instrument **(**Appendix F**)**. All the Technological sub-criteria were accepted and included in the final model. Table 17 below shows a summary of the responses from the panel of experts.

Table 17. Technological Sub- Criteria Validation – Experts' Responses.

	Sub-Criteria	Agreed	Disagreed	Threshold	Decision
1	Improving Technological Capabilities	12	2	85.71%	Included
2	Digital Transformation of Application Process	13	1	92.80%	Included
3	Increase Security Features for Applicants	12	2	85.71%	Included

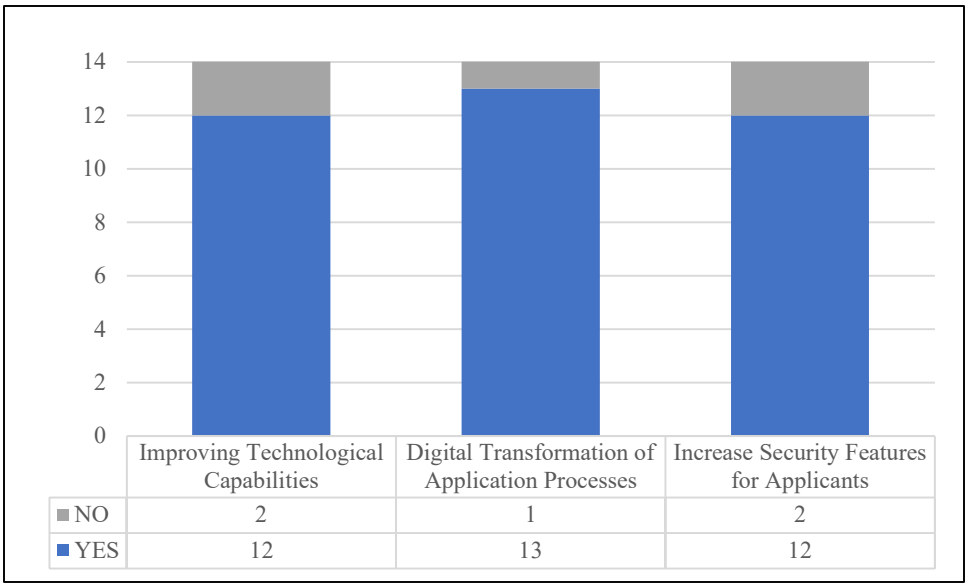

Figure 17. Technological Sub-Criteria Validation Results

5.2.2 Regulatory Landscape Sub-Criteria

The Regulatory Landscape Expert panel was composed of sixteen experts who validated the sub-criteria using the research instrument **(**Appendix F**)**. All the Regulatory Landscape sub-criteria were accepted and included in the final model. Table 18 below shows a summary of the expert panel responses.

Table 18. Regulatory Landscape Sub-Criteria Validation – Experts' Responses

	Sub-Criteria	Agreed	Disagreed	Threshold	Decision
1	Labor Conditions	15	1	93.75 %	Included
2	Fluctuation of Caps/Limits	15	1	93.75 %	Included
3	Adapt Industry Necessities	15	1	93.75 %	Included
4	Ease Lawful Permanent Residence Status	15	1	93.75 %	Included
5	Raising and Balance Immigration Levels	15	1	93.75 %	Included

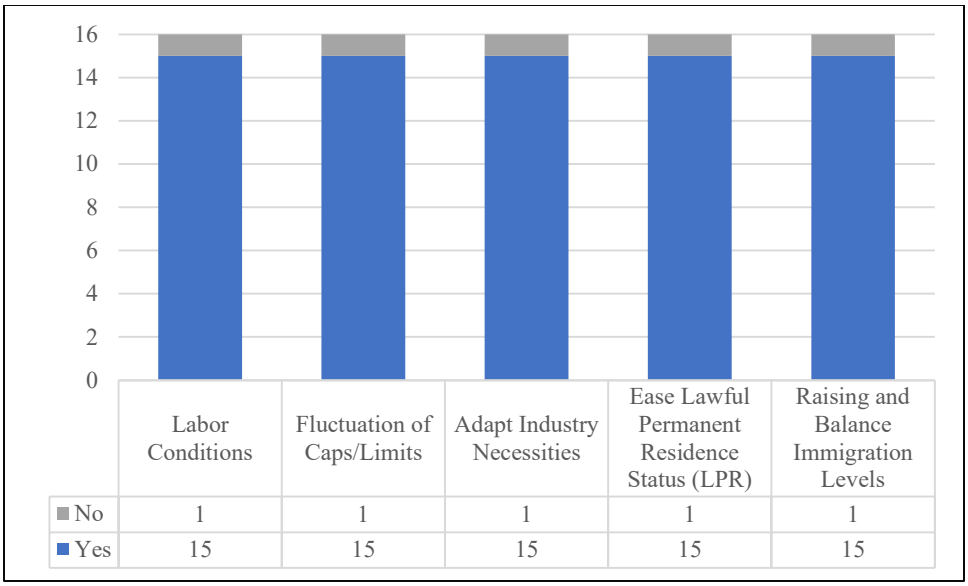

Figure 18. Regulatory Landscape Sub-Criteria Validation Results

5.2.3 Economic Sub-Criteria

The Economic Expert panel was composed of twelve experts who validated all sub-criteria using the research instrument (Appendix F). All the Economic sub-criteria were accepted and included in the final model. Table 19 below shows a summary of the expert panel responses.

Table 19. Economic Sub-Criteria Validation – Experts' Responses

	Sub-Criteria	Agreed	Disagreed	Threshold	Decision
1	Fee Applications	9	3	75 %	Included
2	Competitive Wages	11	1	91.66 %	Included
3	Value of Contributions	10	2	83.33 %	Included
4	Actively Engagement	12	0	100 %	Included
5	Adjust Immigration Targets Based on Economic Demands	11	1	91.66 %	Included

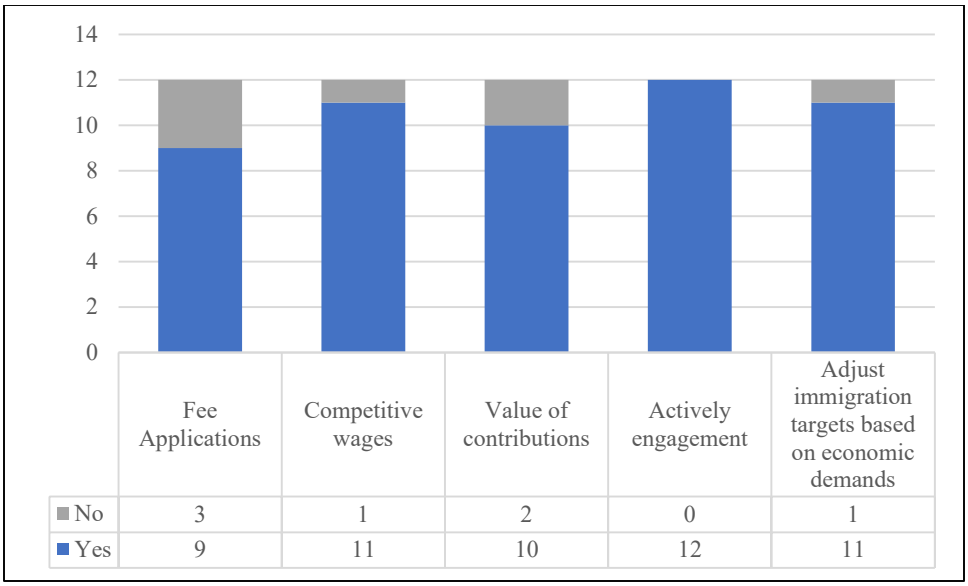

Figure 19. Economic Sub-Criteria Validation Results

5.2.4 Political Interpretation and Proposals Sub-Criteria

The Political Interpretation and Proposals Expert was composed of twelve experts who validated all sub-criteria using the research instrument **(**Appendix F**)**. All the Political Interpretation and Proposals sub-criteria were accepted and included in the final model. Table 20 below shows a summary of the expert panel responses.

Table 20. Political Interpretation and Proposals Sub-Criteria Validation – Experts' Responses

	Sub-Criteria	Agreed	Disagreed	Threshold	Decision
1	Level Immigration Selectivity	9	3	75 %	Included
2	Upgrade Type of Selection System	10	2	83.33 %	Included
3	Backlog Reduction	12	0	100 %	Included
4	Redistribution of LPR Cards / Visas	8	4	67 %	Included

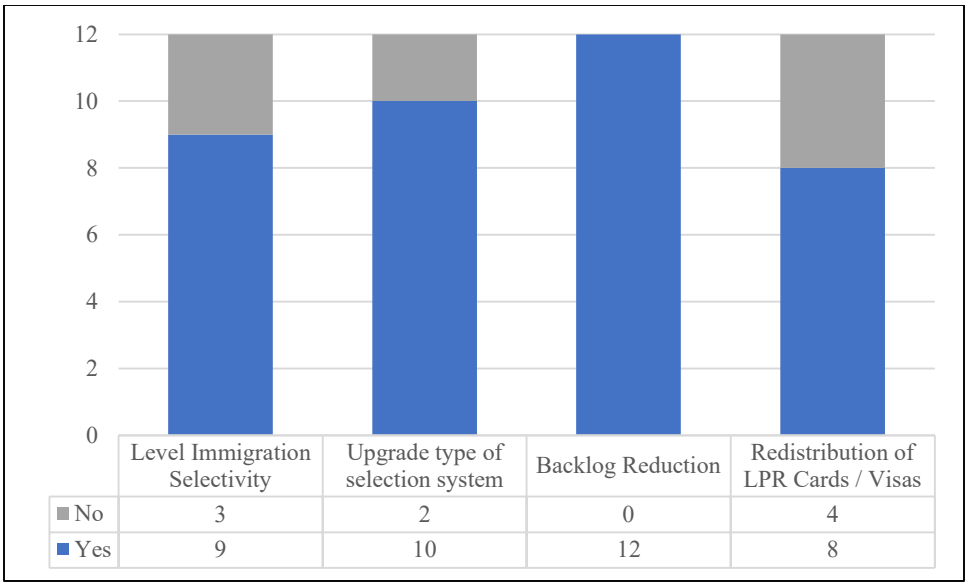

Figure 20. Political Interpretation and Proposals Sub-Criteria Validation Results

5.2.5 Social Sub-Criteria

The Social Expert panel was composed of ten experts who validated all sub-criteria using the research instrument (Appendix F). All the Social sub-criteria were accepted and included in the final model. Table 21 below shows a summary of the expert panel responses.

Table 21. Social Sub-Criteria Validation – Experts' Responses

	Sub-Criteria	Agreed	Disagreed	Threshold	Decision
1	High-Quality Education	8	2	80 %	Included
2	High-Quality Training	9	1	90 %	Included
3	Increase Immigration Acceptance	8	2	80 %	Included
4	Increase Immigration Welcoming, Diversity, and Inclusion	9	1	90 %	Included

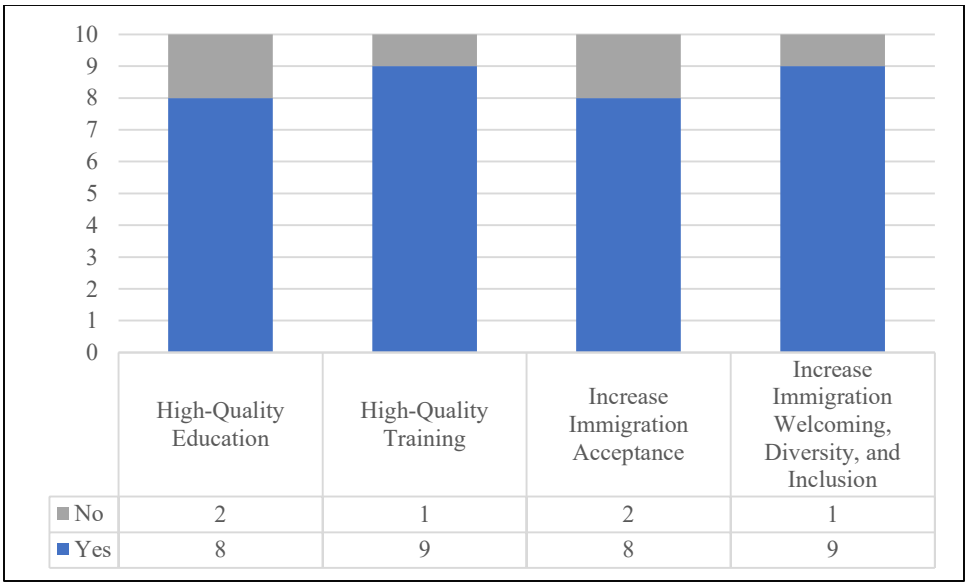

Figure 21. Social Sub-Criteria Validation Results

The model development process follows the activities in Table 11, Summary of Expert Panels. First, the experts of panel P0 validated and provided feedback using a "YES" or "NO" form, which was designed using the Qualtrics® survey software Version: XM 2023 (Qualtrics software, 2023). Moreover, the experts could comment on this form and provide additional feedback. After several iterations, the experts' feedback was carefully analyzed. The concepts and definitions from the model were adapted accordingly. The final model includes the criteria and sub-criteria, in which the acceptance rate was over 0.66 or 2/3 of positive responses. Recent dissertations using the Hierarchical Decision Modeling methodology suggest this acceptance rate. (Estep, 2017; Garces, 2020). The additional sub-criteria suggested by experts was validated following the same criteria categories. All criteria that experienced a name change (Guidelines to Political Interpretation & Proposals, Recruitment Modernization to Digital Transformation of Application Processes, Increase Security Features for Applicants to Increase National

Security Features for Applicants, Engagement in Economic Activities to Actively Engagement, Level Immigration Selectivity to Making Immigration Selectivity more Egalitarian) or are new additions to the model (Increase Immigration Welcoming, Diversity and Inclusion) are outlined in green (see Figure 22).

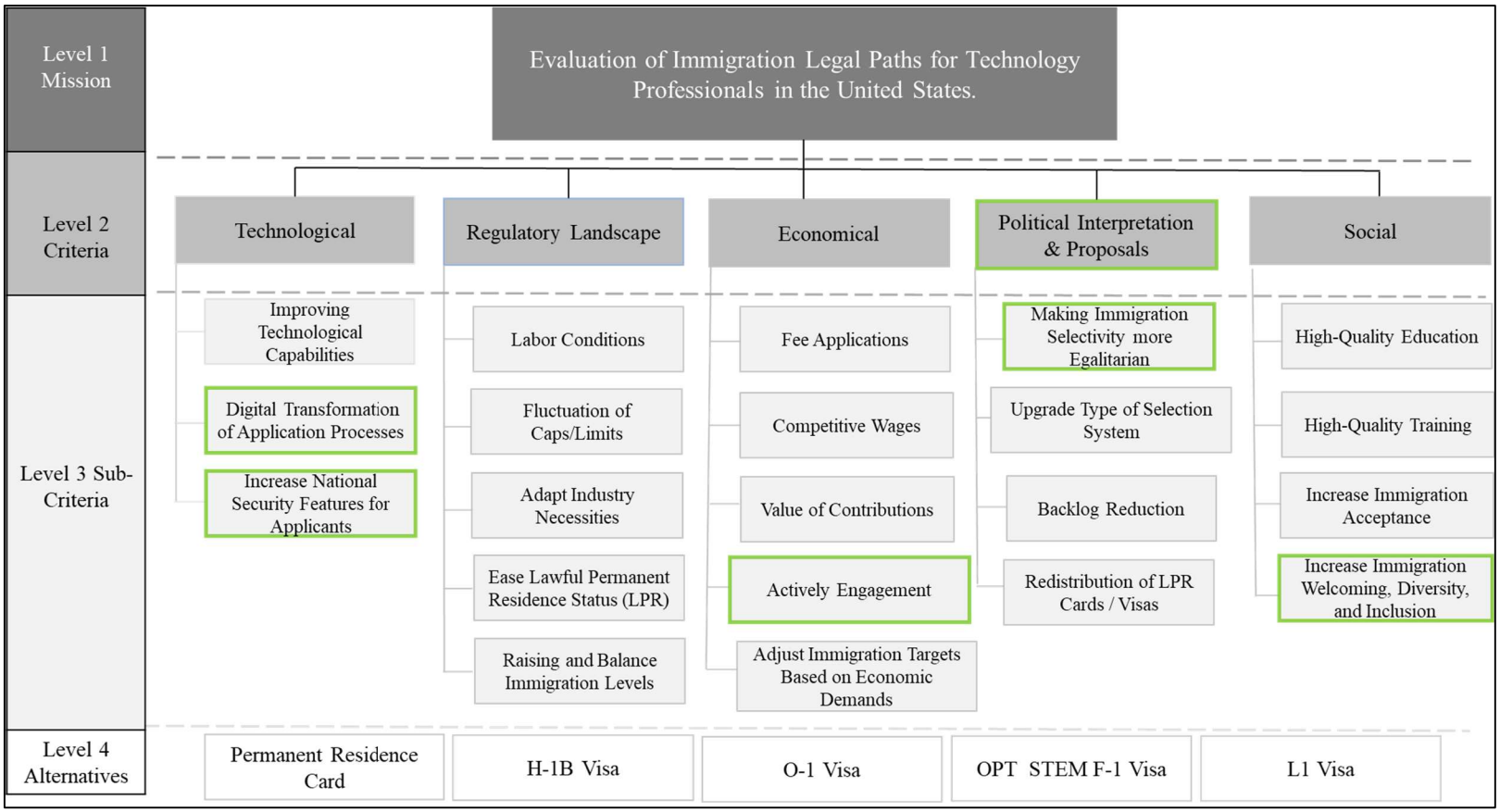

Figure 22. Final Hierarchical Decision Model

CHAPTER 6: RESULTS OF MODEL QUANTIFICATION

This chapter presents the results of the pairwise comparisons provided by the different expert panels. The experts from panels P1 to P6 agreed to participate in the model quantification phase. The experts were required to allocate 100 points between the two compared options to determine the weights of the criteria, sub-criteria, and alternatives of the proposed Hierarchical Decision Model. Depending on the panel, experts shared their judgment based on how important the compared elements were concerning the model's objective. The Hierarchical Decision Model Software® Version: Beta 2.0 (ETM, 2016) collected the data to calculate local weights, inconsistency, and disagreement values.

All inconsistency and disagreement values below the threshold of 0.1 are termed acceptable. Disagreement values above the threshold should be treated following cluster analysis techniques by organizing items into subgroups. According to Garces (2020), inconsistency values below 0.1 are considered acceptable results, and no F-test verification is needed. Additional studies found that the F-test fails to explain the relation between the variance and identical values obtained from the pairwise comparison. Therefore, since the Hierarchical Decision Model methodology does not depend on statistical methods, the data might not be normally distributed (Garces, 2020).

6.1 Criteria Level Quantification

The experts from panel P1 weighted and prioritized a set of criteria (Technological, Regulatory Landscape, Economic, Political Interpretation and Proposals, and Social) concerning the HDM mission (Evaluation of Immigration Legal Paths for Technology Professionals in the United States). There were twenty-three experts in Panel P1. A general

assessment of criteria results suggests that all five criteria contribute evenly to the HDM objective. These values are shown, in descending order, as follows: Regulatory Landscape 0.22, Social 0.21, Economic 0.2, Technological 0.19, and Political Interpretation and Proposals 0.18. Table 22 shows the statistical mean values for each criterion's relative importance.

Table 22. Criteria Level Quantification

Expert	Technological	Regulatory Landscape	Economic	Political Interpretation and Proposals	Social	Inconsistency
Expert 1	0.28	0.16	0.22	0.11	0.22	0
Expert 3	0.23	0.2	0.18	0.17	0.22	0.02
Expert 6	0.27	0.12	0.35	0.15	0.12	0.03
Expert 7	0.1	0.32	0.21	0.17	0.2	0.08
Expert 9	0.09	0.18	0.23	0.21	0.29	0.05
Expert 10	0.1	0.37	0.07	0.2	0.26	0.01
Expert 11	0.17	0.2	0.23	0.17	0.23	0.04
Expert 13	0.32	0.18	0.24	0.09	0.16	0.04
Expert 16	0.07	0.16	0.1	0.1	0.57	0.01
Expert 18	0.05	0.53	0.06	0.32	0.04	0.01
Expert 20	0.36	0.1	0.29	0.12	0.13	0.01
Expert 21	0.11	0.38	0.14	0.27	0.09	0.04
Expert 22	0.11	0.16	0.23	0.26	0.24	0.01
Expert 23	0.09	0.17	0.11	0.41	0.21	0.09
Expert 24	0.15	0.27	0.2	0.2	0.18	0.03
Expert 26	0.18	0.14	0.21	0.17	0.3	0.01
Expert 27	0.4	0.1	0.23	0.14	0.14	0
Expert 28	0.27	0.17	0.21	0.18	0.17	0.02
Expert 29	0.43	0.11	0.3	0.06	0.1	0.03
Expert 31	0.18	0.2	0.18	0.21	0.23	0.02
Expert 35	0.27	0.27	0.27	0.09	0.09	0.01
Expert 50	0.07	0.35	0.19	0.09	0.29	0.03
Expert 56	0.15	0.21	0.22	0.18	0.24	0.04
Mean	**0.19**	**0.22**	**0.2**	**0.18**	**0.21**	---
Std Dev	0.11	0.11	0.07	0.08	0.1	---
				Disagreement		**0.082**
Source of Variation		**Sum of Square**	**Degrees of Freedom**		**Mean Square**	**F-Test Value**

Between Subjects	0.02	4	0.006	0.5
Between Conditions	0	22	0	---
Residual	1.04	88	0.012	---
Total	1.06	114	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				3.54
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				2.93
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.48
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.01

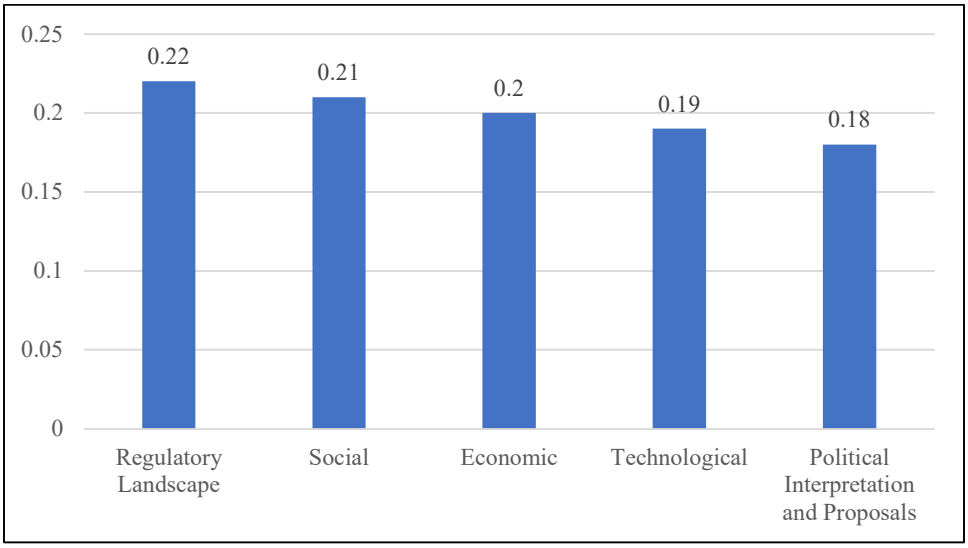

Figure 23. Relative Importance of Criteria

Expert panel P1 considered the Regulatory Landscape as the top criterion (0.22), followed by Social (0.21), Economic (0.20), Technological (0.19), and Political Interpretation and Proposals (0.18). However, the evidence between the ranked criteria suggest that all criteria all almost equally important to the model. The inconsistency and disagreement values from the 23 experts are acceptable (all < 0.10).

6.2 Sub-Criteria Quantification

The panel experts (P2 to P6) quantified all sub-criteria using the Hierarchical Decision Model Software® Version Beta 2.0 (ETM, 2016). The following section describes local weights, inconsistency, and disagreement values.

6.2.1 Technological Sub-criteria

Expert panel P3 (thirteen participants) evaluated the relative contribution of the three sub-criteria concerning the technological criteria. Table 23 shows the statistical mean values representing each criterion's relative importance.

Table 23. Technological Sub-Criteria Level Quantification

Technological Sub-Criteria Quantification	Expert	Improving Technological Capabilities	Digital Transformation of Application Processes	Increase National Security Features for Applicants	Inconsistency
	Expert 1	0.31	0.38	0.31	0
	Expert 3	0.43	0.33	0.25	0
	Expert 4	0.22	0.51	0.27	0.02
	Expert 5	0.2	0.54	0.26	0.09
	Expert 6	0.26	0.26	0.48	0
	Expert 7	0.32	0.15	0.53	0
	Expert 8	0.2	0.6	0.2	0
	Expert 9	0.28	0.58	0.14	0.04
	Expert 11	0.38	0.38	0.25	0
	Expert 12	0.2	0.74	0.06	0.04
	Expert 14	0.32	0.6	0.08	0.01
	Expert 15	0.31	0.29	0.4	0
	Expert 34	0.54	0.16	0.3	0
	Mean	**0.31**	**0.42**	**0.27**	---
	Std Dev	0.1	0.18	0.13	---
	Disagreement				**0.126**

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects	0.17	2	0.084	2.65
Between Conditions	0	12	0	---
Residual	0.76	24	0.032	---
Total	0.93	38	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				5.61
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				4.32
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				3.4
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.54

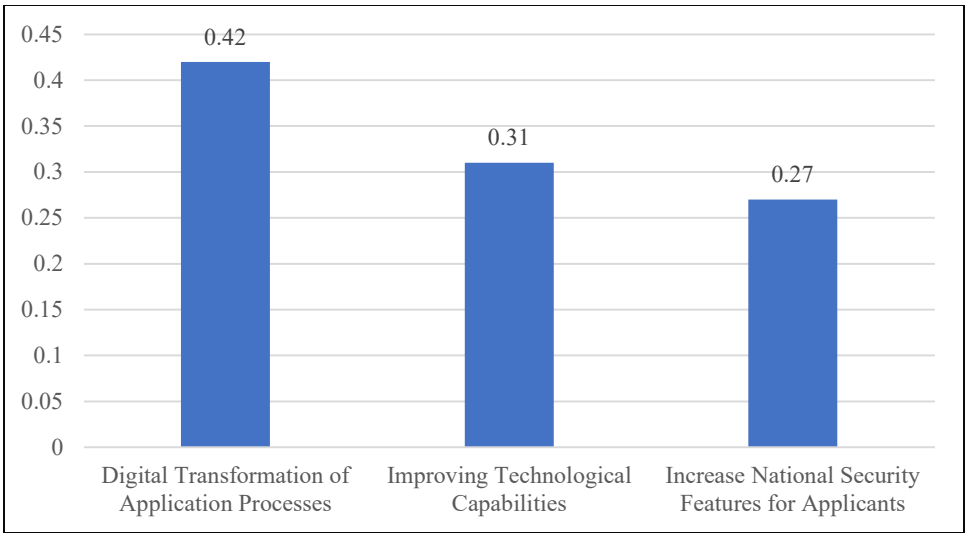

Figure 24. Relative Importance of Technological Sub-criteria

Expert panel P2 determined the Digital Transformation of Application Processes as the top sub-criterion (0.42). The inconsistency values from the 13 experts are acceptable (all < 0.10). However, the disagreement value of the Technological sub-criteria is above the threshold. Then, a Hierarchical Agglomerative Clustering (HAC) is recommended to analyze the disagreement value (Alzahrani, 2021). The HAC technique helps identify natural groups within the panel of experts.

A cluster test was performed following the Ward methodology to analyze the disagreement value found in the Technological Sub-Criteria. The software used to run this analysis was the SPSS IBM© Software 28 (IBM Corp, 2021). The results of clustering the Technological Sub-criteria are shown below. The analysis suggests that there are two clusters, “A” and “B” (see Figure 25).

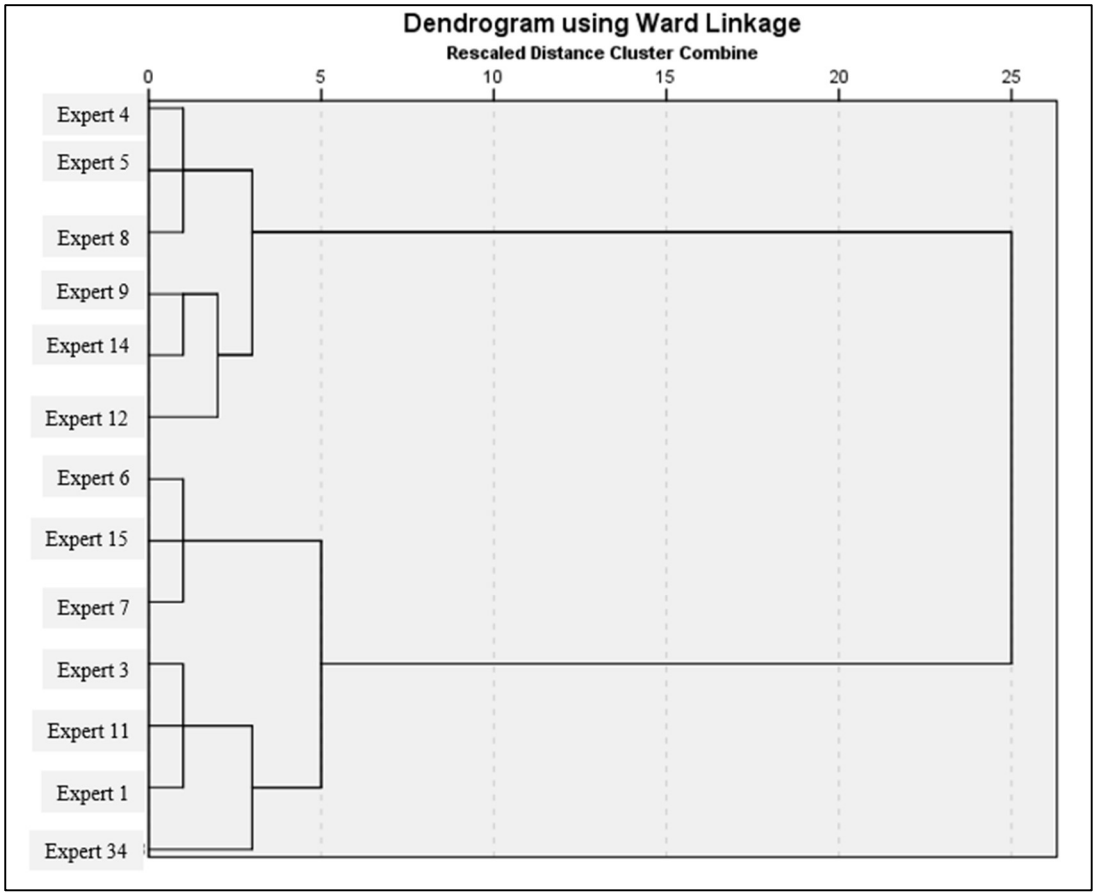

Figure 25. Technological Sub-criteria Clusters - Results

Table 24 shows the results of Cluster A, which has six experts. Cluster A results are similar to the overall results of the Technological Sub-criteria, where Digital Transformation of Application Processes is ranked first (0.42 vs. 0.60), Improving Technological Capabilities is ranked second (0.31 vs. 0.24), and Increase National Security Features for Applicants is ranked third (0.27 vs. 0.17). The inconsistency and disagreement values are below the threshold.

Table 24. Analysis of Cluster "A" Results from Panel P3

Expert	Improving Technological Capabilities	Digital Transformation of Application Processes	Increase National Security Features for Applicants	Inconsistency
Expert 4	0.22	0.51	0.27	0.02

Expert 5	0.2	0.54	0.26	0.09
Expert 8	0.2	0.6	0.2	0
Expert 9	0.28	0.58	0.14	0.04
Expert 12	0.2	0.74	0.06	0.04
Expert 14	0.32	0.6	0.08	0.01
Mean	**0.24**	**0.60**	**0.17**	---
Std Dev	0.05	0.07	0.08	---
			Disagreement	**0.063**

The results of Cluster B, which has seven experts, differ from the results of the Technological Sub-criteria (see Table 25). While Improving Technological Capabilities and Increasing National Security Features for Applicants moved up the rankings as the first two options, Digital Transformation of Application Processes went down (0.42 vs. 0.28). Even though there are more experts in Cluster B than in Cluster A (seven vs. six), experts from Cluster A assigned more weighty values when making the pairwise comparisons of the Digital Transformation of Application Processes sub-criteria against the two others, which further explains why the original disagreement value of the Technological Sub-Criteria did not meet the threshold.

Table 25. Analysis of Cluster "B" Results from Panel P3

Expert	Improving Technological Capabilities	Digital Transformation of Application Processes	Increase National Security Features for Applicants	Inconsistency
Expert 1	0.31	0.38	0.31	0
Expert 3	0.43	0.33	0.25	0
Expert 6	0.26	0.26	0.48	0
Expert 7	0.32	0.15	0.53	0
Expert 11	0.38	0.38	0.25	0
Expert 15	0.31	0.29	0.4	0
Expert 34	0.54	0.16	0.3	0
Mean	**0.36**	**0.28**	**0.36**	---
Std Dev	0.09	0.09	0.11	---
			Disagreement	**0.089**

6.2.2 Regulatory Landscape Sub-criteria

Expert panel P3 (nine participants) evaluated the relative contribution of the five sub-criteria with respect to the Regulatory Landscape criteria. Table 26 shows the statistical mean values representing each criterion's relative importance.

Table 26. Regulatory Landscape Sub-Criteria Level Quantification

Regulatory Landscape Sub-Criteria Quantification	Expert	Labor Conditions	Fluctuation of Caps/Limits	Adapt Industry Necessities	Ease Lawful Permanente Resident Status	Raising and Balancing Immigration Levels	Inconsistency
	Expert 17	0.07	0.38	0.06	0.28	0.21	0.01
	Expert 18	0.14	0.22	0.15	0.14	0.36	0.02
	Expert 19	0.1	0.37	0.17	0.3	0.07	0.07
	Expert 21	0.23	0.27	0.14	0.12	0.24	0.01
	Expert 22	0.18	0.23	0.12	0.29	0.19	0.03
	Expert 25	0.16	0.32	0.15	0.11	0.25	0.03
	Expert 26	0.2	0.16	0.1	0.3	0.24	0.02
	Expert 29	0.17	0.1	0.29	0.24	0.2	0.04
	Expert 40	0.15	0.39	0.13	0.16	0.17	0.09
	Mean	**0.16**	**0.27**	**0.15**	**0.22**	**0.21**	---
	Std Dev	0.05	0.1	0.06	0.08	0.07	---
					Disagreement	**0.07**	

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects	0.1	4	0.025	3.19
Between Conditions	0	10	0	---
Residual	0.47	40	0.012	---
Total	0.57	54	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				3.97
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.22
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.67
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.13

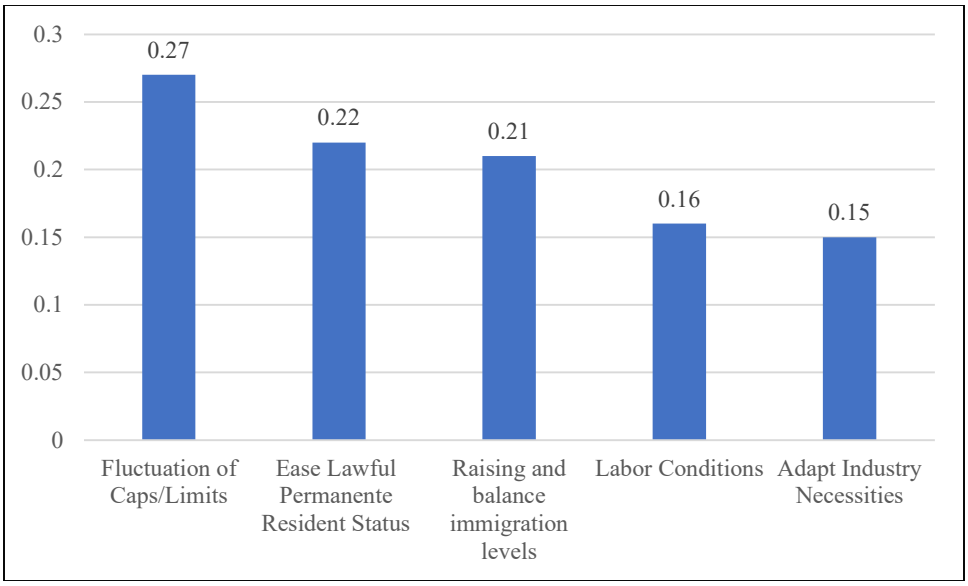

Figure 26. Relative Importance of Regulatory Landscape Sub-criteria

Expert panel P3 determined that the Fluctuation of Caps/Limits is the top sub-criterion (0.27). The inconsistency and disagreement values from the nine experts are acceptable (all < 0.10).

