

Strengthening Disaster Resilience Through Diaspora Engagement: A Study on Integrating Diaspora Communities into Engineering Education

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Abstracts

Integrating resilience into disaster management and harnessing the potential of diaspora communities in engineering education curriculum is pivotal in equipping future engineers to tackle the intricate challenges posed by disasters and their ramifications on diaspora populations. The construction industry has long grappled with a scarcity of skilled labor, which becomes especially pronounced in the aftermath of disasters during the reconstruction phase. In the aftermath of a natural disaster, the active engagement of diaspora communities within social networks can serve as a sustainable lifeline for recovery and reconstruction. They can contribute invaluable resources, both in the form of supplies and financial support, as well as a pool of skilled workers. The primary focus of this research is to advocate for the incorporation of techniques into the engineering curriculum aimed at fostering community workforce development. This involves recruiting, engaging, and training the diaspora workforce to play a crucial role in post-disaster support. To achieve this, the research adopts an extensive literature review for future surveys to elaborate on the work in progress of this research. The results of this study underscore the diaspora's willingness and ability to make a substantial impact on the industry, thus diversifying and advancing the construction workforce. It further sheds light on the dynamic global network dynamics of diaspora communities and their role in the construction industry post-disaster. This research endeavor aims to augment our comprehension of the influence of diasporas on global network dynamics within the construction industry post-disasters. Moreover, it aspires to provide recommendations for construction management education that will prepare future engineers to manage diaspora stakeholders effectively, fostering inclusive and diversified workforce communities.

Keywords: Diaspora; Post-Disaster; Resilience, Sustainability

Background and Motivation

Diaspora studies is a sub-genre or extension of literature that explores broader socio-cultural contexts. The word 'diaspora' denotes the forced relocation of a person, community, or group of people from their native country to a foreign region [1]. Furthermore, it implies a cultural shift from original traditions to a blend of practices in the new country. As a result of this change, diaspora communities are unable to preserve their cultural identity, leading them to suffer feelings of alienation, nostalgia, and desire[2]. For the majority of the next two thousand years, the term diaspora maintains its limited definition. What becomes intriguing about the phrase is that its definition gradually broadened over the 20th century [3].

Upon encountering a hybrid environment, individuals may either embrace cross-culturalism or have a persistent sensation of trauma [1]. Many of the diaspora community incorporate there into their new living areas, participating in several industries, including construction [4]. An example of a diaspora community that has been severely affected by natural disasters is the Puerto Rican

Diaspora. In the United States, approximately five million residents are of Puerto Rican descent, accounting for 1.8 percent of the overall population in 2019 [5]. The phenomenon of labor migration of different diasporas in the construction sector may be traced back to the migrations that occurred during the colonial era. The transatlantic slave trade stands as one of the most significant instances of mass human migration in history, including the coerced transportation of around 15 million individuals from Africa to the Americas [4]. Diaspora communities have left their countries because of natural disasters and other political and social situations that have required them to relocate to a different country [6]. The scientific approach to disasters focuses on the hazard aspect, specifically related to hydrometeorological, geodynamic, and technological/anthropogenic events such as earthquakes, floods, mudslides, cyclones, industrial accidents, and nuclear fallout[7]. The literature on the sociology of science and technology highlights the importance of the scientific community in maintaining knowledge-creation processes. Within this community, socio-cognition plays a highly specialized function and is actively practiced[6]. Companies in developed countries are now grappling with the task of effectively accessing and mobilizing expatriate STEM talent worldwide. This is crucial in order to boost global knowledge production and increase productivity significantly [6]. The topic of international commerce in construction materials and services has garnered significant interest in recent years, both within this journal and in other sources [4]. Such as globalization continues to influence the social and economic conditions of different countries and many countries due to situations of war or climate change and displacement. It is important to determine the influence of the diaspora in the construction industry, and then there is the recovery after a national disaster[8]. After a natural disaster, a patriotic sentiment overcomes the diaspora of the affected country. Resulting in a community effort of different situations in the country deciding to get together and participate in the recovery efforts of their country [9]. Establishing the different mechanisms that the diaspora decides to assist in the recovery of their respective countries after a natural disaster[10].

According to the United States of America Bureau of Economic Analysis report for the first quarter of 2022, the construction industry's nominal value added was 4.1 percent of the GDP and is projected to reach a Compound Annual Growth Rate of 5 percent from 2022-2026 [11]. This projection of industry growth exacerbates the ongoing crisis of workforce shortage currently that exists in the U.S. construction industry.

Consequently, this would assist the construction industry in recruiting and retaining the young workforce. As presented by the United States of America Bureau of Economic Analysis report for the first quarter of 2022, the construction industry's nominal value added was 4.1 percent of the GDP and is projected to reach a Compound Annual Growth Rate of 5 percent from 2022-2026. This projection of industry growth exacerbates the ongoing crisis of workforce shortage that exists in the United States' construction industry.

