PROPOSING A NEW METHODOLOGY: APPLYING SYSTEMS ENGINEERING APPROACHES TO THE CURRENT POLITICAL IMPASSE IN THE IMMIGRATION LAW AND POLICY DEBATE IN THE U.S.

A thesis presented by
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DEDICATION

This thesis is dedicated to my parents, Mr. and Mrs. Mikano Japhet and the entire

Nelle Eke family.
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Noah Nelle Eke Japhet
ACKNOWLEDGEMENTS

I have always dreamed of getting a doctorate degree in some discipline. After more than four years of diligent academic endeavors, while dutifully carrying out my professional responsibilities as a staff member in the college of engineering, at Northeastern University, this dream is slowly but surely being fulfilled. I could only stay focused with the strength that the good Lord through the power of His Holy Spirit blessed me with determination to carry through to the end of this academic exercise. To God, be the glory, honor, and the power for the knowledge, wisdom and understanding he gave me to persevere to the end of this doctoral experience. Credit and thanks also goes to my faculty advisor Doctor Neenah Estrella-Luna who guided me through this entire academic process and encouraged me every step of the way to stay focused and diligent. More importantly, she trusted in my thought process of picking out a modified topic for the thesis project. I am most grateful to her for allowing me to test this thesis concept and to come up with an original topic to investigate. Her feedback and recommendations have proven invaluable.

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How can I forget to appreciate my parents who not only gave me life, but started me on this long arduous journey of acquiring knowledge and understanding of the world around me? Though they have passed on, I would continue to cherish the early memories of learning the alphabet with my mother. My family and elder sister Rose Ekindi Mbella (Cocona) have been instrumental in shaping my desire to be the best that I can be. As a teacher, she instilled in me the desire to learn challenging things and never to give up even when the academic journey gets rough. As my elder sister, who brought me up from childhood, she is the reason why I loved school so much that I have come to be known as a professional student whose appetite for knowledge only keeps growing on a daily basis.
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ABSTRACT

There is a general agreement among U.S. politicians that the country is in need of comprehensive immigration reform. However, there is also fundamental disagreement among members of Congress about how to overcome their political and ideological differences to pass comprehensive immigration legislation. This thesis focused on the question: What are the most important issues for the U.S. House of Representatives to focus on in the immigration debate?

The goal of this study was to develop an interdisciplinary quantitative approach to decision making in law and policy. The identification and use of non-biased and non-partisan tools may help identify core issues around which constructive discourse and compromise may be possible to overcome the current impasse in the House of Representatives over these contentious immigration issues. In 2013, the U.S. Senate passed the Senate version of immigration reform under the Border Security, Economic Opportunity and Immigration Modernization Act. This bill then went to the U.S. House of Representatives for a general vote. But the law hit an impasse in the House due to strongly held positions amongst the House members. The debate on immigration is viewed by many observers as ideological and political in nature. While some policymakers favor border security as priority, others prefer a restructuring of the visa program. And yet, others prefer the legalization of the undocumented immigrant population with a path to citizenship.

In this thesis project, I explore the possibility of applying systems engineering techniques, especially the analytic hierarchy process (AHP), to the immigration debate currently stalled in the U.S. House of Representatives. By applying an AHP approach, I seek to identify
which issues are most important for future House discussions to take up. The results show that study participants clearly considered legalization and path to citizenship as their top priority ranking it with an overwhelming 0.496 compared to the second top priority, border security and control at a distant 0.246. The fight against terrorism came third with a 0.163 and the need for STEM professionals came in fourth with 0.094. While these results show an overwhelming preference by the respondents to consider the legalization and a path to citizenship as the top priority for the immigration reform, the respondents’ individual preferences played a positive role in determining the final aggregate preferences of all the respondents. Nonetheless, passing legislation on comprehensive immigration reform is a critical aspect in the general wellbeing of the U.S. society. This study clearly showed that the respondents regarded legalization and path to citizenship as the most important issue that would benefit the American society politically, socially, and economically while maintaining the rule of law and safeguarding the civil liberties of unauthorized residents in the U.S. The method described in this thesis supports the view that law and policymakers should adapt proven interdisciplinary approaches such as the AHP method of analysis used by systems engineers to find consensus to group decision making. The AHP method therefore, may contribute to combining empirical evidence and subjective experience to improve decisions on law and policy questions faced by the American public on a daily basis.
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Chapter 1: Introduction

There is a general agreement among U.S. policymakers that the country is in need of comprehensive immigration reform. However, there is also a fundamental disagreement among members of Congress about how to overcome their political and ideological differences in order to pass this legislation. This implies one question that remains: What are the most important issues for the U.S. House of Representatives to focus on in the immigration debate? What is the level of importance for the many issues in the debate hierarchy? How can members of the U.S. House of Representatives overcome their differences on these issues and move forward? An analysis by the Migration Policy Institute showing a side-by-side comparison of the 2013 Senate Bill with individual 2013 unpassed House Bills displays mutual agreement on the issues.\(^1\) However, House members disagree in their order of priority.

Given the current stalemate in the U.S. Congress to answer these questions, this thesis was developed to attempt an answer to these questions and to make recommendations to the immigration debate at hand. This thesis proposes that applying a systems engineering technique to the immigration debate will provide policymakers with a non-partisan method to facilitate discussion and allow them to improve on their decision making abilities and potentially reach a consensus on the prioritization of the issues under contention. The Analytic Hierarchy Process (AHP) is a decision making tool that could aid law and policymakers to make complex decisions in an ever increasing complex world.\(^2\)

**Thesis Goal and Research Question**

The goal of this study is to develop an interdisciplinary quantitative approach to decision making in law and policy. The identification and use of non-biased and non-partisan tools may help identify core issues around which constructive discourse and compromise may be possible. In this thesis, I will apply a systems engineering approach to a law and policy debate. Specifically, I will apply analytic hierarchy process (AHP) to the immigration reform debate currently stalled in the U.S. House of Representatives. The AHP technique is a method of prioritization that enables the decision maker to rank the issues under consideration in order of priority and importance. It is, therefore, the hope of this study that if this technique is applied by the collective membership of the U.S. House of Representatives, that it may be a useful tool in assisting law makers in prioritizing the issues as a collective body of lawmakers, thereby helping to overcome the current impasse in the immigration debate and allow for negotiations to resume towards the adoption of comprehensive immigration reform. The research question for this study is: Can we apply systems engineering methods to a contentious political question and arrive at a non-partisan method for solving a law and policy problem?

**Statement of Purpose**

This study will adopt the AHP technique used in systems engineering to the immigration debate. I pilot tested the AHP technique using citizens’ opinion data. The goal is to identify an objective ranking by order of importance of the immigration issues and find a constructive non-partisan path towards the adoption of a comprehensive immigration reform.

**Problem Definition and Objective**

Ideological constructs and political interest groups in the U.S. Congress have contributed to
the political stalemate on the issue of comprehensive national immigration reform.\textsuperscript{3} I have identified four primary issues of contention:

- Border security and control;
- Fight against terrorism;
- Need for STEM professionals; and
- Legalization & path to citizenship for undocumented immigrants.

The contentious issues outlined above, have resulted in rigid ideological stances to be adopted by most policymakers who are eager to appeal to their particular constituencies. This has caused the failure of the majority of the members of the U.S. House of representatives to agree on a common platform to reconcile their political and ideological differences. One error observed in the immigration debate is that lawmakers tend to view immigration on a state-by-state or region-by-region level, making it difficult to agree on a federal solution. This study proposes that the four listed issues above be looked at as multiple subsystems forming one whole complex system which work to ensure the welfare of the entire U.S. immigration legal system.

\textbf{Study significance}

Adapting and tailoring systems engineering analytical methods to address the immigration challenges of our time will provide an added solution method to the current methods of negotiation such as the independent lobbying strategies from powerful advocacy groups or earmarks to members of Congress to gain their support and secure their votes for or against a particular measure. At the completion of the study, the knowledge gained in applying engineering solutions to law and policy issues would contribute to the advancement of knowledge in interdisciplinary studies. The application

of interdisciplinary problem solving techniques, such as AHP, to socio-legal fields would begin to bridge the gap between management sciences and legal studies in an attempt at finding long lasting solutions to common human problems. This study also adds to the field of law and policy study in that it explores a methodological tool for future law and policy researchers to consider as they endeavor to answer complex policy questions. The AHP method of analysis has been successfully applied to other decision making challenges, including healthcare and criminal justice, with a measure of success.⁴

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⁴ Jack Levin and Jack McDevitt, *Hate crimes revisited: America’s war against those who are different* (Basic Books, 2002).
Chapter 2: Background and literature review

Defining the problem: Impasse in Congress

In 2013, the U.S. Senate passed the Senate version of immigration reform under the Border Security, Economic Opportunity and Immigration Modernization Act. This Act then went to the U.S. House of Representatives for a general vote. But the law hit an impasse in the House due to strong ideological and political opposition amongst the House members.

A review of the arguments in the Senate and the House of Representatives confirms that members of Congress have opposing views on issues surrounding immigration. Notably, there are opposing views posed by a cross section of politicians who are against legalization and a path to citizenship for undocumented immigrants. On the other hand, some members of Congress argue that securing and controlling the southern borders from illegal entry into the United States is more of a priority to their constituents. Meanwhile, some members of Congress have adopted a more economic standpoint, siding with U.S. employers who would rather see foreign students who have graduated from American universities with a degree in Science, Technology, Engineering and Math (STEM) be granted work visas to allow them to take up residence in the U.S. in a bid to grow the economy. And finally, there are members of Congress and their lobbyists who are strongly opposed to allowing entry of immigrants from certain nations for fear of unknowingly permitting terrorists into the American soil. These four contentious issues mentioned above, were also identified by the U.S. Senate and these became the cornerstone for the bipartisan Senate bill passed in June of 2013. Nonetheless, these four issues are the basis for strong positions in Congress and an inability for members of the U.S. House of

Representative to reconcile their respective views, thereby creating an impasse on the immigration policy debates. There are those whose priority is to keep immigrant families together (for political gains). There are others whose focus is on illegal immigration. In either case, there is an urgent need for a new strategy to assist members of Congress in reconciling their opposing viewpoints so as to advance the debate on immigration reform.