6.2.3 Economic Sub-criteria

Expert panel P4 (eight participants) evaluated the relative contribution of the five sub-criteria with respect to the Economic criteria. Table 27 shows the statistical mean values, representing each criterion's relative importance.

Table 27. Economic Sub-Criteria Level Quantification

Economic Sub-Criteria Quantification	Expert	Fee Applications	Competitive Wages and Benefits	Value of Contributions	Actively Engagement	Adjust Immigration Targets Based on Economic Demands	Inconsistency
	Expert 1	0.05	0.22	0.24	0.25	0.26	0
	Expert 7	0.13	0.13	0.25	0.25	0.25	0
	Expert 27	0.18	0.24	0.2	0.14	0.24	0.07

	Expert 29	0.14	0.3	0.26	0.17	0.13	0.01
	Expert 31	0.2	0.2	0.2	0.19	0.21	0
	Expert 32	0.03	0.2	0.22	0.24	0.31	0.01
	Expert 34	0.41	0.27	0.13	0.11	0.08	0.01
	Expert 37	0.08	0.44	0.17	0.19	0.13	0.08
	Mean	**0.15**	**0.25**	**0.21**	**0.19**	**0.20**	---
	Std Dev	0.11	0.09	0.04	0.05	0.07	---
					Disagreement	**0.069**	

Source of Variation	**Sum of Square**	**Degrees of Freedom**	**Mean Square**	**F-Test Value**
Between Subjects	0.04	4	0.011	1.16
Between Conditions	0	9	0	---
Residual	0.42	36	0.012	---
Total	0.46	49	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.07
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.29
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.71
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.16

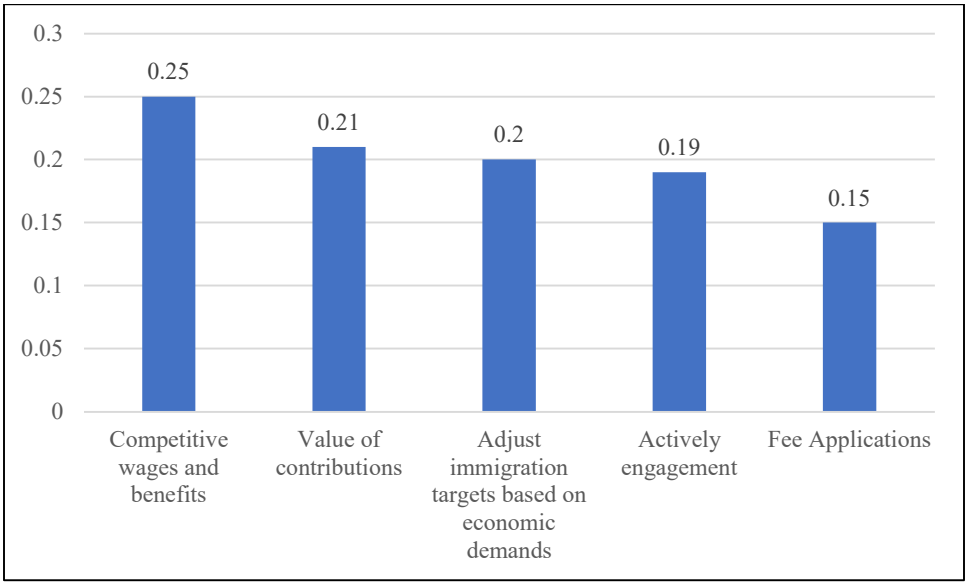

Figure 27. Relative Importance of Economic Sub-criteria

Expert panel P4 determined that Competitive Wages and Benefits is the top sub-criterion (0.25). The inconsistency and disagreement values from the eight experts are acceptable (all < 0.10).

6.2.4 Political Interpretation & Proposals - Sub-criteria

Expert panel P5 (twelve participants) evaluated the relative contribution of the four sub-criteria concerning the Political Interpretation and Proposals criteria. Table 28 shows the statistical mean values representing each criterion's relative importance.

Table 28. Political Interpretation and Proposals Sub-Criteria Level Quantification

Political Interpretation & Proposals - Sub-Criteria Quantification	Expert	Making Immigration Selectivity More Egalitarian	Hybrid System For Dual Selection And Verification	Backlog Reduction	Redistribution and Recapture of LPR Cards / Visas	Inconsistency
	Expert 21	0.17	0.37	0.34	0.13	0.04
	Expert 24	0.36	0.25	0.3	0.09	0.05
	Expert 31	0.24	0.24	0.27	0.26	0
	Expert 40	0.13	0.06	0.61	0.2	0.02
	Expert 42	0.28	0.17	0.17	0.39	0.01
	Expert 44	0.16	0.52	0.15	0.17	0.01
	Expert 45	0.29	0.23	0.42	0.07	0.09
	Expert 46	0.39	0.19	0.3	0.12	0.01
	Expert 47	0.3	0.14	0.07	0.5	0.09
	Expert 48	0.59	0.14	0.15	0.13	0.04
	Expert 49	0.33	0.18	0.25	0.25	0.03
	Expert 53	0.58	0.08	0.2	0.14	0.03
	Mean	**0.32**	**0.21**	**0.27**	**0.2**	---
	Std Dev	0.14	0.12	0.14	0.12	---
					Disagreement	**0.118**

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects	0.1	3	0.034	1.35
Between Conditions	0	11	0	---
Residual	0.83	33	0.025	---
Total	0.93	47	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.44

Critical F value with degrees of freedom 3 & 30 at 0.025 level:	3.54
Critical F value with degrees of freedom 3 & 30 at 0.05 level:	2.89
Critical F value with degrees of freedom 3 & 30 at 0.1 level:	2.26

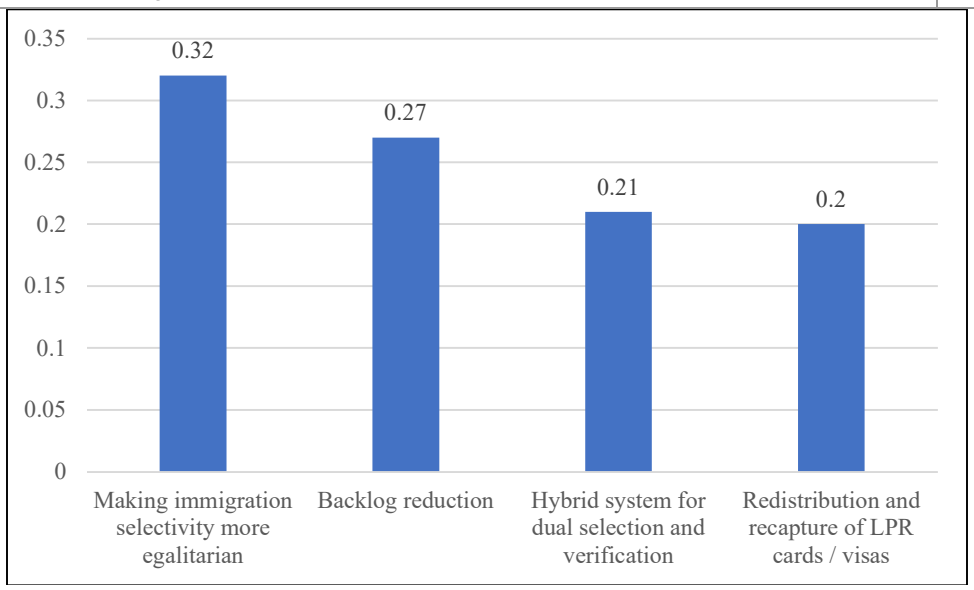

Figure 28. Relative Importance of Political Interpretation and Proposals Sub-criteria

Expert panel P5 determined that Making Immigration Selectivity More Egalitarian is the top sub-criterion (0.32). The inconsistency value from the 12 experts is acceptable (all < 0.10). However, the disagreement value of the Political Interpretation and Proposals sub-criteria is above the threshold. Then, a Hierarchical Agglomerative Clustering (HAC) is recommended to analyze the disagreement value as shown with the Technological sub-criteria.

A cluster test was performed following the Ward methodology to analyze the disagreement value found in the Political Interpretation and Proposals Sub-Criteria. The same SPSS IBM© Software 28 (IBM Corp, 2021) was used to run the analysis. The results of clustering the Political Interpretation and Proposals Sub-criteria are shown below. The analysis suggests that there are two clusters, “A” and “B” (see Figure 29).

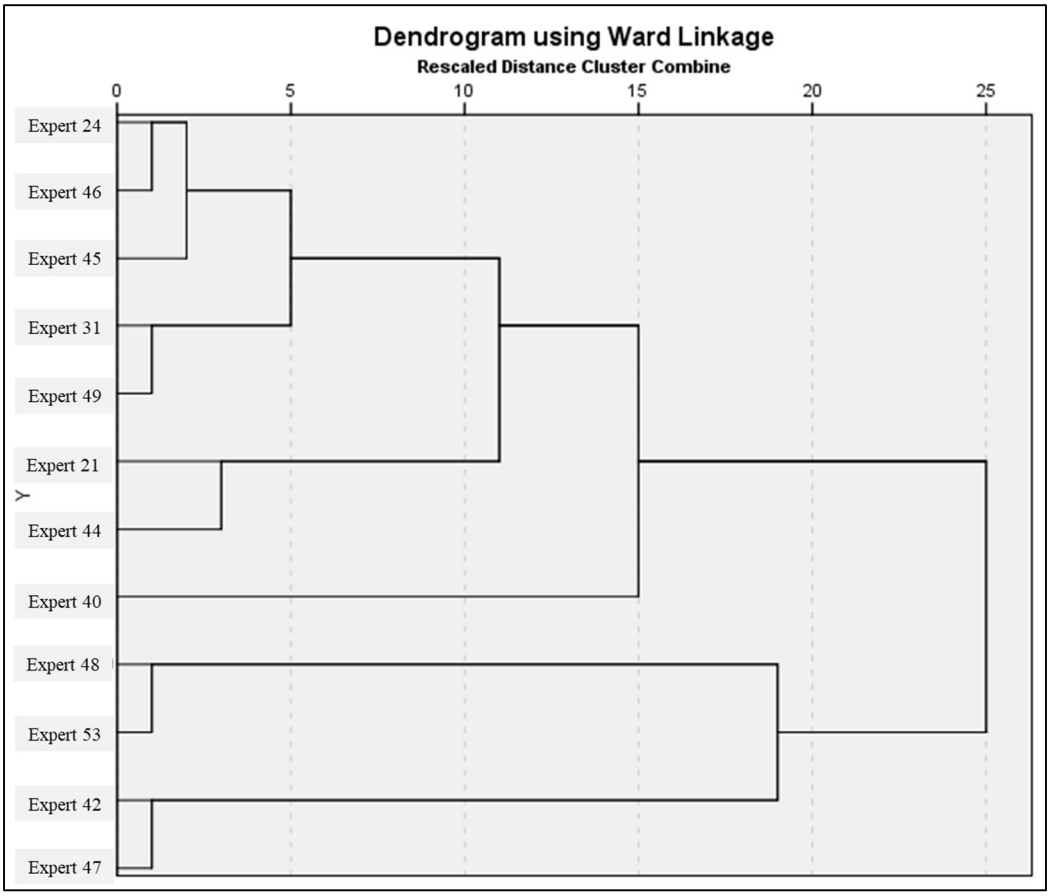

Figure 29. Political Interpretation and Proposals Sub-criteria Clusters - Results

Table 29 shows the results of Cluster A, which has eight experts. Results from Cluster A contradict the overall results of the Political Interpretation and Proposals Sub-criteria, where Making immigration selectivity more egalitarian is ranked first (0.32). In this second analysis, Backlog reduction is ranked first (0.33), while Making immigration Selectivity More Egalitarian and Hybrid System for Dual Selection and Verification sub-criteria are ranked second (0.26). The inconsistency and disagreement values are below the threshold.

Table 29. Analysis of Cluster "A" results from Panel P5

Political Interpretation and Proposals	Making Immigration Selectivity More Egalitarian	Hybrid System for Dual Selection And Verification	Backlog Reduction	Redistribution and Recapture of LPR Cards / Visas	Inconsistency
Expert 21	0.17	0.37	0.34	0.13	0.04
Expert 24	0.36	0.25	0.3	0.09	0.05
Expert 31	0.24	0.24	0.27	0.26	0
Expert 40	0.13	0.06	0.61	0.2	0.02
Expert 44	0.16	0.52	0.15	0.17	0.01
Expert 45	0.29	0.23	0.42	0.07	0.09
Expert 46	0.39	0.19	0.3	0.12	0.01
Expert 49	0.33	0.18	0.25	0.25	0.03
Mean	**0.26**	**0.26**	**0.33**	**0.16**	---
Std Dev	0.09	0.13	0.13	0.07	---
				Disagreement	**0.096**

The results of Cluster B (see Table 30), which has four experts, are similar to the overall results of the Political Interpretation and Proposals Sub-criteria. Making Immigration Selectivity More Egalitarian is ranked first (0.32 vs 0.44). All inconsistency values are below the threshold. However, the disagreement value is still above the threshold.

Table 30. Analysis of Cluster "B" results from Panel P5

Political Interpretation and Proposals	Making Immigration Selectivity More Egalitarian	Hybrid System for Dual Selection And Verification	Backlog Reduction	Redistribution and Recapture of LPR Cards / Visas	Inconsistency
Expert 42	0.28	0.17	0.17	0.39	0.01
Expert 47	0.3	0.14	0.07	0.5	0.09
Expert 48	0.59	0.14	0.15	0.13	0.04
Expert 53	0.58	0.08	0.2	0.14	0.03
Mean	**0.44**	**0.13**	**0.15**	**0.29**	---
Std Dev	0.15	0.03	0.05	0.16	---
				Disagreement	**0.112**

Table 31 shows two sub-clusters inside cluster B. Sub-cluster B.1 is formed by Experts 42 and 47, who assigned larger values to the Redistribution and Recapture of LPR Cards / Visas sub-criteria (0.45). Sub-cluster B.2 is formed by Experts 48 and 53, who assigned larger values to the Making Immigration Selectivity More Egalitarian (0.59).

Table 31. Analysis of Sub-Cluster "B.1 and B.2" results from Panel P5

Sub-Cluster "B.1"	**Making Immigration Selectivity More Egalitarian**	**Hybrid System for Dual Selection And Verification**	**Backlog Reduction**	**Redistribution and Recapture of LPR Cards / Visas**	**Inconsistency**
Expert 42	0.28	0.17	0.17	0.39	0.01
Expert 47	0.3	0.14	0.07	0.5	0.09
Mean	**0.29**	**0.16**	**0.12**	**0.45**	---
Std Dev	0.01	0.01	0.05	0.06	---
				Disagreement	**0.038**
Sub-Cluster "B.2"	**Making Immigration Selectivity More Egalitarian**	**Hybrid System for Dual Selection And Verification**	**Backlog Reduction**	**Redistribution and Recapture of LPR Cards / Visas**	**Inconsistency**
Expert 48	0.59	0.14	0.15	0.13	0.04
Expert 53	0.58	0.08	0.2	0.14	0.03
Mean	**0.59**	**0.11**	**0.18**	**0.14**	---
Std Dev	0	0.03	0.03	0.01	---
				Disagreement	**0.02**

By analyzing cluster B further, the inconsistency values are below the threshold (0.038 and 0.02), which explains why the initial disagreement value of the Political Interpretation and Proposals Sub-Criteria needed to meet the threshold.

6.2.5 Social - Sub-criteria

Expert panel P6 (seven participants) evaluated the relative contribution of the four sub-criteria with respect to the Social criteria. Table 32 shows the statistical mean values, representing each criterion's relative importance.

Table 32. Social Sub-Criteria Level Quantification

Social - Sub-Criteria Quantification	Social	High-Quality Education	High-Quality Training and Salary	Increase Immigration Acceptance	Increase Immigration Welcoming, Diversity, and Inclusion	Inconsistency
	Expert 15	0.26	0.21	0.25	0.28	0
	Expert 22	0.31	0.3	0.22	0.17	0.01
	Expert 50	0.14	0.14	0.35	0.38	0.01
	Expert 53	0.13	0.26	0.29	0.31	0.01
	Expert 56	0.17	0.25	0.28	0.3	0.01
	Expert 58	0.45	0.23	0.17	0.14	0.09
	Expert 59	0.16	0.33	0.24	0.27	0
	Mean	**0.23**	**0.25**	**0.26**	**0.26**	---
	Std Dev	0.11	0.06	0.05	0.08	---
					Disagreement	**0.069**

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects	0.1	3	0.034	0.16
Between Conditions	0	11	0	---
Residual	0.44	33	0.013	---
Total	0.54	47	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				5.09
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.95
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				3.16
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.42

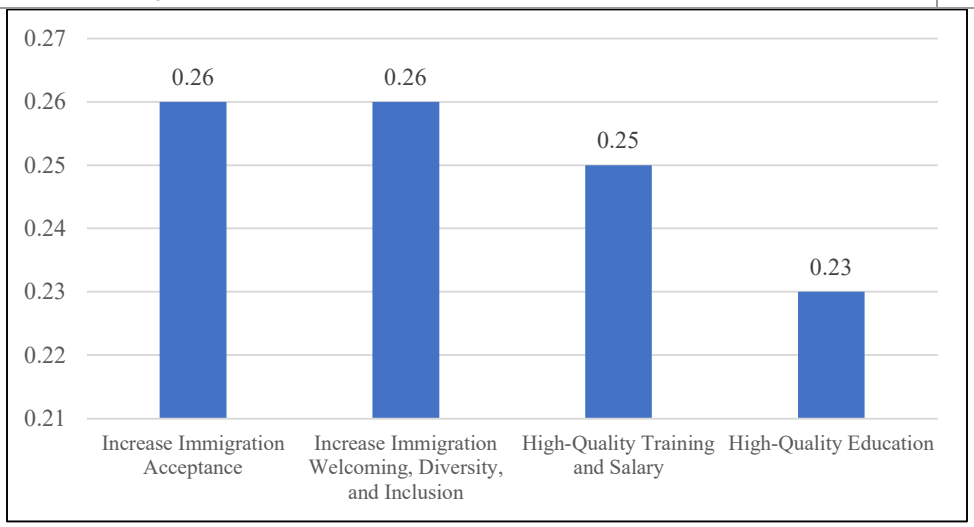

Figure 30. Relative Importance of Social Sub-criteria

Expert panel P6 determined that Increase Immigration Acceptance and Increase Immigration Welcoming, Diversity, and Inclusion are the top sub-criterion (0.26). Also, there is no apparent difference compared with the second ranked sub-criteria High-Quality Training and Salary (0.25). The inconsistency and disagreement values from the seven experts are acceptable (all < 0.10).

6.3 Alternatives Quantification

The panels P2 to P6 experts quantified all alternatives using the Hierarchical Decision Model Software® Version: Beta 2.0 (ETM, 2016). Local weights, inconsistency, and disagreement values are described in the following section.

6.3.1 Results of Alternatives with Improving Technological Capabilities Sub-Criteria

Twelve experts from panel P2 evaluated the relative importance of the model alternatives concerning the Improving Technological Capabilities sub-criterion using pairwise comparison through the HDM software Version Beta 2.0. All comparisons of sub-criteria and alternatives used the same software. Table 33 shows the statistical means of the result of experts' judgment quantifications.

Table 33. Relative Importance of Alternatives Respect to the Improving Technological Capabilities Sub-criterion.

Improving Technological Capabilities	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 1	0.22	0.2	0.2	0.2	0.2	0
Expert 3	0.41	0.26	0.11	0.11	0.11	0.02
Expert 4	0.23	0.19	0.18	0.19	0.2	0
Expert 5	0.08	0.37	0.32	0.06	0.18	0.09

Expert 6	0.25	0.36	0.11	0.15	0.14	0.02
Expert 7	0.2	0.2	0.2	0.2	0.2	0
Expert 8	0.39	0.24	0.16	0.13	0.08	0
Expert 9	0.07	0.3	0.16	0.38	0.09	0.07
Expert 11	0.26	0.21	0.18	0.17	0.18	0
Expert 14	0.21	0.22	0.2	0.13	0.24	0.01
Expert 15	0.39	0.19	0.16	0.15	0.1	0.01
Expert 34	0.57	0.16	0.16	0.06	0.06	0
Mean	**0.27**	**0.24**	**0.18**	**0.16**	**0.15**	---
Std Dev	0.14	0.07	0.05	0.08	0.06	---
				Disagreement	**0.074**	

Source of Variation	**Sum of Square**	**Degrees of Freedom**	**Mean Square**	**F-Test Value**
Between Subjects	0.22	4	0.054	3.67
Between Conditions	0	12	0	---
Residual	0.58	48	0.012	---
Total	0.8	64	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				3.78
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.09
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.58
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.08

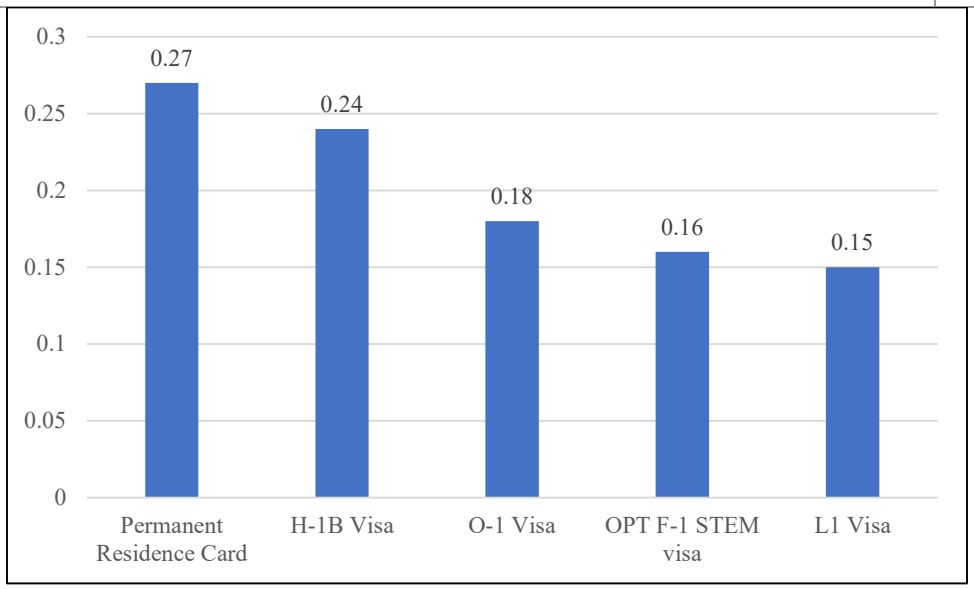

Figure 31. Relative Importance of Alternatives Respect to Improving Technological Capabilities Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.27) concerning the Improving Technological Capabilities sub-criterion. The H-1B Visa

Alternative scored second (0.24), followed by the O-1, F-1 STEM OPT, and L1 visas (0.18, 0.16, and 0.15, respectively). The inconsistency (all < 0.10) and disagreement (0.074) values are below the acceptable threshold.

6.3.2 Results of Alternatives with Digital Transformation of Application Processes Sub-Criteria

Ten experts from Panel P2 evaluated the relative importance of the model alternatives with respect to the Digital Transformation of Application Processes sub-criterion. Table 34 shows the statistical means of the result of experts' judgment quantifications.

Table 34. Relative Importance of Alternatives Respect to the Digital Transformation of Application Processes Sub-criterion

Digital Transformation of Application Processes	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 1	0.23	0.2	0.19	0.18	0.19	0
Expert 3	0.41	0.26	0.11	0.11	0.11	0.02
Expert 4	0.22	0.19	0.2	0.19	0.2	0
Expert 6	0.57	0.2	0.07	0.08	0.09	0.02
Expert 7	0.2	0.2	0.2	0.2	0.2	0
Expert 8	0.2	0.2	0.2	0.2	0.2	0
Expert 9	0.08	0.29	0.14	0.43	0.07	0.06
Expert 11	0.27	0.2	0.18	0.17	0.18	0
Expert 15	0.36	0.2	0.15	0.18	0.11	0.01
Expert 34	0.43	0.27	0.16	0.07	0.07	0.04
Mean	**0.30**	**0.22**	**0.16**	**0.18**	**0.14**	---
Std Dev	0.14	0.04	0.04	0.1	0.05	---
				Disagreement	**0.071**	

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects:	0.15	4	.038	4.08
Between Conditions:	0.00	9	0.000	---
Residual:	0.33	36	0.009	---
Total	0.49	49		---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				3.89

Critical F value with degrees of freedom 3 & 30 at 0.025 level:	3.17
Critical F value with degrees of freedom 3 & 30 at 0.05 level:	2.63
Critical F value with degrees of freedom 3 & 30 at 0.1 level:	2.11

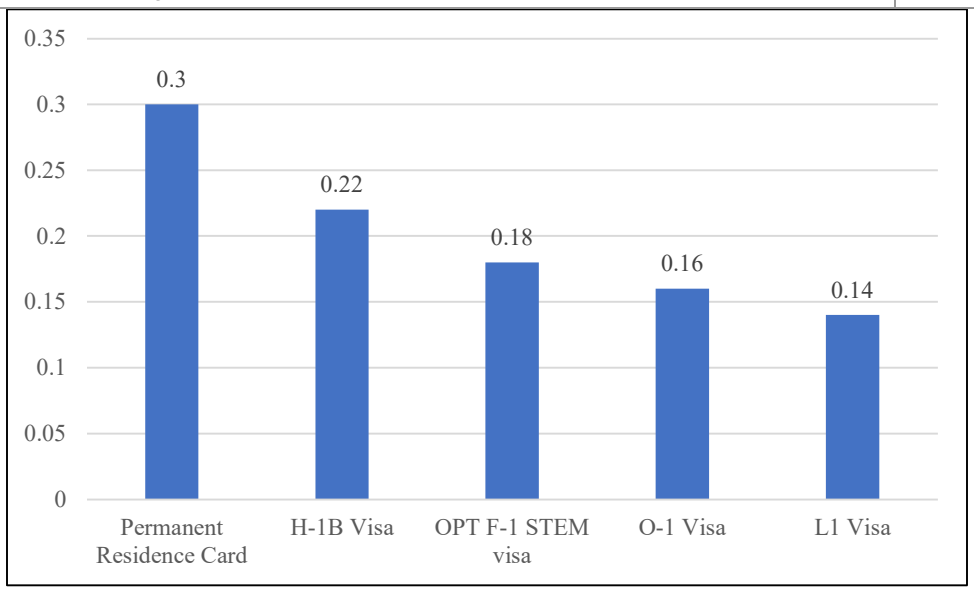

Figure 32. Relative Importance of Alternatives Respect to Digital Transformation of Application Processes Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.30) with respect to the Digital Transformation of Application Processes sub-criterion. The H-1B Visa Alternative scored second (0.22), followed by the O-1, F-1 STEM OPT, and L1 visas (0.16, 0.18, and 0.14, respectively). The inconsistency (all < 0.10) and disagreement (0.071) values are below the acceptable threshold.

6.3.3 Results of Alternatives with Increase National Security Features for Applicants Sub-Criteria

Eleven experts from Panel P2 evaluated the relative importance of the model alternatives with respect to the Increase National Security Features for Applicants sub-criterion. Table 35 shows the statistical means of the result of experts' judgment quantifications.

Table 35. Relative Importance of Alternatives Respect to the Increase National Security Features for Applicants Sub-criterion

Increase National Security Features for Applicants	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 1	0.2	0.2	0.2	0.2	0.2	0
Expert 3	0.5	0.16	0.11	0.11	0.11	0
Expert 4	0.22	0.2	0.2	0.19	0.2	0
Expert 5	0.6	0.2	0.04	0.1	0.05	0.1
Expert 6	0.4	0.19	0.12	0.1	0.19	0.04
Expert 7	0.2	0.2	0.2	0.2	0.2	0
Expert 8	0.37	0.25	0.16	0.14	0.08	0
Expert 9	0.41	0.11	0.11	0.11	0.26	0.02
Expert 11	0.2	0.23	0.19	0.19	0.18	0
Expert 15	0.36	0.21	0.16	0.16	0.11	0.01
Expert 34	0.55	0.23	0.12	0.05	0.05	0.03
Mean	**0.36**	**0.20**	**0.15**	**0.14**	**0.15**	---
Std Dev	0.14	0.04	0.05	0.05	0.07	---
				Disagreement	**0.072**	

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects:	0.15	4	.038	12.06
Between Conditions:	0.00	9	0.000	---
Residual:	0.33	36	0.009	---
Total	0.49	49		---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				3.83
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.13
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.61
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.09

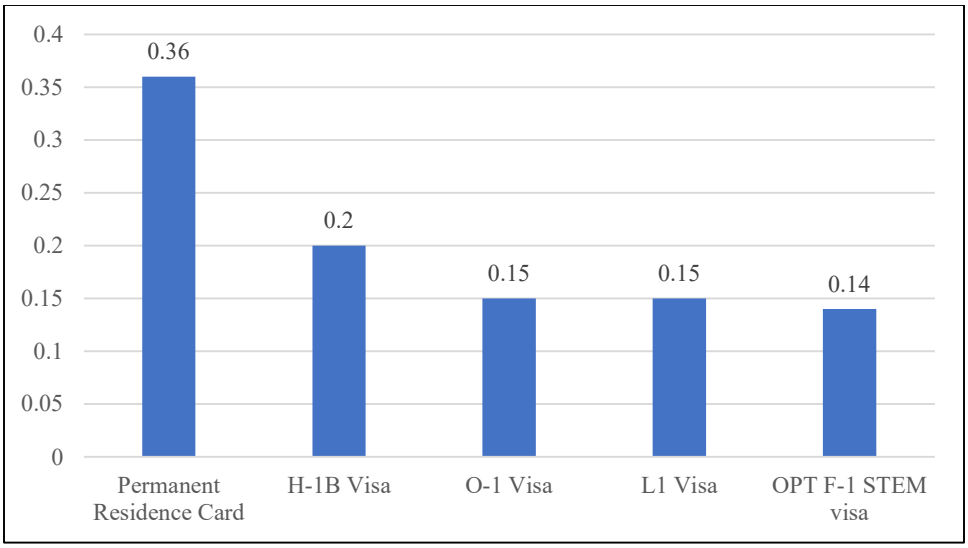

Figure 33. Relative Importance of Alternatives Respect to Increase National Security Features for Applicants Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.36) concerning the Increase National Security Features for Applicants sub-criterion. The H-1B Visa Alternative scored second (0.20), followed by the O-1, F-1 STEM OPT, and L1 visas (0.15, 0.15, and 0.14, respectively). The inconsistency (all < 0.10) and disagreement (0.072) values are below the acceptable threshold.

6.3.4 Results of Alternatives with Labor Conditions Sub-Criteria

Seven experts from Panel P3 evaluated the relative importance of the model alternatives with respect to the Labor Conditions sub-criterion. Table 36 shows the statistical means of the result of experts' judgment quantifications.

Table 36. Relative Importance of Alternatives Respect to the Labor Conditions Sub-criterion

Labor Conditions	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 17	0.24	0.29	0.22	0.07	0.18	0.01
Expert 19	0.15	0.25	0.07	0.36	0.17	0.05

Expert 21	0.34	0.33	0.09	0.11	0.13	0.03
Expert 24	0.25	0.23	0.17	0.21	0.14	0.02
Expert 25	0.11	0.31	0.19	0.19	0.19	0.08
Expert 26	0.27	0.13	0.21	0.18	0.21	0.01
Expert 29	0.5	0.25	0.11	0.08	0.07	0.02
Mean	**0.27**	**0.26**	**0.15**	**0.17**	**0.16**	---
Std Dev	0.12	0.06	0.06	0.09	0.04	---
				Disagreement	**0.074**	

Source of Variation	**Sum of Square**	**Degrees of Freedom**	**Mean Square**	**F-Test Value**
Between Subjects:	0.09	4	0.022	2.4
Between Conditions:	0.00	6	0.000	---
Residual:	0.22	24	0.009	---
Total	0.31	34	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.22
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.38
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.78
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.19

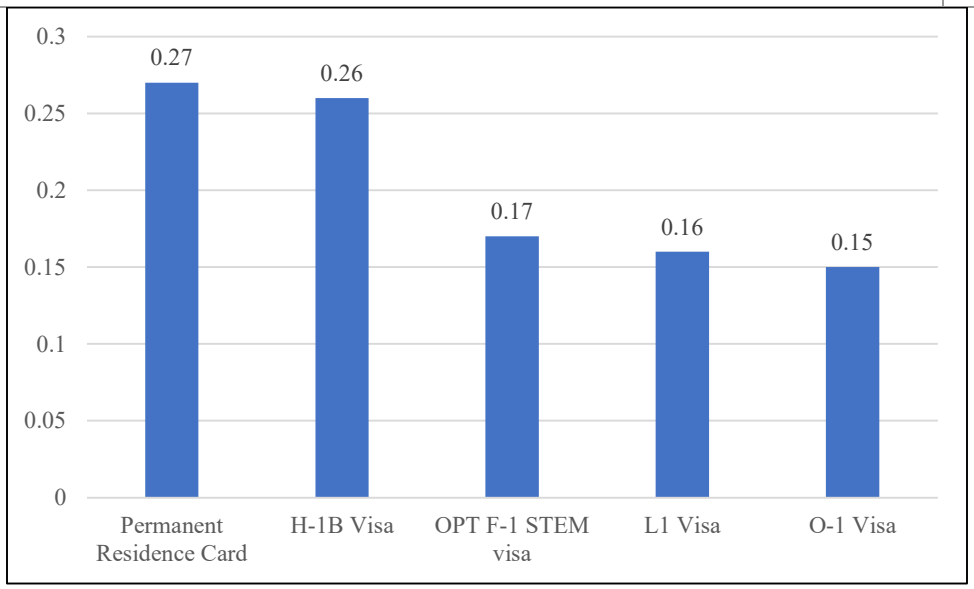

Figure 34. Relative Importance of Alternatives Respect to Labor Conditions Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.27) concerning the Labor Conditions sub-criterion. However, there is no major difference with the second-ranked H-1B Visa Alternative (0.26); the first two alternatives are followed by the F-1 STEM OPT, L1, and O-1 visas (0.17, 0.16, and 0.15, respectively). The

inconsistency (all < 0.10) and disagreement (0.074) values are below the acceptable threshold.

6.3.5 Results of Alternatives with Fluctuation of Caps/Limits Sub-Criteria

Seven experts from Panel P3 evaluated the relative importance of the model alternatives with respect to the Fluctuation of Caps/Limits sub-criterion. Table 37 shows the statistical means of the result of experts' judgment quantifications.

Table 37. Relative Importance of Alternatives Respect to the Fluctuation of Caps/Limits Sub-criterion

Fluctuation of Caps/Limits	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 17	0.42	0.43	0.05	0.05	0.05	0
Expert 21	0.35	0.32	0.1	0.1	0.13	0.02
Expert 23	0.29	0.19	0.13	0.23	0.16	0.05
Expert 24	0.34	0.16	0.13	0.19	0.19	0.01
Expert 26	0.25	0.2	0.2	0.16	0.2	0.01
Expert 29	0.11	0.13	0.16	0.23	0.36	0.01
Expert 40	0.72	0.18	0.04	0.02	0.05	0.1
Mean	**0.35**	**0.23**	**0.12**	**0.14**	**0.16**	---
Std Dev	0.17	0.1	0.05	0.08	0.1	---
				Disagreement	**0.094**	

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects:	0.26	4	0.064	3.76
Between Conditions:	0.00	6	0.000	---
Residual:	0.41	24	0.017	---
Total	0.67	34	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.22
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.38
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.78
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.19

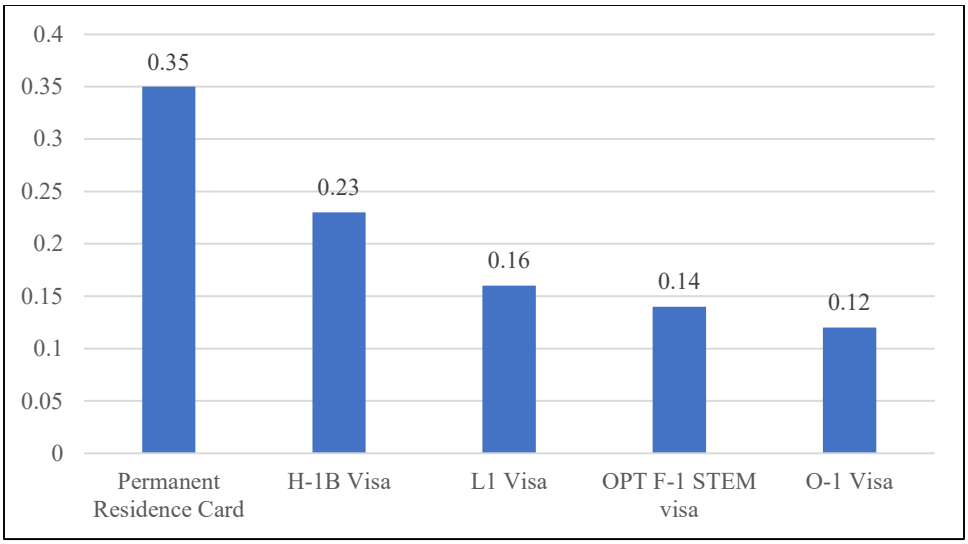

Figure 35. Relative Importance of Alternatives Respect to Fluctuation of Caps/Limits Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.35) concerning the Fluctuation of Caps/Limits sub-criterion. The H-1B Visa Alternative is ranked second (0.23), followed by the L1, F-1 STEM OPT, and O-1 visas (0.16, 0.14, and 0.12, respectively). The inconsistency (all < 0.10) and disagreement (0.094) values are below the acceptable threshold.

