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Strengthening the Role of Gender and Geographic Diversities in Developing Effective Solutions to Humanity's Foremost Problem

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Abstract
The objective of this paper is to describe the contributions of the author for strengthening the role of gender and geographic diversities in developing effective solutions to humanity's foremost problem. The foremost problem facing humanity today is sustaining human development and preserving the planet.[1] *Science and engineering, with their range of sub-disciplines, have been important contributors to humankind's survival and to the improvement of our quality of life. There is, currently, a global shortage of well qualified scientists and engineers who can design, build, and maintain sustainable development plans and structures. Within this manpower, gender and geographic diversities play an important role in developing effective solutions to sustainable development.*
The following are the author's contributions on strengthening the role of gender and geographic diversity. He has taught a total of 5000 students, over 1500 were women. The students come from all 50 states of the United States as well as from other countries. He recruited over 430 professional members including over 200 women members, from six continents to various professional organizations.
Keywords: ***Gender and Geographic Diversities, Effective Solutions, Humanity's Foremost Problem***

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I. INTRODUCTION

The objective of this paper is to describe the contributions of the author for strengthening the role of gender and geographic diversities in developing effective solutions to humanity's foremost problem. The foremost problem facing humanity today is sustaining human development and preserving the planet.[1] Sustainable development is development that meets present needs without compromising future generations' ability to meet their own needs. This requires balancing environmental, social, and economic considerations. [2] For many hundreds of years science and engineering have grown synergistically with humanity. Science and engineering, with their range of sub-disciplines, have been important contributors to humankind's survival and to the improvement of our quality of life. [1] There is, currently, a global shortage of well qualified scientists and engineers who can design, build and maintain sustainable development plans and structures. Within this manpower, gender and geographic diversities play an important role in developing effective solutions to sustainable development.

Over the past decade, diversity and inclusion in science and engineering has become a mainstream topic for many organizations around the world. This has been driven largely by a number of overarching factors including: i) increasing recognition of the current and historic lack of equality in opportunities for all; ii) a skills shortage driven by an increasingly technical world, coupled with an ageing demographic [3] ; iii) acknowledgement of the reality that innovation, profit and high-quality engineering is improved with a more diverse team of engineers. [4] It is now recognized that a more interdisciplinary approach and inclusive mindset will enable global challenges to be addressed in a more balanced and holistic way, ensuring that progress made against one goal is simultaneously considered against other goals. A diverse and inclusive workforce is vital for the successful implementation of solutions to address these multiple and diverse goals, and this workforce must ensure that their science, engineering, and technological outputs (products, services, solutions) are equally

accessible and inclusive of all. The solutions must be considered through a 'diversity' lens and without the full participation of under-represented and marginalized groups and geographic regions as well as their effective participation in decision-making roles in political, economic and public life. [1]

Moreover, it is understood that the effects of climate change, such as droughts, floods, and other extreme weather events, will have a disproportionate effect on women and marginalized people globally. [5] In many occupations, (1) women's and (2) people's in the least developed nations lower socio-economic and managerial status results in them having a limited voice where key decisions are being taken, and their status and experience as gatekeepers of family, food, health and home mean that these perspectives are poorly represented in solution outcomes. These groups restricted access in some parts of the world to education, land ownership and independence often means that their needs are poorly served by science, engineering and technology solutions. Encouraging more diverse representation in engineering and ensuring the progress of these groups towards senior decision-making positions is seen as crucial to enabling these views, so that they are equally represented. [6,7] A factor that is growing in importance and recognition is the need to ensure that bias and discrimination are not embedded in future solutions. Huge changes are taking place with a shift towards a more digitized world driven by big data, machine learning, autonomous systems and Artificial Intelligence. Without vigilance, there is a risk that historical biases and discriminations will be built into new systems, inadvertently resulting in the proliferation of discrimination and the reinforcement of bias. Many examples have already come to light where largely unseen algorithmic decision-making succeeds in further discriminating against certain groups of the population.[8] By ensuring a diverse workforce that represents all perspectives, these biases are more likely to be recognized and prevented. [1]

Gender Diversity

Ensuring women's access to science, technology and engineering will close the gender gap and ensure women can benefit from and participate in the technology revolution, as well as take up leadership positions (SDG Tracker27). The participation of women in the development of advanced technologies, especially engineering, is critical to achieving the UN Sustainable Development Goals. Diversity of thought is vital for innovation and the development of solutions that reflect community standards, values, and aspirations. [1]

The author has taught over 1500 female students, (1100 in 40 non-science majors and 400 engineering majors). The non-science majors gained an appreciation for engineering and science through his course "Intro to Environment." He treated his female students with respect, creating a collegial atmosphere where they felt free to ask questions and actively participate in their learning. This is evidenced by his receiving the National Outstanding Teaching standard of the American Society for Engineering Education.

The author has recruited over 120 women professional members for various international engineering organizations from all the six continents.

Geographic Diversity

Africa is the least developed continent among all the ones. The continent of Africa is the second largest landmass in the world and is home to a wealth of cultures, as well as policies and strategies. Given the strong relationship between engineering, science graduates and economic growth, several countries in Africa regard science, technology, engineering and mathematics (STEM) as crucial for development. Africa has a young population and faces an array of challenges in terms of inequality, equity, service provision and justice. There are well-known difficulties relating to the provision of universal health coverage and quality education, beneficiation from natural resources and infrastructure, as well as a recognized need to create sustainable cities and to develop a holistic response to disasters resulting from the climate crisis, migration, pandemics or armed conflict. Indeed, appropriate solutions necessitate co-development.[1]

Although there is a wide gap between and within African countries, studies and reports show that income levels in sub-Saharan Africa are substantially lower than those in many other countries of the world. African formal economies rely mainly on extractive industries, while large sections of the population depend on agriculture in informal settings. Africa also relies heavily on imports of machinery, and its share of manufacturing as a proportion of GDP is substantially lower than that of the rest of the world.[1]

The author has taught a total of 5000 students. The students come from all 50 states of the United States as well as from over eighty other countries. He recruited over 430 professional members from six continents to various professional organizations. The author paid more attention to the 33 least developed nations of Africa and recruited majority of the members from these countries.

II. CONCLUSIONS

The foremost problem facing humanity today is sustaining human development and preserving the planet. Science and engineering, with their range of sub-disciplines, have been important contributors to humankind's survival and to the improvement of our quality of life. There is, currently, a global shortage of

well qualified scientists and engineers who can design, build, and maintain sustainable development plans and structures. Within this manpower, gender and geographic diversities play an important role in developing effective solutions to sustainable development.

The following are the author's contributions on strengthening the role of gender and geographic diversity.

(1) His service efforts focusing on diversity of gender and geography are exemplary. He has taught a total of 5000 students, over 1500 were women. The students come from all 50 states of the United States as well as from other countries.

(2) He recruited over 430 professional members including over 200 women members, from six continents to various professional organizations.

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