

Visual Analytics toward Evidence-based Global Migration Policy Making and Governance

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ABSTRACT

Migrations and refugees are a global phenomenon. People migrate from their country or region for many reasons, including to seek out economic opportunities, or to escape from atrocities or disasters. These migrants and refugees face various challenges at the destination countries due to language barriers, cultural differences, and social acceptance. The NGO Committee on Migration (CoM) has been established to form a coalition of organizations worldwide that advocate, educate, and collaborate to encourage the promotion and protection of migrants and their human rights, in accordance with the United Nations Charter. The NGOs operate in different parts of the world, and the information on their migrant trends and support activities are to be shared for better coordination and collaborative governance or for identifying high priority policy issues. This paper presents the visual analytics approach to support the NGOs around the globe to better understand and govern the NGO activities and migration trends, and to monitor international migration policy issues.

CCS CONCEPTS

• Human-centered computing~Visualization~Visualization application domains~Visual analytics

KEYWORDS

global migration, geospatial visualization, NGO, interactive data analytics, Tableau, UN Global Compact on Migration, SDG

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1 Introduction

The number of international migrants, persons living in a country other than where they were born, globally reached an estimated 272 million in 2019 according to UN's Department of Economic and Social Affairs (DESA) [4]. This is up from 258 million in 2017 and from 173 in 2000 [3], and comprising 3.5% of the global population. The migrations and human mobilities occur due to many factors, including economic, social, environmental, and are considered fundamentally natural with human nature to seek security, prosperity and stability. Some labor workers move from one region to another for better economic

opportunities and sustainability, while others flee their origin country due to political persecutions or ethnic discriminations, and yet others escape from the natural and man-made disasters, such as volcano eruptions or regional wars, in search of safety and security. According to a UN study in [3], the main reasons people cross borders are economic and social factors. Recently, the number of persons forcibly displaced across borders as refugees or asylum seekers has become the highest since World War II due to political instability and conflict, reaching up to 26 million. The benefits of the cross-border (international) migrations include the economic growth and development by filling labor market shortages in the destination countries, and by providing jobs and sources of revenue for individual migrants and their families. Many countries suffer from the population aging and the migrants who are in working age can alleviate the country's dependence on the old population.

One of the UN's Sustainable Development Goals (SDG) is Goal 10 to reduce inequality within and among countries. The poverty and inequality in income within countries may create a divisive society with non-inclusive and unfair policies, without fair representation by minorities or marginalized communities. It also creates a poor voice from developing countries with lower GDP in decision-making on global issues, so the global initiatives may not be fair or effective. One of the 2030 Agenda of the SDG includes the international migration issues, i.e. SDG 10.7 targets that governments and other stakeholders can facilitate orderly, safe, regular and responsible migration, including through the implementation of planned and well-managed policies, for the millions of people who have left their homes seeking better lives due to war, discrimination, poverty, lack of opportunity and other drivers of migration [6]. Also included as a cross-cutting target is to analyze data by various characteristics, including migratory status to help identify the particular vulnerabilities of migrants and ensure inclusive development.

Data sets on estimated population of international migrants by age, sex and origin are presented in [5]. The 2019 statistics show the order of continents that accept migrants, the destination and origin countries by numbers, the gender and age groups of migrants. Europe is the leading continent followed by North America, the USA is the leading country of destination followed by Germany and Saudi Arabia, India, Mexico and China are leading countries of migrant origins. The leading regions of global refugees and asylum seekers are from Northern Africa and Western Asia, followed by sub-Saharan Africa.

In addition to these comparative ordering of migration facts, the data also can help derive the aggregated policy trends and differences across different countries. For instance, the following country's government trends are identified [3] among many:

- Most countries try to maintain the current levels of immigration
- Meeting labor demands is the top rationale for countries' immigration policies
- The share of governments with a policy to raise the level of immigration of highly skilled workers doubled from 22% in 2005 to 44% in 2015.
- Globally, 59% of governments have introduced a policy or program aimed at integrating non-nationals into their society, including measures such as protection against discrimination (52 %), language skills training for immigrants (37%) and the transfer of professional credentials (36%).
- 72 % of governments have policies to encourage the return of their citizens.