6.3.6 Results of Alternatives with Adapt Industry Necessities Sub-Criteria

Six experts from Panel P3 evaluated the relative importance of the model alternatives with respect to the Adapt Industry Necessities sub-criterion. Table 38 shows the statistical means of the result of experts' judgment quantifications.

Table 38. Relative Importance of Alternatives Respect to the Adapt Industry Necessities Sub-criterion

Adapt Industry Necessities	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 17	0.24	0.24	0.24	0.03	0.24	0
Expert 21	0.43	0.22	0.11	0.1	0.14	0.03
Expert 23	0.5	0.1	0.13	0.13	0.13	0.02

Expert 24	0.37	0.16	0.16	0.16	0.16	0
Expert 26	0.43	0.13	0.13	0.15	0.15	0.01
Expert 29	0.34	0.25	0.17	0.14	0.11	0.02
Mean	**0.39**	**0.18**	**0.16**	**0.12**	**0.16**	---
Std Dev	0.08	0.06	0.04	0.04	0.04	---
				Disagreement	**0.05**	

Source of Variation	**Sum of Square**	**Degrees of Freedom**	**Mean Square**	**F-Test Value**
Between Subjects:	0.27	4	0.068	14.7
Between Conditions:	0.00	5	0.000	---
Residual:	0.09	20	0.005	---
Total	0.36	29	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.43
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.51
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.87
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.25

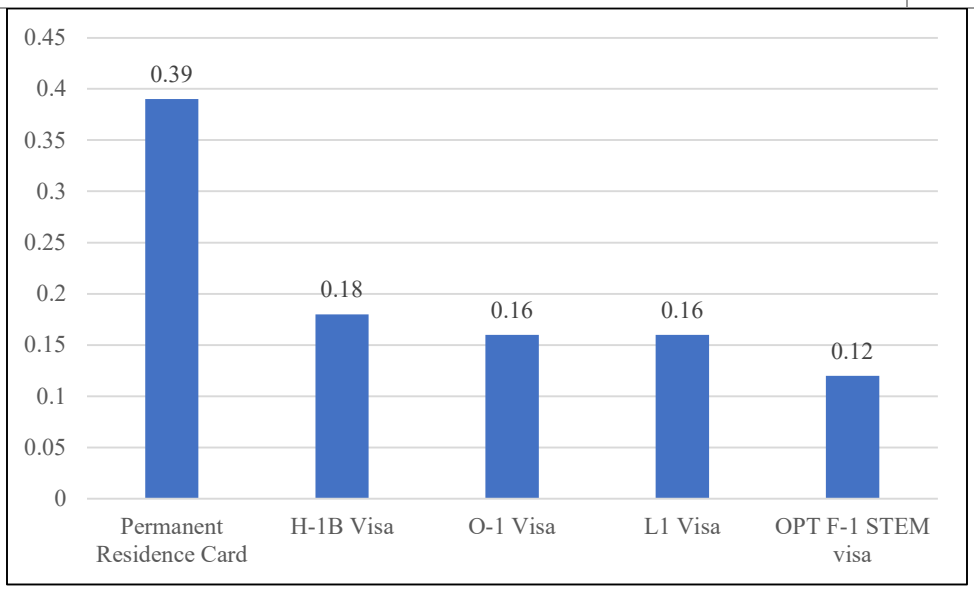

Figure 36. Relative Importance of Alternatives Respect to Adapt Industry Necessities Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.39) with respect to the Adapt Industry Necessities sub-criterion. The H-1B Visa Alternative is ranked second (0.18) followed by the O-1 and L1 visas (0.16). The F-1 STEM OPT visa alternative is ranked last (0.12). The inconsistency (all < 0.10) and disagreement (0.050) values are below the acceptable threshold.

6.3.7 Results of Alternatives with Ease Lawful Permanent Residence Status Sub-Criteria

Six experts from Panel P3 evaluated the relative importance of the model alternatives with respect to the Ease Lawful Permanent Residence Status sub-criterion. Table 39 shows the statistical means of the result of experts' judgment quantifications.

Table 39. Relative Importance of Alternatives Respect to the Ease Lawful Permanent Residence Status Sub-criterion

Ease Lawful Permanent Residence Status	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 17	0.2	0.2	0.2	0.2	0.2	0
Expert 21	0.2	0.2	0.2	0.2	0.2	0
Expert 23	0.42	0.22	0.11	0.11	0.14	0.03
Expert 24	0.37	0.16	0.16	0.16	0.16	0
Expert 26	0.5	0.12	0.15	0.1	0.12	0.01
Expert 29	0.41	0.21	0.17	0.13	0.08	0.02
Mean	**0.35**	**0.19**	**0.17**	**0.15**	**0.15**	---
Std Dev	0.11	0.03	0.03	0.04	0.04	---
				Disagreement	**0.056**	

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects:	0.17	4	0.43	7.91
Between Conditions:	0.00	5	0.000	---
Residual:	0.11	20	0.005	---
Total	0.28	29	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.43
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.51
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.87
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.25

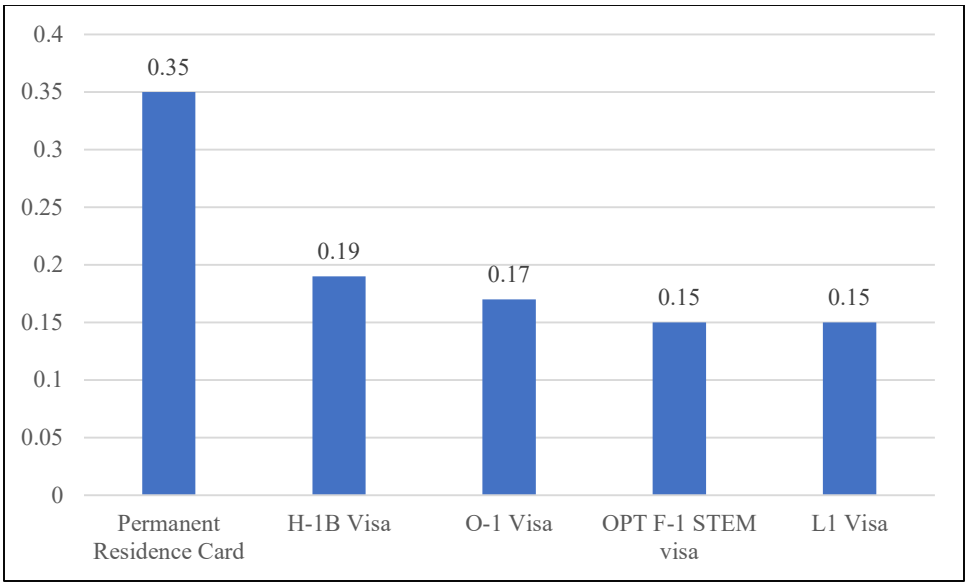

Figure 37. Relative Importance of Alternatives Respect to Ease Lawful Permanent Residence Status Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.35) with respect to the Ease Lawful Permanent Residence Status sub-criterion. The H-1B Visa Alternative is ranked second (0.19), followed by the O-1, F-1 STEM OPT, and L1 visas (0.17, 0.15, and 0.15, respectively). The inconsistency (all < 0.10) and disagreement (0.056) values are below the acceptable threshold.

6.3.8 Results of Alternatives with Raising and Balance Immigration Levels Sub-Criteria

Six experts from Panel P3 evaluated the relative importance of the model alternatives concerning the Raising and Balance Immigration Levels sub-criterion. Table 40 shows the statistical means of the result of experts' judgment quantifications.

Table 40. Relative Importance of Alternatives Respect to the Raising and Balance Immigration Levels Sub-criterion

Raising and Balance Immigration Levels	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 17	0.21	0.21	0.21	0.14	0.21	0
Expert 19	0.32	0.29	0.08	0.24	0.07	0.07
Expert 21	0.43	0.14	0.14	0.14	0.14	0
Expert 24	0.32	0.16	0.16	0.16	0.19	0.01
Expert 26	0.42	0.17	0.14	0.09	0.17	0.01
Expert 29	0.31	0.24	0.21	0.14	0.1	0.01
Mean	**0.34**	**0.20**	**0.16**	**0.15**	**0.15**	---
Std Dev	0.07	0.05	0.04	0.04	0.05	---
				Disagreement	**0.052**	

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects:	0.15	4	0.08	8.67
Between Conditions:	0.00	5	0.000	---
Residual:	0.09	20	0.004	---
Total	0.24	29	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.43
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.51
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.87
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.25

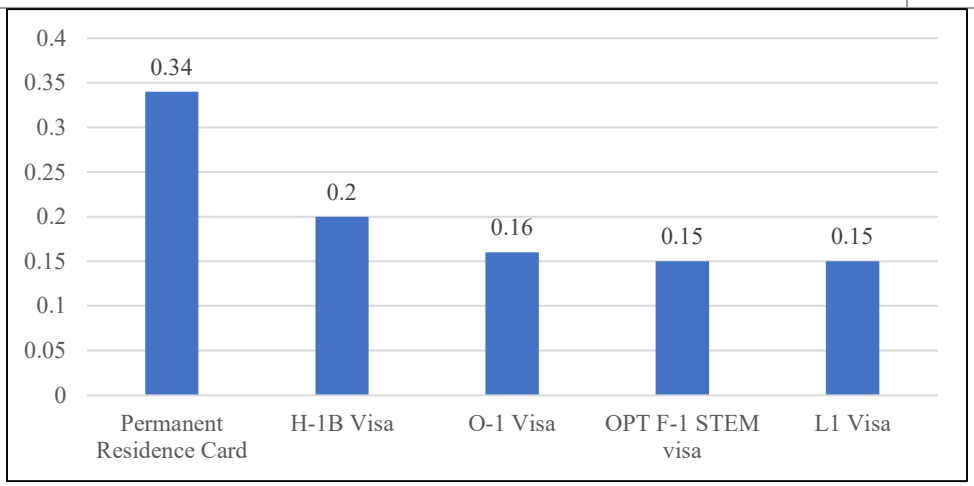

Figure 38. Relative Importance of Alternatives Respect to Raising and Balance Immigration Levels

According to the results, the Permanent Residence alternative scored highest (0.34) with respect to the Raising and Balance Immigration Levels sub-criterion. The H-1B Visa Alternative is ranked second (0.20), followed by the O-1, F-1 STEM OPT, and L1 visas

(0.16, 0.15, and 0.15, respectively). The inconsistency (all < 0.10) and disagreement (0.052) values are below the acceptable threshold.

6.3.9 Results of Alternatives with Fee Applications Sub-Criteria

Seven experts from Panel P4 evaluated the relative importance of the model alternatives with respect to the Fee Applications sub-criterion. Table 41 shows the statistical means of the result of experts' judgment quantifications.

Table 41. Relative Importance of Alternatives Respect to the Fee Applications Sub-criterion

Fee Applications	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 7	0.2	0.2	0.2	0.2	0.2	0
Expert 27	0.27	0.24	0.2	0.16	0.14	0.01
Expert 29	0.42	0.21	0.16	0.13	0.08	0.02
Expert 31	0.24	0.19	0.19	0.2	0.19	0
Expert 32	0.24	0.24	0.24	0.24	0.06	0
Expert 34	0.55	0.17	0.17	0.05	0.05	0.01
Expert 35	0.29	0.29	0.07	0.28	0.07	0
Mean	**0.32**	**0.22**	**0.18**	**0.18**	**0.11**	---
Std Dev	0.12	0.04	0.05	0.07	0.06	---
				Disagreement	**0.066**	

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects:	0.16	4	0.0390	5.29
Between Conditions:	0.00	6	0.000	---
Residual:	0.18	24	0.007	---
Total	0.33	34	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.22
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.38
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.78
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.19

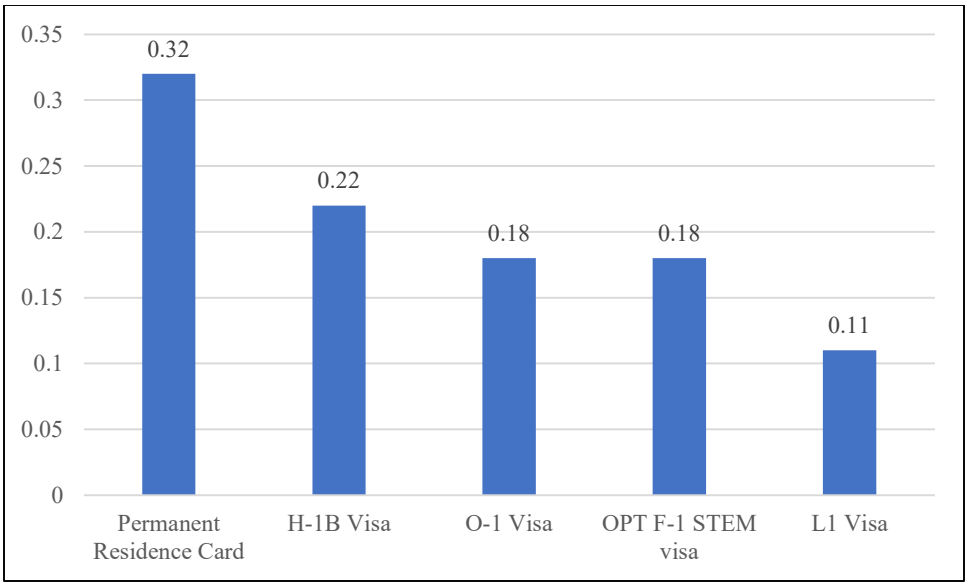

Figure 39. Relative Importance of Alternatives Respect to Fee Applications Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.32) with respect to the Fee Applications sub-criterion. The H-1B Visa Alternative is ranked second (0.22), followed by the O-1, F-1 STEM OPT, and L1 visas (0.18, 0.18, and 0.11, respectively). The inconsistency (all < 0.10) and disagreement (0.066) values are below the acceptable threshold.

6.3.10 Results of Alternatives with Competitive Wages Sub-Criteria

Six experts from Panel P4 evaluated the relative importance of the model alternatives with respect to the Competitive Wages sub-criterion. Table 42 shows the statistical means of the result of experts' judgments quantification.

Table 42. Relative Importance of Alternatives Respect to the Competitive Wages Sub-criterion

Competitive Wages	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 7	0.2	0.2	0.2	0.2	0.2	0
Expert 29	0.31	0.25	0.2	0.15	0.1	0.01
Expert 31	0.2	0.2	0.2	0.2	0.2	0
Expert 32	0.22	0.22	0.21	0.17	0.19	0
Expert 34	0.55	0.17	0.17	0.05	0.05	0.01
Expert 35	0.3	0.3	0.1	0.22	0.08	0.04
Mean	**0.30**	**0.22**	**0.18**	**0.17**	**0.14**	---
Std Dev	0.12	0.04	0.04	0.06	0.06	---
				Disagreement	**0.062**	

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects:	0.09	4	0.023	3.11
Between Conditions:	0.00	5	0.000	---
Residual:	0.15	2	0.007	---
Total	0.24	29	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.43
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.51
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.87
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.25

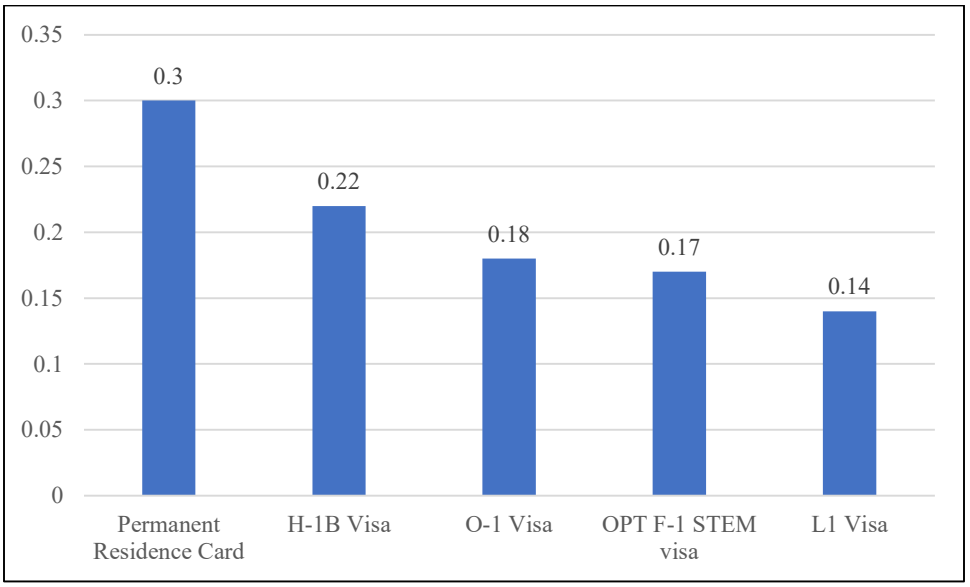

Figure 40. Relative Importance of Alternatives Respect to Competitive Wages Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.30) with respect to the Competitive Wages sub-criterion. The H-1B Visa Alternative is ranked second (0.22), followed by the O-1, F-1 STEM OPT, and L1 visas (0.18, 0.17, and 0.14, respectively). The inconsistency (all < 0.10) and disagreement (0.062) values are below the acceptable threshold.

6.3.11 Results of Alternatives with Value of Contributions Sub-Criteria

Six experts from Panel P4 evaluated the relative importance of the model alternatives with respect to the Value of Contributions sub-criterion. Table 43 shows the statistical means of the result of experts' judgments quantification.

Table 43. Relative Importance of Alternatives Respect to the Value of Contributions Sub-criterion

Value of Contributions	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 7	0.15	0.23	0.23	0.15	0.23	0
Expert 29	0.3	0.28	0.19	0.14	0.08	0.02
Expert 31	0.2	0.2	0.2	0.2	0.2	0
Expert 32	0.2	0.2	0.2	0.2	0.2	0
Expert 34	0.43	0.17	0.17	0.12	0.12	0
Expert 35	0.29	0.29	0.07	0.29	0.07	0
Mean	**0.26**	**0.23**	**0.18**	**0.18**	**0.15**	---
Std Dev	0.09	0.04	0.05	0.06	0.06	---
				Disagreement	**0.06**	

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects:	0.05	4	0.012	1.98
Between Conditions:	0.00	5	0.000	---
Residual:	0.12	20	0.006	---
Total	0.17	29	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.43
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.51
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.87
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.25

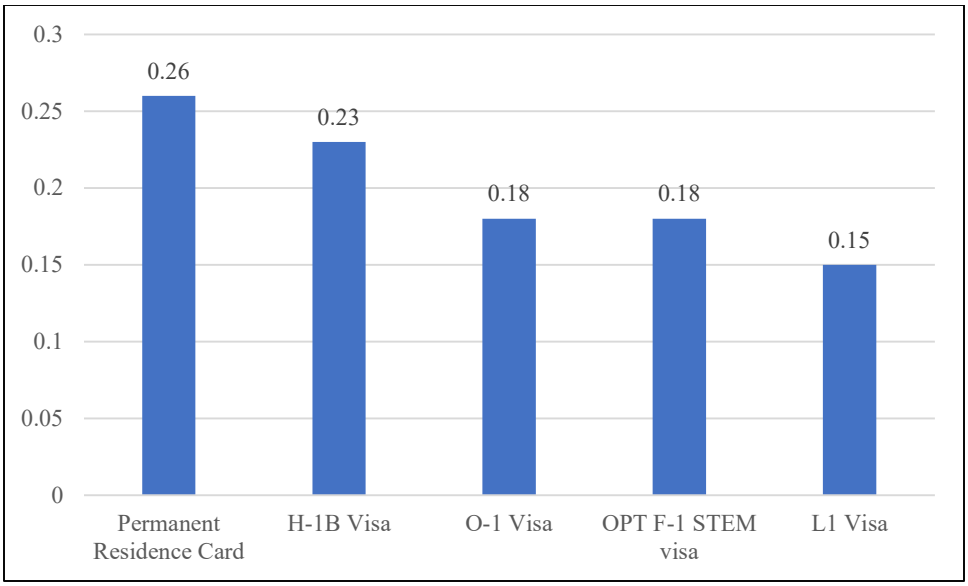

Figure 41. Relative Importance of Alternatives Respect to Value of Contributions Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.26) with respect to the Competitive Wages sub-criterion. The H-1B Visa Alternative is ranked second (0.23), followed by the O-1, F-1 STEM OPT, and L1 visas (0.18, 0.18, and 0.15, respectively). The inconsistency (all < 0.10) and disagreement (0.06) values are below the acceptable threshold.

6.3.12 Results of Alternatives with Actively Engagement Sub-Criteria

Six experts from Panel P4 evaluated the relative importance of the model alternatives with respect to the Actively Engagement sub-criterion. Table 44 shows the statistical means of the result of experts' judgments quantification.

Table 44. Relative Importance of Alternatives Respect to the Actively Engagement Sub-criterion

Actively engagement	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency

Expert 7	0.15	0.23	0.23	0.15	0.23	0
Expert 29	0.37	0.27	0.17	0.11	0.07	0.01
Expert 31	0.2	0.2	0.2	0.2	0.2	0
Expert 32	0.21	0.21	0.21	0.17	0.21	0
Expert 34	0.43	0.17	0.17	0.12	0.12	0
Expert 35	0.29	0.29	0.07	0.29	0.07	0
Mean	**0.28**	**0.23**	**0.18**	**0.17**	**0.15**	---
Std Dev	0.1	0.04	0.05	0.06	0.07	---

		Disagreement	**0.065**	
Source of Variation	**Sum of Square**	**Degrees of Freedom**	**Mean Square**	**F-Test Value**
Between Subjects:	0.06	4	0.15	2.33
Between Conditions:	0.00	5	0.000	---
Residual:	0.13	20	0.007	---
Total	0.19	29	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.43
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.51
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.87
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.25

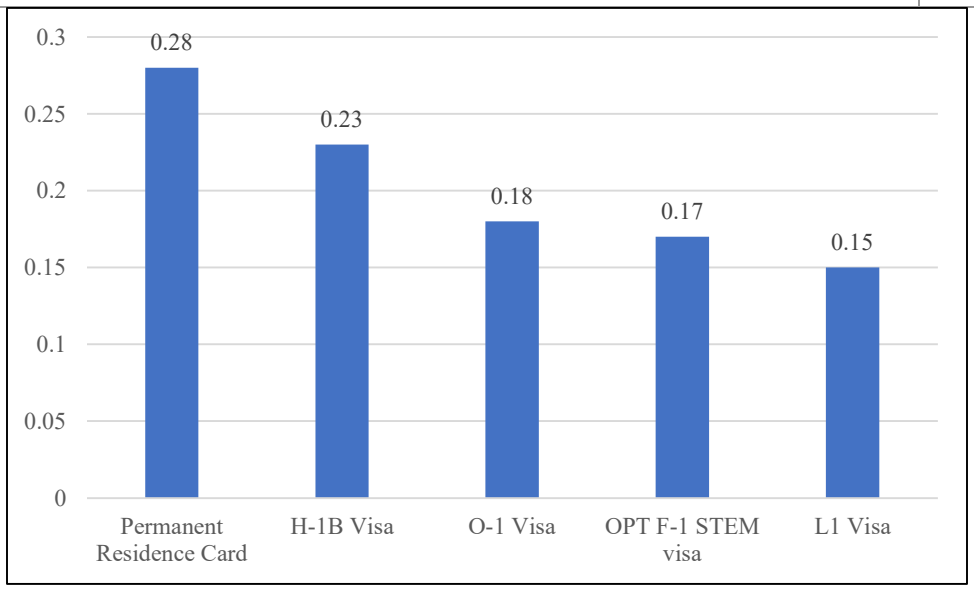

Figure 42. Relative Importance of Alternatives Respect to Actively Engagement Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.28) with respect to Actively Engagement sub-criterion. The H-1B visa Alternative is ranked second (0.23), followed by the O-1, F-1 STEM OPT, and L1 visas (0.18, 0.17,

and 0.15, respectively). The inconsistency (all < 0.10) and disagreement (0.065) values are below the acceptable threshold.

6.3.13 Results of Alternatives with Adjust Immigration Targets Based on Economic Demands Sub-Criteria

Six experts from Panel P4 evaluated the relative importance of the model alternatives with respect to the Adjust Immigration Targets Based on Economic Demands sub-criterion. Table 45 shows the statistical means of the result of experts' judgments quantification.

Table 45. Relative Importance of Alternatives Respect to the Adjust Immigration Targets Based on Economic Demands Sub-criterion

Adjust Immigration Targets Based on Economic Demands	**Permanent Residence Card**	**H-1B Visa**	**O-1 Visa**	**F-1 STEM OPT Visa**	**L1 Visa**	**Inconsistency**
Expert 7	0.15	0.23	0.23	0.15	0.23	0
Expert 29	0.41	0.23	0.17	0.11	0.07	0.01
Expert 31	0.23	0.2	0.19	0.2	0.19	0
Expert 32	0.22	0.21	0.21	0.18	0.18	0
Expert 34	0.31	0.2	0.2	0.14	0.14	0
Expert 35	0.29	0.29	0.07	0.29	0.07	0
Mean	**0.27**	**0.23**	**0.18**	**0.18**	**0.15**	---
Std Dev	0.08	0.03	0.05	0.06	0.06	---
				Disagreement	**0.054**	

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects:	0.06	4	0.014	2.67
Between Conditions:	0.00	5	0.000	---
Residual:	0.10	20	0.005	---
Total	0.16	29	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.43
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.51
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.87
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.25

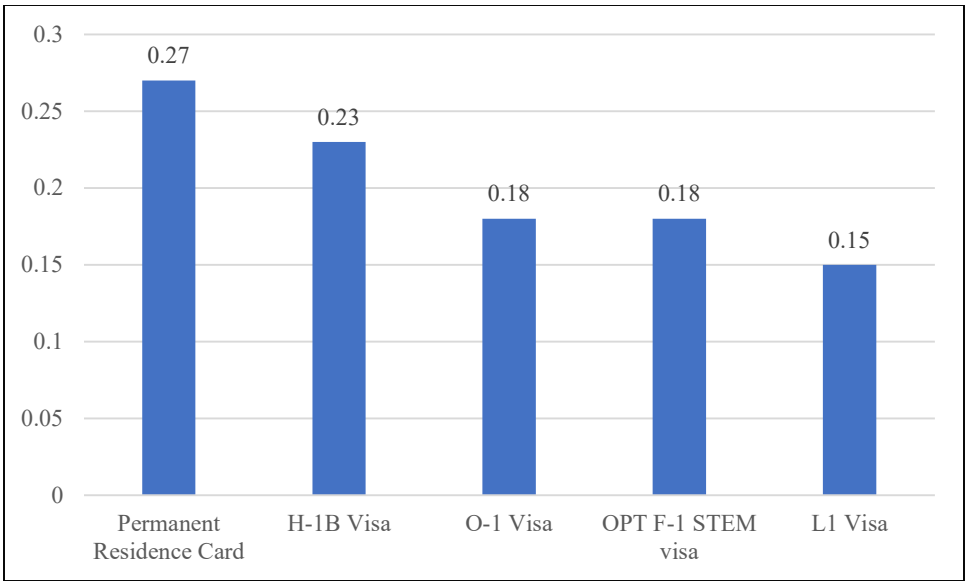

Figure 43. Relative Importance of Alternatives Respect to the Adjust Immigration Targets Based on Economic Demands Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.27) concerning the Adjust Immigration Targets Based on Economic Demands sub-criterion. The H-1B Visa Alternative is ranked second (0.23), followed by the O-1, F-1 STEM OPT, and L1 visas (0.18, 0.18, and 0.15, respectively). The inconsistency (all < 0.10) and disagreement (0.054) values are below the acceptable threshold.

6.3.14 Results of Alternatives with Making Immigration Selectivity More Egalitarian Sub-Criteria

Thirteen experts from Panel P5 evaluated the relative importance of the model alternatives with respect to the Making Immigration Selectivity More Egalitarian sub-criterion. Table 46 shows the statistical means of the result of experts' judgments quantification.

Table 46. Relative Importance of Alternatives Respect to the Making Immigration Selectivity More Egalitarian Sub-criterion

Making Immigration Selectivity More Egalitarian	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 21	0.29	0.28	0.06	0.3	0.07	0.01
Expert 24	0.52	0.12	0.12	0.12	0.12	0
Expert 31	0.2	0.2	0.2	0.21	0.19	0
Expert 40	0.68	0.19	0.08	0.03	0.01	0.09
Expert 42	0.32	0.17	0.17	0.22	0.13	0.02
Expert 44	0.2	0.2	0.2	0.2	0.2	0
Expert 45	0.43	0.43	0.05	0.05	0.05	0
Expert 46	0.15	0.55	0.08	0.08	0.15	0.07
Expert 48	0.1	0.19	0.24	0.24	0.24	0.02
Expert 49	0.42	0.18	0.14	0.11	0.14	0.02
Expert 50	0.51	0.18	0.11	0.11	0.1	0.08
Expert 53	0.4	0.25	0.09	0.14	0.13	0.04
Expert 57	0.14	0.11	0.21	0.21	0.32	0.05
Mean	**0.34**	**0.23**	**0.13**	**0.16**	**0.14**	---
Std Dev	0.17	0.12	0.06	0.08	0.08	---
					Disagreement	**0.099**

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects:	0.38	4	0.098	5.97
Between Conditions:	0.00	12	0.000	---
Residual:	0.76	48	0.016	---
Total	1.14	64	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				3.74
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.07
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.57
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.07

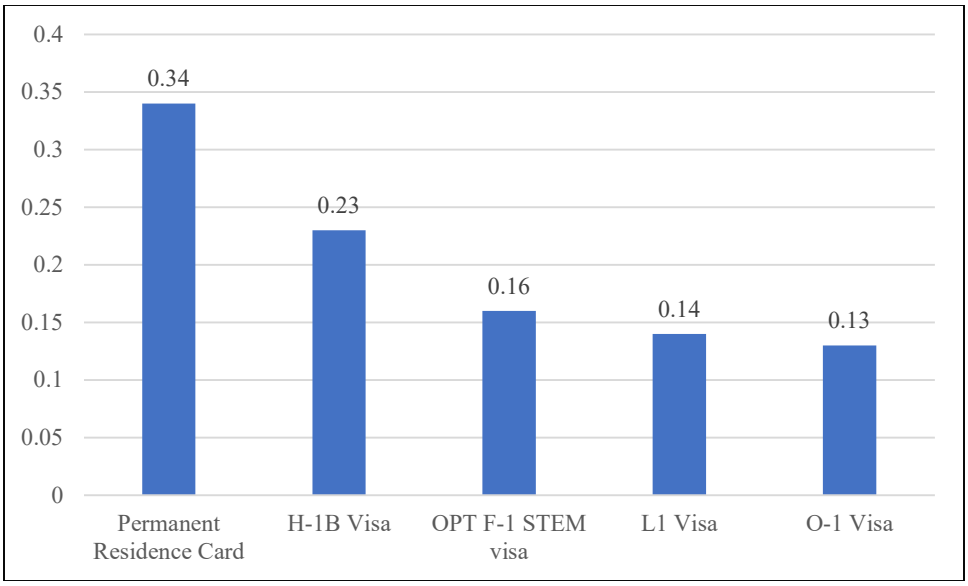

Figure 44. Relative Importance of Alternatives Respect to the Making Immigration Selectivity More Egalitarian Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.34) with respect to the Making Immigration Selectivity More Egalitarian sub-criterion. The H-1B Visa Alternative is ranked second (0.23), followed by the F-1 STEM OPT, L1, and O-1 visas (0.16, 0.14, and 0.13, respectively). The inconsistency (all < 0.10) and disagreement (0.099) values are below the acceptable threshold.

6.3.15 Results of Alternatives with Upgrade Type of Selection System Sub-Criteria

Twelve experts from Panel P5 evaluated the relative importance of the model alternatives with respect to Upgrade Type of Selection System sub-criterion. Table 47 shows the statistical means of the result of experts' judgments quantification.

Table 47. Relative Importance of Alternatives Respect to the Upgrade Type of Selection System Sub-criterion

Upgrade Type Of Selection System	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 21	0.26	0.3	0.08	0.28	0.08	0

Expert 24	0.5	0.13	0.13	0.13	0.13	0
Expert 31	0.23	0.19	0.2	0.19	0.19	0
Expert 40	0.2	0.2	0.2	0.2	0.2	0
Expert 42	0.32	0.19	0.19	0.19	0.11	0.01
Expert 44	0.27	0.14	0.23	0.16	0.2	0.07
Expert 45	0.65	0.17	0.08	0.06	0.04	0.05
Expert 48	0.03	0.24	0.24	0.24	0.24	0
Expert 49	0.41	0.22	0.15	0.11	0.11	0.08
Expert 50	0.2	0.2	0.2	0.2	0.2	0
Expert 53	0.2	0.2	0.2	0.2	0.2	0
Expert 57	0.16	0.13	0.28	0.19	0.24	0.01
Mean	**0.29**	**0.19**	**0.18**	**0.18**	**0.16**	---
Std Dev	0.16	0.05	0.06	0.06	0.06	---
				Disagreement	**0.074**	

Source of Variation	**Sum of Square**	**Degrees of Freedom**	**Mean Square**	**F-Test Value**
Between Subjects:	0.12	4	0.029	2.82
Between Conditions:	0.00	11	0.000	---
Residual:	0.45	44	0.010	---
Total	0.57	59	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				3.78
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.09
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.58
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.08

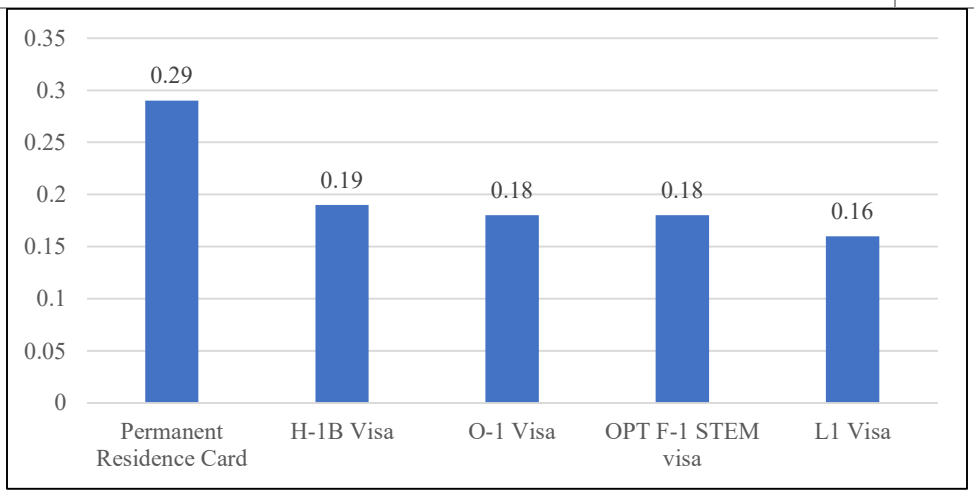

Figure 45. Relative Importance of Alternatives Respect to the Upgrade Type of Selection System Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.29) with respect to the Upgrade Type of Selection System sub-criterion. The H-1B Visa

Alternative is ranked second (0.19), followed by the O-1 and F-1 STEM OPTvisas (0.18). L1 visa is ranked the last (0.16). The inconsistency (all < 0.10) and disagreement (0.074) values are below the acceptable threshold.

6.3.16 Results of Alternatives with Backlog Reduction Sub-Criteria

Twelve experts from Panel P5 evaluated the relative importance of the model alternatives with respect to the Backlog Reduction sub-criterion. Table 48 shows the statistical means of the result of experts' judgments quantification.