**Literature Review**

The debates on immigration are viewed by many observers as ideological and political in nature. While some policymakers favor border security as priority, others prefer a restructuring of the visa program, and others prefer the legalization of the undocumented immigrant population with a path to citizenship. The Migration Policy Institute (MPI) reports that the current fierce immigration debates in Congress could be the result of the nation’s direct response to the terrorist attacks on U.S. soil after September 11, 2001. In response to the attack of September 2001, the Federal Government passed a series of stringent security measures aimed at preventing any future attacks. These laws sought to bolster security at ports of entry and securing the U.S. southern border against illegal immigration from neighboring nations. Congress’ inability to pass a comprehensive immigration package has created a political quagmire. A power struggle between the President of the United States and Congress that has created a political power vacuum in the pushbacks as the President threatens to unilaterally solve the immigration dilemma for millions of undocumented immigrants through an

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9 Ibid.
executive order. \(^\text{10}\) Both proponents and opponents of a comprehensive immigration reform sharply disagree on the legality of such an executive order but, more importantly, they disagree on their preferences on the issues and have argued strictly on party and ideological lines.\(^\text{11}\)

Previous studies have explained the current impasse on the comprehensive immigration debate as being rooted in a general lack of interest by members of the House of Representatives in reconciling their ideological differences and seeking a common solution for their conflicting priorities and interests.\(^\text{12}\) Members of Congress and the general public are still debating the effects of the 1986 Immigration Reform and Control Act (IRCA) that supported a general legalization of undocumented immigrants in the U.S.\(^\text{13}\) Opponents of legalization argue against comprehensive immigration reform based on IRCA’s failure to stop illegal immigration and to permanently reduce the unauthorized population, as IRCA’s advocates had predicted it would.\(^\text{14}\) Opponents of general legalization of non-immigrants argue that the proposals found in the Senate bill are not much different from those of IRCA, and therefore, predict that the outcomes will be similar. However, if efforts are made to apply and enforce the terms of the 1986 Immigration Reform and Control Act (IRCA, 1986) law, it will significantly reduce unauthorized immigrant movement within and without the United States.\(^\text{15}\)

Members of the House therefore, must choose among these three options suggested by the 1986 immigration law: a) a general legalization approach, b) a limited approach, or c) a combination


\(^{15}\) Ibid.
of both). One argument against general legalization is based on the fear that President Obama would grant an amnesty to the 11 million undocumented immigrants currently living in the U.S. and would not keep his promise to strengthen border security and controls in the southern states. The lack of trust among members of the House, the President, and the Senate has caused political opponents to be skeptical of the intentions of the Senate Bill having no real “triggers” to secure the southern borders through which many unauthorized entries were made into the U.S. Armed with the memories of the failed 1986 law to deter unauthorized entry into the U.S., and also given that the federal government has not fully funded, equipped, or provided adequate manpower to protect, control and apprehend unauthorized entry through the southern states, the current members of the House rejected the 2013 Senate Bill (S.744) due to a lack of financial and judicial will to implement the law therein. This rejection of S.744 by the House created a stalemate in the debates. The Congressional Budget Office (CBO) has also argued that if the Senate Bill is passed it will increase the total number of immigrants living in the United States to 9.6 million by the year 2023. However, the CBO and the Joint Committee on Taxation (JCT) conducted a cost estimate of the Senate bill. Their report shows that “enacting S. 744, as passed by the Senate, would generate changes in direct spending and revenues that would decrease federal budget deficits by $158 billion over the 2014-2023 period.” The report also “estimates that implementing the legislation would result in net discretionary costs of $23 billion over the 2014-2023 period, assuming appropriation of the amounts authorized or otherwise needed to implement the legislation. Combining those figures would lead to a net savings of about $135 billion over the 2014-2023 period from enacting S. 744.” An analysis by the Migration Policy Institute

16 Ibid.
showing a side-by-side comparison of the 2013 Senate Bill with individual 2013 House Bills displays a mutual agreement on the four issues outlined above. However, members diametrically disagree in their order of priority.¹⁹

Opponents of a comprehensive immigration reform have employed same arguments to derail comprehensive immigration efforts in the past.²⁰ U.S. lawmakers also saw an increased number of migrant workers into the United States as a result of cheap agricultural labor from neighboring countries like Mexico who are needed to work the extensive agro farm lands of U.S. businesses.²¹ Given these factors, policymakers and the public have become wary of partisan immigration policy changes that are derived at times to satisfy cross sections of the U.S. economic sectors. The dilemma is between safeguarding and respecting the need to preserve the fundamental rights of migrants and deporting them back to their respective home countries.²²

This dilemma has sparked a national debate on the complex “immigration question” about adopting a comprehensive immigration reform that would speak to the fundamental principles of the rule of law in the United States of America. The partisan state of affairs in Congress has made members of the House of Representatives unable to come to a consensus and find a common solution. For example, the House approved an enforcement-only Bill (H. R. 4437) in 2005.²³ To neutralize the House bill, the Senate approved its own version of a comprehensive bill (S. 2611) in 2006, also called “The DREAM Act,” that included both enforcement and a pathway to legalization.²⁴ Politicians on

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¹⁹ "Side-by-Side Comparison of 2013 Senate Immigration Bill with individual 2013 House Bills."
both sides (Republicans and Democrats) could not agree on a reconciled Bill. Given Congress’ inability to pass a compromise bill, President Obama is stepping in and challenging lawmakers to start a national conversation on how to solve the problem. He suggested a bill that supports tougher enforcement against unauthorized migration, legalizes most, if not all, the unauthorized immigrant residents in the U.S.; provides a pathway to citizenship; and reorganizes the visa system by expanding old visa programs and creating new workers’ programs. This plan is simple in the eyes of immigration supporters yet complicated because opponents of this plan view it as an amnesty program for millions of undocumented immigrants in the U.S. The President’s proposal ignited national debate on immigration reform. Policy scholars believe that in order to avoid repeating the mistakes of past debates on immigration, members of Congress must grapple with those socio-economic, political, and civil rights issues which are fundamental and central to the immigration law and policy debates.

Chapter 3: Methodology

In this thesis project, I explore the possibility of applying systems engineering approach, especially the Analytic Hierarchy Process (AHP), to the immigration debate currently stalled in the U.S. House of Representatives. By applying an AHP approach, I seek to identify which issues are most important for future House discussions to take up.

Definition of AHP

“The Analytic Hierarchy Process is a decision model that aids us in making decisions in our complex world. It is a three part process which includes identifying and organizing decision objects, criteria, constraints, and alternatives into a hierarchy; evaluating pairwise comparisons between the relevant elements at each level of the hierarchy and the synthesis using the solution algorithm of the results of the pairwise comparisons over all the levels and the algorithm result gives the relative importance of alternative courses of action” Thomas L. Saaty,\(^{28}\)

The rationale for applying systems engineering design and its analytical tools to policy questions before the U.S. Congress is to provide a fresh set of tools for considering the immigration issues in Congress. Adopting and adapting the AHP method of decision making to law and policy concerns may assist in reaching non-partisan solutions to a practical social issue with political, economic, and civil liberties overtones.\(^{29}\) The AHP is an effective tool for quantifying qualitative knowledge, as it allows policymakers to measure intangible dimensions such as subjective preferences of the study participants’ judgments of issues under investigation, particularly, personal

\(^{28}\) Saaty, What is the analytic hierarchy process?
experiences and knowledge of experts in certain fields.\textsuperscript{30} The AHP is a multi-dimensional, multi-level, and multi-factorial decision making method based on the idea that it is possible to prioritize elements by grouping them into meaningful categories and sub-categories, by performing pairwise comparisons, and by defining a coherent framework of quantitative and qualitative knowledge, so that researchers can measure intangible domains.\textsuperscript{31} Furthermore, it is a tool supported by simple mathematics, which enables decision makers to explicitly weigh tangible and intangible criteria against each other for the purpose of resolving conflict or setting priorities.\textsuperscript{32} This hierarchical approach allows researchers to construct a consistent framework for a step-by-step decision making approach which breaks down complex problems into many small, less complex ones that decision makers can more easily manage.\textsuperscript{33} This step-by-step decision making process provides law and policymakers in Congress a framework in which to address immigration reform with some measureable outcomes.\textsuperscript{34}

**Study Design: Developing the Hierarchy**

The AHP design allows the decision maker to specify judgments about the relative importance of each criterion in terms of its contribution to the achievement of the overall goal. AHP asks the decision maker to indicate a preference or priority for each decision alternative in terms of how it contributes to each criterion. In this study, each respondent was asked to prioritize four immigration

\textsuperscript{30} Leandro Pecchia et al., "Use of the Analytic Hierarchy Process (AHP) for examining healthcare professionals’ assessments of the relative importance of risk factors for falls in community-dwelling older people," *Methods of information in medicine* 50, no. 5 (2011).
\textsuperscript{31} Pecchia et al., "User needs elicitation via analytic hierarchy process (AHP). A case study on a Computed Tomography (CT) scanner."
\textsuperscript{33} Uwe Reinhardt, "Divide et impera: protecting the growth of health care incomes (COSTS)," *Health economics* 21, no. 1 (2012).
\textsuperscript{34} Thomas L Saaty, "An essay on how judgment and measurement are different in science and in decision making," *International Journal of the Analytic Hierarchy Process* 1, no. 1 (2009).
issues (legalization & path to citizenship for undocumented immigrants, border security and control, fight against terrorism, and need for STEM professionals). Respondents were also asked to prioritize the criteria by which these priorities would be evaluated. The study used a modified pairwise value judgment of preference on a scale of 1 through 5 compared, as shown in Table 3.1 in relation to these four criteria (politics, social aspects, economy, and civil liberties) as shown in Figure 3.1.

**Table 3.1: Modified verbal judgment of preference and its numerical rating scale**

<table>
<thead>
<tr>
<th>Verbal judgment of preference</th>
<th>Numerical rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Much less</td>
<td>1</td>
</tr>
<tr>
<td>Less</td>
<td>2</td>
</tr>
<tr>
<td>Equally</td>
<td>3</td>
</tr>
<tr>
<td>More</td>
<td>4</td>
</tr>
<tr>
<td>Much more</td>
<td>5</td>
</tr>
</tbody>
</table>

**Figure 3.1 Design hierarchy: Overall goal, criteria, and decision alternatives**
Following the prioritization, matrix algebra was used to synthesize the information on relative importance and preferences and a priority ranking was developed to satisfy the best criteria for the best decision alternative towards the overall goal. Figure 3.1 shows the elements in a design hierarchy to achieve the best overall immigration option. Table 3.2 provides a visual view of how the pairwise comparison was designed to achieve the desired pairwise preferences in terms of the four chosen criteria.

**Table 3.2 Pairwise comparisons for the four chosen criteria**

<table>
<thead>
<tr>
<th>Politics vs. Social aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Politics vs. Economy</td>
</tr>
<tr>
<td>Politics vs. Civil Liberties aspects</td>
</tr>
<tr>
<td>Social aspects vs. Economy</td>
</tr>
<tr>
<td>Social aspects vs. Civil Liberties aspects</td>
</tr>
<tr>
<td>Economy vs. Civil Liberties aspects</td>
</tr>
</tbody>
</table>

The systems engineering approach, AHP, uses a design structure that includes three interrelated parts; the overall goal, study criteria, and decision alternatives. A design hierarchy as shown in Figure 3.1 was developed to reflect these three parts with a particular emphasis on the decision alternatives. The four major decision alternatives were central to the Senate Bill (S.744) passed by the U.S. Senate in June 2013. These decision alternatives were measured against social, political, economic, and civil liberties concerns to determine the most important immigration option among those presented.
Data collection procedure: Survey Questionnaire layout

This study collected data via both an online survey and paper survey. Online surveys are common and simple to administer (see Appendix B). The survey questionnaire was divided into two sections. Section one contained the pairwise comparison for the four study criteria, and section two contained the four decision alternatives - legalization and path to citizenship, border security and control, the fight against terrorism, and the need for science, technology, engineering and math (STEM) graduates. Section one contains a lead question with six pairwise comparison questions of equal weight as shown in Table 3.3. Participants were asked to prioritize each element on the left to each element on the right using the pairwise comparison.