The UN's population data on international migration helps to understand these. In addition, the UN General Assembly adopted the intergovernmental negotiated and agreed outcome on the issues related to the Global Compact on Migration (GCM) for safe, orderly and regular migration in 2018 [7]. The government representatives of the Global Compact on the Migration agreed to build upon the New York Declaration of Refugees and Migrants [8] and established a cooperative framework with twenty-three implementation objectives and implementation steps [7]. Twenty three objectives fall into four major categories as follows [9]:

- Protect human rights of all migrants (objectives 6, 13, 15-18)
- Reduce forced migrations (Objectives 2, 5, 19-20, 22-23)
- Improve Migration Management (Objectives 1,3,4,7,12,14)

- Enhance the safety of Migration (Objectives 8-11, 21)

The high priority agenda item for improving the migrant management is the ability to collect and utilize accurate and disaggregated data as a basis for evidence-based policymaking and well-informed public discourse with the capability of monitoring and evaluating the agreed outcomes (Objective 1) and to provide accurate and timely information at all stages of migration (Objective 3).

Since the UN adoption of the Global Compact on Migration, the Member States are moving toward the implementation, but the implementation is to be carried out through partnerships and collaboration among diverse stakeholders including the Member States (governments), the UN agencies, the civil society in the local and national levels, along with the migrants, and share their practices and policies.

In this paper, we present the efforts of data gathering and sharing practices by the NGO Committee of Organizations (CoM), in order to meet the objective of the evidence-based migrant management efforts among member organizations. The NGO members of the CoM face the following challenges to support policy governance and practices for implementing the objectives of evidence-based migration management the Global Compact on Migration. We specifically address the three issues: the visibility of organizational information, the visibility of migrant related issues, and the sharing and collaboration among NGO activities to prioritize and evaluate their practices that are in alignment with the SDG objectives on the Migration and Refugee issues. We address the data and analyses and sharing challenges with the visualization methods that are interactive visual Web platforms where different stakeholders, i.e. NGO's, migrants and refugees, and Member States, could interact with the information in an intuitive way to get insights in policy design and governance decisions. This shared platform is to facilitate knowledge exchange and collaboration across dispersed civic organizations and member countries around the world toward meeting the objective of policy and practice governance based on data, instead of anecdotal cases.

The remaining sections consist of Section 2 with background information on the NGO Committee on Migration and their challenges with information, Section 3 that presents the overview of the methodology and data collection and system design process, and Section 4 describes the visual analytics results followed by discussion in Section 5. We conclude with a brief summary and the remaining challenges.

2 NGO Committee on Migration

Founded in 2006, the NGO Committee on Migration (CoM) [1] has been established as a Committee of the Conference of Non-Governmental Organizations in consultative status with the United Nations Economic and Social Council (ECOSOC). Its purpose is to encourage the promotion and protection of migrants and their human rights, in accordance with the United Nations Charter. CoM is one of the three conveners of the global Civil Society Action Committee along with the International Catholic Migration Commission (ICMC) and the International Council of Voluntary Associations (ICVA). The CoM urge civil society thinking, strategies and advocacy worldwide to achieve commitments of the 2016 UN High-Level Summit for Refugees and Migrants through the Global Compact for Migration.

According to their bylaws [2], its core activities to achieve the purpose involve: (1) Facilitating cooperation among its member organizations for the exchange of information, education and awareness and for substantive discussions on the issues and policies related to all facets of global migration under United Nations consideration; (2) Encouraging UN bodies and agencies to include migration policies and issues in their planning and social policy considerations; (3) Acting as a forum which raises awareness of migration in a human rights framework; (4) Cooperating with UN departments, bodies, organizations and agencies to raise public awareness about the frameworks on migration in order to promote, protect, and defend the human rights of migrants; (5) Identifying and recommending good practices and policies for migration issues, in cooperation with UN bodies and consistent with UN frameworks, to propose to the UN Member States to use as a reference to how they can negotiate and implement a Global Compact for Migration. Their focus subareas include (1) protection and assistance for vulnerable groups of migrants, especially women and children, particularly for those migrants experiencing abuses in transit and at borders; (2) those forced to

migrate due to climate change and environmental degradation, and (3) those encountering xenophobia and lack of access to services in countries of transit and destination.