Table 48. Relative Importance of Alternatives Respect to the Backlog Reduction Sub-criterion

Backlog Reduction	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 21	0.96	0.01	0.01	0.01	0.01	0
Expert 24	0.5	0.13	0.13	0.13	0.13	0
Expert 31	0.23	0.19	0.19	0.19	0.19	0
Expert 40	0.2	0.2	0.2	0.2	0.2	0
Expert 42	0.33	0.19	0.19	0.16	0.12	0.01
Expert 44	0.2	0.2	0.2	0.2	0.2	0
Expert 46	0.49	0.3	0.05	0.05	0.12	0.2
Expert 48	0.5	0.13	0.13	0.13	0.13	0
Expert 49	0.35	0.15	0.19	0.15	0.15	0.06
Expert 50	0.72	0.09	0.08	0.07	0.04	0.09
Expert 53	0.09	0.13	0.27	0.3	0.21	0.04
Expert 57	0.25	0.1	0.22	0.19	0.24	0.04
Mean	**0.4**	**0.15**	**0.16**	**0.15**	**0.15**	---
Std Dev	0.24	0.07	0.07	0.08	0.07	---

		Disagreement	**0.10**	
Source of Variation	**Sum of Square**	**Degrees of Freedom**	**Mean Square**	**F-Test Value**
Between Subjects:	0.61	4	0.152	7.29
Between Conditions:	0.00	11	0.000	---
Residual:	0.92	44	0.021	---
Total	1.53	59	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				3.78
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.09

Critical F value with degrees of freedom 3 & 30 at 0.05 level:	2.58
Critical F value with degrees of freedom 3 & 30 at 0.1 level:	2.08

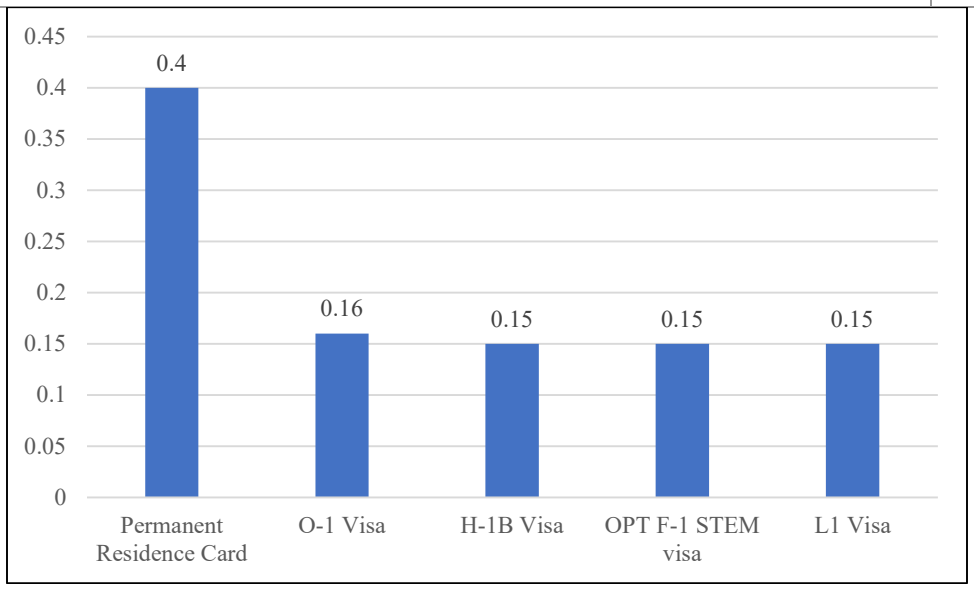

Figure 46. Relative Importance of Alternatives Respect to Backlog Reduction Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.40) concerning the Backlog Reduction sub-criterion. There is no major difference between the other ranked options O-1, H-1B, F-1 STEM OPT, and L1 visas (0.16, 0.15, 0.15, and 0.15, respectively). The inconsistency values (all < 0.10) are below the acceptable threshold. However, the disagreement value of the Backlog Reduction sub-criteria is on the threshold's limit (0.1). Then, a Hierarchical Agglomerative Clustering (HAC) is recommended to threaten the disagreement value, as shown previously.

A cluster test was performed following the Ward methodology to threaten the disagreement value found in the Backlog Reduction Sub-Criteria. The SPSS IBM© Software 28 (IBM Corp, 2021) was used to run the analysis. The results of clustering the Backlog Reduction Sub-criteria are shown below. The analysis suggests that there are two clusters, "A" and "B" (see Fig. 47).

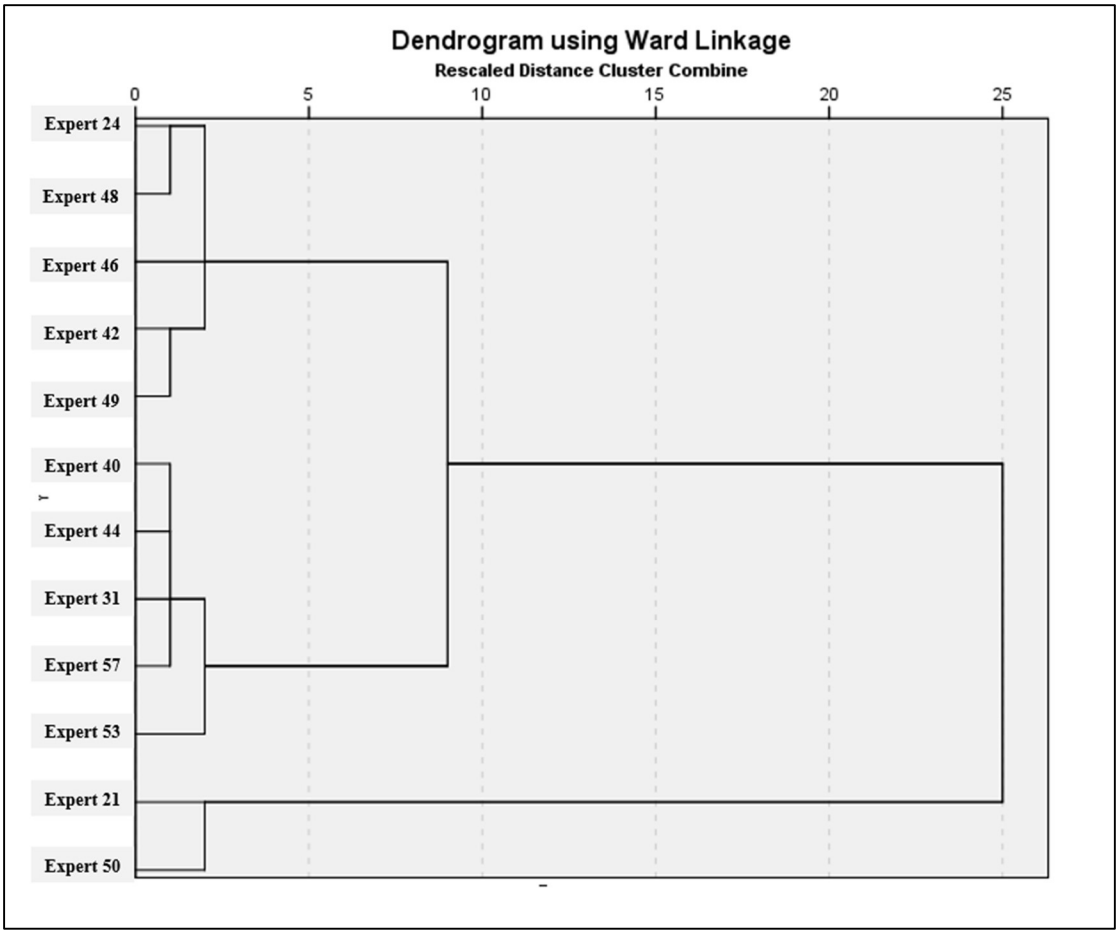

Figure 47. Backlog Reduction Sub-criteria Clusters – Results

Table 49 shows the results of Cluster A, which has ten experts. Results from Cluster A are consistent with the overall results of the Backlog Reduction Sub-criteria, where the Permanent Residence card is ranked first (0.40 vs 0.28). However, this value loses 0.12 points of difference. The rest of the alternatives have similar results. The inconsistency and disagreement values are below the threshold.

Table 49. Analysis of Cluster "A" results from Panel P5

Backlog Reduction	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 24	0.5	0.13	0.13	0.13	0.13	0
Expert 31	0.23	0.19	0.19	0.19	0.19	0

Expert 40	0.2	0.2	0.2	0.2	0.2	0
Expert 42	0.33	0.19	0.19	0.16	0.12	0.01
Expert 44	0.2	0.2	0.2	0.2	0.2	0
Expert 46	0.49	0.3	0.05	0.05	0.12	0.2
Expert 48	0.5	0.13	0.13	0.13	0.13	0
Expert 49	0.35	0.15	0.19	0.15	0.15	0.06
Expert 53	0.09	0.13	0.27	0.3	0.21	0.04
Expert 57	0.25	0.1	0.22	0.19	0.24	0.04
Mean	**0.28**	**0.16**	**0.16**	**0.16**	**0.16**	---
Std Dev	0.14	0.05	0.06	0.06	0.04	---
				Disagreement	**0.096**	

The results of Cluster B, which has two experts, are also similar to the overall results of the Backlog Reduction Sub-criteria. However, there is a difference in the value of the first-ranked option (0.40 vs 0.64). Experts 21 and 50 gave the Permanent Residence Card a notably higher value than the other options, which explains why the initial disagreement value is above the threshold. All inconsistency and disagreement values are below the threshold.

Table 50. Analysis of Cluster "B" results from Panel P5

Backlog Reduction	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 21	0.56	0.23	0.07	0.07	0.07	0.2
Expert 50	0.72	0.09	0.08	0.07	0.04	0.09
Mean	**0.64**	**0.16**	**0.08**	**0.07**	**0.06**	---
Std Dev	0.08	0.07	0	0	0.02	---
				Disagreement	**0.048**	

6.3.17 Results of Alternatives with Redistribution of LPR Cards / Visas Sub-Criteria

Ten experts from Panel P5 evaluated the relative importance of the model alternatives with respect to the Redistribution of LPR Cards / Visas sub-criterion. Table 51 shows the statistical means of the result of experts' judgments quantification.

Table 51. Relative Importance of Alternatives Respect to the Redistribution of LPR Cards / Visas Sub-criterion

Redistribution of LPR Cards / Visas	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 24	0.5	0.13	0.13	0.13	0.13	0
Expert 31	0.23	0.19	0.19	0.19	0.19	0
Expert 42	0.33	0.19	0.19	0.19	0.11	0.01
Expert 44	0.2	0.2	0.2	0.2	0.2	0
Expert 45	0.54	0.31	0.06	0.06	0.03	0.07
Expert 46	0.03	0.51	0.15	0.09	0.22	0.2
Expert 47	0.96	0.01	0.01	0.01	0.01	0
Expert 49	0.49	0.16	0.13	0.08	0.13	0.03
Expert 50	0.2	0.2	0.2	0.2	0.2	0
Expert 53	0.37	0.15	0.19	0.13	0.16	0.03
Mean	**0.39**	**0.21**	**0.15**	**0.13**	**0.14**	---
Std Dev	0.25	0.12	0.06	0.06	0.07	---
				Disagreement	**0.108**	

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F-Test Value
Between Subjects:	0.46	4	0.116	4.75
Between Conditions:	0.00	9	0.000	---
Residual:	0.88	36	0.024	---
Total	1.34	49	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				3.89
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.17
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.63
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.11

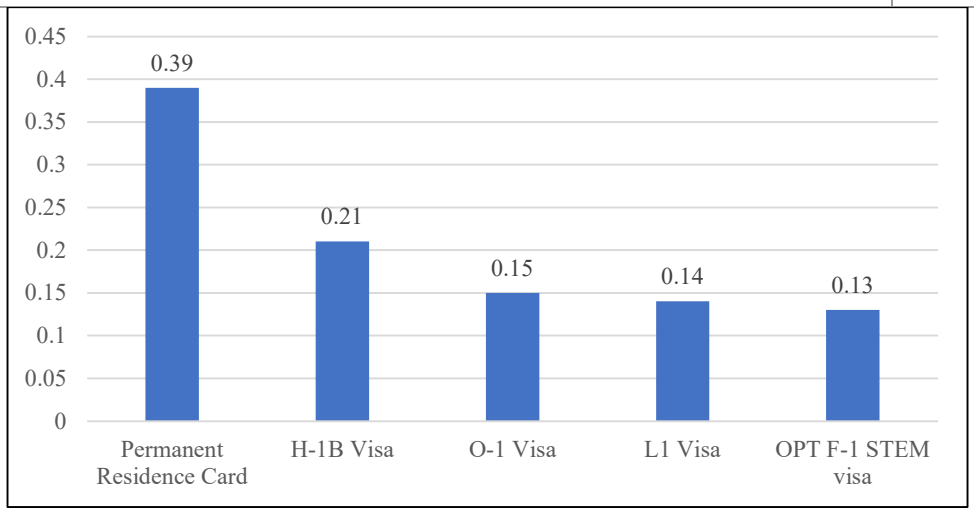

Figure 48. Relative Importance of Alternatives to Respect Redistribution of LPR Cards / Visas Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.39) concerning the Redistribution of LPR Cards / Visas sub-criterion. The H1-B visa is ranked second (0.21), followed by the O-1, L1, and F-1 STEM OPT visas (0.15, 0.14, and 0.13, respectively). The inconsistency values (all < 0.10) are below the acceptable threshold. However, the disagreement value of the Respect Redistribution of LPR Cards / Visas sub-criteria is above the threshold (0.108). Then, a Hierarchical Agglomerative Clustering (HAC) is recommended to threaten the disagreement value, as shown previously.

A cluster test was performed following the Ward methodology to threaten the disagreement value found in the Redistribution of LPR Cards / Visas Sub-Criteria. SPSS IBM© Software 28 (IBM Corp, 2021) was used to run the analysis. The results of clustering the Backlog Reduction Sub-criteria are shown below. The analysis suggests that there are two clusters, “A” and “B” (see Fig. 49).

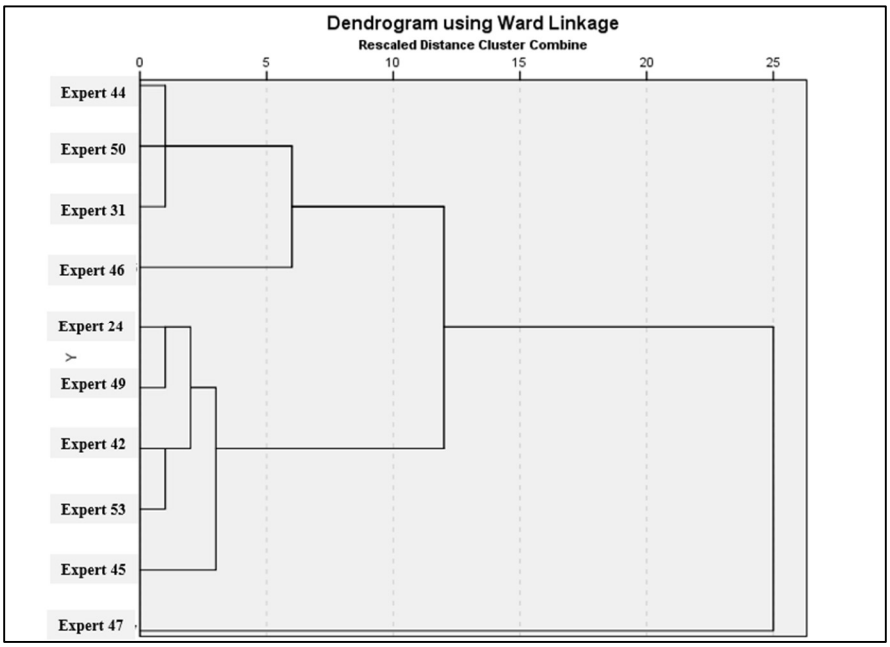

Figure 49. Redistribution of LPR Cards / Visas Sub-criteria Clusters – Results

Table 52 shows the results of Cluster A, which has four experts. Results from Cluster A contradict the overall results of the Redistribution of LPR Cards / Visas Sub-criteria, where the Permanent Residence card option is ranked first (0.39). In this second analysis, H1-B visa ranks first (0.28), followed by L1 and O1 visas (0.20 and 0.19). F-1 STEM OPT visa and Permanent Residence card are ranked the last (0.17). All inconsistency values and the overall disagreement value (0.064) are below the threshold.

Table 52. Analysis of Cluster "A" results from Panel P5

Redistribution of LPR Cards / Visas	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 31	0.23	0.19	0.19	0.19	0.19	0
Expert 44	0.2	0.2	0.2	0.2	0.2	0
Expert 46	0.03	0.51	0.15	0.09	0.22	0.2
Expert 50	0.2	0.2	0.2	0.2	0.2	0
Mean	**0.17**	**0.28**	**0.19**	**0.17**	**0.2**	---
Std Dev	0.08	0.14	0.02	0.05	0.01	---
				Disagreement	**0.064**	

Results from Cluster B are similar to the overall results of the Redistribution of LPR Cards / Visas Sub-criteria, where the Permanent Residence card is ranked first (0.39 vs. 0.53) since this group of experts gave a higher value to this sub-criterion, i.e., Element A is ten times more important than Element B. Then, H1-B Visa is ranked second (0.21 vs 0.16), followed by O1, L1, and F-1 STEM OPT visas (0.12, 0.10, and 0.10, accordingly). All inconsistency values and the overall disagreement value (0.09) are below the threshold.

Table 53. Analysis of Cluster "A" results from Panel P5

Redistribution of LPR Cards / Visas	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 24	0.5	0.13	0.13	0.13	0.13	0

Expert 42	0.33	0.19	0.19	0.19	0.11	0.01
Expert 45	0.54	0.31	0.06	0.06	0.03	0.07
Expert 47	0.96	0.01	0.01	0.01	0.01	0
Expert 49	0.49	0.16	0.13	0.08	0.13	0.03
Expert 53	0.37	0.15	0.19	0.13	0.16	0.03
Mean	**0.53**	**0.16**	**0.12**	**0.1**	**0.1**	---
Std Dev	0.21	0.09	0.07	0.06	0.06	---
				Disagreement	**0.09**	

6.3.18 Results of Alternatives with High-Quality Education Sub-Criteria

Eight experts from Panel P6 evaluated the relative importance of the model alternatives with respect to the High-Quality Education sub-criterion. Table 54 shows the statistical means of the result of experts' judgments quantification.

Table 54. Relative Importance of Alternatives Respect to the High-Quality Education Sub-criterion

High-Quality Education	**Permanent Residence Card**	**H-1B Visa**	**O-1 Visa**	**F-1 STEM OPT visa**	**L1 Visa**	**Inconsistency**
Expert 15	0.33	0.18	0.2	0.17	0.12	0
Expert 22	0.19	0.16	0.27	0.25	0.13	0.03
Expert 50	0.5	0.13	0.13	0.13	0.13	0
Expert 51	0.27	0.17	0.2	0.17	0.2	0.08
Expert 53	0.39	0.22	0.13	0.13	0.14	0.02
Expert 56	0.42	0.18	0.12	0.17	0.11	0.02
Expert 57	0.2	0.2	0.2	0.2	0.2	0
Expert 60	0.18	0.35	0.13	0.2	0.15	0.03
Mean	**0.31**	**0.20**	**0.17**	**0.18**	**0.15**	---
Std Dev	0.11	0.06	0.05	0.04	0.03	---
				Disagreement	**0.06**	

Source of Variation	**Sum of Square**	**Degrees of Freedom**	**Mean Square**	**F-Test Value**
Between Subjects:	0.13	4	0.032	5.31
Between Conditions:	0.00	7	0.000	---
Residual:	0.17	28	0.006	---
Total	0.30	39	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.07
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.29
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.71
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.16

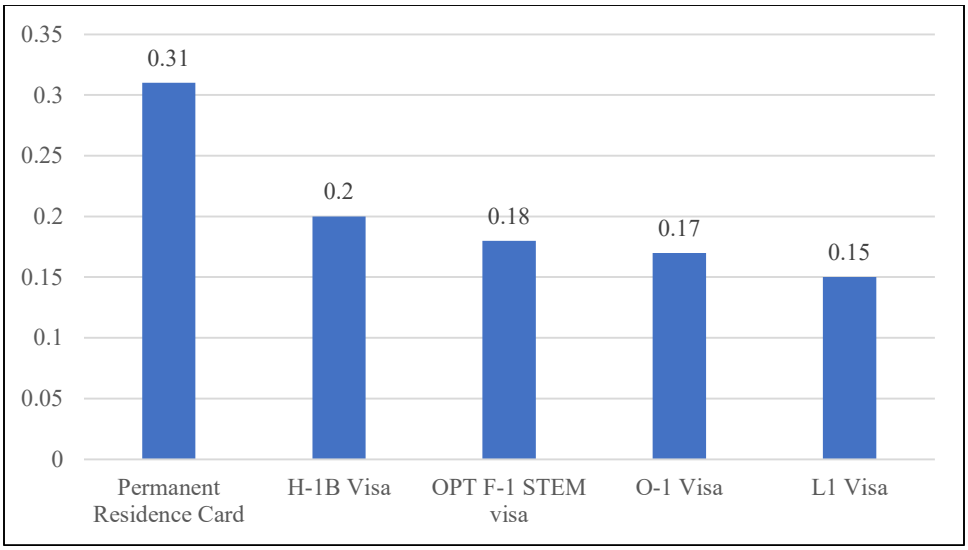

Figure 50. Relative Importance of Alternatives to Respect High-Quality Education Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.31) concerning the High-Quality Education sub-criterion. The H1-B visa alternative is ranked second (0.20), followed by the F-1 STEM OPT, O-1, and L1 visas (0.18, 0.17, and 0.15, respectively). The inconsistency (all < 0.10) and disagreement (0.06) values are below the acceptable threshold.

6.3.19 Results of Alternatives with High-Quality Training Sub-Criteria

Seven experts from Panel P6 evaluated the relative importance of the model alternatives with respect to the High-Quality Training sub-criterion. Table 55 shows the statistical means of the result of experts' judgments quantification.

Table 55. Relative Importance of Alternatives Respect to the High-Quality Training Sub-criterion

High-Quality Training	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 15	0.34	0.19	0.18	0.17	0.12	0
Expert 22	0.23	0.22	0.15	0.28	0.12	0.02
Expert 50	0.5	0.13	0.13	0.13	0.13	0
Expert 53	0.08	0.25	0.3	0.17	0.2	0.05

Expert 58	0.6	0.12	0.18	0.06	0.04	0.04
Expert 59	0.96	0.01	0.01	0.01	0.01	0
Expert 60	0.18	0.35	0.14	0.16	0.16	0.04
Mean	**0.41**	**0.18**	**0.16**	**0.14**	**0.11**	---
Std Dev	0.28	0.1	0.08	0.08	0.06	---
				Disagreement	**0.124**	

Source of Variation	**Sum of Square**	**Degrees of Freedom**	**Mean Square**	**F-Test Value**
Between Subjects:	0.41	4	0.103	3.39
Between Conditions:	0.00	6	0.000	---
Residual:	0.73	24	0.030	---
Total	1.15	34	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.22
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.38
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.78
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.19

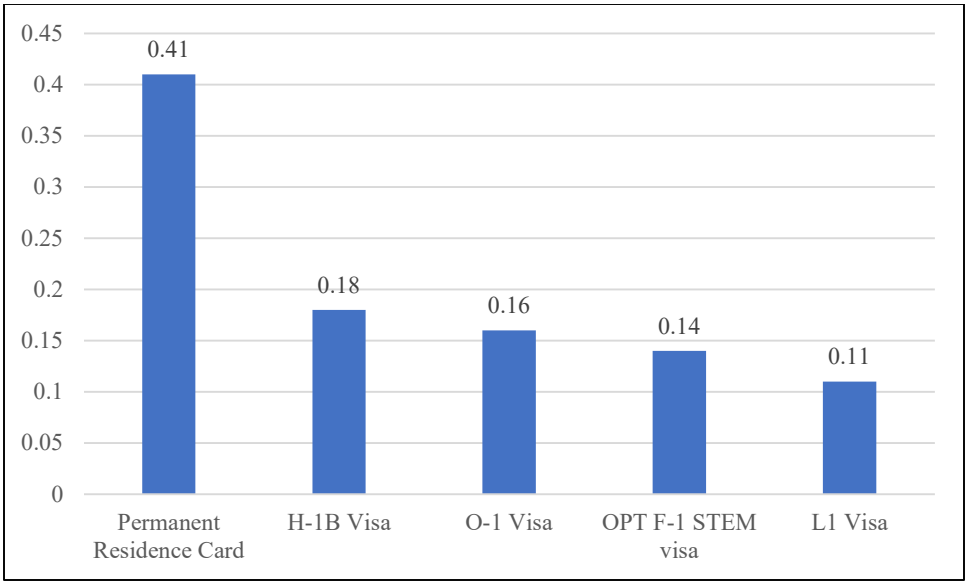

Figure 51. Relative Importance of Alternatives to Respect High-Quality Training Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.41) concerning the High-Quality Training sub-criterion. The H1-B visa alternative is ranked second (0.18), followed by the O-1, F-1 STEM OPT, and L1 visas (0.16, 0.14, and 0.11, respectively). The inconsistency values (all < 0.10) are below the acceptable threshold.

However, the disagreement value of the High-Quality Training sub-criteria is above the threshold (0.124). Then, a Hierarchical Agglomerative Clustering (HAC) is recommended to threaten the disagreement value, as shown previously.

A cluster test was performed following the Ward methodology to threaten the disagreement value found in the High-Quality Training Sub-Criteria. The SPSS IBM© Software 28 (IBM Corp, 2021) was used to run the analysis. The results of clustering the High-Quality Training Sub-criteria are shown below. The analysis suggests that there are two clusters, “A” and “B” (see Figure 52).

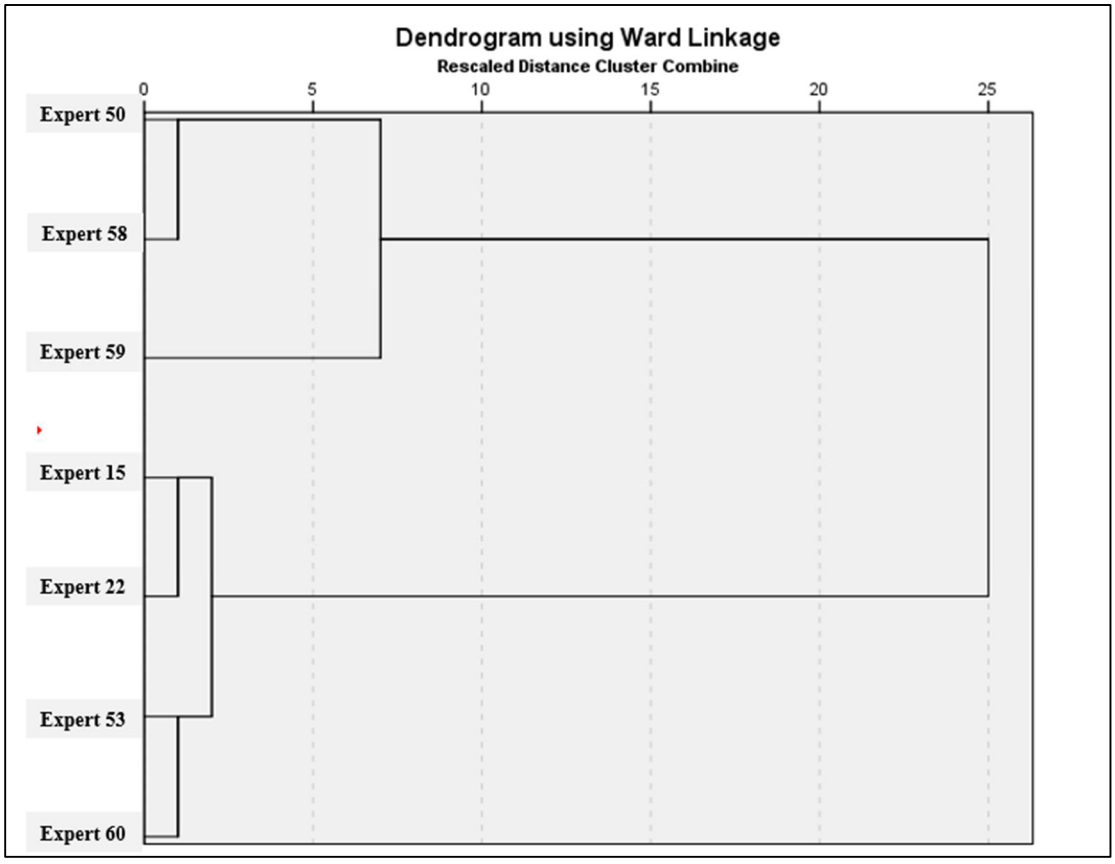

Figure 52. High-Quality Training Sub-criteria Clusters – Results

Results from Cluster A are similar to the overall results of the High-Quality Training -criteria where the Permanent Residence card alternative ranked first (0.41 vs. 0.69) since this group of experts gave a higher value to this sub-criterion, i.e., Element A is ten times more impact than Element B. Then, O-1Visa is ranked second (0.11), followed by H1-B, F-1 STEM OPT, and L1 visas (0.09, 0.07, and 0.06, respectively). All inconsistency values and the overall disagreement value (0.09) are below the threshold.

Table 56. Analysis of Cluster "A" results from Panel P6

High-Quality Training	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 50	0.5	0.13	0.13	0.13	0.13	0
Expert 58	0.6	0.12	0.18	0.06	0.04	0.04
Expert 59	0.96	0.01	0.01	0.01	0.01	0
Mean	**0.69**	**0.09**	**0.11**	**0.07**	**0.06**	---
Std Dev	0.2	0.05	0.07	0.05	0.05	---
				Disagreement	**0.096**	

Table 57 shows the results of Cluster B, which has four experts. Results from Cluster B contradict the overall results of the High-Quality Training Sub-criteria, where the Permanent Residence card is ranked first (0.41). In this second analysis, H1-B Visa ranks first (0.25), followed by Permanent Residence card, O1, F-1 STEM OPT, and L1 visas (0.21, 0.20, 0.19, and 0.15). All inconsistency values and the overall disagreement value (0.062) are below the threshold.

Table 57. Analysis of Cluster "B" results from Panel P6

High-Quality Training	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 15	0.34	0.19	0.18	0.17	0.12	0
Expert 22	0.23	0.22	0.15	0.28	0.12	0.02
Expert 53	0.08	0.25	0.3	0.17	0.2	0.05

Expert 60	0.18	0.35	0.14	0.16	0.16	0.04
Mean	**0.21**	**0.25**	**0.19**	**0.2**	**0.15**	---
Std Dev	0.09	0.06	0.06	0.05	0.03	---
				Disagreement	**0.062**	

6.3.20 Results of Alternatives with Increase Immigration Acceptance Sub-Criteria

Seven experts from Panel P6 evaluated the relative importance of the model alternatives with respect to the Increase Immigration Acceptance sub-criterion. Table 58 shows the statistical means of the result of experts' judgments quantification.

Table 58. Relative Importance of Alternatives Respect to the Increase Immigration Acceptance Sub-criterion

Increase Immigration Acceptance	**Permanent Residence Card**	**H-1B Visa**	**O-1 Visa**	**F-1 STEM OPT Visa**	**L1 Visa**	**Inconsistency**
Expert 15	0.33	0.18	0.17	0.19	0.13	0
Expert 22	0.24	0.22	0.17	0.23	0.13	0.01
Expert 50	0.5	0.13	0.13	0.13	0.13	0
Expert 53	0.65	0.11	0.16	0.04	0.05	0.06
Expert 55	0.2	0.2	0.2	0.2	0.2	0
Expert 59	0.96	0.01	0.01	0.01	0.01	0
Expert 60	0.3	0.25	0.15	0.15	0.16	0.01
Mean	**0.45**	**0.16**	**0.14**	**0.14**	**0.12**	---
Std Dev	0.25	0.08	0.06	0.08	0.06	---
				Disagreement	**0.109**	

Source of Variation	**Sum of Square**	**Degrees of Freedom**	**Mean Square**	**F-Test Value**
Between Subjects:	0.57	4	0.142	5.49
Between Conditions:	0.00	6	0.000	---
Residual:	0.57	24	0.024	---
Total	1.14	34	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.22
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.38
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.78
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.19

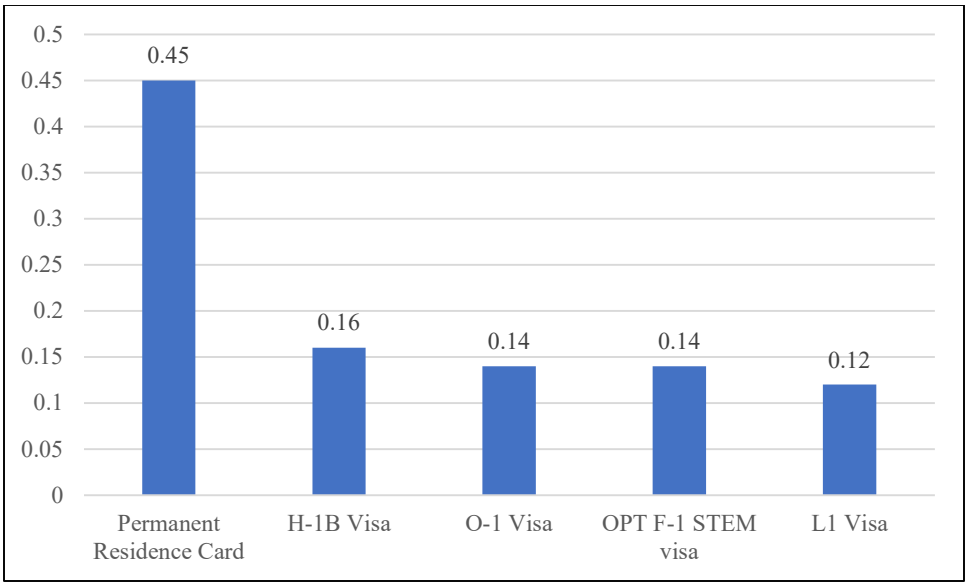

Figure 53. Relative Importance of Alternatives Respect to the Increase Immigration Acceptance Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.45) concerning the Increase Immigration Acceptance sub-criterion. The H-1B Visa Alternative is ranked second (0.16), followed by the O-1 and F-1 STEM OPT visas (0.14). L1 visa is ranked the last (0.12). The inconsistency (all < 0.10) values are below the acceptable threshold. However, the disagreement value (0.109) is above the threshold. Then, a Hierarchical Agglomerative Clustering (HAC) is recommended to threaten the disagreement value, as shown previously.

A cluster test was performed following the Ward methodology to threaten the disagreement value found in the Increase Immigration Acceptance Sub-Criteria; the SPSS IBM© Software 28 (IBM Corp, 2021) was used to run the analysis. The results of clustering the Increase Immigration Acceptance Sub-criteria are shown below. The analysis suggests that there are two clusters, “A” and “B” (see Fig. 54).

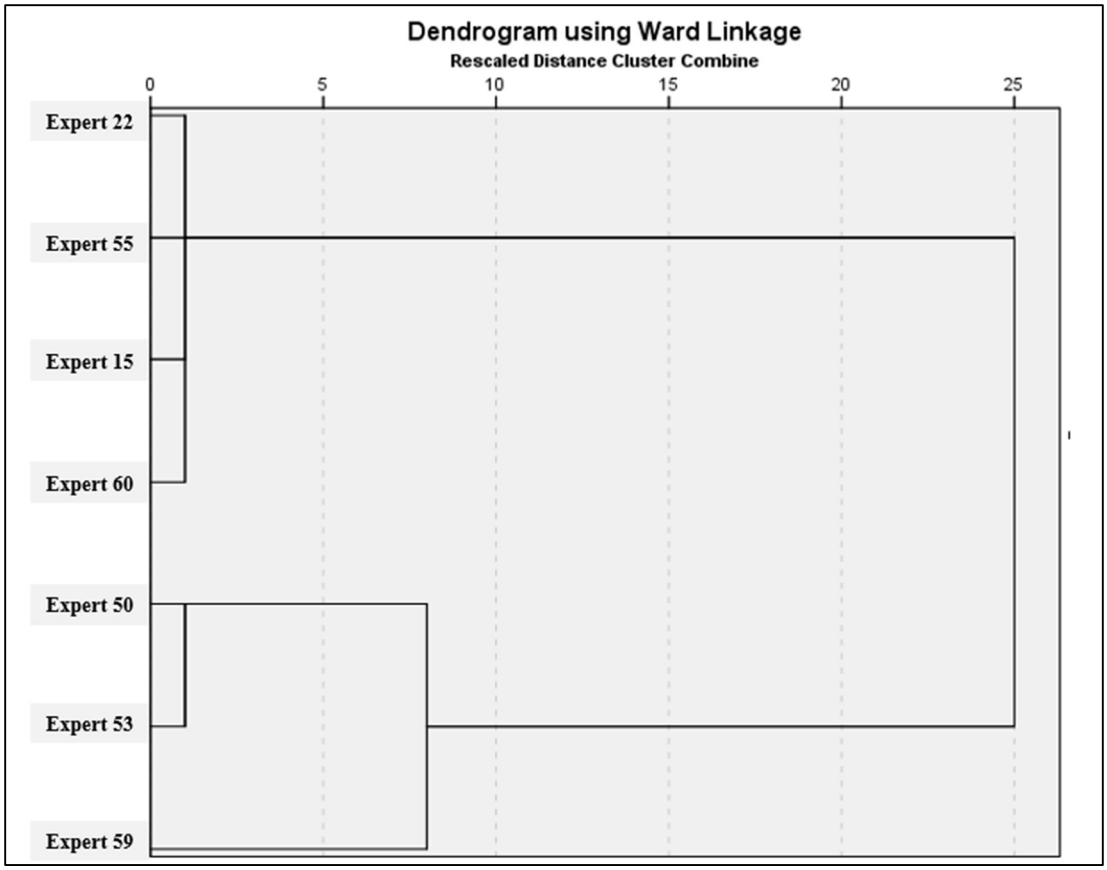

Figure 54. Increase Immigration Acceptance Sub-criteria Clusters – Results

Cluster A and B results are similar to the overall results of the Increase Immigration Acceptance -criteria, where the Permanent Residence card alternative ranked first (0.41 vs 0.27 and 0.70). However, the group of experts from Cluster B gave a higher value to this sub-criterion, i.e., Element A is ten times more important than Element B. Then, in cluster A, the H1-B visa is ranked second (0.21), while O-1Visa is ranked second (0.10) in cluster B. All inconsistency values and the overall disagreement values (0.03 and 0.091) are below the threshold.