Table 3.3 Pairwise comparisons for criteria and survey questionnaire layout

<table>
<thead>
<tr>
<th>In your opinion in the immigration debate how important is each element on the left compared to each element on the</th>
<th>Social aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Politics</td>
<td>Social aspects</td>
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<td>Much Less</td>
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<td>More</td>
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<td>Much More</td>
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<tr>
<td>Important than</td>
<td></td>
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<tr>
<td>Politics</td>
<td>Economy</td>
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<td>is</td>
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<tr>
<td>Much Less</td>
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<tr>
<td>Much More</td>
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<tr>
<td>Important than</td>
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<tr>
<td>Social aspects</td>
<td>Economy</td>
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<td>Much Less</td>
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<td>More</td>
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<tr>
<td>Much More</td>
<td></td>
</tr>
<tr>
<td>Important than</td>
<td></td>
</tr>
<tr>
<td>Social aspects</td>
<td>Civil Liberties aspects</td>
</tr>
<tr>
<td>is</td>
<td></td>
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<tr>
<td>Much Less</td>
<td></td>
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<tr>
<td>Less</td>
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<tr>
<td>Equally</td>
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<tr>
<td>More</td>
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<tr>
<td>Much More</td>
<td></td>
</tr>
<tr>
<td>Important than</td>
<td></td>
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<tr>
<td>Economy</td>
<td>Civil Liberties aspects</td>
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<td>is</td>
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<tr>
<td>Much Less</td>
<td></td>
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<tr>
<td>Less</td>
<td></td>
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<tr>
<td>Equally</td>
<td></td>
</tr>
<tr>
<td>More</td>
<td></td>
</tr>
<tr>
<td>Much More</td>
<td></td>
</tr>
<tr>
<td>Important than</td>
<td></td>
</tr>
</tbody>
</table>

Section two of the survey questionnaire layout also contain six lead questions with twenty four pairwise comparison questions highlighting the four decision alternatives as shown in Table 3.4
For the purpose of this study, and to satisfy the overall goal of selecting the best immigration option, the first step is to determine the relative rank of the four criteria in Table 3.3 in relation to each other. Next, we must also determine the priority ranking of each of the six decision alternatives as shown in Table 3.4 above.
Methods

An online survey instrument of similar format was developed using Google forms. An email to all the individual members of the House of Representatives containing a link to the online survey was generated (See Appendix C). When the online survey method failed to collect the necessary data, a paper survey was drafted similar to the online version and given to Northeastern University undergraduate and graduate law and policy students to complete. In both survey sections of the pairwise comparison survey, participants were asked to rank the issues in the immigration debate by rating each element in the left column against each element in the right column using the comparison judgment scale as shown in Tables 3.3 and 3.4.

This study initially intended to collect data from members of the United States House of Representatives or their research teams. Participants’ consent was sought via online email. A sample size of 40 of the target audience, slightly less than 10% of a total of 435 members of the U.S. House of Representatives, was determined to be a sufficient number to achieve any significant results and to allow the study to draw meaningful conclusions from the data set. After securing approvals from the Northeastern University Internal Review Board (IRB), (See Appendix D), an introductory email containing an unsigned consent form was sent out informing them of the purpose of the survey and reassuring them of the confidentiality of their input and identities. A copy of the unsigned consent form is provided in Appendix E -1. A follow up email containing the link to the survey questionnaire was sent out to the target audience a few days later advising them that they may choose not to participate in the study and thanking those that had completed the survey (See Appendix F). Clicking on the survey link and entering the survey was considered consenting to participate. A start and end date for the data collection was also provided. Study participants were identified using the House of
Representatives website to ensure that they were members of the U.S. House of Representatives. The target group was further encouraged to return their responses within a one month period. Given the difficulty of reaching members of the House of Representatives by phone or by regular mail, the choice was made to reach them via their official email address. This method of reaching the target audience assures quick delivery, a certainty that an intern will see these things in their inbox and will bring it to the attention of the Congressman or his representative. The study assumed that the quick delivery would allow representatives to respond on time for the completion of the study. During this period, only five members of the U.S. House of Representatives completed the survey questionnaire.

This attempt failed to produce the desired amount of data to perform the analysis. Therefore, the online survey questionnaire was converted to a paper survey. Then the Northeastern University Internal Review Board was petitioned for a second approval. After securing approval, the study recruited 58 undergraduate and graduate Northeastern law and policy students from three classes as the new target audience. Appendix B contains paper copy of the survey questionnaire. A recruitment pitch was also developed and is included in Appendix E - 2.

All data from the online questionnaire was stored in a password protected secure database for analysis and all paper surveys were also securely stored away for future reference. Incomplete questionnaires were not considered for this analysis.

**Analysis**

In this study, I used the Transparent Choice software developed by Stuart Easton\(^\text{35}\) to construct the AHP design and to analyze the data. I also used Microsoft Excel to perform step-by-step

calculations modeled on Anderson and Sweeney.\textsuperscript{36} Similar analysis using AHP calculations was conducted by Gupta and Ilgin on Remanufacturing Modeling and analysis.\textsuperscript{37}

**Conclusion**

Systems engineers have used AHP to analyze engineering problems and policy issues in healthcare, manufacturing and production, aviation, tunnels, and bridges, to ensure that an entire system performs effectively and functions properly in harmony with all related subsystems. For a system to function harmoniously, sound policies must be made to achieve the desired end goal. Based on the design hierarchy above, this study considered the entire U.S. society as a human system whose subsystems (political, social, economic, and civil liberties) must also function properly and harmoniously together to achieve peace and progress in the society. To achieve this overall level of peace and progress within the society’s system, sound policies must also be made to keep all the subsystems working together.

The technique adapted for this study applies the analytical concepts in systems engineering problem solving to specific law and policy matters in an attempt to find common ground during group decision making about immigration policies. The goal of this study was to pilot and test a new methodology which, if successful, would be suggested as a useful tool to policymakers in the U.S. House as they endeavor to come to a group consensus on the contentious immigration issues.

\textsuperscript{36} David Anderson et al., *An Introduction to Management Science: Quantitative Approaches to Decision Making, Revised* (Cengage Learning, 2011).

Chapter 4: Analysis and Results

The Pairwise Comparison Judgment Matrix

This study considers four immigration issues: legalization & path to citizenship for undocumented immigrants, border security and control, fight against terrorism, and the need for STEM professionals as decision alternatives using the following four criteria: political aspects, social aspects, the economy, and civil liberties aspects. To determine which criterion has more weight against all other criteria, the study conducts pairwise comparisons of the elements against each other.

To conduct a pairwise comparison of all the judgments from study participants, and assign each judgment a numerical value scale, the study used the judgment matrix in Figure 4.1. The values in Figure 4.1 represent the preferences that study participants specified in their individual judgments in the survey questionnaire. AHP equates an equal value to an element when it is compared to itself. When the rest of the elements in the matrix are compared to the same element, they only carry a fraction of the value of the original element.

\[
\begin{bmatrix}
1 & 2.56 & 2.63 & 2.40 \\
1 & 1 & 3.21 & 2.92 \\
2.56 & 1 & 1 & 2.81 \\
2.63 & 3.21 & 1 & 1 \\
2.40 & 2.92 & 2.81 & 1 \\
\end{bmatrix}
\]

**Figure 4.1: Pairwise comparison of criteria**
Synthesis

Having developed the matrix of pairwise comparisons of aspects of society, the priority of each of the elements compared can be calculated. To calculate the relative priority of each of the decision alternatives in relation to the criteria, all the values in the matrix must be summed up in a process defined by AHP as synthesization.

**Synthesization proceeds as follows:**

The values in each column of the pairwise comparison matrix are summed up. Then, each element in the pairwise comparison matrix is divided by its column total (step 1). Next, the average of the elements in each row of the normalized matrix is computed to determine an estimation of the relative priorities of the elements compared (step 2). These steps are repeated for each element in the matrix until all the values are obtained and an average is determined for a final decision. Figure 4.2 and 4.3 show steps 1 and 2 respectively.

**Step one:** All the values in the matrix columns are summed up

\[
\begin{bmatrix}
1 & 2.56 & 2.63 & 2.4 \\
0.39 & 1 & 3.21 & 2.92 \\
0.38 & 0.31 & 1 & 2.81 \\
0.42 & 0.34 & 0.36 & 1 \\
2.19 & 4.21 & 7.2 & 9.13 \\
\end{bmatrix}
\]

*Figure 4.2: Total of columns from figure 4.1*

**Step two:** Each element in the matrix is divided by its column total
Figure 4.3: Computation of normalized values and averages

Step three: The elements in each row of the normalized matrix from step 2 are averaged and computed to six decimal places. Step 3 results are shown in a priority ranking vector in Figure 4.3. They are also shown in Table 4.1. These results are further depicted for clarity in Figure 4.4

Table 4.1 Ranking of the pairwise comparison by criteria

<table>
<thead>
<tr>
<th>Results: Priority Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Political Aspects</strong></td>
</tr>
<tr>
<td>0.423211</td>
</tr>
<tr>
<td>No.1</td>
</tr>
</tbody>
</table>

Figure 4.4 Priority ranking by criteria
The final pairwise ranking in relation to the criteria selection was as follows: politics ranks first, social aspects ranks second, economy ranks third and civil liberties ranks fourth. These results show that, after considering the totality of the survey participants’ collective judgments, politics ranks as the top priority in the list of given criteria to be considered when Law and Policymakers resume the immigration debate followed by social aspects, then the economy, and finally civil liberties. In order words, politics has a major role to play in the immigration debate moving forward. While this is true of these rankings, the rankings also show that social aspects, the economy, and civil liberty aspects in that order must be considered a priority when the immigration debate resumes in Congress.

Analysis and results of priority ranking of decision alternatives

To determine the priority ranking of the four decision alternatives in relation to the four criteria, (politics, social, economy, and civil liberties), the same AHP procedure outlined was used. Because of the complexity of the analytical tool that deals mainly with prioritization and ranking of the issues through percentages and averages, this study uses only aggregate averages to arrive at the final results.

Politics

Following participants’ final judgments in their selections of the elements against each other, AHP computed the preference ratio as shown in Table 4.2.

Table 4.2 Pairwise comparisons of decision alternatives based on politics

<table>
<thead>
<tr>
<th></th>
<th>Legalization and Path</th>
<th>Border Security</th>
<th>Fight Terrorism</th>
<th>Need for STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legalization</td>
<td>1</td>
<td>3.56</td>
<td>3.13</td>
<td>3.19</td>
</tr>
<tr>
<td>Border Security</td>
<td>0.28</td>
<td>1</td>
<td>2.83</td>
<td>2.81</td>
</tr>
<tr>
<td>Fight Terrorism</td>
<td>0.32</td>
<td>0.35</td>
<td>1</td>
<td>3.21</td>
</tr>
<tr>
<td>Need for STEM</td>
<td>0.31</td>
<td>0.36</td>
<td>0.31</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1.91</strong></td>
<td><strong>5.27</strong></td>
<td><strong>7.27</strong></td>
<td><strong>10.21</strong></td>
</tr>
</tbody>
</table>
The averages of the final ranking of the elements based on politics alone are shown in Figure 4.5.

<table>
<thead>
<tr>
<th></th>
<th>Legalization</th>
<th>Border Security</th>
<th>Fight on Terrorism</th>
<th>Need for STEM</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legalization</td>
<td>0.52356</td>
<td>0.675522</td>
<td>0.430536</td>
<td>0.312439</td>
<td>0.485514</td>
</tr>
<tr>
<td>Border Security</td>
<td>0.146597</td>
<td>0.189753</td>
<td>0.389271</td>
<td>0.27522</td>
<td>0.25021</td>
</tr>
<tr>
<td>Fight on Terrorism</td>
<td>0.167539</td>
<td>0.066414</td>
<td>0.137552</td>
<td>0.314398</td>
<td>0.171476</td>
</tr>
<tr>
<td>Need for STEM</td>
<td>0.162304</td>
<td>0.068311</td>
<td>0.042641</td>
<td>0.097943</td>
<td>0.09278</td>
</tr>
</tbody>
</table>

**Figure 4.5: Computation and averages of elements based on politics**

The averages of the elements measured against politics shown in Figure 4.5 are depicted in a visual graph in Figure 4.6.

**Figure 4.6 Priority ranking of issues measured against politics**

The averages in Figure 4.5, indicate that the preference of the group of survey participants rates legalization as the top priority, followed at a distance by border security and control, the fight against terrorism and the need for STEM professionals in that order.
Social

Following participants’ final judgments in their selections of the elements against each other, AHP computed the preference ratio as shown in Table 4.3

Table 4.3 Pairwise comparisons of decision alternatives based on social aspects

<table>
<thead>
<tr>
<th>Social Aspects</th>
<th>Legalization and Path to citizenship</th>
<th>Border Security</th>
<th>Fight Terrorism</th>
<th>Need for STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legalization</td>
<td>1</td>
<td>3.65</td>
<td>3.24</td>
<td>3.21</td>
</tr>
<tr>
<td>Border Security</td>
<td>0.27</td>
<td>1</td>
<td>2.83</td>
<td>2.84</td>
</tr>
<tr>
<td>Fight Terrorism</td>
<td>0.31</td>
<td>0.35</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Need for STEM</td>
<td>0.31</td>
<td>0.35</td>
<td>0.33</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1.89</td>
<td>5.35</td>
<td>7.4</td>
<td>10.05</td>
</tr>
</tbody>
</table>

The numbers found in Figure 4.7 displays the computation of the ratios from Table 4.3 after repeating steps 1 through 3.

