
ENGINEERING AND HUMAN CAPACITY BUILDING

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ABSTRACT

Engineering capacity is a prerequisite for the sustainability of countries, their communities and ultimately the world in general. This applies whether or not a country is developed or not. In the quest to ensure and facilitate sustainable engineering, there is need for capacity building within engineering professions and for areas associated with engineering as well as to provide guidelines and ideas for capacity building activities, events, projects and programs. To achieve this goal, countries need a sufficient pool of appropriately educated and practitioners to effectively sustain and where indicated, improve the quality of life for their communities and citizens. In the case of developing countries, the presence of such a group of professionals could facilitate the infusion of foreign capital through attraction of multinational companies to invest in that particular country, assist in making sure that foreign aid funds are appropriate as well as that these funds are applied consistently and wisely in order to transfer skills and as such build indigenous capacity to deal with engineering infrastructure, services and products.

Keywords: Capacity, Education, Engineering, Sustainability

INTRODUCTION

In the global context, Capacity refers to the ability of individuals and institutions to make and implement decisions and perform functions in an effective, efficient and sustainable manner. At the individual level, capacity building refers to the process of changing attitude and behaviors in imparting knowledge and developing skills while maximizing the benefits of participation, knowledge exchange and ownership. At institutional level, it focuses on the overall organizational performance and functioning capacities as well as the ability of an organization to adapt to change. It aims to develop the institution as a total system, including individuals, groups and the organization itself. Traditionally, interventions at the systematic level were simply termed institutional strengthening. This reflected a concern with human resource development as well as assisting in the emergence and improvement of organizations. However, capacity development further emphasizes the overall policy framework in which individuals and organizations operate and interact with the external environment as well as the formal and informal relationships of institutions. Capacity is not mere existence of potentials but rather the harnessing and utilization of the existing potentials to identify and solve problems. It is only when this is done that it can be considered as capacity.

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CAPACITY BUILDING IN ENGINEERING

Engineering and technology are vital but often overlooked part of our knowledge. The development and application of knowledge in engineering and technology is a driving force of sustainable social and economic development factor for poverty eradication. These issues were underlined at the world conference on science in 1999 and the world engineers' convention in 2000. Human and institutional capacity building, policy and planning issues in the engineering, science and technology are important priorities in development and application of knowledge in many developing countries and transitional economies such as ours. Engineering environment is a lever for economic, social and sustainable development and it is recognized as a priority in the global engineering community. Engineering capacity building is dealing with this important component of informed decision making on several fronts. In the pursuit of secure, stable and sustainable world, countries need to sustain and or enhance their human, institutional and infrastructure capacity. In today's global economy, every country has to acknowledge the need to create sustainability at all levels of engineering services, provide for the needs of communities in the world of diminishing resources, environmental challenges and a strong need to reduce the consumption of limited resources. This can be achieved partially by engineering appropriate and suitable engineering educational quality. A competent engineering workforce base can then provide several paths to sustainable development as well as to ensure that all role-players and stake holders including investors focus on sustainability and equitable solutions for engineering services, amenities and products. In the case of developing countries like ours, the utilization of foreign aids and investment funds should be managed by professionally competent people and groups. Such group of professionals could facilitate the infusion of foreign capital through attraction of multinational companies to invest in that particular country, assist in making sure that foreign aid funds are appropriate as well as that these funds are applied consistently and wisely in order to transfer skills and as such build indigenous capacity that deals with engineering infrastructure, services and products. This pool of experts can also provide a basis for business development by local entrepreneurs. In developed countries, the challenges are different and much focus needs to be set on maintaining and replacing aged infrastructure and to promote attention to these issues to decision-making authorities. In addition, there is a diminishing engineering workforce due to lack of interest from young citizens and in many cases these developed countries have contributed substantially to the brain drain of engineering professionals from developing countries.

Therefore, there is the need to embark on capacity building ventures to rekindle a new interest in engineering from their own communities. This is highlighted in South Africa SKA project of 2005 targeted at youth into science and engineering programme to develop highly skilled young scientists and engineers. The young people, supported by this programme, will serve South Africa and African partner countries, in the future in key areas of economic development in addition to their participation in "blue skies" scientific research. The programme offers comprehensive bursaries to students in engineering, mathematics, physics and astronomy at under graduate and post graduate levels. Bursary holders benefit from regular workshops and students conferences. To date, about 600 students have benefited from SKA

South Africa bursaries and scholarships, including many students from other African countries.

STRATEGY: The overall strategy of UNESCO in the world congress in 2004 held in Shanghai on engineering and technology is to promote human and institutional capacity building, particularly in the developing countries. Emphasis will be given to information, communication, advocacy and the promotion of engineering and technology, especially among young people, equity and participation and application of research and knowledge management for development. There will be a focus on teaching materials, education and training, professional development, standards, accreditation and quality assurance. Other initiatives include the development of ethics and codes of professional practice in engineering and the promotion of the culture of maintenance and asset management. In poverty eradication, the focus will be on technology for basic needs and will involve close co-operation with the cross-cutting project on technology and poverty eradication. Member states will be assisted in this process through international co-operation and sharing of good practice in public and private partnerships. An interdisciplinary intersectoral approach will be pursued in close co-operation with several partners. Co-operation will also continue with other programme sectors, with field offices and national commissions. Through public and private partnerships, efforts will be made to budgetary resources. The concept of an international initiative in engineering and development technologies will be developed.

EXPECTED RESULTS

1. Enhanced advocacy, awareness and promotion of engineering as a component of knowledge, society and toll for social and economic development.

Performance indicators

- Number of workshops and public events regarding knowledge management and research applications in the engineering, sciences and technology organized.
- Governmental and non- Governmental partners identified, involved and engaged.
- Enhanced media coverage obtained.

2. Human and institutional capacities strengthened in engineering and technology.

Performance indicators

- Development and distribution of information, learning and teaching materials.
- Number of courses and workshops organized.
- Standards and accreditation improved through development and distribution of guidelines regarding quality assurance in engineering education and continued professional development with particular reference to the developing and least developed countries.

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3. Contribution of engineering and technology to poverty eradication and sustainable development highlighted and developed.

Performance indicators

- Number of workshops organized for policy makers and practitioners.
 - Information, learning and teaching materials developed and disseminated.
 - Networking supported for starting good practice.
4. Access and participation of women in engineering and technology and associated gender and equity issues promoted.

Performance indicators

- Number of expert meetings organized.
 - Information, advocacy, teaching and learning materials regarding the access and participation of women in gender issues in engineering and technology developed and disseminated.
5. A culture of maintenance promoted in engineering and technology.

Performance indicators

- Number of capacity building workshops organized.
- Guidelines for maintenance activities in engineering and technology developed and disseminated.

CONCLUSION

Over the years, a broad common conceptual framework has emerged. This approach is increasingly being adopted by the developing co-operation communities. It involves a system perspective that addresses various levels of environmental management capacities which include capacities of institutions, individuals, industries, overall countries and regions. Capacity development further emphasizes the overall policies Framework in which individuals and organizations operates and interact with the external environment as well as the formal and informal relationships of institutions. Capacity building is not the mere existence of potentials but rather the harnessing and utilization of the existing potentials to identify and solve problems. Capacity building is a long term continuing process involving creation of an enabling environment with appropriate policy and legal frameworks, institutional development, including community participation (of women in particular), human resources development and strengthening of managerial systems.

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