Table 59. Analysis of Cluster "A" results from Panel P6

Increase Immigration Acceptance	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency

Expert 15	0.33	0.18	0.17	0.19	0.13	0
Expert 22	0.24	0.22	0.17	0.23	0.13	0.01
Expert 55	0.2	0.2	0.2	0.2	0.2	0
Expert 60	0.3	0.25	0.15	0.15	0.16	0.01
Mean	**0.27**	**0.21**	**0.18**	**0.19**	**0.16**	---
Std Dev	0.05	0.03	0.02	0.02	0.03	---
				Disagreement	**0.03**	

Table 60. Analysis of Cluster "B" results from Panel P6

Increase Immigration Acceptance	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 50	0.5	0.13	0.13	0.13	0.13	0
Expert 53	0.65	0.11	0.16	0.04	0.05	0.06
Expert 59	0.96	0.01	0.01	0.01	0.01	0
Mean	**0.7**	**0.08**	**0.1**	**0.06**	**0.06**	---
Std Dev	0.19	0.05	0.06	0.05	0.05	---
				Disagreement	**0.091**	

6.3.21 Results of Alternatives with Increase Immigration Welcoming, Diversity, and Inclusion Sub-Criteria

Seven experts from Panel P6 evaluated the relative importance of the model alternatives with respect to the Increase Immigration Welcoming, Diversity, and Inclusion sub-criterion. Table 61 shows the statistical means of the result of experts' judgments quantification.

Table 61. Relative Importance of Alternatives Respect to the Increase Immigration Welcoming, Diversity, and Inclusion Sub-criterion

Increase Immigration Welcoming, Diversity, and Inclusion	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Expert 15	0.33	0.18	0.18	0.18	0.13	0
Expert 22	0.27	0.18	0.12	0.25	0.18	0.03
Expert 50	0.5	0.13	0.13	0.13	0.13	0
Expert 53	0.43	0.14	0.23	0.09	0.11	0.05

Expert 54	0.55	0.21	0.17	0.02	0.05	0.06
Expert 58	0.63	0.18	0.09	0.06	0.04	0.08
Expert 59	0.2	0.2	0.2	0.2	0.2	0
Expert 60	0.34	0.21	0.13	0.15	0.17	0.02
Mean	**0.41**	**0.18**	**0.16**	**0.14**	**0.13**	---
Std Dev	0.14	0.03	0.04	0.04	0.05	---
				Disagreement	**0.071**	

Source of Variation	**Sum of Square**	**Degrees of Freedom**	**Mean Square**	**F-Test Value**
Between Subjects:	0.44	4	0.109	12.89
Between Conditions:	0.00	7	0.000	---
Residual:	0.24	28	0.008	---
Total	0.67	39	---	---
Critical F value with degrees of freedom 3 & 30 at 0.01 level:				4.07
Critical F value with degrees of freedom 3 & 30 at 0.025 level:				3.29
Critical F value with degrees of freedom 3 & 30 at 0.05 level:				2.71
Critical F value with degrees of freedom 3 & 30 at 0.1 level:				2.16

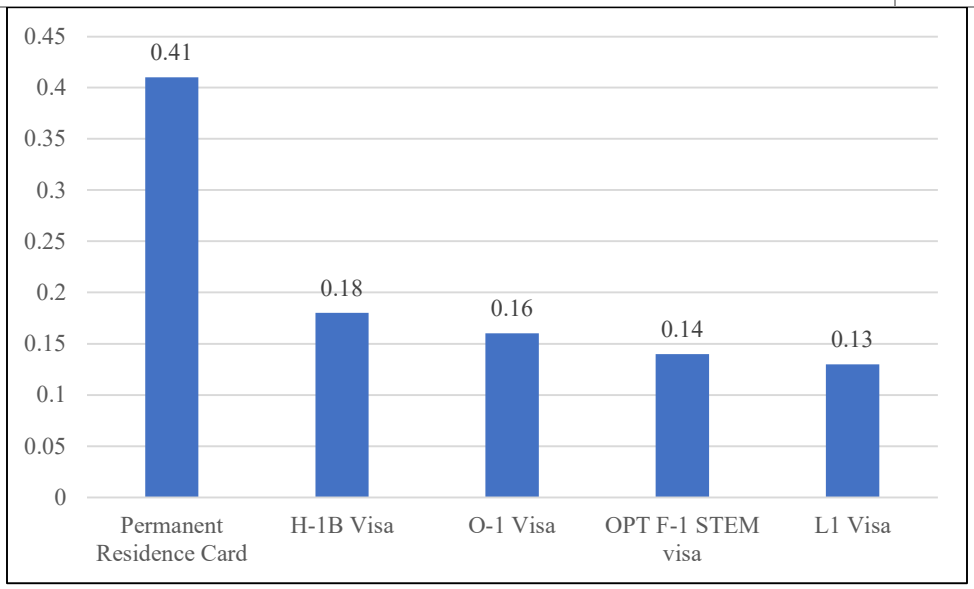

Figure 55. Relative Importance of Alternatives Respect to the Increase Immigration Welcoming, Diversity, and Inclusion Sub-criterion

According to the results, the Permanent Residence alternative scored highest (0.41) concerning the Upgrade Type of Selection System sub-criterion. The H-1B Visa Alternative is ranked second (0.18), followed by the O-1, F-1 STEM OPT, and L-1 visas

(0.16, 0.14, and 0.13). The inconsistency (all < 0.10) and disagreement (0.071) values are below the acceptable threshold.

6.4 Final Model Weights

To conclude this section, the final weights of the importance of alternatives concerning the mission are presented in Table 62. The Permanent Residence Card alternative is ranked first (0.34), followed by the H-1B, O-1, F-1 STEM OPT, and L1 visas (0.21, 0.16, 0.15, and 0.14 accordingly). However, the last three alternatives are weighted closely by expertss. The inconsistency (0.09) and disagreement (0.00) values are acceptable.

Table 62. Relative Importance of Alternatives Respect to the HDM Mission

Mission	Permanent Residence Card	H-1B Visa	O-1 Visa	F-1 STEM OPT Visa	L1 Visa	Inconsistency
Composite	0.34	0.21	0.16	0.15	0.14	0.09
Mean	**0.34**	**0.21**	**0.16**	**0.15**	**0.14**	---
Std Dev	0	0	0	0	0	---
				Disagreement	**0**	

6.4.1. Synthesis of Priorities

According to the results obtained from the expert panels, a synthesis of priorities is calculated to identify the different perspectives that the Hierarchical Decision Model offers. Previous HDM studies suggest there are three types of priorities: (1) the relative priority of criteria concerning the mission, (2) the relative priorities of sub-criteria, and (3) the relative importance of alternatives (Garces, 2020). Table 63 summarizes the output of expert judgment quantification concerning the mission.

Table 63. Synthesis of Priorities

Criteria		Sub-criteria			Alternatives		
Criteria	**Value**	**Sub-criteria**	**Value**	**Value Contribution to Model**	**Alternatives**	**Relative Value**	**Value Contribution to Model**
Technological	0.19	Improving Technological Capabilities	0.31	0.059	Permanent Residence	*0.27*	*0.0159*
					H-1B Visa	0.24	0.0141
					O-1 Visa	*0.18*	*0.0106*
					F-1 STEM OPT Visa	0.16	0.0094
					L-1 Visa	*0.15*	*0.0088*
		Digital Transformation of Application Process	0.42	0.080	Permanent Residence	0.3	0.0239
					H-1B Visa	0.22	0.0176
					O-1 Visa	0.16	0.0128
					F-1 STEM OPT Visa	0.18	0.0144
					L-1 Visa	0.14	0.0112
		Increase National Security Features for Applicants	0.27	0.051	Permanent Residence	0.36	0.0185
					H-1B Visa	0.2	0.0103
					O-1 Visa	0.15	0.0077
					F-1 STEM OPT Visa	0.14	0.0072
					L-1 Visa	0.15	0.0077
Regulatory Landscape	0.22	Labor Conditions	0.16	0.035	Permanent Residence	0.27	0.0095
					H-1B Visa	0.29	0.0102
					O-1 Visa	0.15	0.0053
					F-1 STEM OPT Visa	0.17	0.0060
					L-1 Visa	0.16	0.0056
		Fluctuations of Caps/Limits	0.27	0.059	Permanent Residence	0.35	0.0208
					H-1B Visa	0.23	0.0137
					O-1 Visa	0.12	0.0071
					F-1 STEM OPT Visa	0.14	0.0083
					L-1 Visa	0.16	0.0095
		Adapt Industry Necessities	0.15	0.033	Permanent Residence	0.39	0.0129
					H-1B Visa	0.18	0.0059
					O-1 Visa	0.16	0.0053
					F-1 STEM OPT Visa	0.12	0.0040
					L-1 Visa	0.16	0.0053

		Ease Lawful Permanent Residence Status	0.22	0.048	Permanent Residence	0.35	0.0116
					H-1B Visa	0.19	0.0063
					O-1 Visa	0.17	0.0056
					F-1 STEM OPT Visa	0.15	0.0050
					L-1 Visa	0.15	0.0050
		Raising and Balance Immigration Levels	0.21	0.046	Permanent Residence	0.34	0.0157
					H-1B Visa	0.2	0.0092
					O-1 Visa	0.16	0.0074
					F-1 STEM OPT Visa	0.15	0.0069
					L-1 Visa	0.15	0.0069
Economic	0.2	Fee Applications	0.15	0.030	Permanent Residence	0.32	0.0096
					H-1B Visa	0.22	0.0066
					O-1 Visa	0.18	0.0054
					F-1 STEM OPT Visa	0.18	0.0054
					L-1 Visa	0.11	0.0033
		Competitive Wages and Benefits	0.25	0.050	Permanent Residence	0.3	0.0150
					H-1B Visa	0.22	0.0110
					O-1 Visa	0.18	0.0090
					F-1 STEM OPT Visa	0.17	0.0085
					L-1 Visa	0.14	0.0070
		Value of Contributions	0.21	0.042	Permanent Residence	0.26	0.0109
					H-1B Visa	0.23	0.0097
					O-1 Visa	0.18	0.0076
					F-1 STEM OPT Visa	0.18	0.0076
					L-1 Visa	0.15	0.0063
		Actively Engagement	0.19	0.038	Permanent Residence	0.28	0.0118
					H-1B Visa	0.23	0.0097
					O-1 Visa	0.18	0.0076
					F-1 STEM OPT Visa	0.17	0.0071
					L-1 Visa	0.15	0.0063
		Adjust Immigration Targets Based on Economic Demand	0.19	0.038	Permanent Residence	0.27	0.0108
					H-1B Visa	0.23	0.0092
					O-1 Visa	0.18	0.0072
					F-1 STEM OPT Visa	0.18	0.0072

					L-1 Visa	0.15	0.0060
Political Interpretation and Proposals	0.18	Making Immigration Selectivity More Egalitarian	0.32	0.058	Permanent Residence	0.34	0.0196
					H-1B Visa	0.23	0.0132
					O-1 Visa	0.13	0.0075
					F-1 STEM OPT Visa	0.16	0.0092
					L-1 Visa	0.14	0.0081
		Hybrid System for Dual Selection and Verification	0.21	0.038	Permanent Residence	0.29	0.0167
					H-1B Visa	0.19	0.0109
					O-1 Visa	0.18	0.0104
					F-1 STEM OPT Visa	0.18	0.0104
					L-1 Visa	0.16	0.0092
		Backlog Reduction	0.27	0.049	Permanent Residence	0.4	0.0194
					H-1B Visa	0.15	0.0073
					O-1 Visa	0.16	0.0078
					F-1 STEM OPT Visa	0.15	0.0073
					L-1 Visa	0.15	0.0073
		Redistribution and Recapture of LPR Cards and Visas	0.2	0.036	Permanent Residence	0.39	0.0140
					H-1B Visa	0.21	0.0076
					O-1 Visa	0.15	0.0054
					F-1 STEM OPT Visa	0.13	0.0047
					L-1 Visa	0.14	0.0050
Social	0.21	High-Quality Education	0.23	0.048	Permanent Residence	0.31	0.0150
					H-1B Visa	0.2	0.0097
					O-1 Visa	0.17	0.0082
					F-1 STEM OPT Visa	0.18	0.0087
					L-1 Visa	0.15	0.0072
		High-Quality Training and Salary	0.25	0.053	Permanent Residence	0.41	0.0215
					H-1B Visa	0.18	0.0095
					O-1 Visa	0.16	0.0084
					F-1 STEM OPT Visa	0.14	0.0074
					L-1 Visa	0.11	0.0058
		Increase Immigration Acceptance	0.26	0.055	Permanent Residence	0.45	0.0246
					H-1B Visa	0.16	0.0087
					O-1 Visa	0.14	0.0076

					F-1 STEM OPT Visa	0.14	0.0076
					L-1 Visa	0.12	0.0066
		Increase Immigration Welcoming, Diversity, and Inclusion	0.26	0.055	Permanent Residence	0.41	0.0224
					H-1B Visa	0.18	0.0098
					O-1 Visa	0.16	0.0087
					F-1 STEM OPT Visa	0.14	0.0076
					L-1 Visa	0.13	0.0071
Total	1.0		**Total**	1.0		**Total**	1.0

The results suggest that all the criteria have close values, meaning that designing or upgrading U.S. immigration policies could integrate more than one perspective. Previous studies suggest that the weights of compared elements must differ substantially to considerably affect the model's objective (Garces, 2020). The SPSS IBM© Software 28 (IBM Corp, 2021) was used to run a cluster analysis (Ward methodology) to identify sub-groups for Level 2 of the HDM criteria (see Fig. 56). The analysis suggests that there are two clusters of experts: cluster "A," which includes fifteen experts, and cluster "B," which includes eight experts.

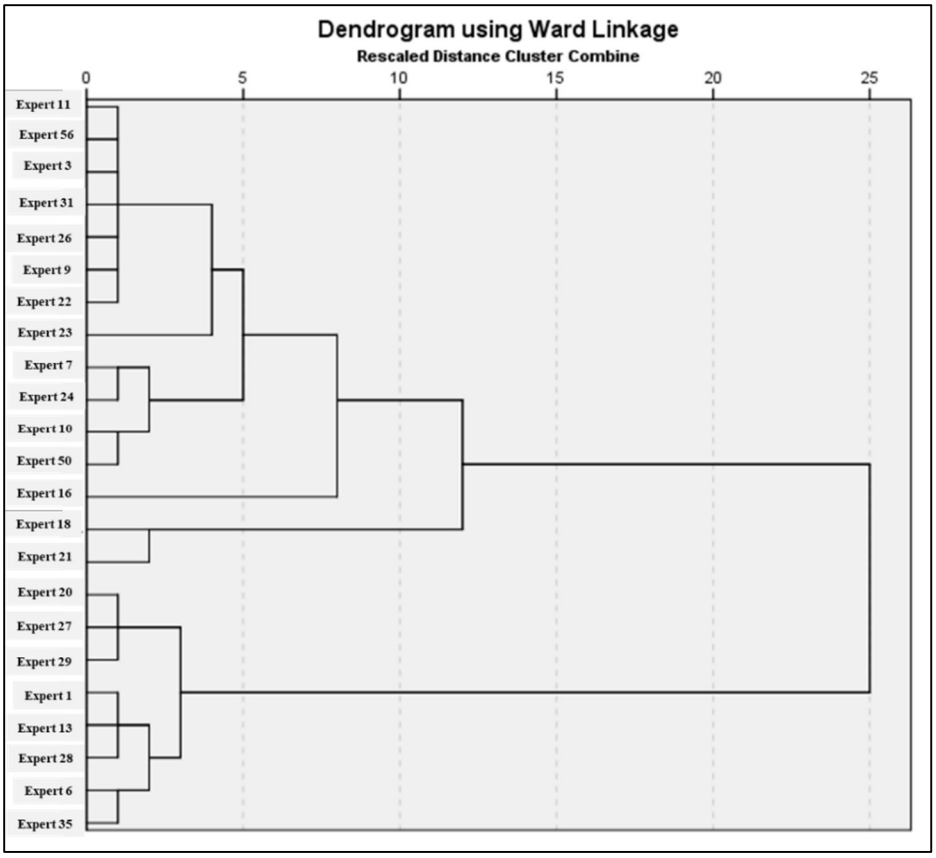

Figure 56. Level 2 - Criteria Cluster – Results

Once the cluster analysis identified two sub-groups regarding the HDM Level 2 – Criteria, mean values were calculated accordingly for each sub-group. Table 64 shows the changes in the ranking for the criteria after running the cluster analysis since each cluster of experts differs in their selection of options. Experts from Cluster A clearly prioritized the following criteria:(1) Regulatory Landscape, (2) Social, and (3) Political Interpretation and Proposals as the most important (0.26, 0.24, and 0.21, respectively). In contrast, experts from Cluster B prioritized the (1) Technological and (2) Economic criteria as their top selection (0.33 and 0.26, respectively).

Table 64. Criteria Value Changes with Cluster Analysis

Changes in L-2	Technological	Regulatory Landscape	Economic	Political Interpretation and Proposals	Social
HDM Base model	0.19	0.22	0.20	0.18	0.21
Cluster A (Fifteen Experts)	0.12	0.26	0.17	0.21	0.24
Cluster B (Eight Experts)	0.33	0.15	0.26	0.12	0.14

The change of priorities would drastically impact the rank of the sub-criteria but, like the sensitivity analysis results, would not affect the rank of the alternatives. For instance, the top priorities for Cluster A are focused on Regulatory Landscape, Social, and Political Interpretation and Proposals aspects: Fluctuations of Caps/Limits (0.070), Making Immigration Selectivity More Egalitarian (0.067), Increase Immigration Acceptance (0.062), Increase Immigration Welcoming, Diversity, and Inclusion (0.062), High-Quality Training and Salary (0.060), Ease Lawful Permanent Residence Status (0.057), Backlog Reduction (0.057), High-Quality Education (0.055), Raising and Balance Immigration Levels (0.055), and Digital Transformation of Application Process (0.050). On the other hand, the top priorities for Cluster B are focused solely on Technological and Economic aspects: Improving Technological Capabilities (0.138), Digital Transformation of Application Process (0.102), Increase National Security Features for Applicants (0.089), Competitive Wages and Benefits (0.065), Value of Contributions (0.054), and Adjust Immigration Targets Based on Economic Demand (0.052).

Figure 57 shows a graphic representation of the final results with values ranked from highest to lowest. According to the experts who participated in this study, the relative priority of criteria concerning the mission is as follows: Regulatory Landscape criteria is ranked first (0.22), followed by Social (0.21), Economic (0.20), Technological (0.19), and Political Interpretation and Proposals (0.18).

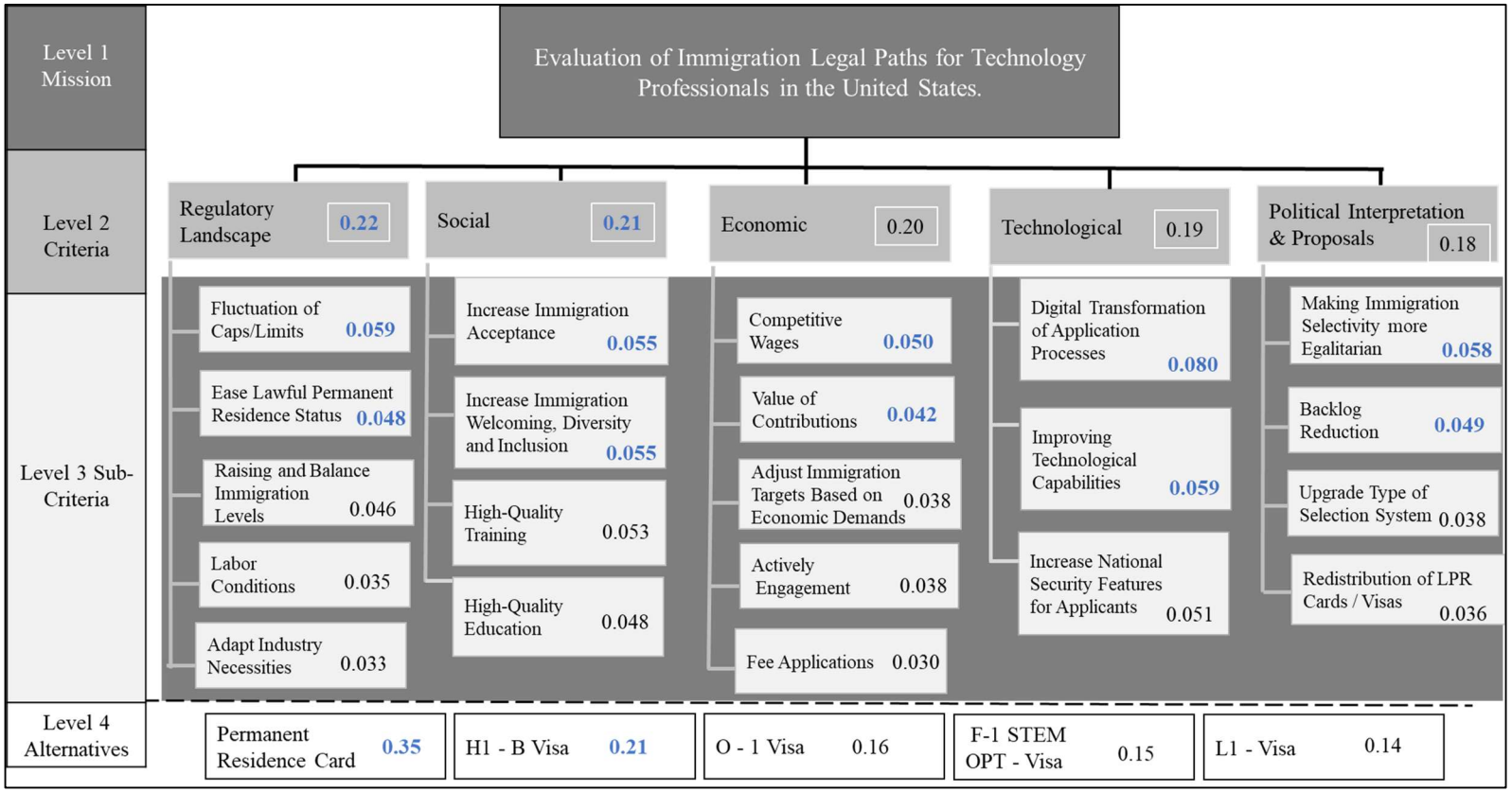

Figure 57. HDM Weighted Model

The top relative priorities of sub-criteria concerning the mission are Digital Transformation of Application (0.080), Fluctuation of Caps/Limits (0.059), Ease of Lawful Permanent Residence Status (0.048), Competitive Wages (0.50), Value of Contributions (0.042), Making immigration selectivity more egalitarian (0.058), Backlog Reduction (0.049), Increase Immigration Acceptance (0.055), and Increase Immigration Welcoming, Diversity and Inclusion (0.055).

Based on the analysis, the HDM model sub-criteria are useful policy tools for decision-makers to design immigration policies for technology professional immigrants (see Table 65). Based on the findings, policymakers can focus on the top policy tool items to guide the policy design process. Out of the 21 policy tools, nine are related to retention strategies, eight are related to attraction strategies, two are related to settlement strategies, and the last two are related to selection strategies. It's worth noting that historically, US immigration policies have mainly focused on attracting and selecting technology professional immigrants without much emphasis on their retention and settlement. However, this new approach can be beneficial in developing more effective and comprehensive immigration policies.

Table 65. Classification of Policy Tools

Criteria	Sub-criteria	Policy Tool	Contribution to Model
Technological	Digital Transformation of Application Process	Retention	0.08
Technological	Improving Technological Capabilities	Retention	0.059
Regulatory Landscape	Fluctuations of Caps/Limits	Retention	0.059
Political Interpretation	Making Immigration Selectivity More Egalitarian	Settlement	0.058
Social	Increase Immigration Acceptance	Attraction	0.055

Social	Increase Immigration Welcoming, Diversity, and Inclusion	Attraction	0.055
Social	High-Quality Training and Salary	Attraction	0.053
Technological	Increase National Security Features for Applicants	Selection	0.051
Economic	Competitive Wages and Benefits	Attraction	0.05
Political Interpretation	Backlog Reduction	Retention	0.049
Regulatory Landscape	Ease Lawful Permanent Residence Status	Settlement	0.048
Social	High-Quality Education	Attraction	0.048
Regulatory Landscape	Raising and Balance Immigration Levels	Retention	0.046
Economic	Value of Contributions	Retention	0.042
Economic	Actively Engagement	Retention	0.038
Economic	Adjust Immigration Targets Based on Economic Demand	Retention	0.038
Political Interpretation	Hybrid System for Dual Selection and Verification	Selection	0.038
Political Interpretation	Redistribution and Recapture of LPR Cards and Visas	Retention	0.036
Regulatory Landscape	Labor Conditions	Attraction	0.035
Regulatory Landscape	Adapt Industry Necessities	Attraction	0.033
Economic	Fee Applications	Attraction	0.03

Table 66 shows the alternatives ranked from the expert panel results, from higher to lower. The alternatives are ranked according to their values with respect to each criterion and sub-criteria following a logical order. Alternative 1, Permanent Residence, has the highest weight in all the sub-criteria, followed by Alternative 2, H1-B visa. On the other hand, Alternatives 3, 4, and 5, O-1, F-1 STEM OPT, and L-1 visas are ranked very closely among all sub-criteria. Disagreement (0.09) and inconsistency (0.0) values are below the threshold.

Table 66. Overall Importance of Alternatives with Respect to the Mission

Alternative	Alternative Name	Base Value	Rank	Sensitivity Value
Alternative 1	Permanent Residence Card	0.34	1	0.34
Alternative 2	H-1B Visa	0.21	2	0.21
Alternative 3	O-1 Visa	0.16	3	0.16
Alternative 4	F-1 STEM OPT Visa	0.15	4	0.15
Alternative 5	L1 Visa	0.14	5	0.14

Based on the results, permanent residence and H1-B visa are the top alternatives for the HDM mission (0.34 and 0.21, respectively) as the top alternatives from all 21 sub-criteria. Permanent Residence EB1 and EB2 employment based are important for the government since several technology professional immigrants work in STEM-related jobs, while for H1-B visa holders, the natural path to adjust the status to seek permanent residency. However, technology professional immigrants from countries such as India, China, Mexico, and the Philippines are facing difficulties in adjusting their status due to the long backlog. This is affecting their professional opportunities, their families, and their well-being. The H1-B visa is the most common way to seek permanent relocation to the United States, while the F-1 student visa is the most common way to attract technology professional immigrants. The loss of these talented individuals means that the government's investment in public universities is never returned, and all the skills that international students acquired in the US are taken to another country. The other two alternatives, O-1 and L1 visas (0.16, and 0.14) were almost equally weighted. Decision makers can use the results from this study to bridge the gap between the alternatives for each sub-criteria group (see Fig. 58).

Figure 58. Priority of Alternatives Respect to the HDM Sub-Criteria

To conclude, decision-makers should not base their final decision solely on the rank of the alternatives from a multicriteria decision-making model. Instead, decision-makers should interpret the results accurately before making a decision (Kujawski, 2003).

CHAPTER 7: ANALYSIS CASE DEVELOPMENT

According to scholars, sensitivity analysis is a helpful tool for stakeholders that eases the decision-making process in many ways, such as visualizing the impact of changes in policies or strategies, identifying the crucial elements involved in the decision-making process, creating alternative scenarios, and creating alternative answers to additional questions (Abotah, 2014; Daim et al., 2018b; Garces, 2020; Thabane et al., 2013). Additionally, sensitivity analysis helps determine whether a recommendation is robust. Among the sensitivity analysis methods, mathematical deduction, numerical incremental analysis, and simulation are some of the most generally used to test multi-criteria decision-making models (Abotah, 2014; Daim et al., 2018b; Garces, 2020).

This chapter performs a sensitivity analysis using the mathematical deduction method to analyze the robustness model. This method determines the changes in the local contribution values of the model. Thus, the new sensitivity coefficients could change and alter the order of the alternatives. The sensitivity analysis could also provide a new set of critical decision elements. Several studies using HDM have tested the sensitivity analysis to prove the effectiveness of this technique (Abotah, 2014; Daim et al., 2018b; Garces, 2020).

7.1 Scenario Analysis

An application case is proposed to demonstrate the validity of the HDM model. The application case is used to test different scenarios using sensitivity analysis (Estep, 2017). Thus, the different scenarios forecast the impact or change on the proposal if one sub-

criteria is evaluated as the most significant (Estep, 2017). This technique is used to determine how sensitive the model is and if there is any pointed change in the evaluated criteria. The application case analysis is expected to demonstrate the model's capacity to assess the immigration policies available for technology professional immigrants in the United States. Also, this analysis can be used for policymakers to develop or upgrade immigration policies.

Following the principles of the mathematical deduction method, five "what if" scenarios are presented to test the robustness of the final model. For each scenario, a value of 0.96 is assigned to the main scenario, while the rest of the criteria are assigned with a constant value of 0.01 (see Table 67).

Table 67. Description of Scenarios

Scenario	Description
Technological	Projects that are focused to achieve technological improves
Regulatory Landscape	Projects that are focused to achieve regulatory landscape improves
Economic	Projects that are focused to achieve economic improves
Political Interpretation & Proposals	Projects that are focused to achieve political improves
Social	Projects that are focused to achieve social improves

Table 68 shows the new weight values for the Technological criterion. In this scenario, the Technological criterion is assigned a value of 0.96, while the others are assigned a value of 0.01 each. The results of this scenario show that the alternatives are still the same. There is a slight variation of the Permanent Residence value (0.34 vs 0.31). The rest of the alternatives remain the same: H-1B (0.21 vs. 0.22), O-1 (0.16), F-1 STEM OPT (0.15 vs. 0.16), and L-1 (0.14 vs. 0.15). The main takeaway from this scenario is that two alternatives are ranked as the third option, O-1 and F-1 STEM OPT visas.

Table 68. Sensitivity Analysis with Technological dominant Criterion

Scenario	Technological	Regulatory Landscape	Economic	Political Interpretation and Proposals		Social
Value	**0.96**	0.01	0.01	0.01		0.01
Alternative	Alternative Title		Base Values	Rank	Sensitivity Value	New Rank
Alternative 1	Permanent Residence		0.34	1	0.31	1
Alternative 2	H-1B Visa		0.21	2	0.22	2
Alternative 3	O-1 Visa		0.16	3	0.16	3
Alternative 4	F-1 STEM OPT Visa		0.15	4	0.16	3
Alternative 5	L-1 Visa		0.14	5	0.15	4

Table 69 shows the new weight values for the Regulatory Landscape criterion. In this scenario, the Regulatory Landscape criterion is assigned a value of 0.96, while the others are assigned a value of 0.01 each. The main takeaway from this scenario is the considerable change in the Permanent Residence alternative. Alternative 1 lost one-third of its weight, meaning that if regulations changed, the permanent residence alternative would change drastically. The rest of the alternatives remain the same: H-1B (0.21), O-1 (0.16 vs. 0.14), F-1 STEM OPT (0.15 vs. 0.14), and L-1 (0.14 vs. 0.15) visas.

Table 69. Sensitivity Analysis with Regulatory Landscape dominant Criterion

Scenario	Technological	Regulatory Landscape	Economic	Political Interpretation and Proposals		Social
Value	0.01	**0.96**	0.01	0.01		0.01
Alternative	Alternative Title		Base Values	Rank	Sensitivity Value	New Rank
Alternative 1	Permanent Residence		0.34	1	0.23	1

Alternative 2	H-1B Visa	0.21	2	0.21	2
Alternative 3	O-1 Visa	0.16	3	0.14	4
Alternative 4	F-1 STEM OPT Visa	0.15	4	0.14	4
Alternative 5	L-1 Visa	0.14	5	0.15	3

Table 70 shows the new weight values for the Economic criterion. In this scenario, the Economic criterion is assigned a value of 0.96 while the others are assigned a value of 0.01 each. The main takeaway from this scenario is the major change in the Permanent Residence alternative, although it remains the top alternative. Also, H-1B Visa (0.21 vs 0.23) and F-1 STEM OPT visa (0.15 vs 0.18) increased their value. The rest of the alternatives continue as follows: O-1 (0.16 vs. 0.18) and L-1 (0.14 vs. 0.14).

Table 70. Sensitivity Analysis with Economic dominant Criterion

Scenario	**Technological**	**Regulatory Landscape**	**Economic**	**Political Interpretation and Proposals**		**Social**
Value	0.01	0.01	**0.96**	0.01		0.01
Alternative	Alternative Title		Base Values	Rank	Sensitivity Value	New Rank
Alternative 1	Permanent Residence		0.34	1	0.29	1
Alternative 2	H-1B Visa		0.21	2	0.23	2
Alternative 3	O-1 Visa		0.16	3	0.18	3
Alternative 4	F-1 STEM OPT Visa		0.15	4	0.18	3
Alternative 5	L-1 Visa		0.14	5	0.14	5

Table 71 shows the new values of the weights for the Political Interpretation and Proposals criterion. In this scenario, the Political Interpretation and Proposals criterion is

assigned a value of 0.96, while the others are assigned a value of 0.01 each. The main takeaway from this scenario is that the important change in the Permanent Residence alternative increased its value and remains the top alternative. The rest of the alternatives continue without important change in their value: H1-B (0.21 vs. 0.22), O-1 (0.16 vs. 0.17), F-1 STEM OPT (0.15 vs. 0.17), and L-1 (0.14 vs. 0.16) visas.

Table 71. Sensitivity Analysis with Political Interpretation & Proposals dominant Criterion

Scenario	**Technological**	**Regulatory Landscape**	**Economic**	**Political Interpretation and Proposals**		**Social**
Value	0.01	0.01	0.01	**0.96**		0.01
Alternative	Alternative Title		Base Values	Rank	Sensitivity Value	New Rank
Alternative 1	Permanent Residence		0.34	1	0.38	1
Alternative 2	H-1B Visa		0.21	2	0.22	2
Alternative 3	O-1 Visa		0.16	3	0.17	3
Alternative 4	F-1 STEM OPT Visa		0.15	4	0.17	3
Alternative 5	L-1 Visa		0.14	5	0.16	4

Table 72 shows the new values of the weights for the Social criterion. In this scenario, the Social criterion is assigned a value of 0.96, while the others are assigned a value of 0.01 each. The main takeaway from this scenario is that the major change in the Permanent Residence alternative increased its value and remains the top alternative. The rest of the alternatives continue without important change in their value: H1-B (0.21 vs. 0.18), O-1 (0.16 vs. 0.16), F-1 STEM OPT (0.15 vs. 0.15), and L-1 (0.14 vs. 0.13) visas.

Table 72. Sensitivity Analysis with Social dominant Criterion

Scenario	Technological	Regulatory Landscape	Economic	Political Interpretation and Proposals		Social
Value	0.01	0.01	0.01	0.01		**0.96**
Alternative	Alternative Title		Base Values	Rank	Sensitivity Value	New Rank
Alternative 1	Permanent Residence		0.34	1	0.39	1
Alternative 2	H-1B Visa		0.21	2	0.18	2
Alternative 3	O-1 Visa		0.16	3	0.16	3
Alternative 4	F-1 STEM OPT Visa		0.15	4	0.15	4
Alternative 5	L-1 Visa		0.14	5	0.13	5

Tables 73 and 74 show the summary of the case analysis results. Despite several iterations because of the sensitivity analysis, Alternatives 1 and 2 remain at the top (see Figure 59). Both alternatives remain as the first and second options. Additionally, the value changes for Alternatives 3 to 5, and the ranks do not change drastically either.