The NGO CoM thus requires various information and capabilities to obtain quick situation awareness of the local NGO organizations in different regions or their migration issues, to share the information for public awareness, and to share and disseminate insights and best practices for effective management and resource allocations. Currently, the NGO CoM is short of these capabilities although it does in conventional monthly meetings and forums. One can summarize the challenges as follows:

NGO organizational Challenges: The location of operating NGOs and their projects in support of migrants is globally distributed and difficult to identify which organizations are operating where and what are their main activities, funds, and challenges they may be facing in the location countries where they operate. Who may be the contact person and how many organizations are operating in the country and their locations. What are the main obstacles or adverse barriers to supporting migrants in the locale? This disperses operations around the world by different civic groups, and information about their projects and programs is not easily visible or shared among the NGOs who are sharing their values of promoting the migrants. The visibility of the organizational and project level information may facilitate situation awareness and collaboration.

Information on Migrant Issues: What kind of migrants the local civic and NGO organizations are currently supporting, such as where are they coming from and which is the destination countries. What kind of challenges do the migrants face in the destination and origin countries? Are they equipped with skill sets or how do they acquire them? What are the basic demographic information and distributions of the migrant population? Knowing the migrant's characteristics is key to successful governance on their support policies.

Collaboration and Knowledge/Practice Sharing and Dissemination Issues: Currently it is difficult to measure the success or effectiveness of collective civic organizations' activities and programs. One lesson learned and best practices are difficult to share and disseminate for a large scale effect on similar migrant situations. The capability of comparison and recommendation of successful activities or programs can be easily identified across different projects around the globe and quickly share for assessment to adopt.

To address these challenges, we propose the Evidence-based Migration Policy-making and Governance Platform to allow data gathering and visualization analytics to support the NGO's migration-related information sharing, policy knowledge discovery, and improved governance. The prototype we develop is available in [10].

3 Methodology

To develop the platform, our development team had working group sessions with the NGO CoM committee members in New York City to understand the needs and requirements. The data was collected by the NGO subcommittee team, and the required information and policy discovery components were discussed including the values this information and visual analytic products may bring and how the end users may interact with the platform. We considered the end-user groups, including the NGOs, CoM, Project Managers, UN policy-making team on the Global Compact on Migration, the Member States, the migrants, the sponsors and funding groups for the NGO migration programs, and any citizen concerned with the migration issues.

The following figure shows the process of designing and developing the proposed visual analytics platform for getting insights into the international migration, and our methods of data analyses.

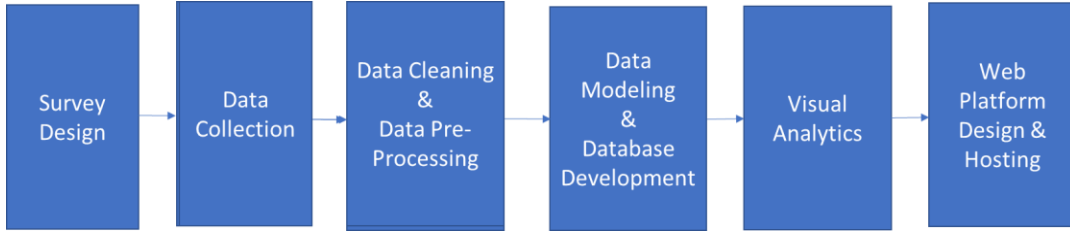


Figure 1 Methodology and Process

3.1 Survey and Data Collection

The survey questions are designed by the expert in the CoM Subcommittee on Xenophobia and Social Inclusion and conducted as an online survey, which is available at [11]. A total of 74 NGO organizations participated in the online survey in the year 2017, and data for total 80 projects have been submitted and collected. The survey consisted of total 16 questions, ranging from details about the organization, numbers of refugees they have served, countries of origin, socio-economic level of the migrants along with ethnicity/religion of the migrants, reason of leaving their home countries, areas in which they are facing problems of intolerance and Xenophobia and best practices followed by the organization to train the migrants.

3.2 Data Cleaning, Modeling and Database Development

The raw dataset was received in an excel file, and basic cleaning, merging, sorting, and pivoting has been done on the data because many data collected with multiple values for one question separated with comma, and some missing values. They were also not in a numerical format, but the free textual format, so the similar values are considered different. In other words, most of the data elements are not easy to machine processible and not easy to implement into a structured database system, i.e. they were not in a normalized format.

We have approached to develop the conceptual data model to meet the needs and the frequent queries or interactions by the end-users. We identified and created a total of 17 entities, such as *Organization*, *Employee*, *Migrant*, *Projects*, *Challenges*, *Reasons* and their connecting relationships among these entities. The Entity Relation diagram shows the data model to capture all the important entities in the migrants and migration-related project domain. The data entities and relationships were implemented with MySQL Relational Database for the Web application.