Methodology

The objective of this study is to improve the construction management curriculum in order to provide students with a thorough understanding of the advantages and possibilities that come with including post-disaster management methods. Furthermore, it aims to provide tactics for academic institutions to cultivate industrial collaborations, therefore improving practical involvement. An

thorough literature analysis was done to develop these curricular improvements. The research specifically focused on areas where diaspora engagement has a substantial influence on resource usage in the construction industry.

The preliminary literature research assessed the preparedness and capacity of diaspora groups to have a beneficial impact on the building sector. This study examined the level of diaspora participation in the construction industry and explored ways to enhance their contributions. It used information from several sources such as Google Scholar and ASEE peers, covering the years 1990 to 2023. By conducting this investigation, we have consolidated suggestions for enhancing the curriculum and fostering engagement with the industry. These measures aim to enhance the preparedness of construction management students for real-life difficulties and prospects.

Results and Discussion

By integrating the management of diaspora into construction management education, students can not only acquire valuable skills but also become better prepared to address the challenges and opportunities presented by the benefits that this community and culture brings to the construction industry. This can lead to more efficient and sustainable construction practices in the future.

1. Resilience in Disaster Management:

a. Disaster Risk Reduction (DRR) Concepts: Start with a foundational understanding of DRR concepts, including hazard assessment, vulnerability analysis, and risk mitigation strategies [7]. Disaster risk reduction prioritizes a novel worldwide approach to managing catastrophes and the associated risks. Disaster risk reduction refers to the methodical creation and implementation of policies, strategies, and practices aimed at minimizing vulnerabilities and disaster risks within a society. Its goal is to prevent or reduce the adverse impact of hazards, while considering the broader framework of sustainable development[7].

b. Engineering for Resilience: Integrate courses that focus on engineering solutions to enhance the resilience of infrastructure, such as earthquake-resistant building design, flood control, and sustainable urban planning [12].

c. Case Studies: Use real-world disaster events as case studies to illustrate the importance of resilience in disaster management. Analyze how engineering decisions can impact the resilience of a community[12].

d. Interdisciplinary Approach: Encourage collaboration with other disciplines, such as environmental science, sociology, and public policy, to understand the multifaceted nature of resilience[13].

e. Emergency Management and Response: Teach the principles of effective disaster response and management, including incident command systems, communication strategies, and resource allocation[7].

2. Diaspora Influence:

a. Understanding Diaspora Communities: Include courses that introduce students to the concept of diaspora and the diverse communities it encompasses. Explore the historical, cultural, and social aspects of diaspora populations[2].

- b. Community Engagement:** Emphasize the importance of engaging diaspora communities in disaster response and recovery efforts. Teach students about the role these communities can play in providing support, resources, and knowledge[14].
- c. Cultural Competency:** Promote cultural competency by educating students on the customs, languages, and traditions of diaspora communities, enabling effective communication and collaboration in disaster situations[1].
- d. Case Studies and Guest Speakers:** Use case studies and invite guest speakers from diaspora communities who have been involved in disaster response and recovery efforts. Their experiences can provide valuable insights[15].
- e. International and Transnational Perspective:** Consider the global and transnational nature of diaspora communities. Explore how diaspora networks can facilitate international aid and assistance during disasters.

3. Ethical Considerations and Social Responsibility:

- a. Ethical Dilemmas:** Discuss ethical dilemmas that engineers may face when dealing with disaster resilience and diaspora influence. Emphasize the importance of balancing technical solutions with social and ethical considerations[16].
- b. Social Responsibility:** Encourage students to recognize the social responsibility of engineers in disaster management, which includes addressing the needs and concerns of affected communities and diaspora populations[16].

4. Hands-on Experience:

- a. Fieldwork and Simulations:** Provide opportunities for students to engage in fieldwork or simulations related to disaster resilience and diaspora influence. This can help students apply their knowledge in practical settings [17]. Research has consistently shown that computer simulation is a valuable decision-support tool for building projects for over forty years [17]. Computer simulation is a very effective analytical approach for assessing the impact of various management actions on a virtual environment [17].
- b. Internships and Service-Learning:** Encourage students to participate in internships or service-learning experiences with organizations that work on disaster resilience and collaborate with diaspora communities [18]. The broad consensus is that the internship provides additional benefits for the students, so it is recommended to include either elective or mandatory internships in future programs. The industry has a favorable attitude towards internships [18]. Students and industry professionals see internships as a very effective learning method for acquiring and transferring information across the academic and corporate sectors. From an academic perspective, the criticism is that university education primarily focuses on acquiring theoretical knowledge rather than practical skills [18]. Service-learning is an educational approach where students participate in activities that directly address the needs of individuals and communities. These activities are carefully planned to facilitate student learning and personal growth [19].

5. Student Research: Encourage students to undertake research projects related to disaster resilience and diaspora influence. This can deepen their understanding of these topics and contribute to the field's knowledge [20]. The process of creating significance also aided student co-researchers in conceptualizing involvement as co-inquirers rather than just

following instructions by being prompted to provide their opinions and insights on every phase of the study process [20].