Table 73. Summary of Case Sensitive Analysis

Alternatives	**Base Case**		**Case 1:**		**Case 2:**		**Case 3:**		**Case 4:**		**Case 5:**	
			Technological = 0.96 Regulatory Landscape = 0.01 Economic = 0.01 Political Interpretation and Proposals = 0.01 Social = 0.01		Technological = 0.01 **Regulatory Landscape = 0.96** Economic = 0.01 Political Interpretation and Proposals = 0.01 Social = 0.01		Technological = 0.01 Regulatory Landscape = 0.01 **Economic = 0.96** Political Interpretation and Proposals = 0.01 Social = 0.01		Technological = 0.01 Regulatory Landscape = 0.01 Economic = 0.01 **Political Interpretation and Proposals = 0.96** Social = 0.01		Technological = 0.01 Regulatory Landscape = 0.01 Economic = 0.01 Political Interpretation and Proposals = 0.01 **Social = 0.96**	
	Base Values	Base Rank	New Value	New Rank	New Value	New Rank	New Value	New Rank	New Value	New Rank	New Value	New Rank
Alternative 1	0.34	1	0.31	1	0.23	1	0.29	1	0.38	1	0.39	1

Alternative 2	0.21	2	0.22	2	0.21	2	0.23	2	0.22	2	0.18	2
Alternative 3	0.16	3	0.16	3	0.14	4	0.18	3	0.17	3	0.16	3
Alternative 4	0.15	4	0.16	3	0.14	4	0.18	3	0.17	3	0.15	4
Alternative 5	0.14	5	0.15	4	0.15	3	0.14	4	0.16	4	0.13	5

Table 74. Summary of Case Sensitive Analysis – Weights

Alternatives	Base value	Case 1	Case 2	Case 3	Case 4	Case 5
Alternative 1	0.34	0.31	0.23	0.29	0.38	0.39
Alternative 2	0.21	0.22	0.21	0.23	0.22	0.18
Alternative 3	0.16	0.16	0.14	0.18	0.17	0.16
Alternative 4	0.15	0.16	0.14	0.18	0.17	0.15
Alternative 5	0.14	0.15	0.15	0.14	0.16	0.13

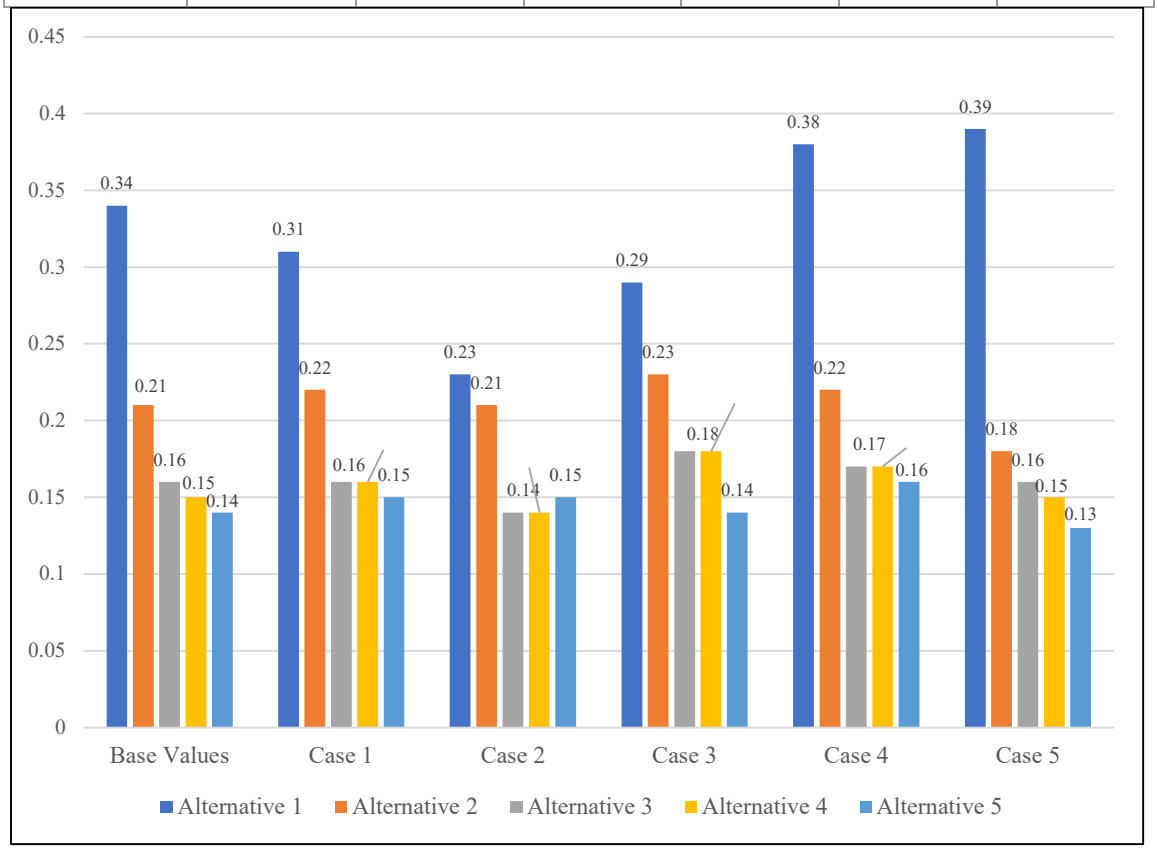

Figure 59. Summary of Case sensitive Analysis – Weights

Table 75 shows how the alternatives changed by performing the sensitivity analysis. There are no substantial changes in the alternatives. Alternatives 1 and 2 remain the first and second alternatives, while Alternatives 3 and 4 have the same value and rank. Alternative 5 remains the last alternative in four out of five tests (see Fig. 60). In other words, lower weights will not alter the alternatives' values since their base value is smaller than the dominant alternatives.

Table 75. Summary of Case Sensitive Analysis – Change of Ranks

Alternatives	Base value	Case 1	Case 2	Case 3	Case 4	Case 5
Alternative 1	1	1	1	1	1	1
Alternative 2	2	2	2	2	2	2
Alternative 3	3	3	4	3	3	3
Alternative 4	4	3	4	3	3	4
Alternative 5	5	4	3	4	4	5

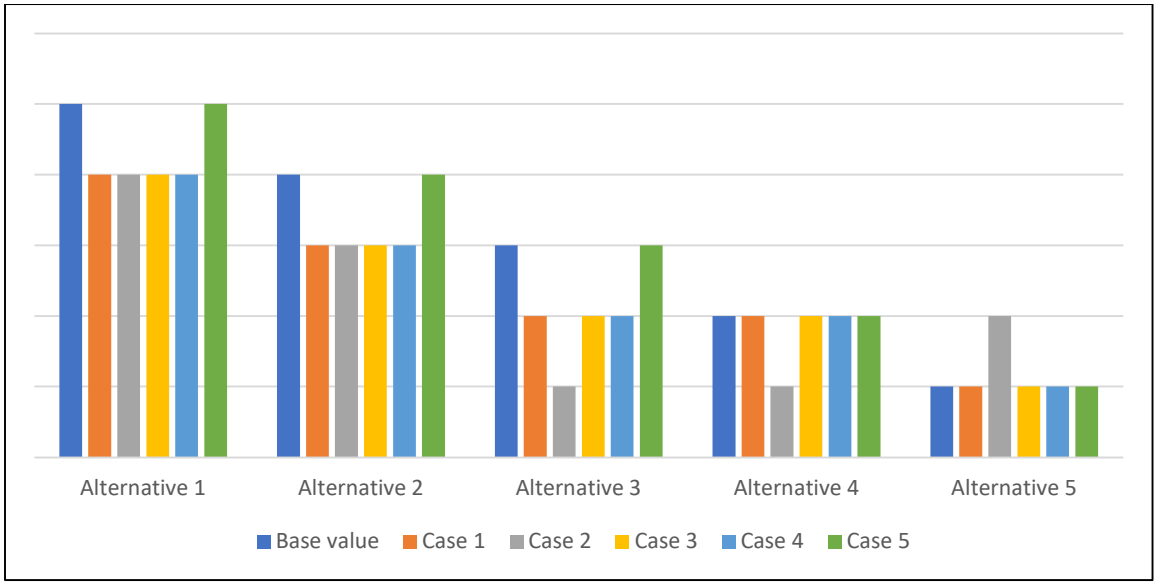

Figure 60. Case Sensitive Analysis – Change of Ranks

It can be determined that a sensitivity analysis is helpful to examine the robustness of the HDM results (Garces, 2020). Multicriteria decision-making methods, such as the Hierarchical Decision Model, can provide several trade-offs, and decisions cannot be determined on a single criterion as an ideal solution (Kujawski, 2003). Therefore, a sensitivity analysis can identify some of the model's limitations, if any. Thus, Alternative 1, Permanent Residence, and Alternative 2, H1-B Visa, are the dominant values in the model.

7.2 Post Hoc Model Results Evaluation

Finally, Table 76 shows a post hoc evaluation that includes responses from 16 experts who participated in the research. The experts responded to the question, "Do you think the HDM's weights and values are logical?" The experts selected "Yes" if they found the HDM's weights and values logical or "No" if they thought the opposite. All 16 experts selected "Yes" and found the model weights and values logical.

Table 76. Post Hoc Model Validation

No.	Expert	Yes	No	Additional Feedback
1	Expert 4	✓		This all looks very good and the result of a thorough process that I have seen improve over the course of the study.
2	Expert 7	✓		
3	Expert 11	✓		
4	Expert 12	✓		
5	Expert 15	✓		
6	Expert 18	✓		
7	Expert 19	✓		
8	Expert 21	✓		Just a little surprised that "Social" was so close to "Regulatory" - interesting!

9	Expert 29	✔		
10	Expert 30	✔		Not clear what "Making Immigration Selectivity more Egalitarian" means in practice. Does it refer to process? Does it refer to outcomes?
11	Expert 34	✔		
12	Expert 42	✔		I think I understand the "gist" of the research. I liked your approach to try to analyze variables and relative weights. Thanks for including me in this project.
13	Expert 44	✔		
14	Expert 48	✔		
15	Expert 56	✔		
16	Expert 57	✔		This research is amazing. Congratulations to the people who were involved along the process.

CHAPTER 8: RESEARCH CONCLUSIONS

8.1 Conclusions, Contributions, and Implications

This research achieved the general objective of developing a comprehensive hierarchical decision model to address current U.S. immigration policy issues by evaluating the legal alternatives available for technology professionals. These policies affect the attraction, selection, retention, and settlement of highly talented individuals seeking to flourish in the United States. Therefore, evaluating immigration policies involves a set of comprehensive criteria and sub-criteria to overcome the challenges that, in some vein, impact all stakeholders.

After conducting a systematic literature review, a group of criteria, sub-criteria, and alternatives were identified regarding U.S. immigration policies for technology professionals. This research followed all the steps of the Hierarchical Decision Model (HDM)methodology to develop a multi-criteria decision making framework. By doing so, the model increases the likelihood of reducing human biases while assuring practical use (Daim, 2016). The HDM model has four levels or hierarchies, which are (1) Mission, (2) Criteria, (3) Sub-criteria, and (4) Alternatives. The model resulting from this research aims to guide policymakers in the United States. However, other countries with similar employment or point-based immigration systems can use the model by customizing it accordingly.

This study also succeeded in answering the research questions formulated in Section 3. For research question 1: What are the criteria for evaluating the effectiveness of immigration policies in increasing the attraction and retention of technology professionals?

The HDM model evaluated U.S. immigration policies for technology professional immigrants by incorporating the research gaps identified from the literature review, making this a substantial contribution to the current body of knowledge. Overall, the HDM model incorporates legal alternatives, and elements from immigration theories to propose a robust and reliable framework. Therefore, the resulting HDM model from this study can guide policymakers in designing or upgrading current U.S. immigration policies and the criteria identified in order of importance are Regulatory Landscape (0.22), Social (0.21), Economic (0.20), Technological (0.19), and Political Interpretation and Proposals (0.18).

For research question 2: Which policy instrument does have the highest effect on accelerating the attraction and retention of technology professional immigration? The experts validated and quantified the identified group of twenty-one sub-criteria, which are policy instruments. The analysis suggests that the policy tools could have the highest effect on accelerating the attraction and retention of technology professional immigrants are:

*Retention (Digital Transformation of Application Process - 0.08, Improving Technological Capabilities - 0.059, Fluctuations of Caps/Limits - 0.059, Backlog Reduction - 0.049, Raising and Balance Immigration Levels - 0.046, Value of Contributions - 0.042, Actively Engagement - 0.038, Adjust Immigration Targets Based on Economic Demand - 0.038, and Redistribution and Recapture of LPR Cards and Visas - 0.036)

*Attraction (Increase Immigration Acceptance - 0.055, Increase Immigration Welcoming, Diversity, and Inclusion - 0.055, High-Quality Training and Salary- 0.053,

Competitive Wages and Benefits - 0.05, High-Quality Education - 0.048, Labor Conditions- 0.035, and Adapt Industry Necessities - 0.033, and Fee Applications - 0.03)

*Settlement (Making Immigration Selectivity More Egalitarian - 0.058, and Ease Lawful Permanent Residence Status - 0.048), and

*Selection (National Security Features for Applicants - 0.051, and Hybrid System for Dual Selection and Verification - 0.038).

Finally, for research question 3: What are the levels and weights of criteria and sub-criteria associated with the attraction and retention of technology professional immigration? The HDM model developed for this study identify the criteria and sub-criteria associated with the attraction and retention of technology professional immigrants. It should be noted that attraction and retention strategies combine sub-criteria from different levels. Retention strategies combine technological, regulatory landscape, economic, and political tools while attraction strategies combine social, regulatory landscape, economic, and political tools. The HDM results suggest that the Permanent Residence and the H1-B visa (0.34 and 0.21, respectively) are the top alternatives from all policy tools. As previously mentioned, Permanent Residence EB1 and EB2 and H1-B visa holders employment options are central for the government, industry, and academia since a large percentage of technology professional immigrants work in STEM-related jobs. The rest of the alternatives, O-1, F-1 STEM OPT, and L1 visas, were almost equally weighted meaning that policy makers can work on bridge the gaps between the top and button alternatives.

This dissertation research project began in Fall 2021 (literature review) and continued until 2023 (validation and quantification of the HDM model). However, there have been several changes in areas related to U.S. immigration policies since then. Therefore, a thorough update on recent changes of U.S. immigration policies is shown below that are similar to the findings of this study.

Technological Criterion Updates

The Technological criterion includes three sub-criteria (1) Improving Technological Capabilities, (2) Digital Transformation of Application Processes, and (3) Increase National Security Features for Applicants. Some of the updates are:

- USCIS launched a service tool that allows applicants to reschedule biometric services appointments (USCIS, 2023a).
- USCIS released its 2023-2026 Strategic Plan, which delivers a roadmap for the agency to strengthen its capabilities. The Strategic Document plans to hire and train USCIS staff to acquire new technological skills to perform their work. According to USCIS, leveraging the digital transformation of their process will transform how employees process immigration applications. It is expected that USCIS employees can work remotely (USCIS, 2023a).
- USCIS released a new design to improve the security of Permanent Resident Cards and Employment Authorization Documents (USCIS, 2023a)
- The White House proposed a new scanning technology to protect the borders (The White House, 2021).

- Lastly, The White House proposed to improve technology for immigration courts along with the development and implementation of AI technologies (The White House, 2021; The White House, 2023).

Regulatory Landscape Criterion Updates

The Regulatory Landscape Criterion includes five sub-criteria (1) Labor Conditions, (2) Adapt Industry Necessities, (3), Fluctuation of Caps/Limits, (4) Ease Lawful Permanent Resident Status, and (5) Raising and Balance Immigration Levels. The main updates regarding the Regulatory Landscape criterion are:

- The White House proposed new worker protection to prevent exploitation and improve the employment verification process (The White House, 2021).
- USCIS will develop a new generation E-Verify program, using a human-centered design approach to ensure that the needs of employees are considered (USCIS, 2023b).
- Cornell University Law School also proposed an industry-specific bill for highly skilled and essential workers (Yale-Loehr et al., 2023).
- The White House proposed providing pathways to citizenship or permanent legal status for immigrants, strengthening labor protections, and increasing the number of visas available (The White House, 2021).

Economic Criterion Updates

The Economic Criterion includes five sub-criteria (1) Fee Applications, (2) Competitive Wages, (3) Value of Contributions, (4) Actively Engagement, and (5) Adjust

Immigration Targets Based on Economic Demands. Some updates for the Economic Criterion are as follows:

- The White House proposed the U.S. Citizenship Act of 2021 to strengthen the economy by solving current U.S. immigration issues, such as the growth backlog, time processing for applications, and also to cap work visas based on economic indicators (The White House, 2021).
- Cornell University Law School proposed a cap per visa program based on economic drivers and labor market dynamics (Yale-Loehr et al., 2023).
- USCIS published a rule to adjust immigration fees, dated to go into effect on April 1, 2024. USCIS stated that the generated revenue will be used to create innovative solutions to the application process and to reduce the STEM backlog, among other projects (USCIS, 2024).

Political Interpretation and Proposals Criterion Updates

The Political Interpretation and Proposals Criterion includes four sub-criteria: (1) Making Immigration Selectivity More Egalitarian, (2) Upgrading the Type of Selection System, (3) Backlog Reduction, and (4) Redistribution of LPR Cards / Visas. The U.S. Citizenship Act of 2021 proposed by the White House (2021) aligns with the Political Interpretation and Proposals sub-criteria in all areas except Upgrading the Type of Selection System. Scholars argue that the U.S. employment-based immigration system is a stricter or meritocratic version of any point-based immigration policy. For instance, the applicants for the EB-1 visa should meet at least three of the ten criteria for extraordinary ability to position them to the level of recipients of Nobel, Pulitzer, Oscar, or Olympic awards (Hopkins, 2021).

Social Criterion Updates

Finally, the Social Criterion includes four sub-criteria (1) High-Quality Education, (2), High-Quality Training, (3) Increase Immigration Acceptance, and (4) Increase Immigration Welcoming, Diversity, and Inclusion. There are several U.S. organizations working on bridging the gap that technology professional immigrants face with social related issues. For instance, Welcoming America works on certifying cities and counties as inclusive for immigrants to thrive in their communities (Peric, 2023; Welcoming America, 2024). Other organizations, such as Open Avenues Foundation that works on offering micro-internships to high-skilled immigrants to obtain professional experience and increase their likelihood to obtain an H1-B visa (Open Avenues, 2024) and Global Detroit that works on developing strategies to strengthen the inclusion of immigrants across the United States (Global Detroit, 2024). This work aligns with The White House pathways for immigrant and refugee integration (The White House, 2021).

Alternatives Updates

The major updates from the alternatives evaluated in the HDM model are:

- Department of Homeland Security and USCIS proposed changes to the H1-B visa program, such as defining the specialty occupation concept, modernizing the registration process, reducing fraud, and increasing the likelihood of applicants to be selected (DHS, 2023).
- The changes to the H1-B visa program can also affect other programs evaluated in this research, such as the F1 and L1.

- USCIS updated the F-1 STEM OPT visa program regarding the flexibility of recent graduates to work under new STEM categories and work with startups. However, these startups should be certified as E-Verify companies (USCIS, 2023).
- USCIS also clarified the L1-visa program for sole proprietorship applications to prevent fraud.

To conclude, U.S. immigration policies for skilled immigrants have been historically used as an economic growth driver (Hopkins, 2021). However, these policies need more long-term strategies to retain and settle immigrants. Despite the restrictive nature of the legal U.S. immigration paths, technology-professional immigrants are willing to settle, work, and contribute to the prosperity of the U.S. economy (Bier, 2023). The results of this dissertation can be a helpful guide for policymakers to develop a bill or complement existing bills since it incorporates immigration and policy elements, such as clearer pathways to permanent status, allowing certain dual intent visas, backlog reduction, and increase in the number of visas and permanent resident cards (Bipartisan Policy Center, 2022). Moreover, this dissertation proposed a holistic assessment framework helpful to reform U.S. employment-based immigration policies, that according to Kandel et al. (2022), these reforms happen as a result of policymakers developing comprehensive analysis. Current U.S. immigration policies have not had a significant reform since the 1990s. Thus, if these issues continue, they will affect not only technology professionals but also companies and the U.S. economy.

Contributions from an Academic Perspective

This research contributes to the discipline of Engineering and Technology Management by presenting a novel study evaluating U.S. immigration policies of technology professionals. Moreover, the Hierarchical Decision Model (HDM) identified the main criteria and sub-criteria associated with the evaluation of U.S. immigration policies for technology professionals. Then, the methodological contributions of this research to the multi-criteria decision-making research are as follows:

(1) The model presented here is a novel and holistic approach to evaluating or developing immigration policies in the United States or any other country that uses a point-based system. However, for countries that rely on point-based systems to attract international talent, the HDM must be customized, (2) the outcomes of this research contribute to the current body of MCDA knowledge, and (3) the introduction of a policy-development framework in the area of technology professional / highly skilled immigration.

Contributions from a Practical Perspective

From a practical perspective, this research which combines qualitative and quantitative approaches, by presenting an MCDA model for the evaluation (levels and weights) of technology professional immigration policies in the United States, which is helpful to unravel the restrictionism of immigration policies and disclose social trends of the immigrants (Czaika and Hein, 2013). In 2023, the shortage of jobs across the United States was estimated to reach 11 million (Committee for Economic Development of The Conference Board, 2023). Therefore, the results from this research can be helpful, in the short and long term, to fulfill the shortage of these jobs across the United States that is

detrimental to economic growth and prosperity (Yale-Loehr et al., 2023). The HDM model is a valuable assessment tool for the contributions of technology professional immigrants in the United States by identifying several economic and non-economic international immigration drivers (Czaika and Hein, 2013). By loosening the restrictions for highly skilled immigrants (Bier, 2023) and enabling the findings of this study, the contributions of these individuals in the United States can increase over time. As a result, the United States will benefit in several areas, including scientific activity, economic growth, technological advantage, as suggested by the U.S. Citizenship Act of 2021 Bill proposed by the U.S. Federal Government (The White House, 2021). Additionally, the HDM model can help government, industry, and academia, in general, to align its hiring policies to the results validated and quantified by the panel of experts. By doing that, the shortage of technology professionals/high-skilled individuals in the United States can be addressed directly by the stakeholders in the era of Employment 5.0, Artificial Intelligence, and CHIPS and Science Act to support engagement and retention of long-term policies for technology-professional immigrants (Contreras et al., 2023; The White House, 2022; The White House, 2023).

8.2 Limitations of the Research

This research aims to evaluate the U.S. immigration policies for technology professionals by determining the main factors that affect those policies. Nonetheless, the methodology used to carry out this study, the Hierarchical Decision Model, has some limitations that must be described.

First, HDM relies heavily on the judgments of experts. The judgments have a subjective nature, which can bias the results. Also, the level of knowledge might significantly differ among experts. Thus, this might negatively affect the validation and quantification processes that lead to obtaining the model's results. The researcher followed all the HDM protocols, aiming to reduce human biases.

Second, the HDM model ranks alternatives based on the importance and weights assigned by experts. However, this model can only determine the likelihood of implementation considering some regulatory and political barriers. As mentioned before, the researcher aims to facilitate the methodology when multi-criteria decision-making methodologies are used to solve problems. However, the final decision needs to be made by decision-makers.

Third, the HDM results might differ if other experts had participated. Since this research took place during a specific time, and despite the best effort to identify experts and accommodate them in the panel that better aligns with their expertise, several circumstances and external factors affected the research development, such as expert engagement, willingness, commitment, noise, personal well-being, and quality of judgment. The researcher is responsible for ensuring the collected data meets the inconsistency and disagreement thresholds. If any response exceeds the threshold, the researcher needs to return to the expert(s) to fix their responses. Then, if the experts are unwilling to provide their judgment again, the data is not helpful. As a result, several responses were deleted since they did not meet consistency and agreement.

Fourth, the study did not consider the experts' political beliefs, country of birth, nationality, or immigration status. Hence, some of the judgments might be biased according to the experts' interests.

Finally, since U.S. immigration policies are constantly evaluated, new updates might make the results obtained from this research obsolete by the time it is published due to regulatory, political, economic, or social changes. Moreover, immigration policy reform is among the most polarizing public and political topics. Therefore, the results of this research are debatable.

8.3 Future Work

This research provides a framework to evaluate U.S. immigration policies, which resulted from a process of identification, validation, and quantification of a set of criteria, sub-criteria, and alternative and the results can be helpful recommendations for policymakers. The HDM model presented here was validated and quantified by experts following the approach used by former dissertations in the multicriteria decision-making area (Estep, 2019; Garces, 2020). Therefore, researchers can test the HDM model from this research to quantitatively evaluate immigration policies by adapting the model to other countries and conditions that employ large numbers of technology professional immigrants, such as Canada, Australia, Germany, or the U.K.

Future studies can also include other streams of highly skilled immigrants such as TN visa holders, DACA recipients, and high-skilled refugees and asylum seekers since these groups often face arbitrary barriers that prevent them to practice their profession or to find a path for legal residency (Owen et al., 2022). Lastly, another research stream can

explore aspects of highly skilled professional immigrants in the United States that are out of the scope of this study, such as age groups, careers, gender, immigration status, political affiliation, and ethnicity. Policymakers must determine the best profiles of technology professional immigrants that the United States should attract and retain for all governmental agencies, industries, research centers, and universities in the short and long term to boost economic growth and innovation.

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Appendix A. Invitation to Participate as an Expert in Doctoral Dissertation

Dear Expert

My name is Angel Contreras Cruz, a Ph.D. candidate in the Department of Engineering and Technology Management at Portland State University, researching the "*Evaluation of Immigration Policies for Technology Professionals in the United States*." The research objective is to propose a hierarchical decision model to evaluate immigration policies for technology professionals to boost economic growth and innovation. The model has five criteria ((Technological, Regulatory Landscape, Economic, Guidelines (Political Interpretation and Proposals after the validation), and Social)) plus twenty-one sub-criteria, and five alternatives.

Please accept this invitation to collaborate on the research mentioned above. Your background and expertise will bring excellent outcomes to this study. Upon accepting this invitation to participate as an expert, the researcher will share online form links to provide your judgment for this study.

The expected time commitment to participate in this study is estimated below:

1. Validation of ***Model's Criteria***: Qualtrics® survey software – 10 minutes
2. Validation of ***Model's Sub-Criteria***: Qualtrics® survey software – 10 minutes
4. Quantification of ***Model's Criteria:*** HDM software – 15 minutes
5. Quantification of ***Model's Sub-Criteria***: HDM software – from 15 to 25 minutes

Looking forward to hearing from you!

Angel Contreras Cruz
Ph.D. Candidate
Department of Engineering and Technology Management | Portland State University
E: acontre2@pdx.edu | C: +1(971) 277 – 8101

Appendix B. Invitation Letter to Validate the Model Criteria

Dear Expert:

Thanks for accepting the request to serve as a subject matter expert to evaluate the research model titled "*Evaluation of Immigration Policies for Technology Professionals in the United States*." The research objective is to propose a hierarchical decision model to evaluate immigration policies for technology professionals to boost economic growth and innovation using a Hierarchical Decision Modeling (HDM) methodology. The model has five criteria ((Technological, Regulatory Landscape, Economic, Guidelines (Political Interpretation and Proposals after the validation), and Social)). The model will evaluate the status quo of the immigration policies available for technology professional immigrants in the United States.

The first step is to validate the criteria that impact technology professional immigrants in the United States. After conducting an extensive literature review, the five Criteria were identified.

Please click on the following link to access the form:

https://portlandstate.qualtrics.com/jfe/form/SV_6SGKAttKqkhliLQ

After clicking on the link, kindly follow the instructions and provide your evaluation. Please fill out the form no later than (one week). The following steps will be sent to you later.

Please feel free to ask any questions or concerns by email or by phone.

Thanks in advance,

Looking forward to hearing from you!

Angel Contreras Cruz

Ph.D. Candidate

Department of Engineering and Technology Management | Portland State University

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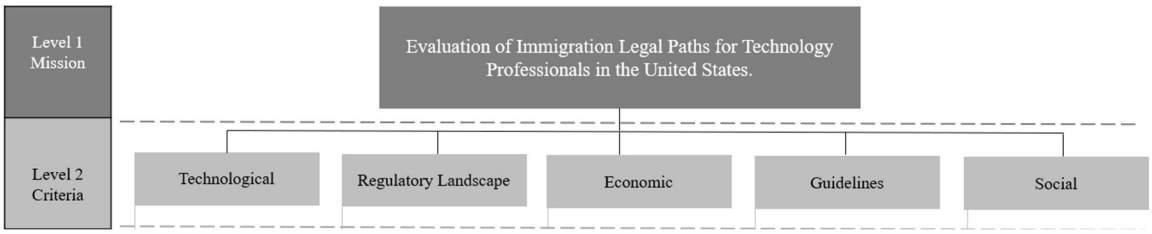
Objective and Criteria Levels:

The research objective is to "Develop an immigration policy framework that can be used for policymakers to create or upgrade U.S. immigration policies to attract, select, and retain technology professional immigrants by using a Hierarchical Decision Modeling (HDM)." The model has five criteria: Technological, Regulatory Landscape, Economic, Guidelines (Political Interpretation and Proposals after the validation), and Social. The model will evaluate the current immigration policies available for technology professional immigrants in the United States.



Description of the Criteria:

- The Technological criteria encompass the management, processing, and authorization of applications of technology professional immigrants by upgrading technological capabilities that the U.S. Government is responsible for managing through the United States Citizenship and Immigration Services agency. By upgrading these capabilities, the U.S. Government will be able to improve the process of the applications of technology to professional immigrants ((Deming Policy, 2015; Hunt and Gauthier-Loiselle, 2010; Parey et al., 2017; USCIS, 2019; USCIS, 2022).
- The Regulatory Landscape criteria set the ground for attracting, selecting, and retaining technology professional immigrants in the United States. It also ensures that technology-skilled immigrants have the same rights as U.S. citizens but also the opportunity to extend their stay or obtain permanent residence (Deming

Policy, 2015; Hunt and Gauthier-Loiselle, 2010; Parey et al., 2017; USCIS, 2019; USCIS, 2022).

- The Economic criteria incorporate micro and macroeconomic aspects to benefit the U. S economy through the contributions of technology professional immigrants. The suggested economic benefits for the U.S. economy are fees, taxes, and the financial value of the innovations made by technology professional immigrants (Deming Policy, 2015; USCIS, 2019; USCIS, 2012; Ferrucci, 2020; Kandel, 2020; Yale-Loehr and Eason, 2020; Czaika and Parsons, 2016; Simon et al., 2018; Melo et al, 2014; Ruyssen et al., 2017; Schotel, 2012; Duncan and Waldorf, 2010).
- The Political Interpretation and Proposal criteria define priority proposals to eliminate/reduce current immigration issues for technology professionals. It helps to identify the best profiles of technology professional immigrants who are willing to relocate to the United States with a lesser number of barriers (USCIS, 2019; USCIS, 2022; Yale-Loehr and Eason, 2020; Czaika and Parsons, 2016; Simon et al., 2018; Melo et al., 2014; Ruyssen et al., 2017; Schotel, 2012; Duncan and Waldorf, 2010).
- Finally, the Social criteria help build community support for technology professionals with their relocation process to the United States. It ensures that technology professional immigrants have access to settlement policies to ease the adaptation to a new culture and increase the likelihood of positive contributions to the U.S. economy (Ferruci et al., 2020; Kandel, 2020; Yale-Loehr and Eason, 2020; Czaika and Parsons, 2016; Simon et al., 2018; USCIS 2019; Melo et al., 2014; Ruyssen et al., 2017; Schotel, 2012; Duncan and Waldorf, 2010)

Appendix C. Invitation Letter to Validate the Model Sub-Criteria

Dear Expert:

Thanks for participating in the first step of validating the Model Criteria. The second step is to validate the Model Sub-Criteria that contribute to the goal of the research "Evaluation of Immigration Policies for Technology Professionals in the United States." Twenty-one sub-criteria were identified from the literature review under five criteria.

Kindly click on the following link to access the form:

Technological Sub - Criteria

https://portlandstate.qualtrics.com/jfe/form/SV_eQZUItPZLZiMh7g

Regulatory Landscape Sub - Criteria

https://portlandstate.qualtrics.com/jfe/form/SV_4IMvwRTL4dRwp2S

Economic Sub - Criteria

https://portlandstate.qualtrics.com/jfe/form/SV_b8zw5JPnnsF99cO

Political Interpretation and Proposals Sub - Criteria

https://portlandstate.qualtrics.com/jfe/form/SV_6o0ZY5UZLpXZDjE

Social Sub - Criteria

https://portlandstate.qualtrics.com/jfe/form/SV_bgEEDvcXjfxvM4m

After clicking on the link, kindly follow the instructions and provide your evaluation. Please fill out the form no later than (one week). The following steps will be sent to you later. Please feel free to ask any questions or concerns by email or by phone.

Thanks in advance,

Looking forward to hearing from you!

Angel Contreras Cruz
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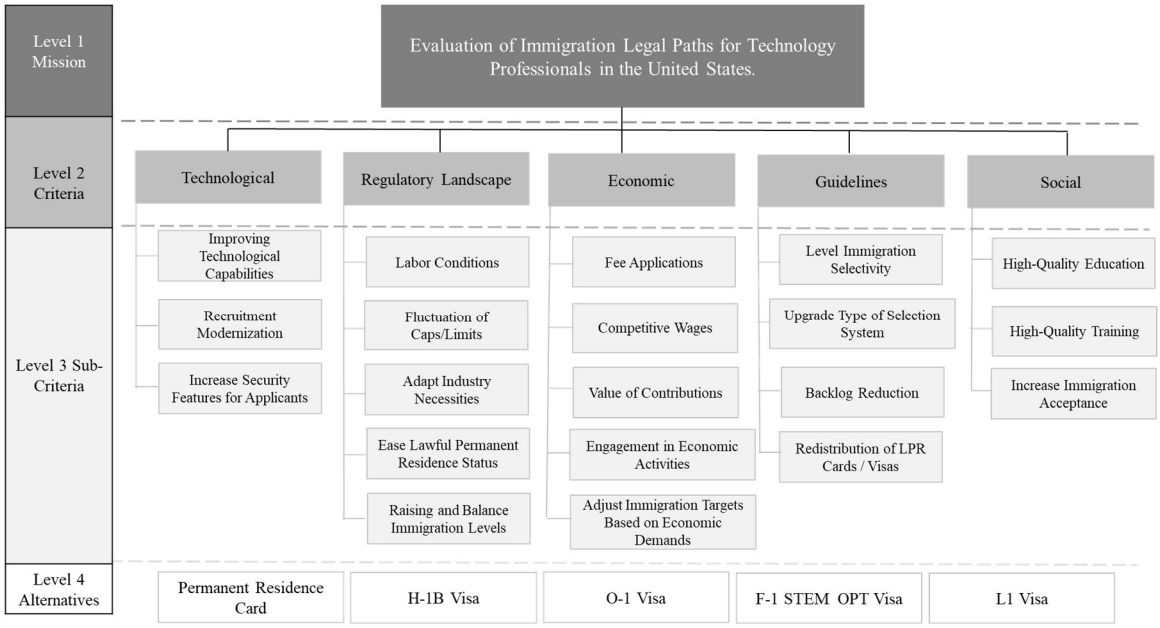
Explanation of the Model's Sub-Criteria

Preliminary Model:

The research objective is "Developing an immigration policy framework that can be used for policymakers to create or upgrade U.S. immigration policies to attract, select, and retain technology professional immigrants by using a Hierarchical Decision Modeling (HDM)."