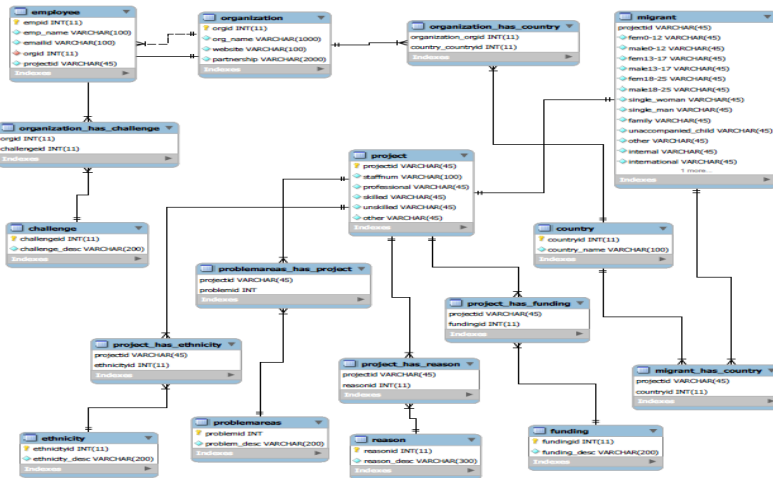


Figure 2 Entity Relationship Diagram

4 Visual analytics for Migration Policy Discovery

To visualize, we used the Tableau software which connected with the backend MySQL workbench. A total of 8 interactive dashboards have been created in Tableau. The geographical mapping, bar graphs and line graphs with color varieties and intensities are utilized to easily spot the regions of interest and data to pay attention. The web platform is developed to incorporate the data analytics products on the web server, with migration-related background information, links to surveys and to the UN Global Compact on Migrations.

4.1 Analysis of NGO Organization Information

The migration support projects are conducted by NGO organizations operating in different countries. The organizations operating in each country are shown in a map with details on projects they work and the contact information regarding the project. For instance in the mapping of organizations shown in Figure 3, one can observe three organizations operating in Bangladesh and four organizations in Egypt. Their organization name, website and collaborator information, and their operation locale information can help the users to locate the organizations operating in different parts of the world. One can pick one country and get a specific list of organizations operating in it. The map visualization easily identifies countries with the absence of these migration support organizations, enabling the CoM to make decisions whether these countries serve as potential areas to launch operations for migration support.

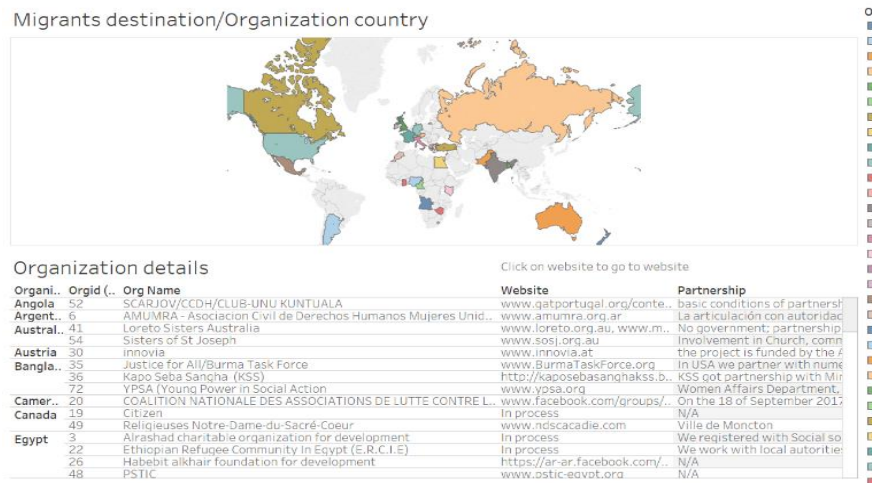


Figure 3 Organization Information by Country

Figure 4 shows the type of challenges and the organizations facing each particular challenge while operating in the location. The types of challenges identified include *Need for organizational funding*; *Discrimination*; *Lack of access to services*; *Barriers at the governmental level such as bureaucratic delays, lack of training, corruptions, etc.*; *Legal Barriers such as lack of laws or limitations in the existing laws*; *Need for more organizational staffing*; *Difficulty in identifying those who need assistance (e.g. fear of arrest/deportation)*; *Lack of coordination in provision of services*; and *Others*. Organizations that experience each challenge are listed with their information.