Figure 4.7 Computation of ratios based on Social aspects

In relation to social aspects, AHP places legalization and path to citizenship once again at the top of the priorities list. Border security and control is placed at a distant second, while the fight against terrorism places behind border security and control in third position, and lastly the need for STEM professionals is placed as the fourth priority of the list of elements.

The aggregate averages of the elements measured against social aspects as shown in Figure 4.7 are displayed in a visual in Figure 4.8
The averages in Figure 4.8 indicate that the preference of the group of survey participants rate legalization as their top priority.

**Economy**

The group’s aggregate averages for the decision alternatives based on economy were also calculated. By applying similar computational process, AHP obtained the ratios formatted to two decimal points as shown in Table 4.4

<table>
<thead>
<tr>
<th>Economy</th>
<th>Legalization and Path to citizenship</th>
<th>Border Security</th>
<th>Fight Terrorism</th>
<th>Need for STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legalization</td>
<td>1</td>
<td>3.83</td>
<td>3.75</td>
<td>3.02</td>
</tr>
<tr>
<td>Border Security</td>
<td>0.26</td>
<td>1</td>
<td>3.02</td>
<td>2.4</td>
</tr>
<tr>
<td>Fight Terrorism</td>
<td>0.27</td>
<td>0.33</td>
<td>1</td>
<td>2.33</td>
</tr>
<tr>
<td>Need for STEM</td>
<td>0.33</td>
<td>0.42</td>
<td>0.43</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1.86</strong></td>
<td><strong>5.58</strong></td>
<td><strong>8.2</strong></td>
<td><strong>8.75</strong></td>
</tr>
</tbody>
</table>

Figure 4.9 displays the computed sums of all the ratios as shown in Table 4.4 to six decimal points using steps 1 through 3.
The averages in Figure 4.9 indicate that the participants prefer legalization twice as much as their top priority compared to all other elements under consideration as visually displayed in figure 4.10.

![Figure 4.9: Computation ratios of elements based on Economy](image)

### Civil Liberties

The last step in the computation was to average the total sum of the group’s preference for the decision alternative based on civil liberties using a similar pairwise comparison format.

Following the survey responses collected, AHP computed the preference of each element against each other in this category when measured against civil liberties in the following ratio placed in two decimal points.
Table 4.5 Pairwise comparisons of decision alternatives based on civil liberties aspects

<table>
<thead>
<tr>
<th></th>
<th>Legalization and Path</th>
<th>Border Security</th>
<th>Fight Terrorism</th>
<th>Need for STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legalization</td>
<td>1</td>
<td>4.11</td>
<td>4.03</td>
<td>3.79</td>
</tr>
<tr>
<td>Border Security</td>
<td>0.24</td>
<td>1</td>
<td>2.86</td>
<td>2.89</td>
</tr>
<tr>
<td>Fight Terrorism</td>
<td>0.25</td>
<td>0.35</td>
<td>1</td>
<td>2.89</td>
</tr>
<tr>
<td>Need for STEM</td>
<td>0.26</td>
<td>0.35</td>
<td>0.35</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1.75</td>
<td>5.81</td>
<td>8.24</td>
<td>10.57</td>
</tr>
</tbody>
</table>

AHP used similar steps to compute the ratios shown in Table 4.5 and by using the Microsoft excel function, and the equation editor, the following matrix was constructed as shown in Figure 4.11

\[
\begin{bmatrix}
\text{Legalization} & 0.571429 & 0.707401 & 0.489078 & 0.358562 \\
\text{Border Security} & 0.137143 & 0.172117 & 0.347087 & 0.273415 \\
\text{Fight on Terrorism} & 0.142857 & 0.060241 & 0.121359 & 0.273415 \\
\text{Need for STEM} & 0.148571 & 0.060241 & 0.042476 & 0.094607 \\
\end{bmatrix}
\]

Average

\[
\begin{bmatrix}
0.531617 \\
0.232441 \\
0.149468 \\
0.086474 \\
\end{bmatrix}
\]

Figure 4.11 Computation and averages of elements based on Civil Liberties Aspects

Figure 4.11 displays only the aggregate averages of all the elements in this category that have been measured against civil liberties. As with previous categories, AHP places legalization and path to citizenship at the top of the priority list. According to AHP analysis, the study participants preferred more than twice the issue of legalization and path to citizenship as more important in the debate compared to border security and control and the fight against terrorism and the need for STEM professionals as seen in Figure 4.12.
Figure 4.12 Priority ranking of the issues based on Civil Liberties Aspects

These preliminary results show that, concerning the civil liberties aspect, respondents rank legalization and path to citizenship as a top priority.

**Synthesization**

Following the analysis of all four decision alternatives in relation to all four criteria, AHP consistently maintains the ranking level of importance throughout the entire process for all four elements relative to all four categories that were being considered in this study. After synthesization of all the averages, the priority list of decision alternatives is shown in Table 4.6.

**Table 4.6: Priority list of decision alternatives measured against criteria**

<table>
<thead>
<tr>
<th>Decision Alternative</th>
<th>Politics</th>
<th>Social</th>
<th>Economy</th>
<th>Civil Liberties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legalization and Path to Citizenship</td>
<td>0.485514</td>
<td>0.492146</td>
<td>0.506619</td>
<td>0.531617</td>
</tr>
<tr>
<td>Border Security and Control</td>
<td>0.25021</td>
<td>0.248698</td>
<td>0.240394</td>
<td>0.232441</td>
</tr>
<tr>
<td>Fight against Terrorism</td>
<td>0.171476</td>
<td>0.165771</td>
<td>0.148130</td>
<td>0.149468</td>
</tr>
<tr>
<td>Need for STEM Professionals</td>
<td>0.0928</td>
<td>0.093385</td>
<td>0.104853</td>
<td>0.086474</td>
</tr>
</tbody>
</table>

The synthesization shows that legalization and path to citizenship is consistently placed as the
top priority when considering factors such as politics, social aspects, economy and civil liberties over all the other decision alternatives in the study.

To calculate the overall average for both criteria and decision alternatives, and to determine the overall ranking of both the issues and respective aspects of society, the averages of all the decision alternatives were multiplied by the averages of the criteria to yield the most favorable immigration option. Figure 4.13 shows this process.

The output of those averages reveals the following overall results as shown in Figure 4.13.

\[
\begin{pmatrix}
\text{Legalization} & 0.486 & 0.492 & 0.507 & 0.532 \\
\text{Border Security} & 0.250 & 0.249 & 0.240 & 0.232 \\
\text{Fight on Terrorism} & 0.171 & 0.166 & 0.148 & 0.149 \\
\text{Need for STEM} & 0.093 & 0.093 & 0.105 & 0.086 \\
\end{pmatrix}
\times
\begin{pmatrix}
\text{Politics} & 0.423 \\
\text{Social aspects} & 0.295 \\
\text{Economy} & 0.173 \\
\text{Civil Liberties aspects} & 0.108 \\
\end{pmatrix}
= 
\begin{pmatrix}
\text{Legalization} & 0.496 \\
\text{Border Security} & 0.246 \\
\text{Fight on Terrorism} & 0.163 \\
\text{Need for STEM} & 0.094 \\
\end{pmatrix}
\]

**Figure 4.13 Computation and overall averages of decision alternatives**

The results of Figure 4.13 clearly show that the overall placement of the decision alternatives when decided in conjunction with the aspects of society under consideration ranks as follows:

1. Legalization and path to citizenship (0.496)
2. Border security and control (0.246)
3. Fight against terrorism (0.163)
4. Need for STEM professionals (0.094)

**Consistency:**

Anderson, states that a key step in AHP is the establishment of priorities through the use of
the pairwise comparison procedure like that used in this study.\textsuperscript{38} Anderson also notes that the quality of the ultimate decision relates to the consistency of judgments that the decision maker demonstrated during the series of pairwise comparisons.\textsuperscript{39} Perfect consistency implies a value of zero for consistency ratio.\textsuperscript{40} However, perfect consistency cannot be demanded since human beings are often biased and inconsistent in our subjective judgment.\textsuperscript{41} To determine the accuracy of consistency in judgments, AHP provides a series of calculations to measure the consistency of the pairwise comparison judgments by computing a consistency ratio. The author of this measure, Saaty\textsuperscript{42} determined that the value of this ratio must not exceed 0.10. Any consistency ratio that exceeded 0.10 is an indication of inconsistent judgment and would require that the decision maker revise the original values in the pairwise comparison matrix to arrive at a reasonable level of consistency in judgment.

**Estimating the Consistency Ratio**

To arrive at the final consistency ratio from survey participants, the following calculations were performed as shown in Appendix G – 1-7.

**Step 1**

Each value in the first column of the pairwise comparison matrix was multiplied by the relative priority of the first item considered. Then, each value in the second column of the matrix was also multiplied by the relative priority of the second item considered. Next, each value in the third


\textsuperscript{39} Ibid.


\textsuperscript{41} Ibid.

\textsuperscript{42} T Saaty, "How to structure and make choices in complex problems," Hum Syst Manag 3, no. 4 (1982); Saaty, "An essay on how judgment and measurement are different in science and in decision making."
column of the matrix was multiplied by the relative priority of the third item considered. Lastly, each
value in the fourth column of the pairwise comparison matrix was multiplied by the relative priority
of the fourth item considered. Values across the rows were then summed to obtain a vector of values
called the weighted sum. The computation of this weighted sum is shown in figure 4.14 and figure
4.15 (step 1)

\[
\begin{bmatrix}
0.108017 & 0.173454 & 0.295317 & 0.423211 \\
181.2 & 1 & 40.2 & 92.2 \\
Liberty & Civil & Economy & Social Politics
\end{bmatrix}
\]

\[
\begin{bmatrix}
0.108017 & 0.173454 & 0.295317 & 0.423211 \\
181.2 & 1 & 40.2 & 92.2 \\
Liberty & Civil & Economy & Social Politics
\end{bmatrix}
\]

Figure 4.14: Step 1: Estimated consistency ratio values in matrix form.
Each value in each column is multiplied by the relative priority of the item being considered and the totals of these values are summed up to produce the corresponding values as shown in Figure 4.15.

\[
\begin{array}{cccc|c}
\text{Politics} & \text{Social aspects} & \text{Economy} & \text{Civil Liberties aspects} & \text{Weighted Sum} \\
0.423211 & 0.756013 & 0.456184 & 0.259242 & 1.89465 \\
0.165052 & 0.295317 & 0.556787 & 0.315411 & 1.332568 \\
0.16082 & 0.091548 & 0.173454 & 0.303529 & 0.729352 \\
0.177749 & 0.100408 & 0.062443 & 0.108017 & 0.448618 \\
\end{array}
\]

Figure 4.15 Weighted sum of the values from Figure 4.14

Step 2

Step 2 divides the elements of the vector of the weighted sums obtained in Step 1 by the corresponding priority value. Step 2 yields the following process and results:

\[
\frac{1.89465}{0.423211} = 4.476843 \text{ (Politics)} \\
\frac{1.332568}{0.295317} = 4.512323 \text{ (Social Aspects)} \\
\frac{0.729352}{0.173454} = 4.204873 \text{ (Economy)} \\
\frac{0.448618}{0.108017} = 4.153193 \text{ (Civil Liberties Aspects)}
\]

Figure 4.16 Results of calculations of values from step 2.
Step 3

In Step 3, the averages of the values found in Step 2 Figure 4.15 are computed. This average is denoted as $\lambda_{\text{max}}$.

