



SCIENCE, TECHNOLOGY AND INNOVATION POLICY RESEARCH ORGANISATION
(STIPRO)

Concept Note for a Research Workshop

on

**Engineering Education Capacities: How Engineering Ecosystems are
Preparing Students in Africa for Employment**

October 2021

1. Context of the Workshop

Engineering practices play a crucial role in addressing development challenges; they bring ideas into reality and particularly contribute to the transformation of the industrial sector that triggers economic growth (Mutambala *et al.* 2020). Engineering practitioners act as catalysts of technological change, which is linked to the acquisition and enhancement of knowledge and skills that address deficits in science, technology, engineering and mathematics (STEM) and their role in development. There are good reasons to renew interest in, and attention to, engineering education in developing countries (Ibrahim, Luo & Metcalfe, 2017; UNESCO, 2010; Royal Academy of Engineering, 2020).

What we refer to by engineering in the context of this discussion entails the process of digesting and combining knowledge, resources and arts to create and operationalise technology (Sheikheldin&Nyichomba, 2019; Sheikheldin, 2018).

Given the importance of engineering, the newly independent states in sub-Saharan Africa saw the need to establish engineering education programmes to fill quantitative and qualitative knowledge deficits in engineering practices in their countries. In East Africa, for example, the East African Community that was formed in 1967 shortly after independence, played at that time a significant role of facilitating students from Tanzania and Uganda to take engineering courses at the University of Nairobi, Kenya, as the nearest engineering school in the region. Since then, engineering schools have increased in each country. Engineering colleges are now almost everywhere in the SSA. They cover different courses such as civil, mechanical, electrical, agricultural, chemical, biomedical, aerospace, environmental, electronic, computer, automobile, software, structural, industrial, manufacturing, petroleum, mining, transportation, telecommunication, and so forth. These academic programmes lead the process of training future and current engineering practitioners. Within the engineering ecosystem, colleges and other stakeholders put in place models and approaches for preparing engineering students for employment after graduation. This is the case of programmes such as student industrial secondments (SOS) – such as practical training (PT) and structural engineers apprenticeship programme (SEAP), in East Africa – as well as teaching models such as problem-based learning (PBL).

However, despite increased efforts, the number of engineering graduates in SSA overall is not in concert with the increasing needs of qualified engineering practitioners (Nganga 2014). Africa faces a challenge of shortage of engineering graduates. For example, not long ago, about 2.5 million more engineering practitioners were estimated to be needed in Africa to meet the development goals of access to clean water and sanitation (UNESCO, 2010). Available data from the international benchmark of engineers per population shows that Africa lags behind as far as international norms are concerned (Patel, 2017) both in terms of quantity and quality of engineering practitioners. Whereas the ratio of engineers per population in China, for example, is at one engineer for every 200 persons, and one engineer for every 300 persons in the UK, the ratio in most African countries is close to one engineer for every 6000 persons. In addition to the challenges of quantity, performance and efficiency of existing engineering practitioners is an additional challenge.

Additionally, we observe dissonance in translating the importance of engineering practices into hiring the engineering graduates. The region that suffers from an acute shortage of engineers still has a large number of engineering graduates unable to land jobs in the field. This raises concerns that stimulated the need to organize the present workshop, as part of an on-going project led by STIPRO and supported mainly by IDRC Canada, to discuss in detail the challenges and opportunities in establishing a balance between engineering skills in development and employability of engineering graduates in East Africa (and SSA at large).

2. Objectives of the Workshop

This workshop aims at spurring national and regional debate on the relationship between engineering education and employment of graduates. It is intended to discuss the role of engineering colleges and universities in preparing engineering students to work in industries and public services, and to chart the way forward. The involvement of three major actors is critical: government (in terms of policies and guidance), research (academic training and research/technology organizations) and industry (private, public, PPP, etc.) — also known as the triple helix.

3. Workshop theme

The workshop theme is titled: **“Engineering Education Capacities: How Engineering Ecosystems are Preparing Students in Africa for Employment.”**

4. Structure of the Workshop

The workshop is organized to contain a number of paper presentations, followed by discussions. It also includes interactive sessions where attendants will brainstorm on issues as well as put together lists of recommendations (for policy and practice). The sessions of the workshop are specifically organized under the following issues:

- a) **Supply and demand of engineers in SSA:** this session intends to discuss the state of quantitative and qualitative supply and demand of engineering practitioners through a benchmark between SSA and other regions, discuss the factors behind either oversupply or undersupply, and understand projections in different engineering disciplines.
- b) **Impacts of the engineering fields:** this session is meant to discuss the results of establishing relationship between engineering training and employability. It will reflect the importance of engineering toward meeting national development plans. The session will reflect on the role and challenges around the provision of adequate and high quality engineers for Africa’s industrial development.
- c) **Employability of African engineering students:** This session is intended to discuss the role of industry, university and government and the status of the linkages amongst themselves in shaping the engineering education.
- d) **Reporting on the SIS project:** the project led by STIPRO since October 2018. The reporting process will cover activities and preliminary findings, and invite attendants for critique and improvement upon the findings, in order to feed the final project report and consequent publications.

Each issue shall be covered by one presentation and one discussion to be followed by a Q&A session. In addition to paper presentations, there will be two other sessions: a session on fireside chat to be followed by Q&A session, and a final session to deliberate on identified policy issues.

5. Date and Venue:

The workshop will take place on 1st - 2nd December 2021 in Dar es Salaam, Tanzania.

6. Registration and Participation

The workshop is designed to consider participants from different sectors and stakeholders, such as higher learning education (representatives from the universities and colleges), private sector (representatives from the private sector associations/organizations; representatives from industrial firms) and government boards and policy makers (representatives from the government ministries and institutions/organizations, boards, science-granting councils and RTOs), in addition to other researchers and representatives of partner organizations interested in supporting efforts of strengthening engineering ecosystems in Africa (such as IDRC Canada, Royal Society of Engineering UK, UNIDO, UNESCO, etc.). They are expected to bring good knowledge from their experience in all the aspects of engineering and employability. The invitees are therefore requested to immediately confirm participation for a final logistic arrangement.

7. For further information, please contact the following:

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