Initial Hierarchical Decision Model Based on Literature Review

Criteria	Sub-criteria	Definitions for Model	References
Technological	Improving Technological Capabilities	Ensure compliance of applications with government regulations.	(USCIS, 2019; USCIS; 2022; CRS, 2018; Reinsch and Denamiel, 2023; Gelb and Krishnan, 2018; Zielinski, 2020)
	Digital Transformation of Application Processes	Accelerate the application process to adopt digital transformation strategies.	(U.S. Government Accountability Office. (2007; Hunt and Gauthier-Loiselle, 2010; US Department of Homeland Security, 2019; USCIS, 2019; USCIS, 2022)

	Increase Security Features for Applicants	Improve the security features of online applications, physical applications, and checkpoint entrees.	(USCIS, 2019; U.S. Department of Homeland Security, 2020; Department of Homeland Security, 2023; Buresh, 2021; Poster, 2022)
Regulatory Landscape	Labor Conditions	Design of policies to ensure the labor conditions of technology professional immigrants match those of native workers.	(Perez, 2015; Macaluso, 2022; Romer, 1990; Czaika and De Haas, 2013)
	Fluctuation of Caps/Limits	Economic growth and labor market conditions will determine the cap of LPR cards/visas available each fiscal year for technology professional immigrants.	(Borjas et al., 2019; Kerr and Kerr, 2020; Kandel et al., 2022)
	Adapt Industry Necessities	Agile bureaucracy will update regulatory instruments to align the objectives of industry necessities.	(Aydemir, 2020; Borjas, 2000; Yeaple, 2018: Kandel et al., 2022)
	Ease Lawful Permanente Resident Status (LPR)	Ease of the partway to LPR of technology professional individuals, STEM professionals, Ph.Ds. Graduated from U.S. universities who have lived/worked at least five years in the U.S.	(Anderson, 2011; Kandel et al., 2022)
	Raising and Balance Immigration Levels	Immigration of technology professionals will increment annually and redistribute the per-country ceiling (7% per country).	(Born, 2019; Kandel et al., 2022)
Economic	Fee Applications	Visa fees and costs for education and employment authorizations.	(Kandel et al., 2022; Simpson, 2022; Moynihan et al., 2022)
	Competitive Wages	The differential income between the home country and the host country.	(Moynihan et al., 2022; Anderson, 2021; Papademetriou et al., 2009)
	Value of Contributions	Define the value of contributions of technology professional immigration	(Kandel et al., 2022; Blau and Mackie, 2017; Hanson and Slaughter,

		towards innovation, U.S. economic growth, and the labor market.	2016; Burchardi et al., 2020)
	Actively Engagement	Define the level of participation of technology professional immigration to measure the value of economic/knowledge contribution.	(Hiebert, 2019; CRS, 2021)
	Adjust Immigration Targets Based on Economic Demands	Yearly adjustment of technology professional immigration targets to meet the country's economic demands.	(Hawthorne, 2014; Kandel et al., 2022; Lofgren, 2021)
Guidelines	Increase Immigration Selectivity	Make the eligibility criteria of technology professional immigrants more selective for LPR cards/ visas.	(Kandel et al., 2022; Anderson, 2021; Matloff, 2013; Papademetriou et al., 2019)
	Hybrid System for Dual Selection and Verification	There will be a combination of a point-based system and current U.S. employment-based system to improve the scores of labor demand.	[38, Kandel et al., 2022; Holtz-Eakin and Varas, 2019; Gest, 2020)
	Backlog Reduction	Improve agencies' resources to reduce waiting time because of administrative processing.	(Kandel 2020; Kandel et al., 2022)
	Redistribution of LPR Cards / Visas	Ensure the distribution of LPR cards and employment-based visas based on occupation.	(USCIS, 2022; Kandel 2020, Kandel et al., 2022; Bier, 2020)
Social	High-Quality Education	Improve the ability of institutions to offer specialized education to high-skilled immigrants.	(Weinar and von Koppenfels, 2020; Connor and Ruiz, 2019; Int. Labor Office, 2010; Desjardins, 2019; Rho and Sanders, 2021
	High-Quality Training	Developing and continual improvement of skills offered to high-skilled immigrants.	Papademetriou and Sumption, 2013; Kerr et alt., 2014; Zients, 2014; Insight, 2020
	Increase Immigration Acceptance	Public support of the native population toward high-skilled immigration.	(Perez, 2015; Connor and Ruiz, 2019; Weina and Klekowski von Koppenfels., 2020 a)

Appendix D. Invitation letter to Quantify the Model's Criteria

Dear Expert

Thanks for participating in the first two steps of the study. The third step is quantifying the Model Criteria using the HDM (Hierarchical Decision Model) software Version Beta 2.0 as the research instrument. The criteria quantification data will be collected using a pairwise comparison approach. The Engineering and Technology Management Department at Portland State University (PSU) developed the HDM software.

Kindly click the following link to access and follow the instructions to complete the task. Please fill it out before **(one week)**.

http://research1.etm.pdx.edu/hdm2/expert.aspx?id=b848040d550ed545/715b30b2e1afcbf2!A01

Please feel free to ask any questions or concerns by email or by phone.

Thanks in advance,

Looking forward to hearing from you!

Angel Contreras Cruz
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Appendix E. Invitation letter to Quantify the Model's Sub-Criteria

Dear Expert

Thanks for participating in the first three steps of the study. The fourth and final step is quantifying the Model Sub-Criteria and Alternatives using the HDM (Hierarchical Decision Model) software Version Beta 2.0 as the research instrument. The sub-criteria quantification data will be collected using a pairwise comparison approach. The Engineering and Technology Management Department at Portland State University (PSU) developed the HDM software.

Kindly click the following link to access and follow the instructions to complete the task. Please fill it out before **(one week)**.

Technological

http://research1.etm.pdx.edu/hdm2/expert.aspx?id=b848040d550ed545/715b30b2e1afcbf2!B01C01C02C03C04

Regulatory Landscape

http://research1.etm.pdx.edu/hdm2/expert.aspx?id=b848040d550ed545/715b30b2e1afcbf2!B02C04C05C06C07C08

Economic

http://research1.etm.pdx.edu/hdm2/expert.aspx?id=b848040d550ed545/715b30b2e1afcbf2!B03C09C10C11C12C13

Political Interpretation and Proposals

http://research1.etm.pdx.edu/hdm2/expert.aspx?id=b848040d550ed545/715b30b2e1afcbf2!B04C14C15C16C17

Social

http://research1.etm.pdx.edu/hdm2/expert.aspx?id=b848040d550ed545/715b30b2e1afcbf2!B05C18C19C20C21

Please feel free to ask any questions or concerns by email or by phone.

Thanks in advance. Looking forward to hearing from you!

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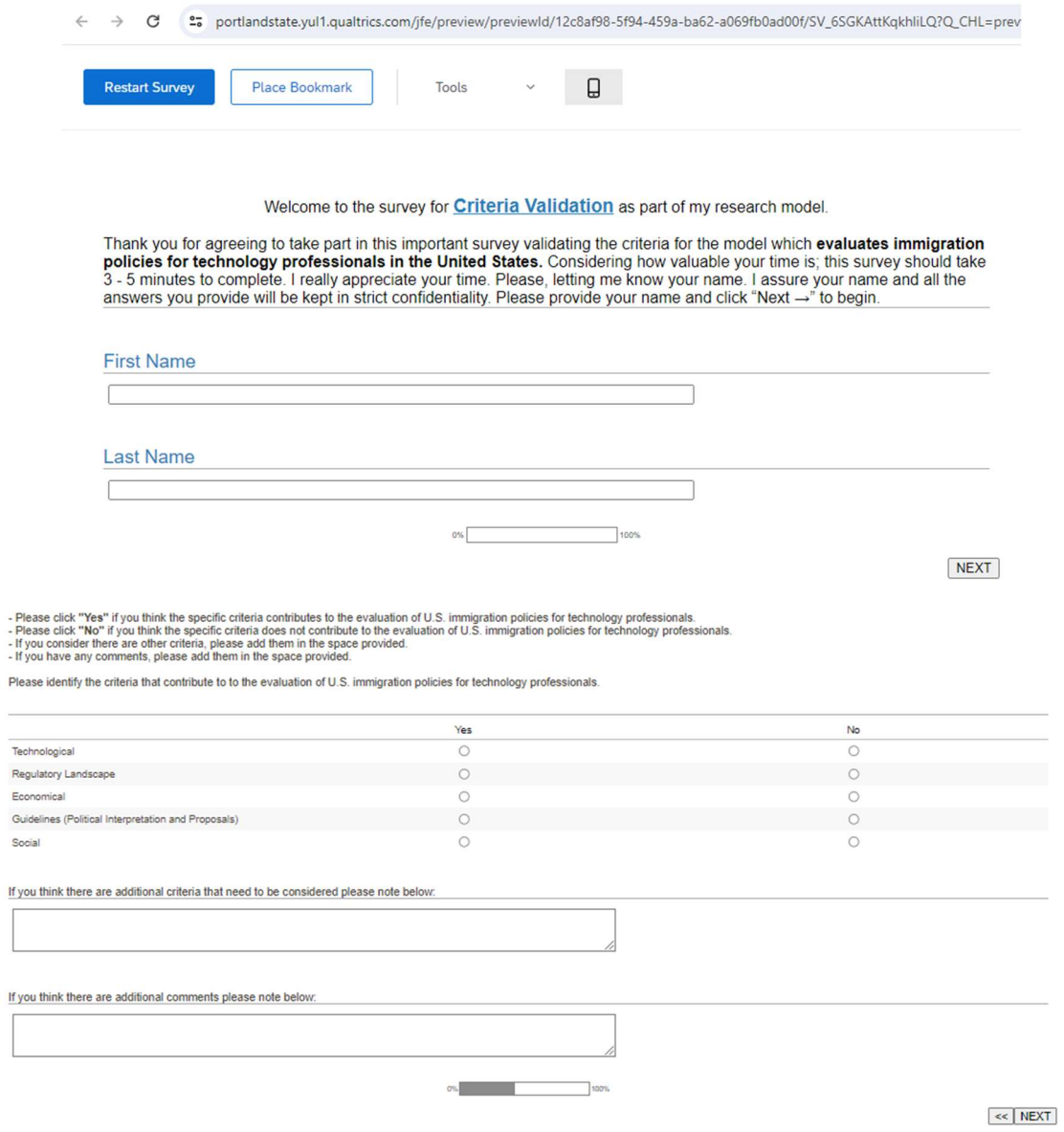
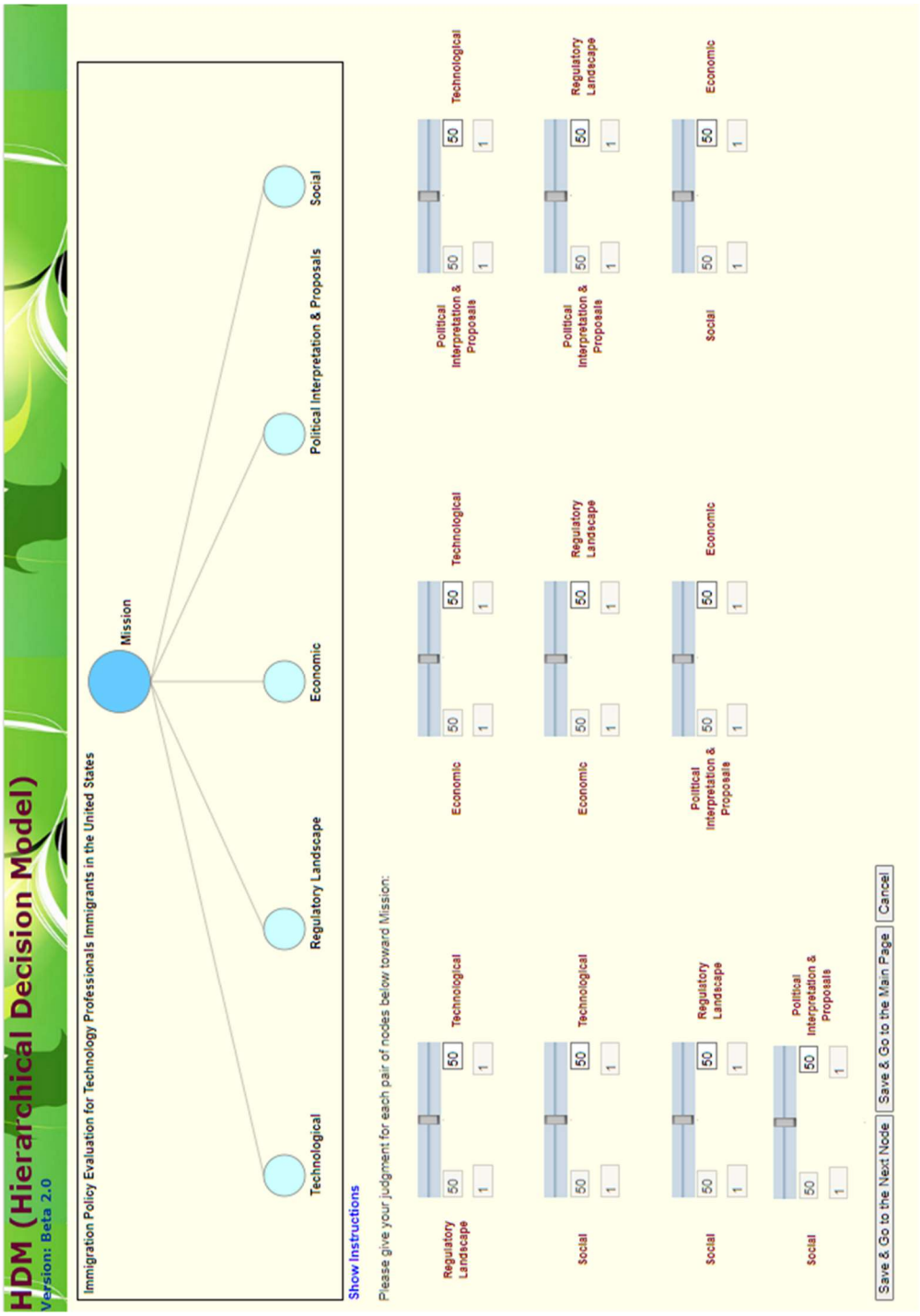
Appendix F. Model Validation and Quantification Assessment Tools

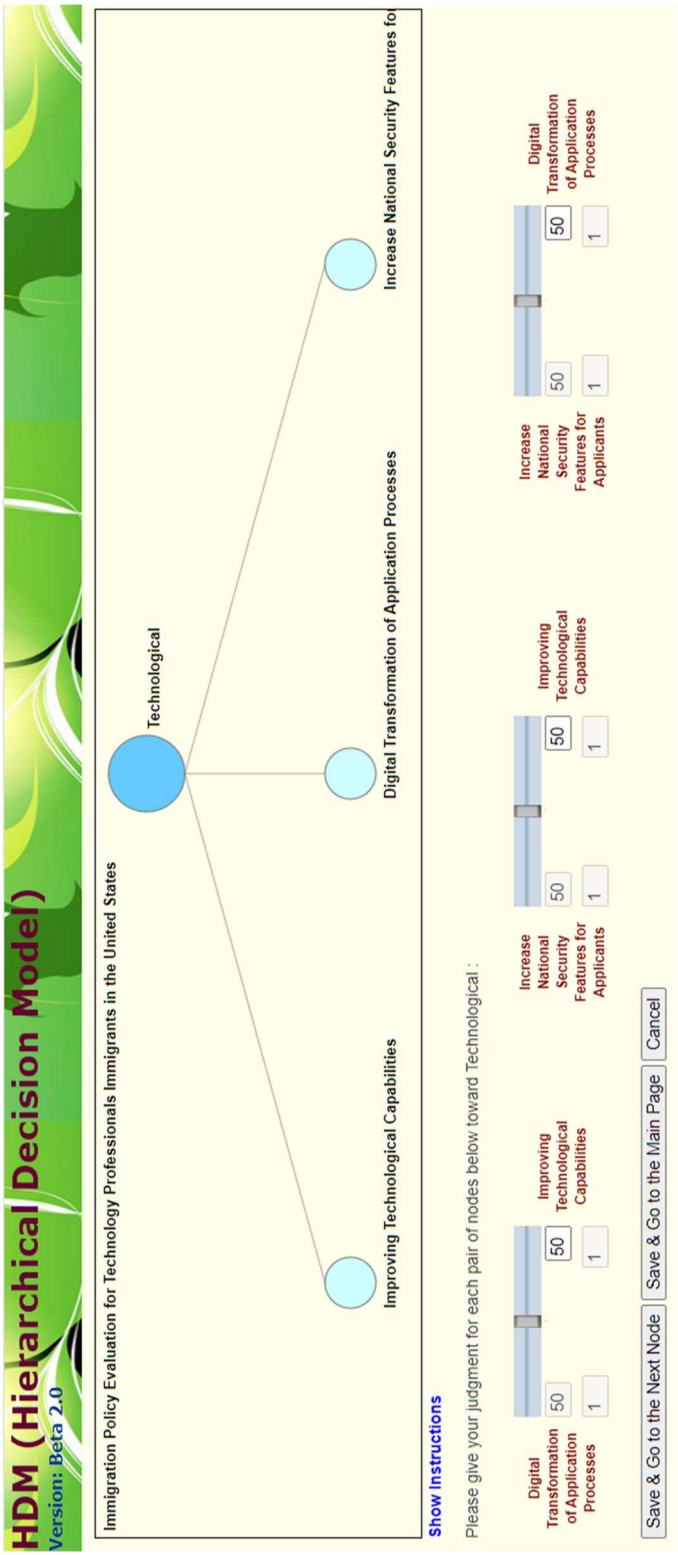
Appendix F1: Validation Tool for Criteria and Sub-Criteria Level



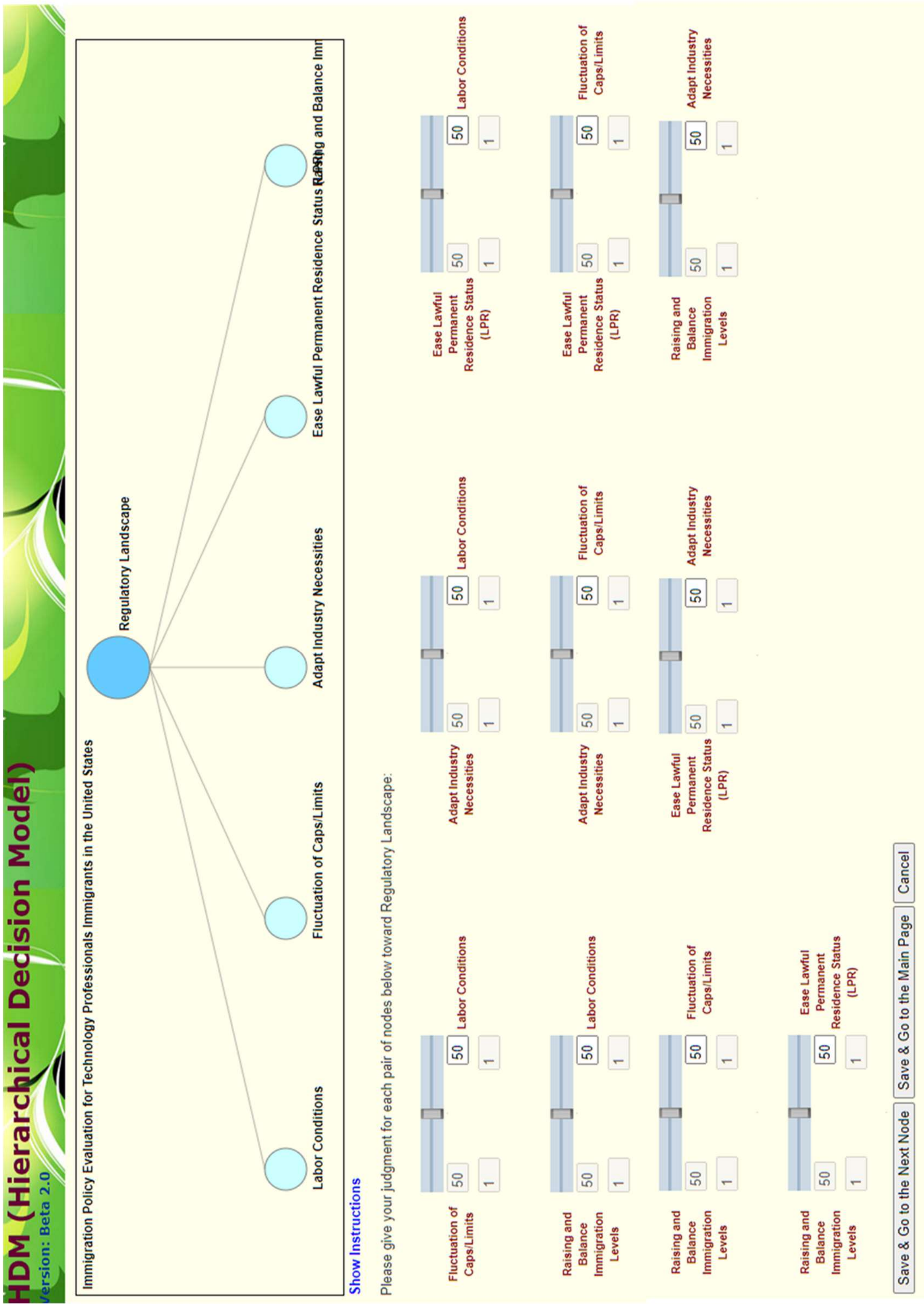
Appendix F2: Quantification Tool for Criteria Level



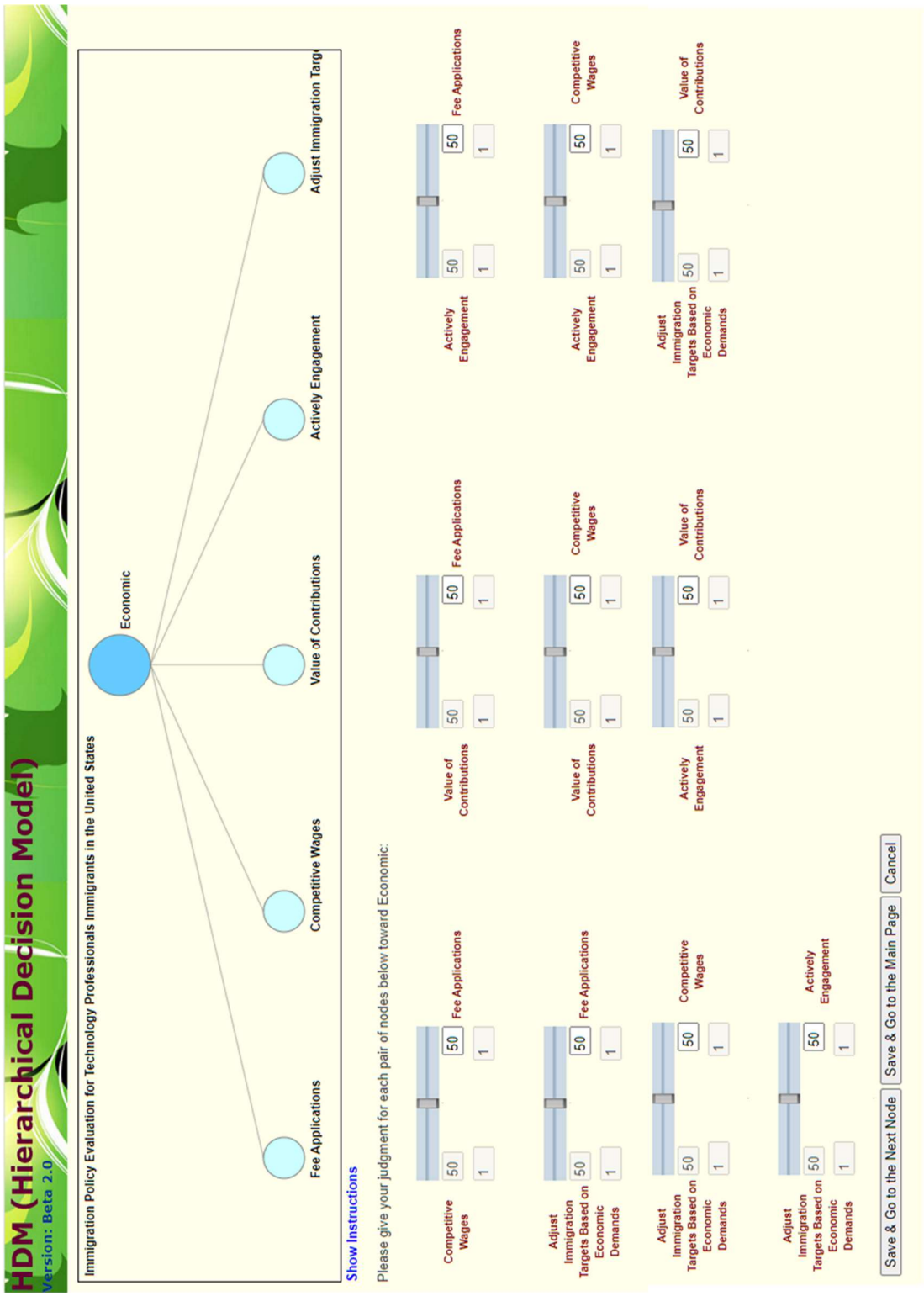
Appendix F3: Quantification Tool for Technological Sub-Criteria



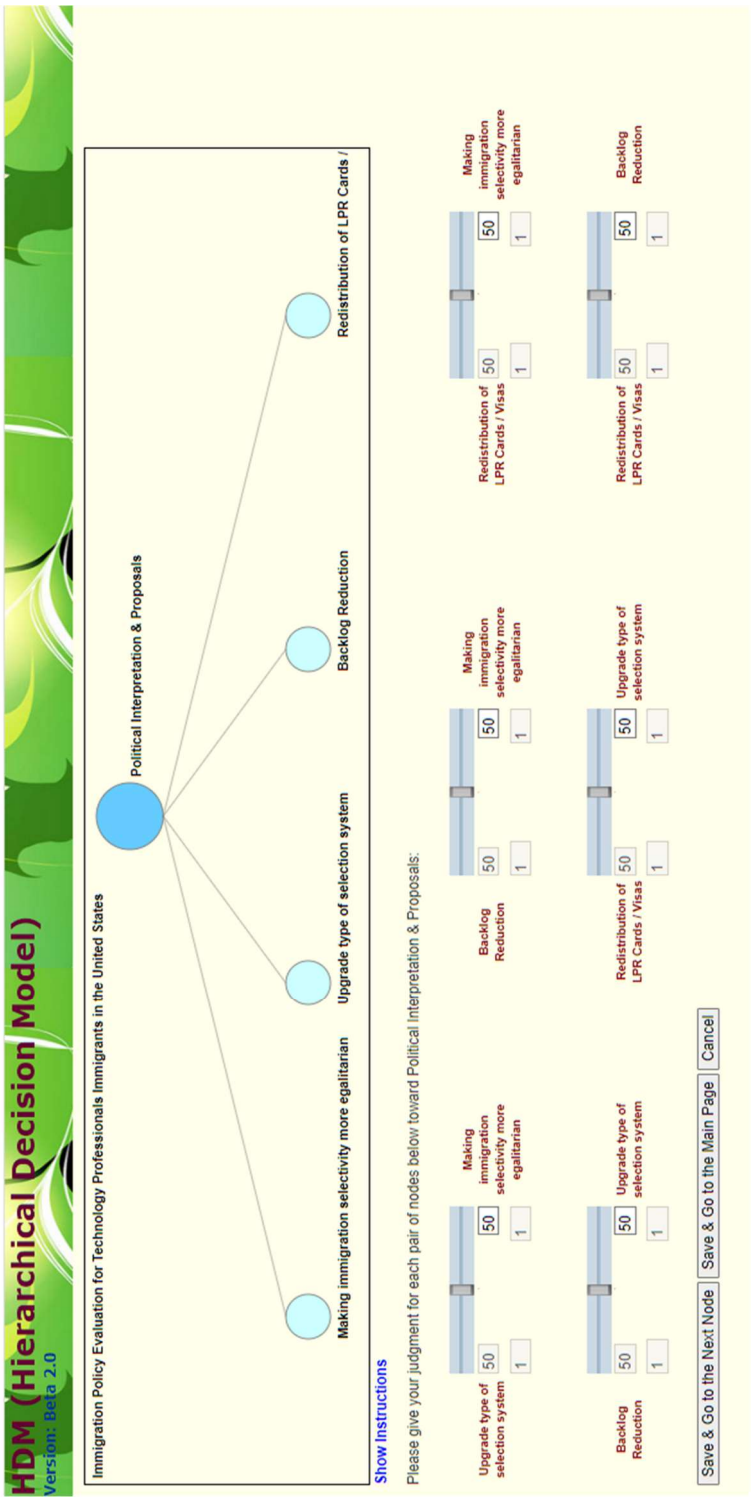
Appendix F4: Quantification Tool for Regulatory Landscape Sub-Criteria



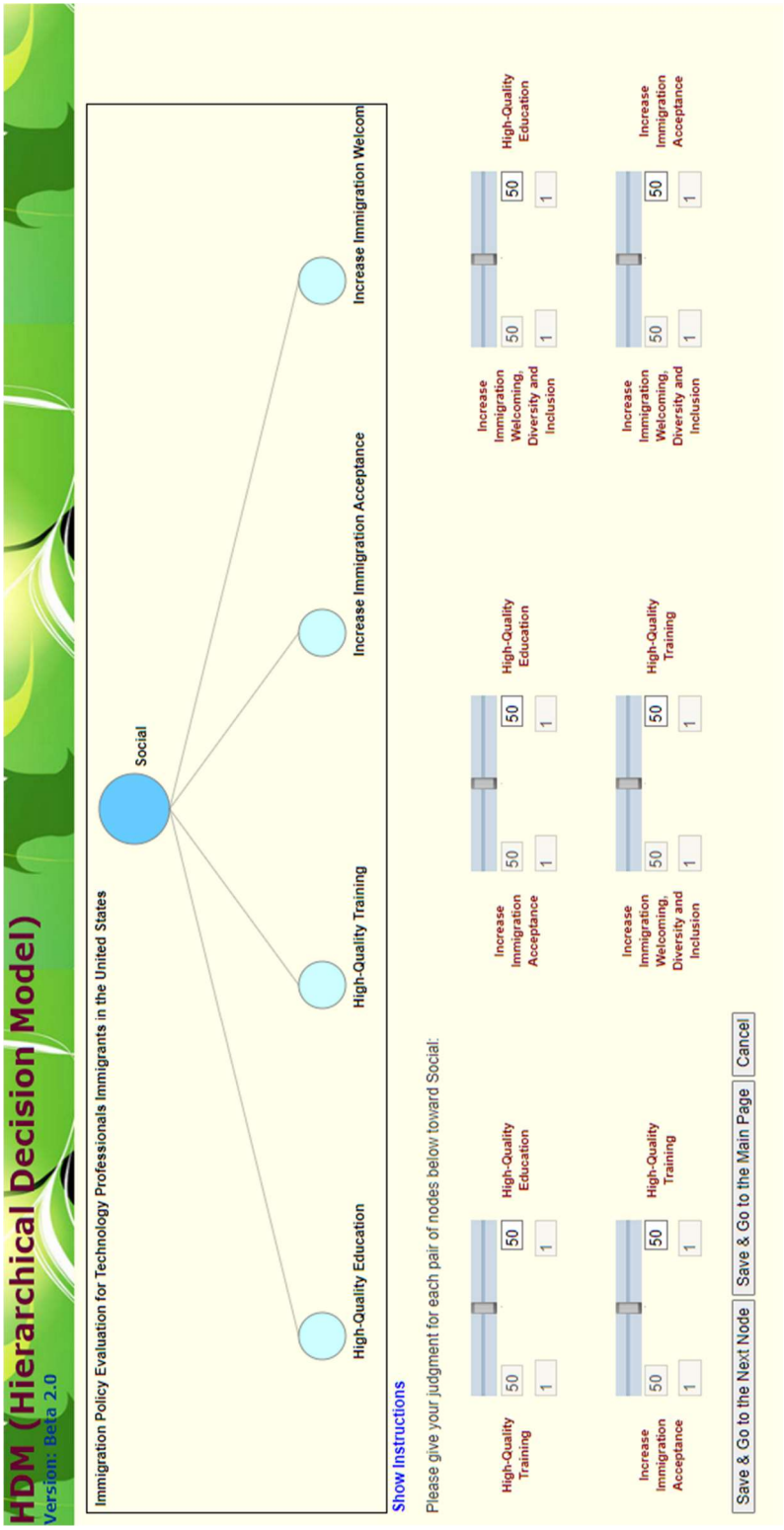
Appendix F5: Quantification Tool for Economic Sub-Criteria



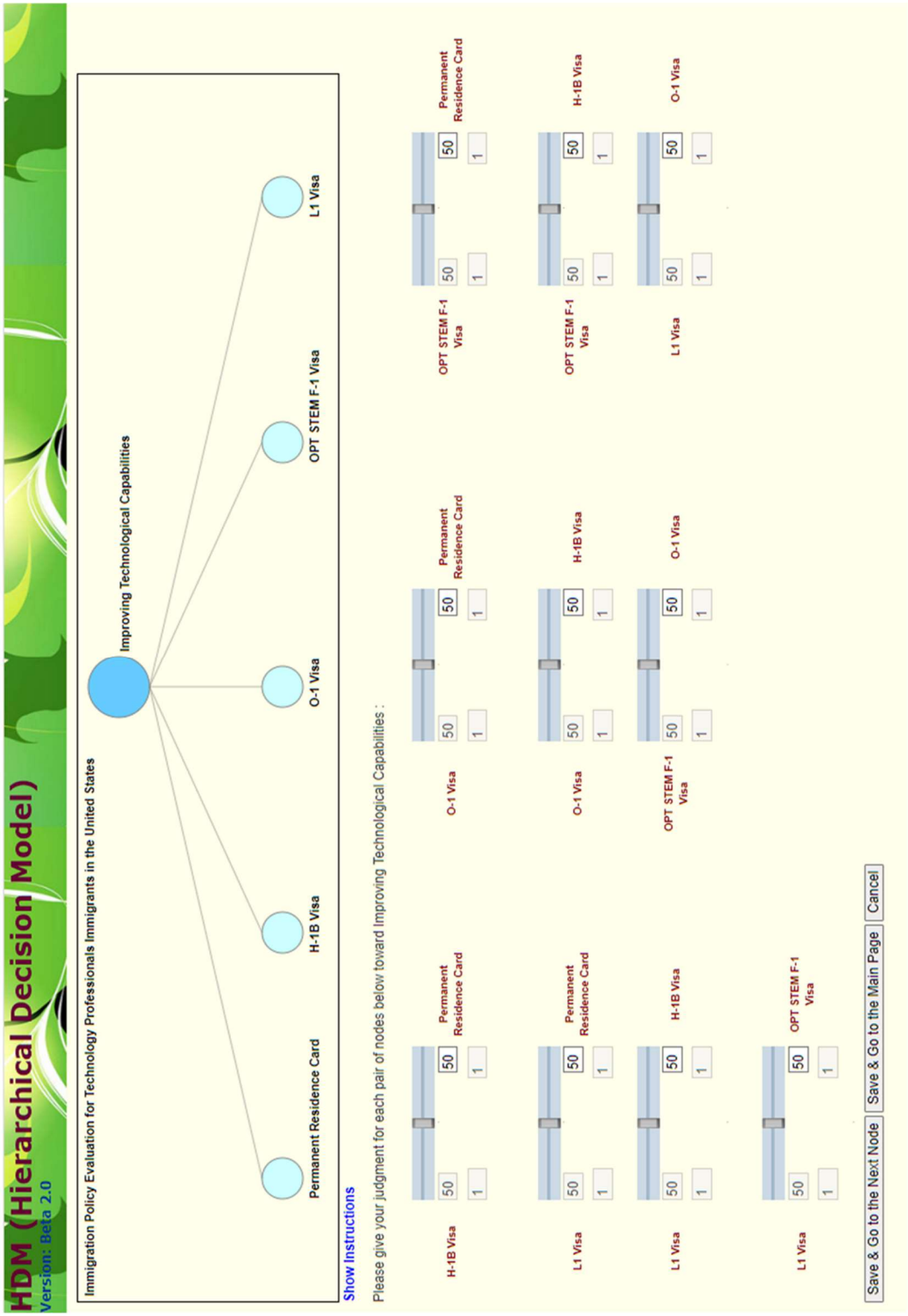
Appendix F6: Quantification Tool for Political Interpretation & Proposals Sub-Criteria



Appendix F7: Quantification Tool for Social Sub-Criteria

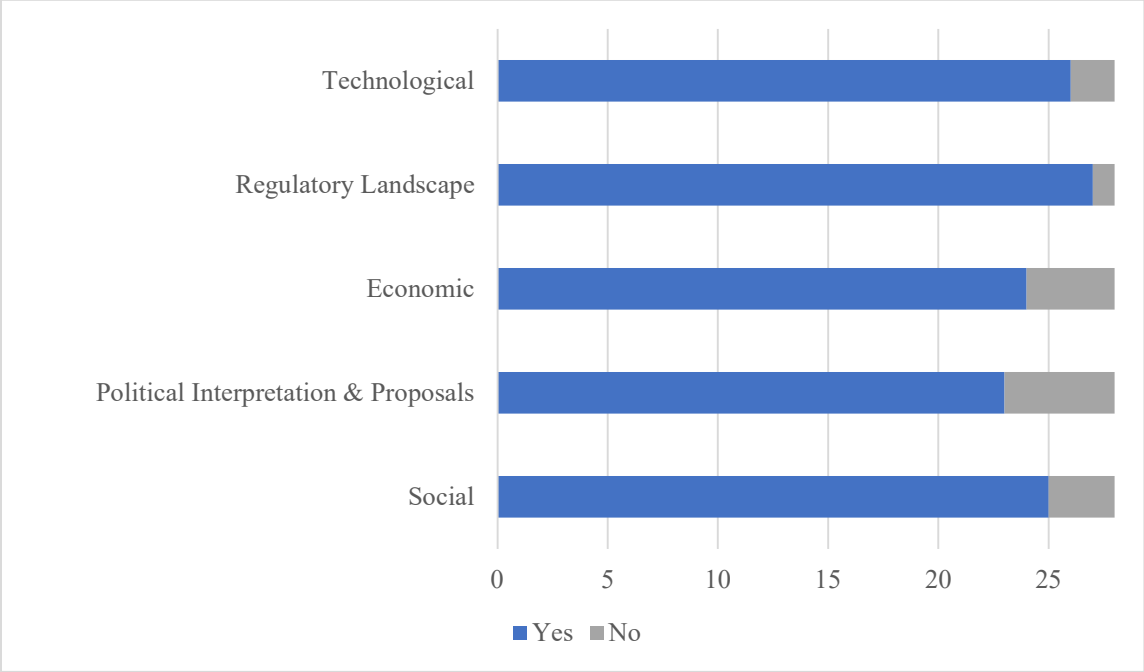


Appendix F8: Quantification Tool for Assessing Alternatives



Appendix G: Model Validation Results

Appendix G1: Validation of Criteria Level



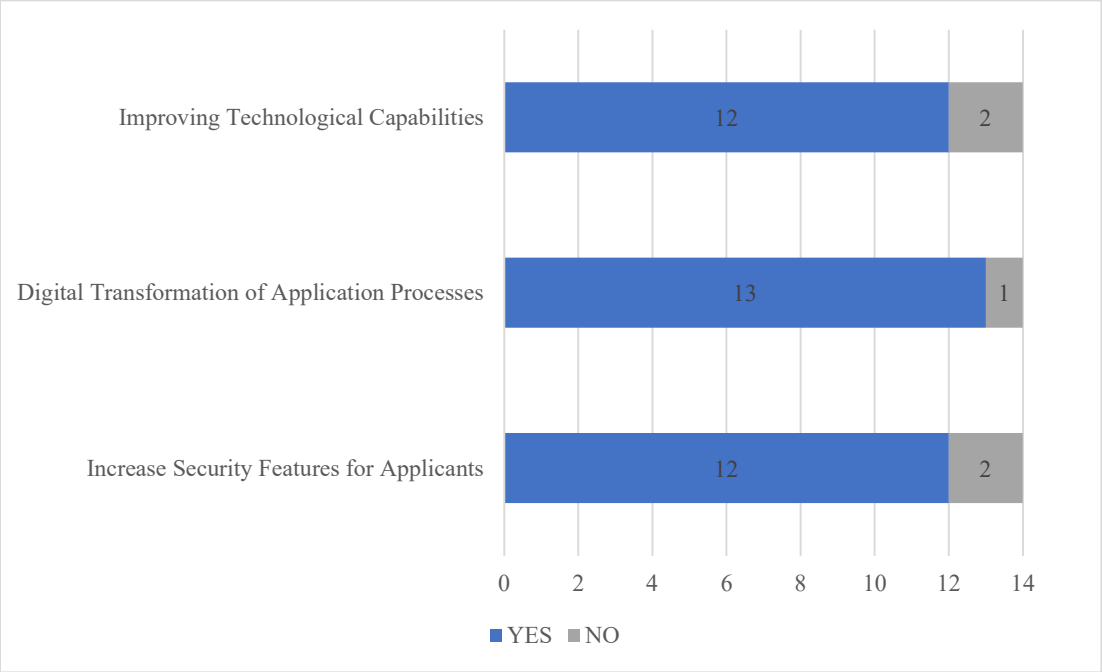
According to the experts, all five criteria were appropriate for assessing U.S. immigration policies. The five criteria exceeded the minimum threshold of 66.6 % to be included in the model. The approval percentage of the five criteria is as follows: Technological - 92.9 %, Regulatory Landscape - 96.4 %, Economic - 85.7 %, Political Interpretation & Proposals - 82.1 %, Social - 89.3 %. Additionally, the researcher carefully reviewed the expert feedback, and action items were developed from it.