$$\lambda_{\text{max}} = \frac{4.476 + 4.512 + 4.204 + 4.153}{4} = 4.336$$

Figure 4.17 Calculations using Eigen value

Step 4

In Step 4, consistency index (CI) is computed. CI is defined as (a set of logical concept in a pairwise comparison of elements in maintaining objectivity in judgments and eliminating bias) as denoted by Figure 4.18

$$CI = \frac{-n}{n-1} \text{ (where } n = \text{ the number of items being compared)}$$

Figure 4.18 Computation of Consistency Index

In this study, four immigration decision alternative options are used, so (n=4). Thus the CI is calculated as follows:

$$CI = \frac{4.336 - 4}{3} = CI = 0.112269$$

Figure 4.19 CI calculations

Step 5:

In step 5, the consistency index value of 0.112269 shown in Figure 4.19 was further computed to estimate the consistency ratio for these values. The consistency index (CI) is 0.0 when there is no logical inconsistency among the pairwise comparison judgments, or the judgment is considered 100% consistent. However, human judgment is often times inconsistent and is not always 100%
consistent.\textsuperscript{43} We can only estimate our best judgments to come as close to 100% or 0.0. To achieve a near perfect consistency in our judgments, we find the consistency ratio. To do this, we adopt a random index (RI), where RI is the consistency index of a randomly generated pairwise comparison matrix. To obtain this figure, the following equation was considered as shown in Figure 4.20.

\[
CR = \frac{CI}{RI}
\]

\textbf{Figure 4.20 Equation for CR}

Using the values within the Eigen conversion table, the \( n \) value is 4. This value corresponds to the Random Index value (RI) of 0.90.\textsuperscript{44} The consistency ratio is computed as shown in Figure 4.21

\[
CR = \frac{CI}{RI} = \frac{0.11269}{0.90} = 0.12 \text{ (Consistency Ratio is 0.12)}
\]

\textbf{Figure 4.21 Computation and results of CR}

The consistency ratio for the overall judgments of this survey questionnaire was 0.12 (88%), only two percentage slightly above the suggested ratio of 0.10 percent. Nonetheless, this ratio can be considered acceptable as it is close to 0.10 or (90%) the recommended ratio proposed by Saaty. This study consistency ratio of 0.12 suggests that the study participants were 88% objective in their preference, thereby eliminating bias in the judgments of the elements being considered for a group decision.

\textbf{Discussion}

Data was collected from 63 responders who completed the survey questionnaire. Five responders were anonymous members of the U.S. House of Representatives and 58 were law and

\textsuperscript{43} “Decision-making with the AHP: Why is the principal eigenvector necessary,” \textit{European journal of operational research} 145, no. 1 (2003).

\textsuperscript{44} Ibid.
policy students at Northeastern University. In this study, the responders’ personal demographic information was not collected. However, judging from the student participation in the survey, we can attest that the age range was between 18 and 30 years old. Those anonymous members of Congress who participated in the survey were likely much older. The data collected was then analyzed using AHP to determine the priority ranking of the issues under consideration. The AHP analysis method adopted for this study proved to be a successful tool in providing a method of prioritization and ranking. A copy of the sample database for AHP is provided in Appendix H.

The overall priority ranking stood as follows:

1. Legalization and path to citizenship
2. Border security and control
3. Fight against terrorism
4. Need for STEM professionals

Study participants clearly considered legalization and path to citizenship as their top priority for consideration and ranked it with an overwhelming 0.496 compared to the second top priority, border security and control at a distant 0.246. The fight against terrorism came third with a 0.163 and the need for STEM professionals came in fourth with 0.094. While these results show an overwhelming preference by the responders for a need to consider the legalization and a path to citizenship as the top priority for the immigration reform, the responders’ individual subjective judgments were not consistent with the aggregate judgments of all the responders. The consistency ratio (CR) was calculated as 0.12, a little over the 0.10 recommended for these kinds of group decision making as indicated by Saaty.45 Saaty states that when such inconsistency occurs during a group decision making, the group members are required to revisit their individual judgments and

reconsider their personal choices in an attempt to improve the decision to arrive at a general consensus for the issue(s) requiring a decision.\textsuperscript{46} The inconsistency ratio for this study could be considered acceptable because the ratio is very close to the 0.10 recommended ratio and because of the small sample size. Therefore, the study results are significant to the investigators as they indicate that the methodology used is a valid analytical tool for assessing and measuring group decisions based on subjective judgments and personal preferences.

These results then raise the question: Could these overall priority rankings of the issues have been different if the responders had been the 435 members of the U.S. House of Representatives as was the original intent and design of this study? This can only be answered by an extended study with a wider audience to confirm the current results. The results of this study were much of a surprise to the investigator because the initial study design did not collect personal data on the age of the respondents. The respondents were mostly college students and may not possess any extensive knowledge of law and policy (particularly on immigration issues). It was therefore surprising that they were, nevertheless, capable of forming an independent opinion on the subject matter under investigation without being swayed by the popular rhetoric around immigration in the media prevalent at the time the study was being conducted.

Of the 63 respondents that completed the survey questionnaire, almost 43 percent of them considered politics to be of the utmost importance during a pairwise comparison with social, economy and civil liberties aspects. The social aspects ranked a distant second with 0.295317, followed by the economy with 0.173454 and finally, by civil liberties with 0.108017.

What these preferences indicate to the individual members of society, at least for the purpose of this thesis, is that study participants considered the political will of members of the U.S. Congress

to be the most important issue in determining the future of immigration when immigration debates resume. Given the current impasse in Congress, these results reveal a lack of political will from members of Congress to come to an acceptable consensus to the immigration question.\textsuperscript{47}

This analysis also showed that legalization and path to citizenship was the overwhelming top priority of the study participants compared to all others. Nearly 50 percent of the aggregate responders preferred legalization and a path to citizenship as their top priority based on all four criteria (political, social, economy and civil liberties) aspects. Border security and control was a distant second with less than 25 percent, followed by the fight against terrorism with 16 percent, and the need for STEM professional coming in at a distant fourth with less than 10 percent.

\textsuperscript{47} Katharine M Donato and Amada Armenta, "What we know about unauthorized migration," \textit{Annual Review of Sociology} 37(2011).
Chapter 5: Conclusion and future research

Conclusion

The goal of this study is to provide a working method to assist lawmakers in their process of selecting the best immigration option amongst a series of available decision alternatives measured against four criteria. This study was designed and piloted to determine if this method of prioritization and ranking of the issues by level of importance could be a useful tool to members of the U.S. Congress to consider for group decision making.48

Passing legislation on comprehensive immigration reform is a critical aspect in the operational life of the U.S. society. This study clearly showed that the responders regarded legalization and path to citizenship as the most important issue that would benefit the American society politically, socially, and economically while maintaining the rule of law and safeguarding the civil liberties of unauthorized members of the U.S. society. The method described in this thesis supports the view that law and policymakers should adapt proven interdisciplinary approaches, such as the AHP method of analysis used by Systems Engineers, to find consensus in group decision making. The AHP method therefore, may contribute to combining empirical evidence and subjective experience to improve decisions on law and policy questions.49

This study used a limited number of criteria and decision alternatives to avoid overwhelming respondents with too many choices that could distract them from the primary question. One limitation of the study was the limited number of study participants. A larger group of participants responding to

49 Decision making for leaders: the analytic hierarchy process for decisions in a complex world, 2.
the survey would have been preferable. However, the sensitivity of the topic, the tense political environment in which the study was being conducted, and the timing of this study contributed to the limited number of respondents. This study was originally designed to demonstrate that adopting and adapting interdisciplinary methodology, such as the AHP method of analysis with its multi-criteria functions, to law and policy matters, can be useful in answering complicated questions in 21st century American society, particularly in the area of immigration.

**Legal implications of the AHP results to law and policy**

One of the many legal implications the AHP results of this study is that it shows a strong inclination towards legalizing unauthorized immigrants in the U.S. relative to border security and control and in comparison to all others in the study: fight against terrorism and the need for STEM professionals. This result justifies President Obama’s executive action announced on November 20, 2014 to use prosecutorial discretionary powers to legislate on an urgent social matter to bring relief to up to five million individuals and their families facing deportation from the U.S. society.

If the results of this study are replicated with a larger study and the results confirm the present results, it would be further proof that the sentiment of the general U.S. public is strongly in favor of granting additional legal relief to unauthorized immigrants currently residing in the U.S. The question that remains to be answered is: How can we apply the AHP results of this study to guide legislation on comprehensive immigration law and policy? In order words, what would be the most appropriate approach for members of the U.S. House of Representatives to adopt following the results of this study?

The result of this thesis study is strong evidence that the immigration question faced by members of the U.S. Congress is a more complex legal issue than originally thought. Given the tense
atmosphere surrounding the debate on immigration, a strong public sentiment in favor of granting some measure of relief to members of the unauthorized immigrant community sends a strong message to law and policymakers in Congress to carefully consider the legal immigration options before them. Should these results be confirmed, policymakers should legislate on the immigration question in a holistic manner, not by personal or regional bias, or through political and ideological maneuvering. Rather, their focus should be to benefit the social and economic welfare of the general U.S. public.

More importantly, the complexity of the immigration question and the strong overwhelming preference by the study participants favoring legalization and a path to citizenship by a ratio of 2:1 over border security and control, fight against terrorism, and the need for STEM professionals, demonstrates a unified will of the majority of the study participants. These results send an unambiguous message to Congress to pass legislation that would be a representation of the collective will of the people. But because of the inability for Congress members to agree on these issues by level of importance and priority, they are unable to come to a group consensus on the issues hence, forcing the current political impasse in the debates before Congress.

The results of this study show that one way to overcome the gridlock in Congress is to consider creating two separate immigration bills. One would deal specifically with the issue of legalization and a path to citizenship, and the other would focus on the social, economic, and civil liberties of the person(s) in question. This approach is more manageable to handle than trying to solve this complex issue in one policy block.

**A reflection**

When I decided to explore the idea of immigration reform as a thesis topic, and propose a new approach for the U.S. House of Representatives to use when they resume discussion of immigration
policy, I was confident that the request for members of Congress to participate in our survey on immigration would be met positively. However, the request was met with overwhelming rejection; only five members completed the online survey. The decision by nearly 98% of U.S. House members not to participate in this study on the basis of “office policy” rules against participating in any academic and public survey for fear of political retaliation was frustrating and disappointing. It also delayed completion of the study. Were it not for one courteous congressman who invited me to visit his office in Washington to discuss my project, I would have lost complete confidence in our lawmakers. Saaty fully remarks that “decision makers that are considered ‘powerful’ members of the organization might refuse to participate in the AHP group decision process for fear of losing control of their ability to influence the outcome of the decision.”  

My experience in this thesis project confirms this assertion. However, Saaty also states that “if these powerful individuals actively participated in the AHP group decision making process, they are likely to strongly influence the process with respect to their preferences.”

Therefore, it is still in the best interest of policymakers to fully participate in the AHP group decision making process.

The lack of response from House members extended the survey time. To obtain a large enough sample size, law and policy students were asked to answer the survey. The students responded graciously and enthusiastically and completed the paper survey without any expectation of compensation or reward in cash or in kind.

The study results showed an inconsistency ratio of 0.12 in the aggregate judgment of all the respondents, meaning that study participants were not themselves consistent in their judgment in prioritizing the issues presented to them in the questionnaire. It is possible that this inconsistency in

---

50 “Group decision making and the AHP.”
51 Ibid.
judgment on the part of our study participants reflects the general opinion in our society. It might also reveal an even more disturbing divide among elected officials who, although elected to Congress as representatives to do the business of the people, have nonetheless sent mixed messages about a wide range of immigration issues. The inability of Congress to come to a consensus on immigration matters may be a sign of even deeper problems in the current system. The results of this research may mean that while the AHP methodology may be a useful tool to analyze policy issues, and members of Congress are strongly encouraged to consider its usefulness, even such a promising objective tool might be rejected in the current partisan atmosphere.52

The overall priority ranking of these results were unexpected because the current general sentiment in the U.S. relating to the immigration debates seems to be focused on securing southern U.S. borders and putting security patrolmen in various places to deter illegal entry into the U.S. The results of this study show a contrary opinion. What this study has shown is that the AHP method of prioritization and ranking is an effective methodological approach that, when adopted and designed properly, could be a useful analytical tool to assist law and policymakers converge on a common platform of agreement in their attempt to prioritize some of the most contentious immigration issues under consideration.

