

Kenyan-German Centre of Excellence for Mining, Environmental Engineering and Resource Management (CEMEREM)

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Abstract

Sustainable resource management is a formidable challenge to most economies, calling for an interdisciplinary and practice-oriented training of resource experts and managers. Informed by this fact, the establishment of academic centres of excellence has become a strategic feature of the German-African partnership in key areas of regional development priorities. A call for Expression of Interest for the establishment of a Kenyan-German Centre of Excellence for Applied Resource Management under the DAAD's Centres of African Excellence Programme was subsequently advertised in June 2015. A consortium of collaborating universities comprising Taita Taveta University College (TTUC), HTW-Dresden and TU-Freiberg in collaboration with personnel from the Hochschule Zittau/Goerlitz developed and submitted an Expression of Interest to compete with other Kenyan universities to have TTUC be the host of the Centre of excellence. In December 2015, the consortium succeeded in having TTUC as the hosting African institution of the Centre for Mining, Environmental Engineering and Resource Management (CEMEREM). It is the eight (8th) German-African centres of academic excellence and *the first one with a niche in engineering for sustainable resource management*. The formation of the centre was motivated by the need to implement training in Bachelors, Masters and PhD through curriculum review and development in mining and Environmental engineering, and applied resource management for the extractive sector to assure sustainability of future staff needs in the region. This central focus will be supplemented with development of the requisite training infrastructure, staff development, staff and student exchange with German partner universities and intense partnership with industry in research and training. The centre's core values shall be relevance, sustainability and efficiency and research activities in mining, environmental engineering and resource management. This paper details the process of forming CEMEREM, its strategic focus, and the lessons arising from the process forming it that can inform future similar engagements.

Key words: CEMEREM, DAAD, HTW-Dresden, KENGER, mining, Taita Taveta University College, TU Bergakademie Freiberg

Introduction

Sustainable resource management is gaining in importance in a world where technology is rapidly transforming the manner and cost of doing business. Quality education remains a key pillar of the world's most competitive economies. Such education must provide opportunities for practice-oriented training in well-networked centres of excellence that promote strong research collaborations with government and industry. The ensuing robust nexus produces a critical mass of innovative practising experts and researchers, as evidenced in the countries that topped the list of the global competitiveness index (2014-2015), namely Switzerland, Singapore, the USA, Finland, Germany, and Japan.

The extractive sector is gaining importance in Kenya and Greater East Africa; following the discovery of substantial deposits of oil, coal, iron ore, rare earth minerals, and other minerals, the development of mineral resources is among the six priority sectors under the Economic Pillar of Kenya Vision 2030 Strategic Development Blueprint GOK(2007 and 2013). The contribution of Kenya's mining sector is

expected to increase from 1% to 6.5% of the GDP in the medium term, with Base Titanium Ltd's Mineral Sands Project alone contributing to 1% of the GDP. However, an underdeveloped human resource base undermines the potential of this sector.

The German Academic Exchange Service (DAAD) advertised a call for Expression of Interest for the establishment of a Kenyan-German Centre of Excellence (KENGER) for Applied Resource Management under the DAAD's Centres of African Excellence Programme in June 2015 contained in DAAD(2015). The Government of Kenya supported the process through the National Commission for Science, Technology and Innovation (NACOSTI).

A consortium of collaborating universities comprising Taita Taveta University College (TTUC), HTW-Dresden and TU-Freiberg in collaboration with personnel from the Hochschule Zittau/Goerlitz developed and submitted an Expression of Interest to compete with other Kenyan universities to have TTUC be the host of the Centre of excellence. In December 2015, the consortium succeeded having TTUC as the hosting African institution of the Centre for Mining, Environmental Engineering and Resource Management (CEMEREM). The Centre promises to empower the Government of Kenya and local industry to prepare, nurture and sustain technical and managerial skills to support the development of the emerging mineral, oil and gas sector. For the last 50 years, Kenya has not trained enough human capacity to run the sector. This led to an acute shortage of local practice-oriented experts who can lead the relevant teaching, research and development. It was only 2007 that Taita Taveta University College, then a campus of Jomo Kenyatta University of Agriculture and Technology, was set up to formally offer training in Mining and Mineral Processing Engineering.