6. Community Engagement:

a. **Partnerships with Diaspora Organizations:** Collaborate with diaspora organizations and community groups to facilitate engagement and projects that address disaster resilience within their communities [8]. Disadvantaged groups have a heightened risk of negative outcomes due to existing gaps in healthcare, limited access to services, and exposure to environmental hazards. Massive catastrophes cause significant physical, social, and communication disruptions, which present difficulties in responding effectively and create overwhelming demands on healthcare resources and social assistance [8].

Integrating resilience in disaster management and considering the influence of diaspora communities in engineering education equips future engineers with a more comprehensive and socially responsible approach to disaster preparedness, response, and recovery. It also acknowledges the importance of diverse communities in disaster management efforts, recognizing their unique strengths and resources.

Limitation and Future Work

This study is a work in progress, with continued work in the future covered in this literary review and further mentioned. Although integrating resilience into disaster management and including diaspora groups in engineering school curricula show potential for solving intricate difficulties, it is essential to recognize numerous limitations of this research. The efficacy of incorporating resilience and involving diaspora populations may change depending on various areas and settings. The effectiveness of a particular approach in one region may not necessarily be transferable or prosperous in another region, owing to variations in cultural and socio-economic circumstances and infrastructural disparities. Executing curricular improvements and promoting community involvement requires substantial resources, such as financial backing, specialized knowledge, and institutional backing. Several educational institutions and localities prone to disasters may need more resources to implement the planned efforts properly. To effectively engage expatriate populations, it is crucial to have a sophisticated understanding of cultural norms, beliefs, and sensitivities. Neglecting these variables might result in misconceptions, miscommunications, and inefficient teamwork. Recognizing the diverse nature of catastrophe management is critical when adding resilience to engineering education. Solely focusing on resilience may not sufficiently equip future engineers to negotiate the intricacies of catastrophe response, recovery, and long-term sustainability. Evaluating the efficacy of curricular upgrades and community involvement activities necessitates the implementation of rigorous assessment frameworks and monitoring systems. With the assessment, it is easier to ascertain the extent to which these activities accomplish their desired results and enhance catastrophe preparation and response. Engaging diaspora groups raises ethical concerns surrounding power relations, representation, and fair participation. It is crucial to guarantee that efforts are inclusive, respectful, and empowering for diaspora groups rather than continuing paternalistic or exploitative behaviors. Incorporating resilience and diaspora participation into engineering education may need substantially reorganization of the current curriculum, perhaps facing

opposition from conventional academic frameworks and stakeholders. Technological advancements, climatic patterns, population shifts, and geopolitical factors have influenced the techniques and problems of disaster management and should be further studied in future work. To successfully handle new challenges and opportunities, it is crucial for curriculum upgrades and community involvement measures to maintain flexibility and adaptability. To overcome these limitations, it is essential to embrace a cooperative and flexible strategy that gives importance to the specific circumstances of the area, the empowerment of the community, and a long-term dedication to enhancing resilience in the presence of calamities. To tackle these difficulties in a proactive manner, stakeholders might strive towards implementing more comprehensive, efficient, and enduring disaster management methods.

Conclusions

It is crucial to incorporate resilience into disaster management and actively involve diaspora communities in engineering education curricula. These measures are necessary to equip future engineers with the skills and knowledge needed to effectively tackle the intricate difficulties presented by disasters, especially in relation to their effects on diaspora populations. The construction sector has always encountered a scarcity of proficient workforce, which is most apparent during the aftermath of calamities when rehabilitation efforts are underway. In such circumstances, expatriate groups may be useful assets for recovery and rebuilding endeavors, providing tangible assistance and a reservoir of highly qualified laborers. This study proposes the integration of specific methodologies into engineering education to promote the growth of community workforce resilience. The core of this effort is the enlistment, involvement, and instruction of expatriate groups to assume crucial positions in post-disaster assistance programs. The results highlight the eagerness and ability of diaspora groups to make a substantial contribution to the building sector, therefore enhancing and promoting the construction workforce. Moreover, the study illuminates diaspora groups' ever-changing global network dynamics and their pivotal involvement in post-disaster reconstruction efforts. This research aims to enhance our comprehension of how diasporas impact global network dynamics in the construction industry after disasters. It also provides recommendations for construction management education to equip future engineers to effectively engage with diaspora stakeholders properly. Construction management programs may enhance students' ability to successfully manage diaspora involvement by embracing inclusion and diversity, promoting the development of more resilient and varied workforce communities. To summarize, incorporating resilience into disaster management and acknowledging the impact of diaspora communities in engineering education is a crucial measure to prepare upcoming engineers with the requisite expertise and abilities to navigate the intricacies of disaster response and recovery. Furthermore, it emphasizes the need to recognize and use the abilities of varied populations in disaster management efforts, therefore promoting more comprehensive and efficient methods for preparing and recovering from disasters.

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