**Future research**

Study Design: No user feedback was obtained in this study. For future studies of this kind, a qualitative aspect should be part of the study design. Researchers could then share the output results with the respondents through a one-on-one interview or group interviews to confirm the quantitative figures with the qualitative feedback.

52 Ibid.
Consistency: The study must achieve a consistency of 0.10 according to Satay. While some studies have accepted an inconsistency ratio of up to 0.14 as acceptable, when such a high inconsistency occurs, it may be due to a few factors such as distraction, loss of interest at the time of filling out the survey, or sample size. When that happens, respondents are required to retake the entire questionnaire to minimize future inconsistency, especially when a group decision is required. This study was not able to correct for this type of inconsistency.

The discussion indicated that the limited participating audience and the approximation of numbers during calculations, may have led to the higher inconsistency. A larger sample size would therefore be required to validate the results of this kind of study with the right audience as the respondents. To conduct such a large study might require some funding to reach a wider audience.
Bibliography:


Appendix A: Thesis Proposal for IRB application

For NU IRB use:

Date Received: ___________________________ NU IRB No. ________________
Review Category: ___________________________ Approval Date ________________

APPLICATION FOR APPROVAL FOR USE OF HUMAN PARTICIPANTS IN RESEARCH

Before completing this application, please read the Application Instructions and Policies and Procedures for Human Research Protections to understand the responsibilities for which you are accountable as an investigator in conducting research with human participants. The document, Application Instructions, provides additional assistance in preparing this submission. Incomplete applications will be returned to the investigator. You may complete this application online and save it as a Word document.

If this research is related to a grant, contract proposal or dissertation, a copy of the full grant/contract proposal/dissertation must accompany this application.

Please carefully edit and proof read before submitting the application. Applications that are not filled out completely and/or have any missing or incorrect information will be returned to the Principal Investigator.
REQUIRED TRAINING FOR RESEARCH INVOLVING HUMAN SUBJECTS

Under the direction of the Office of the Vice Provost for Research, Northeastern University is now requiring completion of the NIH Office of Extramural Research training for all human subject research, regardless of whether or not investigators have received funding to support their project.

The online course titled “Protecting Human Research Participants” can be accessed at the following url: http://phrp.nihtraining.com/users/login.php. This requirement will be effective as of November 15, 2008 for all new protocols.

Principal Investigators, student researchers and key personnel (participants who contribute substantively to the scientific development or execution of a project) must include a copy of their certificate of completion for this web-based tutorial with the protocol submission.

X☐ Certificate(s) Attached
☐ Certificate(s) submitted previously – on file with the NU's Office of Human Subject Research Protection

Investigator Information

Principal Investigator (PI cannot be a student) Dr. Neenah Estrella-Luna

Investigator is: NU Faculty_X ☐ NU Staff☐ ☐ Other ☐

College ☐ College of Professional Studies (CPS)

Department ☐ Doctor of Law and Policy

Address 360 Huntington Ave 20BV; Northeastern University, Boston, MA 02115

Telephone 617-373-2186 ☐ Email n.estrellaluna@neu.edu ☐

Is this student research? YES_X ☐ NO ☐ If yes, please provide the following information:

Student Name Noah Japhet ☐ Undergrad ☐ MA/MS ☐ DLP_X

Mailing Address: 334 SN, 360 Huntington Ave, ☐ Anticipated graduation date 6/2014

Telephone 617 373 2186 Primary Email n.japhet@neu.edu

Cell phone ☐ N/A ☐ Secondary Email ☐ N/A

Protocol Information

Title: Proposing a new methodology: Applying Systems Engineering in the current political impasse in addressing the challenging issues in 21st century Immigration Law and Policy debate in the U.S.

Projected # subjects 40-60 Participants

Approx. begin date of project 1/20/2014 Approx. end date 4/30/2014

It is the policy of Northeastern University that no activity involving human subjects be undertaken until those activities have been reviewed and approved by the University's
D. What are the goals of this research? Please state your research question(s) and related hypotheses.

Goal of the Study:

The goal of this study is to develop an interdisciplinary quantitative approach to decision making in law and policy. The identification and use of different tools may help identify core issues around which constructive discourse and compromise may be possible. For this thesis project, therefore, I will apply Systems Engineering approaches to a law and policy debate. Specifically, I will apply Analytic Hierarchy Process (AHP) to the immigration reform debate in the US House of Representatives. This method of prioritizing, if adopted, may be a useful tool to overcome the current impasse in the immigration debate and allow for negotiations to continue towards the adoption of a comprehensive immigration reform.

The research question for this study is: What are the most important issues for the US House of Representatives to focus on in the immigration debate?
E. **Provide a brief summary of the purpose of the research in non-technical language.**

**Statement of Purpose**

The purpose of this study is to explore the application of Systems Engineering approaches to the immigration debate in the US House of Representatives. The aim of this study is to adopt one of the proven approaches in Systems Engineering known as Analytic Hierarchy Process (AHP) to the immigration debate. By specifically applying its method of ranking, I will develop several models that, when applied consistently, may help overcome the current impasse in the debates and allow for negotiations to continue towards the adoption of a comprehensive immigration reform eventually.

F. **Identify study personnel on this project. Include name, credentials, role, and organization affiliation.**

Noah Japhet, M.Ed, M.S. (CAP)
Doctoral candidate in Law and Policy,
College of Professional Studies (CPS)
Northeastern University
Boston, MA 02115

G. **Identify other organizations or institutions that are involved. Attach current Institutional Review Board (IRB) approvals or letters of permission as necessary.**

NONE

**Consent Process**

Describe the process of obtaining informed consent*. Be specific. How will the project and the participants’ role be presented to potential participants? By whom? When? Where? Having the participant read and sign a consent statement is done only after the researcher provides a detailed oral explanation and answers all questions. Please attach a copy of informed consent statements that you intend to use, if applicable.

If your study population includes non-English speaking people, translations of consent information are necessary. Describe how information will be translated and by whom. You may wait until the consent is approved in English before having it translated.

An introductory email containing the unsigned consent form in English will be sent out to all participants introducing them to the purpose of the exercise and reassuring them of the protection of their opinions. A second email containing the link to the survey questionnaire will be sent out to participants a few days later and advising participants that they may choose not to participate in the study. However, clicking on the link and entering the survey will be considered consenting to participate. A start and end date for the data collection would also be provided. However, study participants will be instructed to return their responses within a one month period.

If your population includes children, prisoners, people with limited mental capacity, language barriers, problems with reading or understanding, or other issues that may make
them vulnerable or limit their ability to understand and provide consent, describe special procedures that you will institute to obtain consent appropriately. If participants are potentially decisionally impaired, how will you determine competency?

N/A

*If incomplete disclosure during the initial consent process is essential to carrying out the proposed research, please provide a detailed description of the debriefing process. Be specific. When will full disclosure of the research goals be presented to subjects (e.g., immediately after the subject has completed the research task(s) or held off until the completion of the study’s data collection)? By whom? Please attach a copy of the written debriefing statement that will be given to subjects.

N/A

. Study Procedures

Provide a detailed description of all activities the participant will be asked to do and what will be done to the participants. Include the location, number of sessions, time for each session, and total time period anticipated for each participant, including long term follow up.

The survey is divided into five main sections. Each section contains a central question which is further subdivided into six questions for a total of thirty questions of equal weight. An online survey instrument will be developed using Google forms.

The first part of the survey (Section A), is a pairwise criteria comparison with only one main question containing six secondary questions. In this section, participants are asked to state their opinion in the immigration debate and by order of importance, compare each element on the left to each element on the right. (I have attached a copy of the survey questionnaire with this application)

Who will conduct the experimental procedures, questionnaires, etc? Where will this be done? Attach copies of all questionnaires, interview questions, tests, survey instruments, links to online surveys, etc.

The student investigator will be responsible for collecting data for analysis. Following the creation of the survey instrument, the doctoral student would be in charge of placing the survey instrument online and also emailing study participants directly. A link to the survey questionnaire and other documentation has been provided with this application: https://docs.google.com/forms/d/1wCBC9m9qwL_ZU3EwqoRTlCXUeqtqPM4cjrVayChLQVk/edit?usp=drive_web#

. Risks

Identify possible risks to the participant as a result of the research. Consider possible psychological harm, loss of confidentiality, financial, social, or legal damages as well as physical risks. What is the seriousness of these risks and what is the likelihood that they may occur?
I do not anticipate any foreseeable personal, emotional, mental or psychological and even political risks to the study participants, as this is strictly an anonymous online survey that requires the collection of data strictly from a general point of view through the process of prioritizing individual judgments on the contentious immigration issues under debate using the pairwise comparison scale for AHP preferences.

Describe in detail the safeguards that will be implemented to minimize risks. What follow-up procedures are in place if harm occurs? What special precautions will be instituted for vulnerable populations?

At this time, I do not anticipate any follow up procedure given that there are no personal, emotional, mental, psychological and even political risks to participants. The risks are therefore, low. However, given the challenges of security concerns on the internet, I intend to utilize only the Google document sites to create an online survey questionnaire that provides a maximum protection for all online communications. Should participants feel uncomfortable with any section of the questions, they will be advised that their participation is voluntary and they may choose not to participate at all.

. **Confidentiality**

Describe in detail the procedures that will be used to maintain anonymity or confidentiality during collection and entry of data. Who will have access to data? How will the data be used, now and in the future?

All the information from the survey questionnaire will be anonymous. Given the survey’s anonymous nature, I will not be able to identify individual responses at any point in the data analysis. The data will be used by the student investigator for academic purposes only.

How and where will data be stored? When will data, including audiotapes and videotapes, be destroyed? If data is to be retained, explain why. Will identifiers or links to identification be destroyed? When? Signed consent documents must be retained for 3 years following the end of the study. Where and how will they be maintained?

**Storing and managing the data collected:**

All data from the questionnaire would be stored in a password protected secure database for analysis. Incomplete questionnaires will not be considered for analysis. After all the data has been analyzed, the raw data would be removed and saved into a portable storing device for potential future analysis. The Google account used to create the online survey will be closed after graduation to prevent data hacking by outsiders.

. **If your research is HIPAA-protected, please complete the following:**

**Individual Access to PHI**

Describe the procedure that will be used for allowing individuals to access their PHI or, alternatively, advising them that they must wait until the end of the study to review their PHI.

N/A

**N. Benefits**
What benefits can the participant reasonably expect from his/her involvement in the research? If none, state that. What are potential benefits to others?

There are no direct benefits for the participants. However, some individuals may request a copy of the report at the end of the study for their archives.

O. Attachments

Identify attachments that have been included and those that are not applicable (n/a).

<table>
<thead>
<tr>
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<th>No</th>
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<td>Copies of IRB approvals or letters of permission from other sites</td>
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<td>Informed Consent or Informed Consent and Health Information Use and Disclosure Authorization*</td>
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<td>No</td>
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<td>Debriefing Statement*</td>
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<td>Copies of all instruments, surveys, focus group or interview questions, tests, etc.</td>
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<td>Yes</td>
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<td>Signed Assurance of Principal Investigator Form (required)</td>
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<tr>
<td>Yes</td>
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<td>NIH Human Subject Training Certificate(s) (required if not already on file at HSRP)</td>
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*(Approved forms must be stamped by the IRB before use)*

P. Health Care Provision During Study

Please check the applicable line:

___X___ I have read the description of HIPAA “health care” within Section 3.0 of the Policies & Procedures for Human Research Protection. I am not a HIPAA-covered health care provider and no health care will be provided in connection with this study.