The idea of the Centre draws motivation from the gaps evident in the training of resource and environmental engineers and managers in Kenya, especially in the highly specialised mining and extractive sector. The discovery of significant mineral resources in Eastern Africa further enhances the visibility of this gap, given the huge deficit of specialists with the technical and managerial skills necessary to sustainably reap the benefits of this resource boon. A new pedagogical paradigm is therefore required to empower governments in producing a new generation of hands-on engineers and managers who can help Kenya and the Greater Eastern African region make good use of its rich natural resource base, for the current and future generations.

TTUC is located in Kenya's coastal mining belt, astride the vast and renowned Tsavo conservation and tourism zone, and has charted a path towards becoming the University of Mining in the region. TTUC will address the huge regional deficit in research and practice-oriented specialists with the research, technical and managerial skills required to reap and transmit the benefits of the region's rich mineral resources in a sustainable manner. The Centre of Excellence for Mining, Environmental Engineering and Resource Management (CEMEREM) brings together a consortium involving Taita Taveta University College (TTUC), the University of Applied Sciences Dresden (HTWD), Technische Universitaet Bergakademie Freiberg (TU Bergakademie Freiberg) and personnel from the Hochschule Zittau/Goerlitz (HSZG) to implement training and research activities in mining, environmental engineering and resource management.

Strategic Focus of CEMEREM

The vision of the centre is "to be an international centre of excellence for mining and resource education for sustainable development in Africa" while her motto is "Networking for excellence in mineral resource education for sustainable development".

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Figure 1 Panoramic view of Taita Taveta University College in Voi - Kenya.



Figure 2 Architectural Impression of the building under construction at TTUC that will house CEMEREM

CEMEREM will be hosted at TTUC shown in Figure 1 and housed in the building whose architectural impression is shown in Figure 2. This centre is the eight (8th) German-African centres of academic excellence and the first one with a niche in engineering for sustainable resource management.

Scope of CEMEREM

The goal is to develop the first-ever Kenyan-German **Centre for Mining, Environmental Engineering and Resource Management (CEMEREM)** at Taita Taveta University College, in collaboration with HTW Dresden, TU Bergakademie Freiberg, and HS Zittau/Goerlitz, the DAAD, the Kenya Government, and industry partners. A budget of **800,000** Euros per year is envisaged to cover the first two years, with a possible extension to the seventh year. CEMEREM's goal will be pursued through the following specific objectives:

- a) To develop and/or improve curricula for new and existing academic programmes (Bachelors, Masters and PhD) in order to ensure practice-oriented education and training of local engineers and managers to meet the increasing needs of Eastern Africa's industrial labour market.
- b) To train a new generation of mining, process and environmental engineers and resource managers for industry and government through the new and improved programmes.
- c) To build the human capacity at TTUC to offer training in Mining and Environmental Engineering and Resource Management.

- d) To network with industry and governments in the region in quality assurance for the proposed training programmes as well as research and training of engineers and resource managers.
- e) To integrate sustainability concepts (societal, environmental, spatial and economic) into the pedagogical and implementation framework of the training, research and project activities undertaken by CEMEREM and partners.

Strategic Framework

To accelerate the achievement of the goal through the given specific objectives, CEMEREM will ensure the following enabling strategic framework:

- a) Equipping teaching staff at TTUC with the necessary advanced pedagogical, research and soft skills for effective curriculum delivery, leadership, and project management. Third-party funding for postgraduate training and continuing professional development will be pursued consistently to grow a strong network for sustained training and capacity development. Productive staff and student exchange programmes between TTUC, the German university partners and Kenyan industry will be undertaken.
- b) Growing and developing the training infrastructure at TTUC using local resources and support drawn widely from long-term partnerships with the key industry and government stakeholders.
- c) Building a strong peer-review and feedback network for monitoring and updating the quality of CEMEREM’s training programmes at TTUC to match the changing needs of the region, including global innovations and sustainable development obligations. To capture the big picture in a systems approach, this network will draw membership from the academia, government, industry experts, and the public including alumni of CEMEREM. The staff who will have benefitted from CEMEREM will find active roles to play within this network, as part of the incentives framework.

Work Packages and Activities

The project has eight (8) Work Packages (WP) with a range of activities that will ultimately lead to full implementation of CEMEREM: Students will be educated and research in the fields of mining and mining-related issues including environment will be carried out within this programme, complete with exchange programmes and summer schools.

