

Introduction:

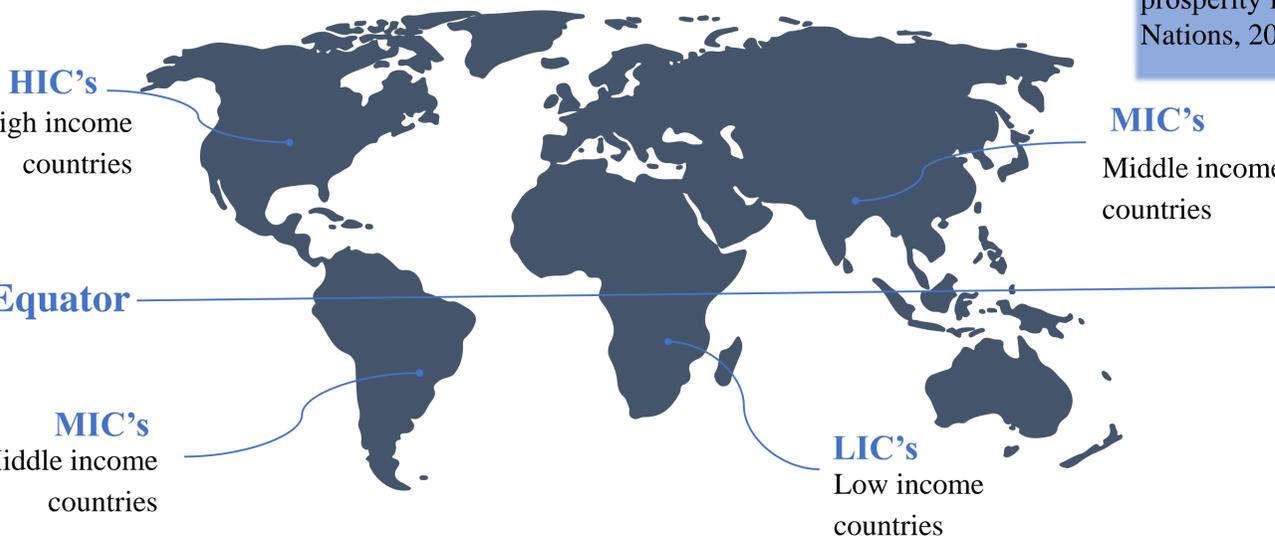
In today's rapidly evolving world, the need for sustainability has become increasingly evident. Challenges such as climate change, resource depletion, social inequality, and poverty demand urgent attention and innovative solutions. Engineers, as problem solvers and innovators, have a crucial role to play in addressing these global issues. To equip the next generation of engineers with the knowledge and skills required to tackle these challenges head-on, it is imperative to integrate sustainability into engineering education. Therefore, to introduce my research project - 'Embedding sustainability in engineering education' which I completed under the supervision of Dr. Manoj Ravi at the School of Chemical and Process Engineering.

Aims and Objective:

The objective of this research is to identify existing knowledge gaps and emerging trends in embedding sustainability in engineering education worldwide. By using diverse methodologies, including literature analysis and surveying opinions in the education community, the findings of this research will help shape the design and delivery of a cutting-edge sustainable engineering curriculum



"The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future" (United Nations, 2015)



Different factors:

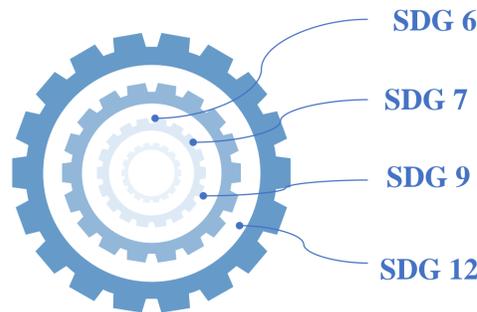
- North/South Divide (Equator)
- HIC's MIC's LIC's
- Social, Environmental or Economic (SDG's)
- Type of Engineering
- Local/National/Global Impact

Methodology :

The methodology I undertook to complete my research used Web of Science and involved analysing 265 documents meticulously. This process entailed reading through each document and categorizing them into subcategories to discern their primary focus. These subcategories encompassed identifying which United Nations Sustainable Development Goals (SDGs) were addressed, determining whether the authors were from a High-Income Country (HIC), Middle-Income Country (MIC), or Low-Income Country (LIC), as well as considering the geographic location of the country, the specific engineering disciplines emphasized, and whether the documents resulted from international collaborations. Furthermore, to ensure the relevance and specificity of the collected data, I established an exclusion criterion. This criterion was employed to filter out documents that did not directly pertain to the research topic, ensuring the precision of the analysis. The insights gained from this rigorous methodology have not only provided valuable information for this research but also hold the potential to influence the future of engineering education.

Results:

While efforts have been put in by universities worldwide to incorporate all SDG's (social, economic and environmental), there is still a divide with the main focus lying on SDG 6,7,9 and 12 in Engineering Education. The results also showed a divide between the Global North and the South with the latter accounting for less than 15% of the publications. These results show what changes should be made in order to allow for the most effective increase of sustainability awareness amongst undergraduate students and in an equitable fashion all over the world



Sustainable development goals that are usually focused on in Engineering curriculum are stated above



Collaboration of Authors

Approximately 25% of documents include collaboration between different countries

HIC/MIC/LIC

Around 70% of all documents are from High income countries with only 2 entries being from Low-income countries

North/South Divide

Approximately 85% of all documentations are from the North of the Equator

Conclusions :

By understanding which SDGs are more prominently addressed and where geographic disparities exist, educators and institutions can tailor their curricula to better equip future engineers to address global challenges effectively. Through the visual presentation of data in various graphs and the ongoing process of transforming these findings into a professional document for publication, the research aims to contribute to the growing body of knowledge on embedding sustainability in engineering education. Ultimately, the aspiration is that this work will serve as a foundation for new discoveries and innovations, furthering the cause of sustainable engineering education worldwide.

METHODOLOGY: Description of what the paper entails	North/South	HIC/MIC/LIC	social/economic / environment	UNSDG	type of engineering	Local/National/Global impact
criteria statement on sustainable development for engineering programs	South	Peru (MIC)	all three	1,2,3,4,5, 6,7,8,9, 10,11,12, 13,14, 15,16	General	Global + National + Local
intersection of UNSDG current outcomes accreditation framework	North	Canada (HIC)	all three	4,6,7,8,9, 11,12,13, 14,15	Chemical	National + Global
contribution of governance actions and their relevance to SDGs	North	China (MIC)	All three	1,3,4,5,6, 7,8,9,10, 13, 16,17	General	Local + National + Global

Acknowledgements:

I am very grateful for the guidance and assistance provided by my supervisor, Dr Manoj Ravi, throughout this project and for the help provided to further guide me to achieve more. This project was funded by the Laidlaw Undergraduate Leadership and Research Programme

References:

- United Nations (2015). *The 17 Goals*. [online] United Nations. Available at: <https://sdgs.un.org/goals>.
- United Nations (2015). *The 17 United Nation Sustainability Development Goals*. Available at: <https://unglobalcompact.org/sdgs/about> [Accessed 19 Sep. 2023]