___ ____ I am a HIPAA-covered health care provider or I will provide health care in connection with this study as described in Section 3.0 of the Policies & Procedures for Human Research Protection. This health care is described above under “Study Procedures,” and the Informed Consent and Health Information Use and Disclosure Authorization form will be used with all prospective study participants.

If you have any questions about whether you are a HIPAA-covered health care provider, please contact Nan C. Regina, Director, Human Subject Research Protection at n.regina@neu.edu or (617) 373-4588.

Please return the completed application to:

Nan C. Regina, Director
Human Subject Research Protection
960 Renaissance Park
Northeastern University
Boston, MA 02115-5000
Tel: 617.373.7570; Fax: 617.373.4595
n.regina@neu.edu
The application and accompanying materials may be sent as email attachments or in hard copy. A signed Assurance of Principal Investigator Form may be sent via fax or in hard copy.

Describe the participants you intend to recruit. Provide all inclusion and exclusion criteria. Include age range, number of subjects, gender, ethnicity/race, socio-economic level, literacy level and health (as applicable) and reasons for exempting any groups. Describe how/when/by whom inclusion/exclusion criteria will be determined.

Participants must be members of the U.S. House of Representative or their delegate. Participants would be 18 years or older to qualify for this study. A minimum target of 40 participants is required to complete the study. Study participants would be male or female, irrespective of their ethnicity/race, socio-economic level or even their literacy level. A mental capacity to understand the questions with a minimum level of education such as high school diploma is enough to qualify them as participants in the study. Only members of the House of Representative or their delegate may take part in the survey as this study is geared towards the debates in Congress on immigration.

Describe the procedures that you will use to recruit these participants. Be specific. How will potential subjects be identified? Who will ask for participation? If you intend to recruit using letters, posters, fliers, ads, website, email etc., copies must be included as attachments for stamped approval. Include scripts for intended telephone recruitment.

An initial email containing the link to the survey will be sent to all the individual members of the House of Representatives explaining the project and inviting them to participate. Two weeks after sending the initial email, I will send a reminder email with the survey link requesting participants to fill out the survey if they haven’t yet done so, and thanking them if they have already completed the survey. Participants will be identified through http://www.house.gov to confirm that they are members of the House of Representatives. A link to the online survey has been provided in this application. I have also provided a hard copy of the survey questionnaire with this application.

What remuneration, if any, is offered?

None
Appendix B: Web and paper survey questionnaire

Title of Project: Proposing a new methodology: Applying Systems Engineering in the current political impasse in addressing the challenging issues in 21st century Immigration Law and Policy debate in the U.S.

Request to Participate in Research

I would like to invite you to participate in a web-based online survey. The survey is part of a research study whose purpose is to provide a new methodology to assist members of the U.S. Congress in overcoming the political impasse in the immigration debates. This survey should take about 15 minutes to complete.

I am asking you to participate in this study because you are a key player in these immigration debates and your input is important to us. You must be at least 18 years old to take this survey. The decision to participate in this research project is voluntary. You do not have to participate and you can refuse to answer any question. Even if you begin the web-based online survey, you can stop at any time.

Two weeks after sending the initial email, I will send a reminder email with the survey link requesting participants to fill out the survey if they haven’t yet done so, and thanking them if they have already completed the survey.

There are no foreseeable risks or discomforts to you for taking part in this study.

There are no direct benefits to you from participating in this study. However, your responses may help us learn more about the complex issues surrounding the immigration issue.

You will not be paid for your participation in this study.

Your part in this study is anonymous to the researcher(s). However, because of the nature of web based surveys, it is possible that respondents could be identified by the IP address or other electronic record associated with the response. Neither the researcher nor anyone involved with this survey will be capturing those data. Any reports or publications based on this research will use only group data and will not identify you or any individual as being affiliated with this project. Your part in this study will be handled in a confidential manner.

If you have any questions regarding electronic privacy, please feel free to contact Mark Nardone, NU’s Director of Information Security via phone at 617-373-7901, or via email at privacy@neu.edu. If you have any questions about this study, please feel free to contact Noah Japhet at n.japhet@neu.edu, the person mainly responsible for the research. You can also contact Dr. Neenah Estrella-Luna at n.estrellaluna@neu.edu the Principal investigator.

If you have any questions regarding your rights as a research participant, please contact Nan C. Regina, Director, Human Subject Research Protection, 960 Renaissance Park, Northeastern University, Boston, MA 02115. Tel: 617.373.4588, Email: n.recina@neu.edu You may call anonymously if you wish.

This study has been reviewed and approved by the Northeastern University Institutional Review Board (# CPS14-01-09). [protocol# will be provided to you by the HSRP office].

By clicking on the CONTINUE button below you are indicating that you consent to participate in this study. Thank you for your time.
COMPARING ASPECTS OF SOCIETY via AHP

In your opinion in the immigration debate, how important is each aspect of society compared to the others? *

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<td>Politics COMPARED TO Economy</td>
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**Political Aspects**

On the basis of Politics alone, how important is:

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**Social and Cultural Aspects**

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## Economic Aspects

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### Civil Liberties

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Appendix C: Cover letter email

Dear Member of Congress,

My name is Noah Japhet and I am a doctoral student at the College of Professional Studies (CPS) at Northeastern University in Boston, Massachusetts. I am finishing my thesis project at the above institution and my thesis topic is:

Proposing a new methodology: Applying Systems Engineering in the current political impasse in addressing the challenging issues in 21st century immigration Law and Policy debate in the US

**My research seeks to answer the Question:**

What are the most important issues for the US House of Representatives to focus on in the immigration debate?

**Goal of Thesis Project:**

The goal of this thesis project is to develop a mechanism, a multidisciplinary quantitative approach to decision making. A methodology that when adopted, and consistently applied to Law and Policy questions, will provide policymakers an added tool to consider as they address the challenging issues of the 21st century US Immigration law currently stalled in debates in Congress.

**Purpose of the study:**

The purpose of this study is to understand, to explore, and, to adopt other proven multidisciplinary methodologies such as in Systems Engineering and, by adaptation, apply its techniques to answer the research question under investigation.

**Aim of the study:**

The aim of this study therefore, is to adopt one of the proven approaches in Systems Engineering known as Analytic Hierarchy Process (AHP) to law and policy. By specifically applying its method of ranking to answer our research question above, we would develop several models by prioritizing the challenging issues in the immigration debates. Models will be developed, that, when applied consistently, will help overcome the current impasse in the debates and allow for negotiations to continue towards the adoption of a comprehensive immigration reform to benefit the American society eventually

I want to thank you in advance for your time, consideration, and for allowing me the opportunity to share in your wisdom and insights in the ongoing national discussions on the immigration issues.

In the meantime, please don't hesitate to contact me by email njaphet@neu.edu if I can answer any pertinent questions that you may have.

Oh, by the way, a few days from now I'm going to email over a very brief survey. It will take less than 10 minutes of your time to fill out and I'd be grateful if you'd please be on the lookout for it. Thanks again!

Sincerely,

Noah Japhet
Doctoral Student investigator
College of Professional Studies
Northeastern University
Appendix D: IRB approvals

Northeastern

Notification of IRB Action

Date: January 29, 2014  IRB #: CPS14-01-09
Principal Investigator(s): Neenah Estrada-Luna  
Noah Japhet
Department: Doctor of Law and Policy  
College of Professional Studies
Address: 20 Belvidere  
Northeastern University
Informed Consent: One (1) unsigned consent
DHHS Review Category: Expedited #6, #7
Monitoring Interval: 12 months
Approval Expiration Date: JANUARY 28, 2015
Investigator's Responsibilities:
1. Informed consent form bearing the IRB approval stamp must be used when recruiting participants into the study.
2. The investigator must notify IRB immediately of unexpected adverse reactions, or new information that may alter our perception of the benefit-risk ratio.
3. Study procedures and files are subject to audit any time.
4. Any modifications of the protocol or the informed consent as the study progresses must be reviewed and approved by this committee prior to being instituted.
5. Continuing Review Approval for the proposal should be requested at least one month prior to the expiration date above.
6. This approval applies to the protection of human subjects only. It does not apply to any other university approvals that may be necessary.

C. Randall Colvin, Ph.D., Chair  
Northeastern University Institutional Review Board

Nan C. Regina, Director
Human Subject Research Protection
January 24, 2014

Dear Member of Congress,

My name is Noah Japhet and I am a doctoral student at the College of Professional Studies (CPS) at Northeastern University in Boston, Massachusetts. I am finishing my thesis project at the above institution. My thesis topic is: Proposing a new methodology: Applying Systems Engineering in the current political impasse in addressing the challenging issues in 21st century immigration Law and Policy debate in the US.

My research seeks to answer the Question:
What are the most important issues for the US House of Representatives to focus on in the immigration debate?

Goal of Thesi Project:
The goal of this thesis project is to develop a multidisciplinary quantitative approach to decision making. This method, when adopted and consistently applied to law and policy questions, will provide policymakers with a tool to consider as they address the challenging issues of the 21st century US immigration law.

Purpose of the study:
The purpose of this study is to explore the use of Systems Engineering approaches to the immigration debate in the US House of Representatives.

Aim of the study:
The aim of this study is to adopt one of the proven approaches in Systems Engineering known as Analytic Hierarchy Process (AHP) to the immigration debate. By specifically applying its method of ranking, I will develop several models that, when applied consistently, may help overcome the current impasse in the debates and allow for negotiations to continue towards the adoption of a comprehensive immigration reform eventually.

Included in this cover letter is a survey link that should take less than 15 minutes to fill out. I'd be grateful if you'd take a few minutes of your time to go over the questionnaire.

https://docs.google.com/forms/d/1wCBC9m9qwL_ZU3EwqoRT1CXUqqtqP4ejrVayChLQVkJ/edit?usp=drive_web

I want to thank you in advance for your time, consideration, and for allowing me the opportunity to share in your wisdom and insights in the ongoing national discussions on the immigration issues.

In the meantime, please don't hesitate to contact me by email Japhet.n@husky.neu.edu if I can answer any pertinent questions that you may have.

Sincerely,

Noah Japhet
Doctoral Student investigator
College of Professional Studies
Northeastern University

APPROVED

NU-0909-01-01
1-29-13

NYOUG6Y
1-28-13
Dear Member of Congress,

Two weeks ago, I sent an email with a survey link requesting your participation in this survey. If you did so, thank you very much for your participation. If not, please take a few moments and complete the survey as soon as possible.

My research seeks to answer the Question:
What are the most important issues for the US House of Representatives to focus on in the immigration debate?

Goal of Thesis Project:
The goal of this thesis project is to develop a multidisciplinary quantitative approach to decision making. This method, when adopted and consistently applied to law and policy questions, will provide policymakers with a tool to consider as they address the challenging issues of the 21st century US immigration law.

Purpose of the study:
The purpose of this study is to explore the use of Systems Engineering approaches to the immigration debate in the US House of Representatives.

Aim of the study:
The aim of this study is to adopt one of the proven approaches in Systems Engineering known as Analytic Hierarchy Process (AHP) to the immigration debate. By specifically applying its method of ranking, I will develop several models that, when applied consistently, may help overcome the current impasse in the debates and allow for negotiations to continue towards the adoption of a comprehensive immigration reform eventually.

Included in this cover letter is a survey link that should take less than 15 minutes to fill out. I'd be grateful if you'd take a few minutes of your time to go over the questionnaire.

https://docs.google.com/forms/d/1wCBC9m9qwl_ZU3EpwqoRJHUXUeqtqPM4cjrVavChLQVw/edit?usp=drive_web

I want to thank you in advance for your time, consideration, and for allowing me the opportunity to share in your wisdom and insights in the ongoing national discussions on the immigration issues.