PhD and MSc training will be increased through the scholarships competitively offered from a variety of sources, structured programmes, and continued staff training support by TTUC with sound incentives for staff retention. Granting paid study leave to staff who are away for training, assuring them of commensurate deployment or promotion after return with a reasonable bonding agreement, and expanding their mentor network as alumni form part of the key incentives. This will ensure that the human resources required to run the centre will be available and guarantee the success of a second phase with the focus shifted to active international exchange and research.

Table 1 Summary of Work Packages.

WP	Description	Deliverables
WP 1	Preparatory work and needs assessment	Needs and priorities list
WP 2	Curricula review and development	New and revised curricula
WP 3	Human resources development and capacity building	Trained personnel
WP 4	Implementation of BSc and MSc courses at TTUC	Trained students/graduates
WP 5	Infrastructure development at TTUC	Training infrastructure
WP 6	Networking and capacity building with industry and government	Sustainable troika of networks
WP 7	International exchange and research	Research publications and patents
WP 8	Management and quality assurance	Key Performance Indicators

The WPs include the revision of already running curricula as well as the development of new curricula for MSc and BSc programmes in mining and environmental engineering. In order to ensure implementation and to address the current staff problems, special attention is paid to human resource development and capacity building. One WP will ensure the infrastructure for the education of students is in place and that staff will be trained to run the facilities, such as laboratories. Another WP focuses on networking with the industry and the provision of support in training for practitioners in the region. Another WP has its emphasis on the establishment of a vibrant international exchange – in particular with the German partners – and the commencement of research activities. In Table 1 is an overview of the eight (8) Work Packages.

Lessons on the Process of Establishing African Centres of Excellence

TTUC has acquired important experience and derived lessons from her year-long engagement in the competitive process of setting up the first African Centre of Excellence for Mining, Environmental Engineering and Resource Management (CEMEREM). The experience and lessons can be discussed under internal success factors and external success factors.

Internal Success Factors

Internal success factors are mainly the comparative advantages the host can inject into the proposed centre of excellence. The process requires sound preparation on the part of the hosting African institution, both in terms of intellectual resources and enabling infrastructure. Records of adequate staff capacity, sex-differentiated student enrolment, student internships, alumni tracer surveys and key milestones need to be well-managed and centralized using ICT for real-time updates and sharing. The hosting institution must identify the advantages of geographical location and existing activities and networks, which together constitute the unique endowment of comparative advantages the host promises. TTUC, for instance, could capitalize on her favorable location in Kenya's rich coastal mineral and mining belt, proximity to the region's main transport corridors, and the vast Tsavo conservation zone. Practice-oriented training requires these internal factors to provide ready case studies in a cost-effective manner.

External Success Factors

External success factors are mainly the competitive advantages and opportunities arising from the host's rich network with existing institutions. TTUC stands out in Kenya for her extensive network with the central government agencies, county governments, policy think tanks, and industries dealing with mining and resource management – all of which she has signed Memoranda of Understanding (MoUs). Partnership with German universities with a record of excellence in the proposed niche area of training is therefore indispensable. TTUC receives international professors and students on a well-established exchange programme every year, a feat that is unmatched in the region. For CEMEREM, the inclusion of HTW-Dresden introduced a key advantage in practice-oriented training for resource management on the one hand. On the other hand, TU-Bergakademie Freiberg brought in a strong component of mining and environmental engineering training.

Conclusions

The process of competing to host the eighth Centre of African Academic Excellence was completed in 2015, with TTUC emerging the winner in a consortium bringing together HTW-Dresden and TU-Bergakademie Freiberg as the key implementing partners. The process revealed key lessons informed by a matrix of internal and external success factors, of which the comparative advantages of the hosting African institution and competitive advantages arising from demonstrated records of excellence and networking strategies are critical. The vision of this new Centre of Excellence, which is also the first Kenyan-German Centre of Excellence, is to be an international centre of excellence for mining and resource education for sustainable development in Africa – hence the name Centre for Mining, Environmental Engineering and Resource Management (CEMEREM). The first two years will see the establishment of robust training programmes and infrastructure, complemented with frequent quality reviews. The subsequent years will entrench the Centre of Excellence and contribute substantially to bridging the gap in practice-oriented pool of resources engineers and managers for the

extractive sector. The main outlook from this experience of establishing CEMEREM for the future of Africa's education and training is instructive in terms of the following key success ingredients: inter-university partnerships built upon partner strengths in definite niche areas and staff capacity; practice-oriented location advantages; practice-oriented curricula; private sector support; and strong bilateral or multilateral funding support.

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