Feedback from experts	Action Item from the feedback
Education.	No action item – Education is already one of the Social Sub-Criteria.
Political: mobilization of support for technology professionals among important stakeholder groups who regard their presence as beneficial, productive, in the national interest.	No action item – this feedback falls into the category of one of the alternatives – Permanent Residence card – EB-2 NIW.

Urgency of the positions and scarcity of the positions worldwide (and in the US).	No action item – this feedback falls into the research objective.
Additional criteria for Social: In my opinion, this should not be limited to IT professionals but their spouses too. Many spouses of skilled immigrant workers leave their career behind to accompany their family here in the United States. They have to wait for their work authorization for a long time. Until they receive work authorization, they cannot work in the US. After receiving the document, the journey to financial independence and full filling career is not at all easy. They face many obstacles and have a hard time standing out in the job market due to career gap, lack of US experience and US education. I am passionate about being the voice of dependent spouses and build an inclusive community for them where they feel supported and have job search resources.	Action item – a new sub-criteria was added to the social group called "Increase Immigration Welcoming, Diversity, and Inclusion."
National Security	Action item – This concept is added to the Technological Sub-Criteria "Increase National Security Features for Applicants"
Possible spillover effects on native workers. For example, some researchers and many politicians believe that more immigrants with scientific training/credentials lowers the economic reward for native students to obtain training or credentials.	No action item – this research argues the opposite
Not sure what this would fall under, but possibly the amount of work or jobs available to such immigrants? Economical?	Action item – This concept is added to the Regulatory Landscape Sub-Criteria "Raising and Balance Immigration Levels"
Goals, intentions, motivations of applicants for immigrant status.	No action item – The feedback falls into the category of the Social Sub-Criteria "Increase Immigration Welcoming, Diversity, and Inclusion."

Perhaps "cultural issues" at a meso-level or "migrant personality" at a micro level. But both could increase the scope.	No action item – The feedback is out of scope of this research
Exceptional education, skills, or talents are evaluated as part of the criteria H-1B visas. H-2B visas apply to people who do certain types of work that is in high demand, but U.S. citizens are not meeting.	No action item – this feedback falls into the category of one of the alternatives – H1-B visas.
There is also a Political Landscape that is different from the Regulatory Landscape. The political landscape determines which laws get made, while the regulatory landscape involves the rules that are made to interpret the laws	Action item – the Guidelines Criteria changed its name to Political Interpretation and Proposals.
As we continue reviewing the framework, I will be able to provide any additional comments, at this point it looks good.	No action action – Thanks.
Love this topic!	No action action – Thanks.
I'm confused by the Guidelines -- how does this differ from Regulatory? Are you referring to government policies?	Action item – the Guidelines Criteria changed its name to Political Interpretation and Proposals.
Guidelines and Regulatory Landscape are closely related. If I am understanding correctly, Regulatory Landscape is focused on describing the current structure, barriers, and available solutions. Guidelines is focused on proposals that would change these for the future.	Action item – the Guidelines Criteria changed its name to Political Interpretation and Proposals.

Appendix G2: Validation of Technological Sub-Criteria

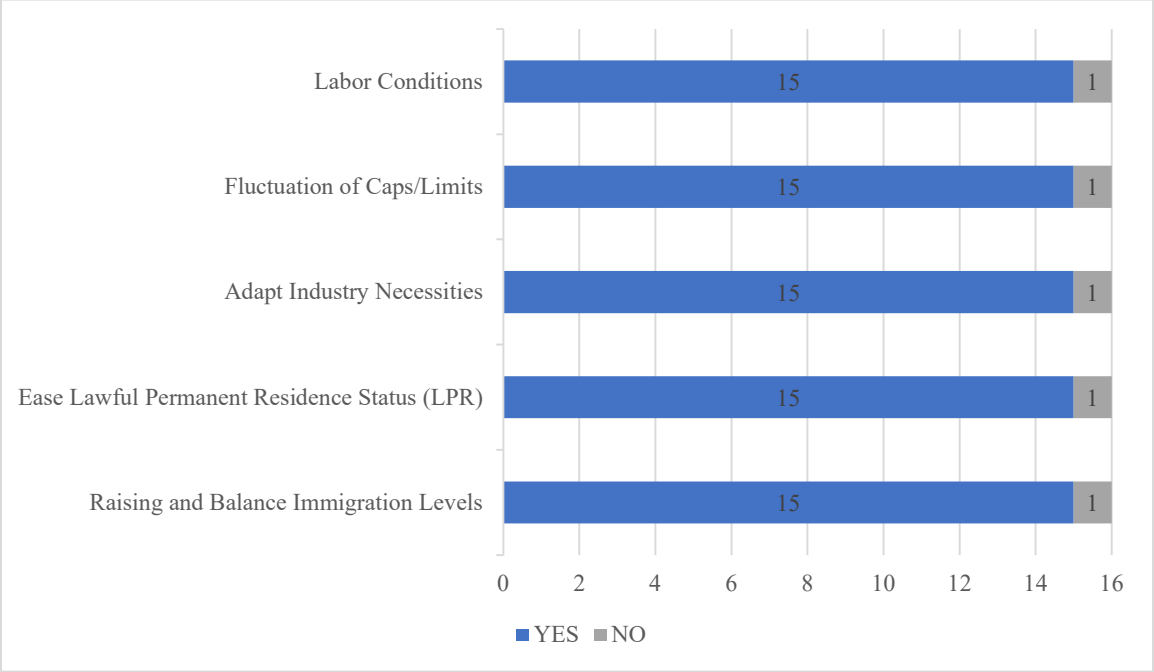


According to the experts, all three Technological sub-criteria were appropriate for the research. The three criteria exceeded the minimum threshold of 66.6 % to be included in the model. Additionally, the researcher carefully reviewed the expert feedback, and action items were developed from it.

Feedback from experts	Action Item from the feedback
Immigration CRM capacity for companies to manage applicants' and employees' immigration status through to LPR.	No action item – This feedback falls out of the scope of this research since the proposed model is for policymakers not companies.
Security features could include streamlining the application with blockchain identity and education tokens.	No action item – This feedback falls into the category of the "Digital Transformation of Application Process' Sub-Criteria.
Improving certifications and equivalencies of technological studies.	No action item – This feedback falls into the category of the Social - Criteria.
Increase opportunities for technological and scientific collaborations.	No action item – This feedback is out of the scope of this research.

Labor Market Requirement should be added as a criteria as it accurately reflects what skills are required to boost growth	No action item – This feedback falls into the category of the Regulatory Landscape - Criteria.
A method for ranking the subjects capabilities	No action item – This feedback falls into the category of the Political Interpretation and Proposal Criteria.
Security features typically means E-VERIFY, which isn't a big issue for technology professionals, but is a non-negligible investment for companies, as an example.	No action item – This feedback falls into the category of the “Increase Security Features for Applicants” Sub-Criteria.
A sine qua non part of this process should be defining the skills that are higher priority such that the tools also consider that in parallel with the subjects capabilities.	No action item – This feedback will be discussed in more detail in the Conclusion section.

Appendix G3: Validation of Regulatory Landscape Sub-Criteria

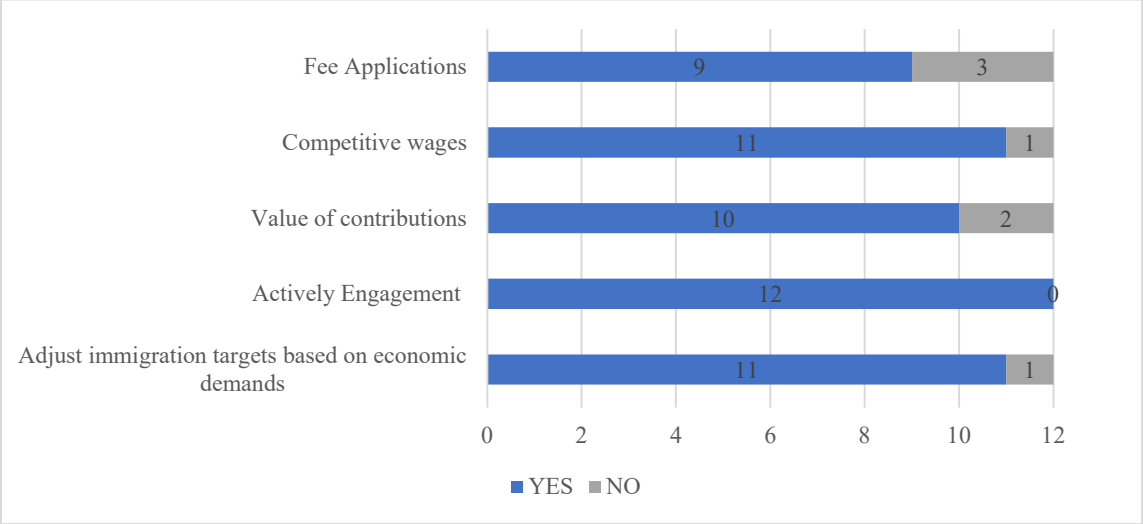


According to the experts, all five Regulatory Landscape sub-criteria were appropriate for the research. The three criteria exceeded the minimum threshold of 66.6 % to be included in the model. Additionally, the researcher carefully reviewed the expert feedback, and action items were developed from it.

Feedback from experts	Action Item from the feedback
I would add relevant temporary WORK VISAS to your framework. Example: H-1B for industry is awful. L-1 is an alternative.	No action item – This feedback falls into the Alternatives category.
Demographic growth.	No action item – This feedback will be discussed in the future research section.
On the permanent side, some things can be changed by altering how immigrant visas are counted (not a tech-exclusive fix, but a fix). Need to clarify how labor market/industry stuff would be calculated and how often for items 2/3.	No action item – This feedback will be discussed in more detail in the Conclusion section.

Increase assimilation services, such as housing options.	No action item – This feedback falls into the Increase Immigration Welcoming, Diversity and Inclusion sub-criteria.
Needs for certain technologies, national security economic interests.	No action item – This feedback falls into the Increase National Security Features for Applicants sub-criteria.
Did you consider the visa process itself?	No action item – This feedback falls into the Alternatives - category.
I am not clear on what Adapt industry necessities means, or - "ease" LPR status?	No action item – See definition section.
Your focus is LPR. What about the temporary WORK VISAS often need to transition from F-1 STEM OPT prior to LPR?	No action item – This feedback will be discussed in more detail in the Conclusion section.
An awful lot of this would need to be changed by actual statute, not just regulation.	No action item.
None.	No action item.
What comes to mind for me in addition to all of this is the DV lottery option, or the implications of those who cannot obtain these visas / expiring (marrying for citizenship, E1 & E2 visas, etc.).	No action item – This feedback is out of the scope of this research.

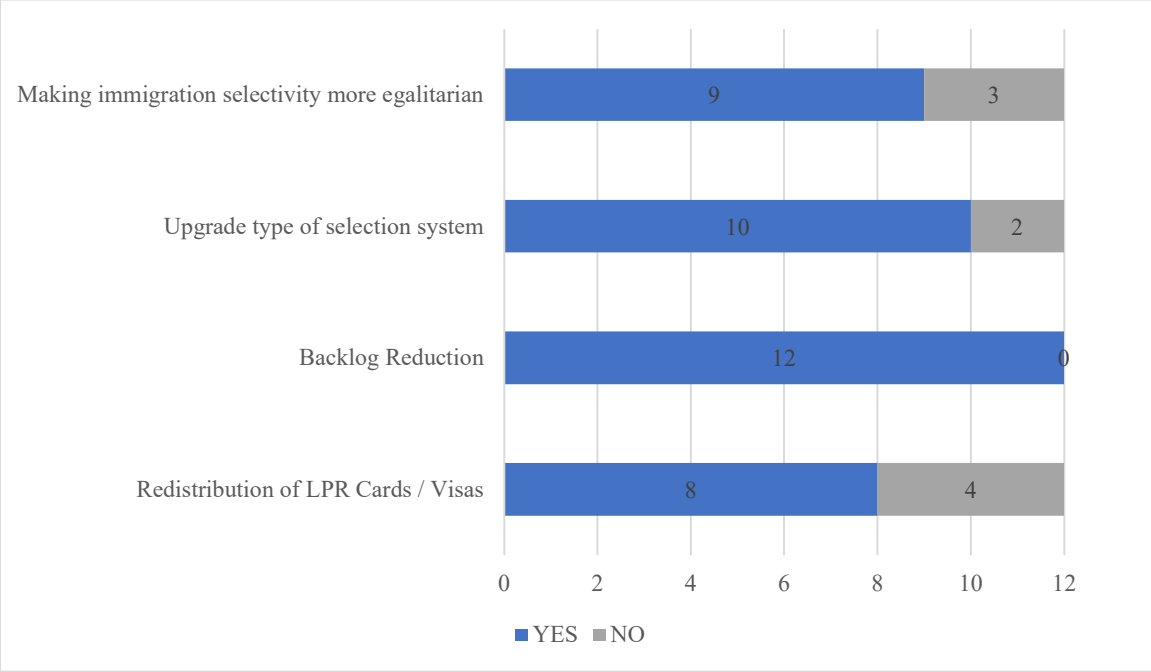
Appendix G4: Validation of Economic Sub-Criteria



According to the experts, all five Economic sub-criteria were appropriate for the research. The three criteria exceeded the minimum threshold of 66.6 % to be included in the model. Additionally, the researcher carefully reviewed the expert feedback, and action items were developed from it.

Feedback from experts	Action Item from the feedback
Developmental opportunity = promotion, more responsibility, higher wages, long-term perspective	No action item – This feedback falls into the Competitive Wages sub-criteria.
Societal engagement - Engagement of immigrants in furtherance of positive societal goals for the US. Eg. volunteering, activism etc.	No action item – This feedback falls into the Increase Immigration Welcoming, Diversity and Inclusion sub-criteria.
Many H1B visas are used by giant subcontracting firms. How should we think about the benefits of the workers supplied by these firms?	No action item – This feedback will be discussed in more detail in the Conclusion section.
Who determines "(1) when and (2) which" technology workers are needed (biomedical? Particle physics? Green Tech?)	No action item – This feedback will be discussed in more detail in the Future Work section.
Not all immigrant contributions are necessarily economic in nature. The ability to take immigrant contribution to the arts, culture, age demographics should also be considered.	No action item – This feedback will be discussed in more detail in the Future Work section.

Appendix G5: Validation of Political Interpretation & Proposals Sub-Criteria

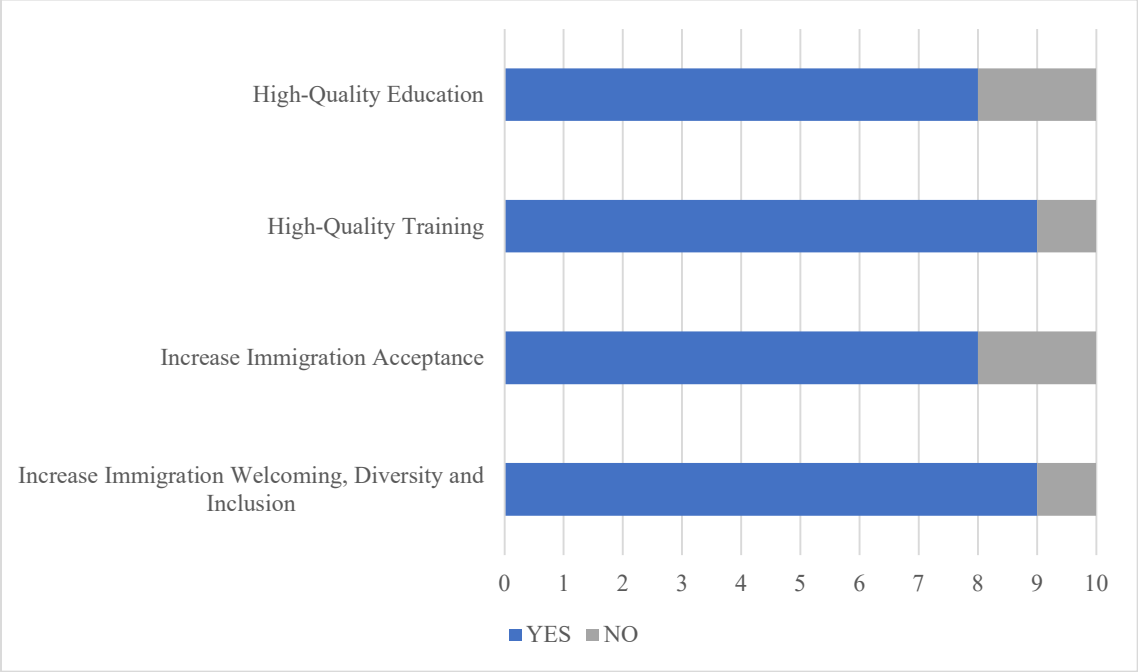


According to the experts, all four Political Interpretation & Proposals sub-criteria were appropriate for the research. The three criteria exceeded the minimum threshold of 66.6 % to be included in the model. Additionally, the researcher carefully reviewed the expert feedback, and action items were developed from it.

Feedback from experts	Action Item from the feedback
Persistence = the probability that technology professionals will stay in US working in their field.	No action item – This feedback will be discussed in more detail in the Future Work section.
AI development.	No action item – This feedback falls into the Improving Technological Capabilities sub-criteria.
Not sure I understand this well enough to suggest.	No action item.
None.	No action item.
Whether immigration limits should be based on country of original and skill level; for example, there could be a pay-to-play system, points system, or lottery.	No action item – This feedback falls into the Upgrade type of selection system sub-criteria.

Be clear on whether decisions are being made based on short or long term interest of country, employer, or immigrant.	No action item – This feedback will be discussed in more detail in the Conclusion section.
It is unclear to me what the level immigration selectivity criteria is, so I have left that blank	No action item – See definition section.
I think we need to consider employer size in distribution – appears with respect to H-1B cap some large employers are filing so many lottery entries that their disadvantaging smaller tech employers (startups/mid-size), not to mention all non-tech. Reserving/redistributing visas to tech doesn't solve the current intra-tec industry problem.	No action item – This feedback will be discussed in more detail in the Conclusion section.
None	No action item.
I have very mixed feelings regarding a point system as we see with places like Canada and the UK. I like the idea but it may not work for a country like the U.S.	This feedback falls into the Upgrade type of selection system sub-criteria.
I am concerned that there is confusion between "Guidelines" and Policies, and the "Regulatory Landscape. The Guidelines sub-criteria #'s 1,3 and 4 are in fact regulatory.	The Guidelines sub-criteria changed its name to Political Interpretation & Proposals criteria.

Appendix G6: Validation of Social Sub-Criteria



According to the experts, all four Social sub-criteria were appropriate for the research. The three criteria exceeded the minimum threshold of 66.6 % to be included in the model. Additionally, the researcher carefully reviewed the expert feedback, and action items were developed from it.

Feedback from experts	Action Item from the feedback
I would add training on Immigration Policies and increasing awareness on those as well. Many immigrant students just do not know what pathways to work permits and permanent residency exists and how feasible they are to achieve based on their career choices and place of birth. If regulatory policies don't change, then students need to start building their profiles and careers early on to become eligible for more competitive work visa and residency programs.	No action item – This feedback will be discussed in more detail in the Future Work section.

There are a whole host of other dimensions of immigrant inclusion and welcoming that would be helpful additions - our Welcoming Standard is one reference point, including elements like access to legal services, naturalization support; language access policy; and more broadly, a welcoming infrastructure in communities. https://welcomingamerica.org/wp-content/uploads/2023/04/Certified-Welcoming-guide-2023.pdf	As a result, a new sub-criteria was created "Increase Immigration Welcoming, Diversity and Inclusion."
Increase the number of technology professionals from under-represented countries.	No action item – This feedback will be discussed in more detail in the Future Work section.
My assumption is high quality training means providing them tools and resources to excel in their career as an immigrant.	No action item – see definitions.
Diversity and Inclusion - the policies should be developed such that it brings and retains a pool of professionals from different regions and countries independent of their race, gender, religion, sexual orientation, age, etc.	As a result, a new sub-criteria was created "Increase Immigration Welcoming, Diversity and Inclusion."
Training and education of technology professionals is crucial. If the US were to raise the minimum salary, it would force firms that use H1B visas to target immigrants with higher quality credentials. Should that minimum be raised?	No action item – This feedback falls into the Competitive Wages sub-criteria.
More diversity among technology professionals would strengthen outcomes, especially as AI/algorithms begin to automate more processes.	As a result, a new sub-criteria was created "Increase Immigration Welcoming, Diversity and Inclusion."

Appendix H: Pairwise Comparison Results

Appendix H1: Criteria Level Pairwise Comparisons

Expert	A:B	A:C	A:D	A:E	B:C	B:D	B:E	C:D	C:E	D:E
Expert 1	70	50	75	50	40	65	40	60	50	40
Expert 3	50	60	50	60	50	50	50	60	40	40
Expert 6	75	50	50	75	25	50	50	75	75	50
Expert 7	20	50	30	30	60	60	60	70	55	50
Expert 9	50	25	20	20	50	50	50	60	40	40
Expert 10	20	60	20	40	90	60	50	40	20	40
Expert 11	45	45	50	40	45	50	48	58	50	42
Expert 13	67	50	80	67	50	67	50	67	67	33
Expert 16	15	50	50	15	50	60	15	50	15	15
Expert 18	10	50	10	50	95	50	95	35	50	95
Expert 20	80	75	80	50	20	50	50	75	80	60
Expert 21	30	30	40	50	80	60	80	30	60	80
Expert 22	40	40	30	25	50	30	40	60	50	50
Expert 23	25	50	25	25	50	25	50	25	25	75
Expert 24	40	40	50	40	60	60	60	50	50	60
Expert 26	50	50	40	50	40	50	25	50	50	25
Expert 27	80	50	80	80	20	50	50	50	50	50
Expert 28	60	60	60	60	40	50	50	60	50	60
Expert 29	85	65	85	75	25	75	45	85	75	50
Expert 31	50	50	50	40	60	50	40	45	50	50
Expert 35	50	50	75	75	50	75	75	75	75	50
Expert 50	20	20	50	20	70	75	60	60	40	20
Expert 56	40	40	40	45	50	50	45	60	45	40

A: Technological

B: Regulatory Landscape

C: Economic

D: Political Interpretation & Proposals

E: Social

Appendix H2: Technological Sub-Criteria Pairwise Comparisons

Expert	A:B	A:C	A:D
Expert 1	45	50	55
Expert 3	60	60	60
Expert 4	25	50	60
Expert 5	40	30	80
Expert 6	50	35	35
Expert 7	65	40	20
Expert 8	25	50	75
Expert 9	25	75	75
Expert 11	50	60	60
Expert 12	14	84	89
Expert 14	40	75	90
Expert 15	50	45	40
Expert 34	80	60	40

A: Improving Technological Capabilities

B: Digital Transformation of Application Processes

C: Increase National Security Features for Applicants

Appendix H3: Regulatory Landscape Sub-Criteria Pairwise Comparisons

Expert	A:B	A:C	A:D	A:E	B:C	B:D	B:E	C:D	C:E	D:E
Expert 17	20	50	20	20	85	65	65	20	20	65
Expert 18	40	60	50	20	60	60	40	50	40	25
Expert 19	25	50	25	40	60	60	90	50	60	90
Expert 21	40	65	65	50	65	65	50	60	35	35
Expert 22	50	60	25	60	60	50	60	30	35	50
Expert 23	65	50	1	40	25	1	50	30	50	70
Expert 24	84	50	50	72	30	50	65	30	31	84
Expert 25	40	45	60	40	70	75	60	70	25	40
Expert 26	50	75	40	40	60	30	40	25	40	50
Expert 29	70	50	36	33	32	33	33	66	66	65
Expert 40	20	75	30	50	80	60	70	70	40	50

A: Labor Conditions

B: Fluctuation of Caps/Limits

C: Adapt Industry Necessities

D: Ease Lawful Permanent Residence Status

E: Raising and Balance Immigration Levels

Appendix H4: Economic Sub-Criteria Pairwise Comparisons

Expert	A:B	A:C	A:D	A:E	B:C	B:D	B:E	C:D	C:E	D:E
Expert 1	16	20	16	14	45	47	45	50	50	50
Expert 7	50	35	35	35	35	35	35	50	50	50
Expert 27	35	61	57	39	67	66	30	60	68	37
Expert 29	32	41	44	47	58	63	67	66	71	62
Expert 31	50	50	52	50	50	50	50	50	49	44
Expert 32	10	10	10	10	50	50	30	50	40	50
Expert 34	60	80	80	80	60	75	80	50	60	60
Expert 35	75	80	80	50	80	80	80	80	80	80
Expert 36	10	10	10	10	10	10	10	90	10	10
Expert 37	20	50	20	20	80	70	50	65	70	65

A: Fee Applications

B: Competitive wages and benefits

C: Value of contributions

D: Actively engagement

E: Adjust immigration targets based on economic demands

Appendix H5: Political Interpretation and Proposals Sub-Criteria Pairwise Comparisons

Expert	A:B	A:C	A:D	B:C	B:D	C:D
Expert 21	25	26	70	50	70	65
Expert 24	50	65	80	30	81	72
Expert 31	49	48	47	45	50	50
Expert 40	75	20	30	10	25	80
Expert 42	66	66	34	50	34	34
Expert 44	30	50	40	80	79	50
Expert 45	35	49	89	20	75	80
Expert 46	70	61	71	36	65	74
Expert 47	80	79	28	83	15	21
Expert 48	80	70	90	50	50	40
Expert 49	75	50	50	50	50	50
Expert 53	82	82	82	28	28	67

A: Making immigration selectivity more egalitarian

B: Hybrid system for dual selection and verification

C: Backlog reduction

D: Redistribution and recapture of LPR cards / visas

Appendix H6: Social Sub-Criteria Pairwise Comparisons

Expert	A:B	A:C	A:D	B:C	B:D	C:D
Expert 15	55	50	50	45	45	45
Expert 22	50	60	65	50	70	50
Expert 50	50	25	30	25	30	60
Expert 51	30	10	1	50	50	28
Expert 53	40	30	25	50	50	50
Expert 54	65	9	44	64	65	39
Expert 55	20	5	10	50	85	50
Expert 56	33	40	40	45	40	50
Expert 57	70	19	30	40	70	70
Expert 58	80	75	60	50	80	50
Expert 59	30	40	40	60	50	50
Expert 60	90	6	18	28	16	70

A: High-Quality Education

B: High-Quality Training and Salary

C: Increase Immigration Acceptance

D: Increase Immigration Welcoming, Diversity, and Inclusion

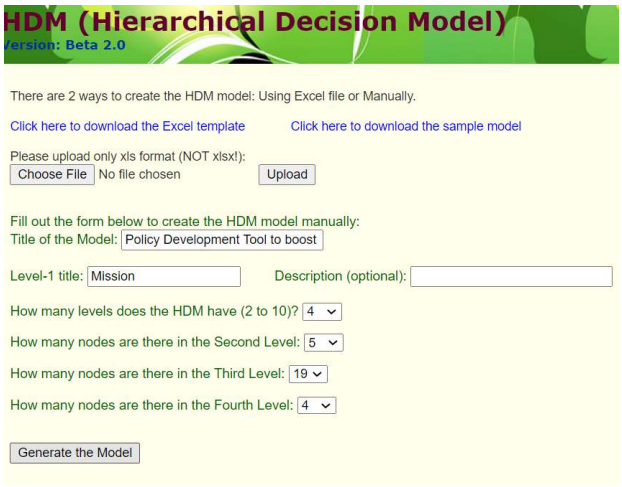
Appendix I. Process to Create the Hierarchical Decision Model

The model creation process using the HDM Software, Version: Beta 2.0, is described below. The HDM model in this research has four levels: level one corresponds to the research's objective, level two checks the five criteria identified in the literature review, and level three corresponds to the set of twenty-one sub-criteria also placed in the literature. Level four corresponds to the HDM alternatives.

Step 1. Sing up in the HDM software (http://research1.etm.pdx.edu/).

Step 2. Click on "Create a New HDM Model."

Step 3. There are two ways to create the HDM model: (1) using an Excel file and (2) entering data manually. Either way works well. The number of levels and nodes the model will include must be selected. The model has four levels: five nodes in the second, twenty-one in the third, and five in the fourth. Each node represents one criterion in the second level, one sub-criteria in the third, and one alternative in the fourth. Once all levels are labeled, click "Generate the Model" to continue with model creation.



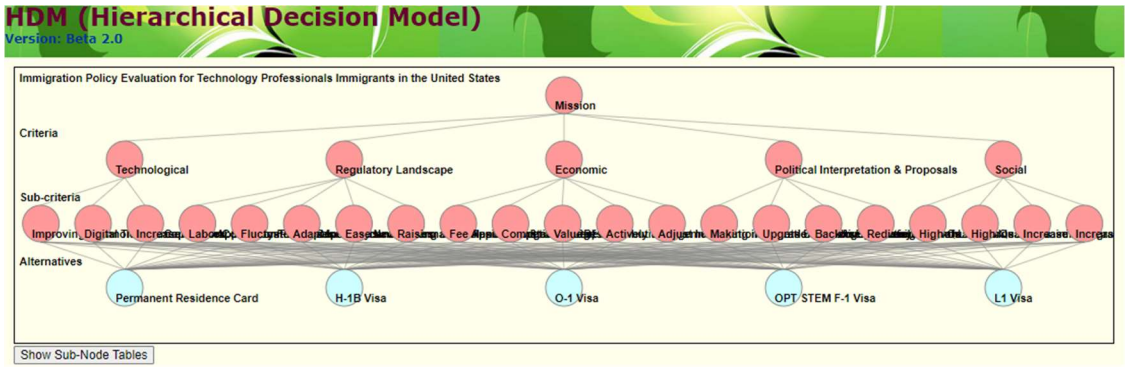
Step 4. Level 2 is titled as "Criteria."

Step 5. Then, Level 3 is labeled as "Sub-criteria."

Step 6. The HDM software automatically links the Mission (Level 1) with the Criteria (Level 2) upon model generation. Then, the next step is to manually link the Criteria (Level 2) with the Sub-criteria (Level 3). Lastly, link the Sub-criteria (Level 3) with the Alternatives (Level 4).

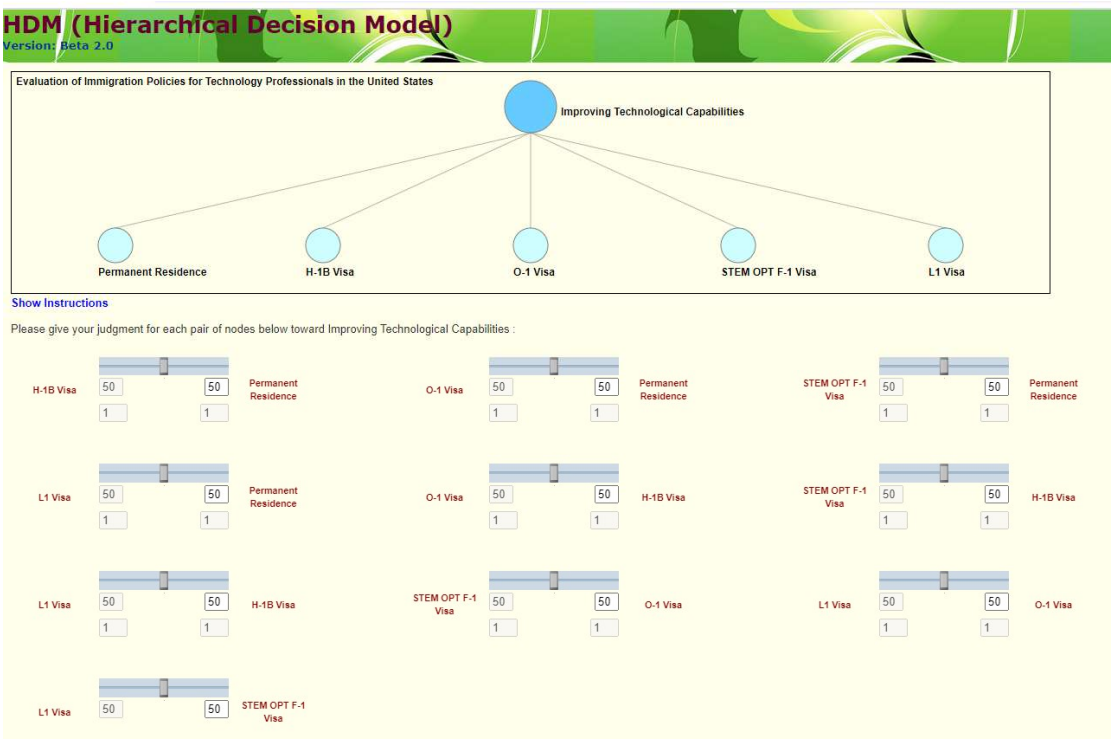
Step 7. The HDM software highlights the notes that need to be linked in blue. The list of notes is displayed next to a check box. The researcher must link the notes and repeat this task until the whole model is linked.

Step 8. After linking the nodes, all turn blue, meaning the model is ready to share with experts.



Step 9. The HDM software can break down the criteria and sub-criteria since each expert has a specific area of knowledge. The researcher will send individual links to experts to share their judgment.

The quantification phase can be completed between ten to twelve weeks, depending on the experts' willingness. Along with a letter of invitation, the experts will receive an HDM link to give their judgment for each pair of nodes. The pairwise comparisons determine the contribution of the criteria, sub-criteria, and alternatives to the HDM mission.



Step 10. After collecting and cleaning the data, the researcher must organize the results according to the quantification provided by experts. The mean values determine the order of the criteria, sub-criteria, and alternatives concerning the mission. The inconsistency and disagreement values are acceptable if they are below the maximum acceptable threshold of 0.1.