In the meantime, please don’t hesitate to contact me by email Japhet.n@husky.neu.edu if I can answer any pertinent questions that you may have.

Sincerely,

Noah Japhet
Doctoral Student Investigator
College of Professional Studies
Northeastern University

APPROVED
NURSE
VALID
THROUGH
Congressional survey on immigration law and policy

Northeastern University, Department of: Doctor of Law and Policy

Name of Investigator(s): Dr. Neenah Estrella-Luna, Noah Japhet

Title of Project: Proposing a new methodology: Applying Systems Engineering in the current political impasse in addressing the challenging issues in 21st century Immigration Law and Policy debate in the U.S.

Request to Participate in Research

I would like to invite you to participate in a web-based online survey. The survey is part of a research study whose purpose is to provide a new methodology to assist members of the U.S. Congress in overcoming the political impasse in the immigration debates. This survey should take about 15 minutes to complete.

I am asking you to participate in this study because you are a key player in these immigration debates and your input is important to us. You must be at least 18 years old to take this survey. The decision to participate in this research project is voluntary. You do not have to participate and you can refuse to answer any question. Even if you begin the web-based online survey, you can stop at any time.

There are no foreseeable risks or discomforts to you for taking part in this study.

There are no direct benefits to you from participating in this study. However, your responses may help us learn more about the complex issues surrounding the immigration issue. You will not be paid for your participation in this study.

Your part in this study is anonymous to the researcher(s). However, because of the nature of web-based surveys, it is possible that respondents could be identified by the IP address or other electronic record associated with the response. Neither the researcher nor anyone involved with this survey will be capturing these data. Any reports or publications based on this research will use only group data and will not identify you or any individual as being affiliated with this project. Your part in this study will be handled in a confidential manner.

If you have any questions regarding electronic privacy, please feel free to contact Mark Nardone, NU’s Director of Information Security via phone at 617-373-7901, or via email at privacy@neu.edu.
If you have any questions about this study, please feel free to contact Noah Japhet at njaphet@neu.edu, the person mainly responsible for the research. You can also contact Dr. Neenah Estrella-Luna at n.estrellaluna@neu.edu the Principal Investigator.

If you have any questions regarding your rights as a research participant, please contact Nan C. Regina, Director, Human Subject Research Protection, 960 Renaissance Park, Northeastern University, Boston, MA 02115. Tel: 617.373.4588, Email: n.regina@neu.edu. You may call anonymously if you wish.

This study has been reviewed and approved by the Northeastern University Institutional Review Board (# xx-xx-xx). [protocol # will be provided to you by the HSRP office].

By clicking on the CONTINUE button below you are indicating that you consent to participate in this study.

Thank you for your time.
Notification of IRB Action
Modification

Date: March 24, 2014
IRB #: CPS14-01-09
Principal Investigator(s): Neenah Estrella-Luna
Noah Jupiet
Department: Doctor of Law and Policy
College of Professional Studies
Address: 20 Belvidere
Northeastern University
Title of Project: Proposing a New Methodology: Applying systems Engineering in
the Current Political Impasse in Addressing the Challenging Issues in
21st Century Immigration Law and Policy Debate in the U.S.
Modification: Add Masters in Urban and Regional Policy and Law and Public
Policy program students as potential participants for recruiting

Participating Sites: 
Informed Consent: Permission from instructors pending
One (1) unsigned consent form

DHHS Review Category: Expedited #6, #7
Monitoring Interval: 12 months

Approval Expiration Date: JANUARY 28, 2015

Investigator's Responsibilities:
1. Informed consent form bearing the IRB approval stamp must be used when recruiting participants into the study.
2. The investigator must notify IRB immediately of unexpected adverse reactions, or new information that may alter our perception of the benefit-risk ratio.
3. Study procedures and files are subject to audit at any time.
4. Any modifications of the protocol or the informed consent as the study progresses must be reviewed and approved by this committee prior to being instituted.
5. Continuing Review Approval for the proposal should be requested at least one month prior to the expiration date above.
6. This approval applies to the protection of human subjects only. It does not apply to any other university approvals that may be necessary.

C. Randall Colvin, Ph.D., Chair
Northeastern University Institutional Review Board

Nan C. Regina
Director, Human Subject Research Protection
Appendix E-1: IRB unsigned consent form

UNSIGNED CONSENT DOCUMENT FOR WEB-BASED ONLINE SURVEYS NU HSRP Rev. 10/16/2013

Northeastern University, Department of: Doctor of Law and Policy
Name of Investigator(s): Dr. Neenah Estrella-Luna, Noah Japhet, Student Researcher
Title of Project: Proposing a new methodology: Applying Systems Engineering in the current political impasse in addressing the challenging issues in 21st century Immigration Law and Policy debate in the U.S.

Request to Participate in Research
We would like to invite you to participate in a web-based online survey. The survey is part of a research study whose purpose is to provide a new methodology to assist members of the U.S. Congress in overcoming the political impasse in the immigration debates. This survey should take about 15 minutes to complete.

We are asking you to participate in this study because you are a key player in these immigration debates and your input is important to us. **You must be at least 18 years old to take this survey.**

The decision to participate in this research project is voluntary. You do not have to participate and you can refuse to answer any question. Even if you begin the web-based online survey, you can stop at any time.

There are no foreseeable risks or discomforts to you for taking part in this study.

There are no direct benefits to you from participating in this study. However, your responses may help us learn more about the complex issues surrounding the immigration issue.

You will not be paid for your participation in this study.

Your part in this study is anonymous to the researcher(s). However, because of the nature of web based surveys, it is possible that respondents could be identified by the IP address or other electronic record associated with the response. Neither the researcher nor anyone involved with this survey will be capturing those data. Any reports or publications based on this research will use only group data and will not identify you or any individual as being affiliated with this project. Your part in this study will be handled in a confidential manner.

If you have any questions regarding electronic privacy, please feel free to contact Mark Nardone, NU’s Director of Information Security via phone at 617-373-7901, or via email at privacy@neu.edu.

If you have any questions about this study, please feel free to contact Noah Japhet at n.japhet@neu.edu, the person mainly responsible for the research. You can also contact Dr. Neenah Estrella-Luna at n.estrellaluna@neu.edu the Principal Investigator.

If you have any questions regarding your rights as a research participant, please contact Nan C. Regina, Director, Human Subject Research Protection, 960 Renaissance Park, Northeastern University, Boston, MA 02115. Tel: 617.373.4588, Email: n.regina@neu.edu. You may call anonymously if you wish.

This study has been reviewed and approved by the Northeastern University Institutional Review Board (# xx-xx-xx). [protocol # will be provided to you by the HSRP office].

By clicking on the CONTINUE button below you are indicating that you consent to participate in this study.
Thank you for your time.

Dr. Neenah Estrella-Luna

Noah Japhet

Northeastern University, Department of: Doctor of Law and Policy
Name of investigator(s): Dr. Neenah Estrella-Luna, Noah Japhet, student researcher
Appendix E-2: Recruitment pitch

Recruitment Pitch

Hi, my name is Noah Japhet and I am a doctoral student at the College of Professional Studies (CPS) at Northeastern University in Boston, Massachusetts. I am finishing my thesis project in the doctor of law and policy program.

**My research seeks to answer the Question:**
What are the most important issues for the US House of Representatives to focus on in the immigration debate?

**Goal of Thesis Project:**
The goal of this thesis project is to develop a multidisciplinary quantitative approach to decision making. This method, when adopted and consistently applied to law and policy questions, will provide policymakers with a tool to consider as they address the challenging issues of the 21st century US immigration law.

**Purpose of the study:**
The purpose of this study is to explore the use of Systems Engineering approaches to the immigration debate in the US House of Representatives.

**Aim of the study:**
The aim of this study is to test one of the proven approaches in Systems Engineering known as Analytic Hierarchy Process (AHP) to the immigration debate. The method of ranking may help overcome the current impasse in the debates and allow for negotiations to continue towards the adoption of a comprehensive immigration reform eventually.

This survey is completely voluntary. You do not have to fill the survey if you do not want to. The survey is also completely anonymous. Please put all surveys back into the envelope I have provided. I will collect them from your instructor.

Do you have any questions?

Thank you very much for your time.
Appendix F: Reminder web cover letter

Dear Member of Congress,

My name is Noah Japhet and I am a doctoral student at the College of Professional Studies (CPS) at Northeastern University in Boston, Massachusetts. I am finishing my thesis project at the above institution. My thesis topic is: Proposing a new methodology: Applying Systems Engineering in the current political impasse in addressing the challenging issues in 21st century immigration Law and Policy debate in the US.

My research seeks to answer the Question:
What are the most important issues for the US House of Representatives to focus on in the immigration debate?

Goal of Thesis Project:
The goal of this thesis project is to develop a multidisciplinary quantitative approach to decision making. This method, when adopted and consistently applied to law and policy questions, will provide policymakers with a tool to consider as they address the challenging issues of the 21st century US immigration law.

Purpose of the study:
The purpose of this study is to explore the use of Systems Engineering approaches to the immigration debate in the US House of Representatives.

Aim of the study:
The aim of this study is to adopt one of the proven approaches in Systems Engineering known as Analytic Hierarchy Process (AHP) to the immigration debate. By specifically applying its method of ranking, I will develop several models that, when applied consistently, may help overcome the current impasse in the debates and allow for negotiations to continue towards the adoption of a comprehensive immigration reform eventually.

Included in this cover letter is a survey link that should take less than 15 minutes to fill out. I'd be grateful if you'd take a few minutes of your time to go over the questionnaire.

https://docs.google.com/forms/d/1wCBC9m9qwL_ZU3EwqoRTICXUeqtqPM4ejVayChLQVk/edit?usp=drive_web#

I want to thank you in advance for your time, consideration, and for allowing me the opportunity to share in your wisdom and insights in the ongoing national discussions on the immigration issues.

In the meantime, please don't hesitate to contact me by email Japhet.n@husky.neu.edu if I can answer any pertinent questions that you may have.

Sincerely,

Noah Japhet
Doctoral Student investigator
College of Professional Studies
Northeastern University
Appendix G: 1-7: Excel worksheet of detailed calculations

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Pairwise Comparison by Criteria

Politics  Social  Economy  Civil Liberties

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Priority Ranking
## Decision alternatives based on Politics

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### Pairwise Comparisons for decision alternatives measured against Politics

- **Legalization & Path to Citizenship**: 0.485514317
- **Border Security & Control**: 0.250210382
- **Fight against Terrorism**: 0.17147554
- **Need for STEM Professionals**: 0.092799761

Priority ranking of issues based on Politics: Legalization & Path to Citizenship > Border Security & Control > Fight against Terrorism > Need for STEM Professionals.
### Decision alternative based on social aspects

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### Pairwise Comparison for decision alternatives based on Social aspects

- **Legalization and Path to Citizenship**: 0.492146086
- **Border Security and Control**: 0.248698132
- **Fight against Terrorism**: 0.165771081
- **Need for STEM professionals**: 0.093384702

**Priority ranking of issues based on Social Aspects**
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**Priority ranking of issues based on Economy**
Decision alternative based on Civil Liberties

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Pairwise Comparison for decision alternatives based on Civil Liberties

- Legalization and Path to Citizenship: 0.53161731
- Border Security and Control: 0.23244065
- Fight Against Terrorism: 0.149468164
- Need for STEM Professionals: 0.086473875

Priority ranking of Issues based on Civil Liberties
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Priority list civil

Product of Pairwise and Alternative

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Overall Priority Ranking of Immigration Issues

final overall ranking of immigration issues based on AHP priority ranking
## Consistency calculations

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CI 0.112269

### Step 5

CR CI/RI 0.124744 can be considered O.K. as it is close to 10%.
Appendix H – Excel spreadsheet of survey respondents

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