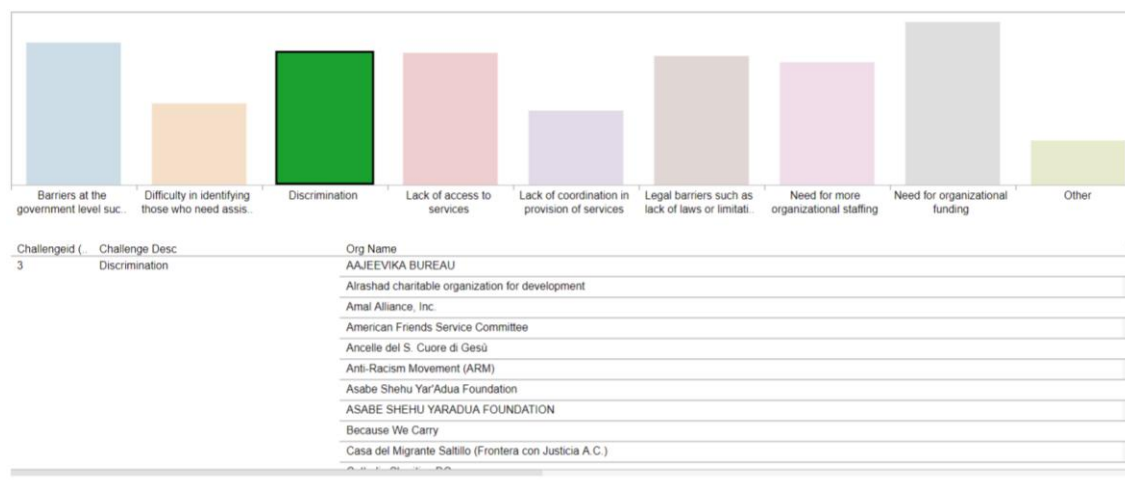


Figure 4 Challenges faced by organizations; it shows the organization list facing discrimination (in green)

4.2 Analysis of Migration Projects

Figure 5 shows the migration projects that an organization is working on in a country. As seen in *Bangladesh*, two projects, 721 and 722 are conducted by one organization 72 (Young Power Social Action) and it shows each project's contact person information and ability to email to the contact. It can click on the particular country, and the counts of the project for the country and a list of projects and the organizations in charge of the projects can be identified. In addition, the graph in Figure 6 shows the funding source types and the list of projects in each funding type.



Figure 5 Projects by country and by organizations



Figure 6 Funding Types for Migration Projects

The funding sources and the number of projects for each funding source are identified: Community-funded projects (31); Foundation-supported projects (24); Religious Organization funded project (22); Private Philanthropy-supported projects (12); Corporate funded projects (6); Political body-supported projects (3); and Other funds (41). The mouseover function for each bar shows the number of projects, and the details of projects, which will aid the easy understanding of the funding sources and what sources need to work on.

4.3 Analysis of Migrant Information

Information related to migrants includes the origin countries where they are from, the reasons for migration, their professional skill levels, the migrants' ethnicity and religions, and the origin and destination of each ethnicity and religious group. These help to monitor the distributions of particular ethnic and religious

movements, and migration patterns of particular skill sets, ethnic group's favorite destinations or religious group's origins and destinations.

In Figure 7, the left column graph shows the number of countries where the migrants originate from each NGO organization. When one organization column is selected (e.g. Amal Alliance, Inc.), the number of countries the migrants are from is 12 as shown in the infobox. And these countries of origin are displayed on the map (upper right corner) and the skill proficiency levels (professional, skilled, unskilled, and other) of migrants from each origin country are shown in the lower right corner. Although these levels are not on individual level, the migrant group skill levels by origin countries can be helpful and enable the migration policymakers to assess their training programs and their support resources.

Figure 8 illustrates different reasons for migration as specified in the migration projects. The identified reasons of migration are due to Conflict/Violence; Poverty; Search for better quality of life; Lack of decent work; Discrimination (e.g. racial, ethnic, religious, national); Threat of detention or Past Imprisonment; Drug smuggling and trafficking; Education; Natural or Man-made Disasters; Environmental Degradation; and Others. Figure 8 specifically shows that when selected the threat of detention or Past Imprisonment as the reason for migration, it shows 23 projects belong there and displays on the map above the twenty-three countries that are associated with the particular reason for migration. It is noted many African and South American and Central Asian countries belong to this category.

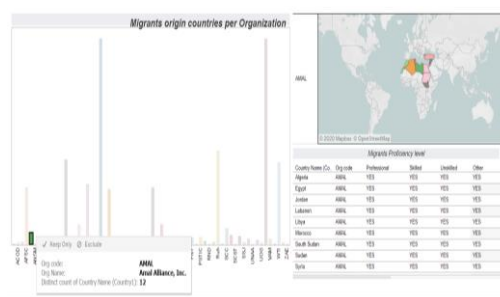


Figure 7 The origin countries of migrants and their skill levels by organization

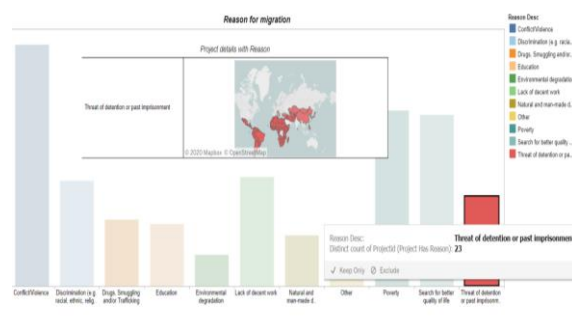


Figure 8 Reasons for Migration in Projects



Figure 9 Migrant Ethnicity, Religions and their origin and destination countries.

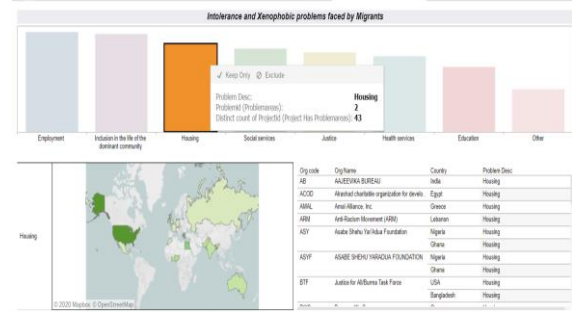


Figure 10 Intolerance and Xenophobia faced by migrants in a destination country

Figure 9 shows the ethnicity and religion subcategories of migrant groups in the count of projects. Ethnic groups shown in the upper left column graph include African, Hispanic, Syrian, Egyptian, Asian, Arab, Latin, Roman, Igbo, and Baptist. The upper right graph show the religion categories of migrants in projects which include: Muslim, Christian, Hindu, Sikh, Buddhist, and All religions. When the Hispanic ethnic groups

(green highlighted bar) is selected, the origin countries of this particular migrants are displayed on the lower left map, i.e. mostly central America and the destination countries for them in the lower right map as the US. Similarly, a particular religious group (the upper right bar graph shows the breakdown of religious groups in different projects) can be shown with their origin countries and their destination countries in the lower panel maps.

Figure 10 shows the Intolerance and Xenophobia faced by migrants in a destination country. The Bar graph on top shows the number of projects having migrants facing any intolerance or xenophobic incidents, and the world map shows the destination country where the migrants had a specific problem. The Intolerance and Xenophobia problems are experienced in the following categories: Employment; Inclusion in the life of a dominant community; Housing; Social Services; Justice; Health Services; Education; and Others.

4.4 Analysis of Best Practices

To identify and aid policy-making, the direct question was asked to list the self-assessed best practices and successful initiatives. These programs are not pre-imposed categories but garnered from the survey responses. The best practice categories include Education, Community Outreach, Job Training, Awareness, Counseling, Medical, Housing, Legal Aid, Scholarships, Socializing, and Undefined.

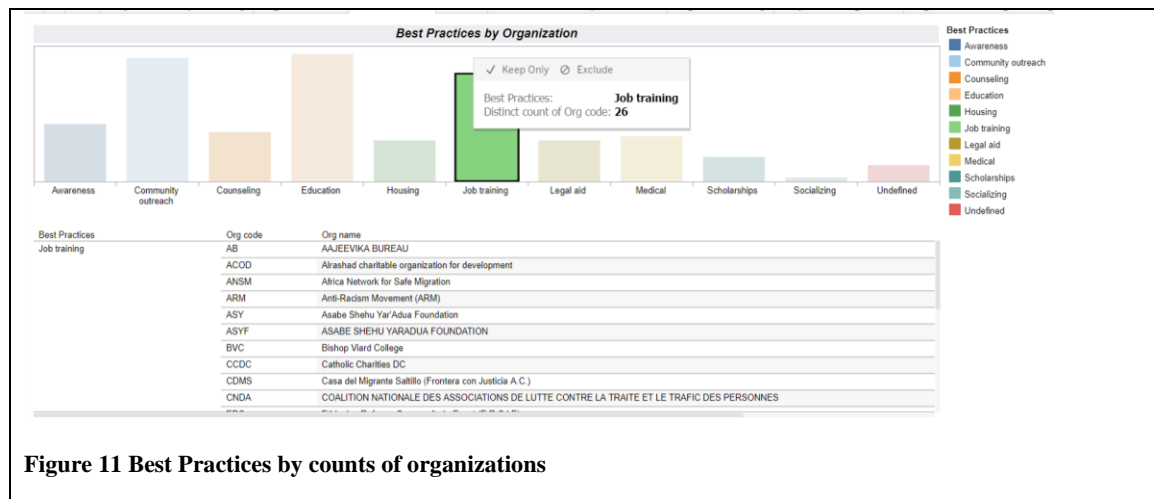


Figure 11 Best Practices by counts of organizations

The visualization in Figure 11 shows the best practice categories by the number of organizations falling in the category and when a particular category such as “Job Training”, the list of organizations that considered Job training as the best practice shows. In this case, 26 organizations reported that job training was the best practice.

5 Discussions

The online visual analytics platform provides information and insights for the NGO or other organizations working with global migrants. The visual interface with online interaction maps and graphs allowed the end-users to see the organizations throughout the world working to support the migrants and refugees, and their top three priority challenges: need for organizational funding, working with the barriers at the governmental level, such as bureaucratic delays, corruptions and lack of training, and equally challenged with lack of access to services and working in the face of discrimination. This kind of insights will help the policymakers working with stakeholders of the Global Compact on Migrations to design better resource allocations for the organizations and make the related member states to be aware of the challenges to improve the governmental support for the organization in their locale.

In terms of projects, the visual analysis helped to identify the funding sources for the global migration projects and found the community, religious organizations and foundations are contributing, but other sources need to be contacted for a more active role in funding. From the visual analytics platform, the global migrant related information was revealed: their origin countries and the skill levels from them, or the ethnicity and

religious groups and their migration origin and destination countries. The interactive maps show the migrants from Central American countries are mostly headed to the US. The reasons why they are migrating have been identified: to escape from the conflicts or violence, and to avoid poverty. The migrants in the destination countries also face various intolerance or xenophobic incidents in different situations. It shows not only the incident categories, such as employment but also shows geographically where this employment-related intolerance is faced. This kind of combined information of a category and the location is extremely important to understand the geographic spread of the particular intolerance or xenophobic problems and the intensity of each location. The visual analysis also enables to identify the best practices across different projects which can help policymakers to focus on disseminating to a large scale by allocating more resources.

The study was based on the 80 organizations that participated in the survey in one year. The platform is designed to collect data more often, at least annually, to ensure the trends over time can provide more robust and consistent findings for policy-making and governance. We have presented this prototype system with the NGO Committee of Migration and their partners, and received positive feedback. The stakeholder adoption tasks, such as securing infrastructure for database, web server and software transfer, is in its initial discussion phase. Also, the survey questions and its visualization results also give a chance to refine the survey questions such that important policy-related questions are included.

6 Conclusions

This paper proposed and implemented the evidence-driven migration policy and governance platform that analyze the global migration-related data to understand the NGOs and other migration-related organizations to gain insights and information awareness to support appropriate policy-making and governance to achieve the SDG 10.7 and the Global Compact on Migration objectives. The platform is designed and implemented and it is working on the end-user adoption.

Future work includes more predictive analytics to predict the number of migrants in a certain destination and the types of migrants with certain characteristics and the number of migrants. The prediction model will allow more proactive policy decisions and preparedness for the migration-related resources, even before the migrants arrive at the destinations, and they could avoid part of predictable challenges they may face.

Another future functionality of this proposed platform is to allow the migration path analysis. Currently, the system identifies the origin and destination countries, but not in between. The mobility path analyses may reveal the typical paths or challenges of issues that may lie along the paths that add further ordeal for the global migrants.

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