

The Role of Construction Universities in Sustainable Development

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Abstract: Sustainable development is viewed as the pathway to economic and social transformation while construction universities are viewed as institutions with high potential and moral responsibilities to promote and disseminate know-how and best practices among students, educators, professionals and the general public, fostering behaviour change and expectations and promoting sustainable practices in architecture and construction. This article investigates how the National Research Moscow State University of Civil Engineering and The Technical University of Kenya develop educational programmes and extracurricular activities to prepare future generations of professionals as well as political and social leaders for responsible actions toward sustainable development. This study also investigates the extent to which these two institutions of higher learning are playing their role as agents of change and in what areas they can cooperate to promote sustainable development. Literature review, administering interviews and filling in questionnaires by a representative sample of the Heads of Departments, lecturers and learners provided data. Obtained data was discussed, analysed and presented. The study found that the universities have a critical role to play in enhancing sustainable development through designing more effective policies and educational programmes to meet the dynamic needs of higher education. The research results have practical implications for universities and can support administrative politics and the advancement of educational programmes related to sustainable development.


1 INTRODUCTION


Moscow State University of Civil Engineering (MGSU) shown in Fig. 1. below, is a National Research University and one of the largest technical universities in the Russian Federation. The university plays a leading role as far as studies in construction related fields is concerned (Molokova, 2020). MGSU trains architects, urban planners, engineers, construction managers and many other professionals for the construction industry (Panteleeva, 2012). The university is equipped with modern research laboratory facilities and equipment that promote studies in science and technology. The university has signed international cooperation agreements with Higher Education Institutions and other research institutions from over 30 countries (Molokova, 2020).




Figure 1: National Research Moscow State University of Civil Engineering.

The Technical University of Kenya (TU-K) is a public university in Nairobi, Kenya that was founded

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as a result of the upgrade of the Kenya Polytechnic University College to a full-fledged university in 2013 (Robert, 2017) and as such became the first of its kind, established in line with the provisions of the Universities Act, 2012. Just like MGSU, TUK's mandate is to offer relevant higher education and cutting edge research in engineering science and technology. The technical university, was created to develop capacities and skills that will foster and support the interaction of engineering science and technology for sustainable development as enshrined in the Kenya Vision 2030 (Robert, 2017). The motivation lied in the fact that elsewhere in the advanced economies, development was achieved owing to the major roles technological universities played (Robert, 2017). Launched in 2008, the Vision 2030 is Kenya's development programme, based on economic, social and political pillars, whose objective is to help transform Kenya into a newly industrializing, middle-income country capable of facilitating its citizens with avenues for a high quality life in a clean and secure environment by 2030.



Figure 2: The Technical University of Kenya.

Sustainable development has gained prominence around the world due to concerns about the impact of human activities on the environment. The concept of sustainable development was defined in 1987 by the Brundtland Commission (formerly the World Commission on Environment and Development) as “development that meets the needs of the present without compromising the ability of future generations to meet their own” (UN General Assembly, 2015). This definition appreciates the fact that development is necessary to meet human needs and improve the quality of life, and that it must be achieved without negatively affecting the ability of the environment to meet the needs of the present and future (UN General Assembly, 2015). The

Sustainable Development Agenda has broadened and campaigned on the fact that sustainability protects both the interests of future generations and the Earth's resilience. Initially, development policy focused on the environment, but since 2002 it has begun to include social justice and poverty alleviation as key principles of sustainable development (Wright, 2002).

A UN Resolution, called the 2030 Agenda or colloquially, Agenda 2030 houses the 17 interlinked Sustainable Development Goals (SDGs) designed to be a "blueprint to achieve a better and more sustainable future for all" (Ramos, 2016).

SDGs put emphasis on the relevance of higher education in endeavors toward a better future (Ramos, 2016).

The 17 SDGs are shown in Figure 3 below



Figure 3: The 17 Sustainable Development Goals.

Sustainable development requires a change in people's way of thinking and provides a basis for further decisions and actions. In accordance with this, a “new learning culture” is needed [8, 9], which should be focused on self-organization and competence. This is where construction education comes in. The goal of construction education is to supply professionals to the construction industry, who will take the lead in planning, designing, building for a sustainable future, by providing a bridge between science and society. In this role, the construction professional must actively promote and participate in multidisciplinary teams with other professionals such as environmentalists, economists and sociologists, and work with the served and affected communities to effectively address sustainable development issues and challenges. (Cortese, 2003).

Construction universities offer good quality education, which is an essential tool for achieving a more sustainable world. This was emphasized at the UN World Summit in Johannesburg in 2002 where the reorientation of current education systems was outlined as key to sustainable development (Cortese, 2003). Higher Education Institutions, of which construction universities form part, facilitate knowledge development, impart skills, promote understanding, and pass values and engage in meaningful activities that ensure social, economic and environmental sustainability (Altabach, 2008; Cerone, 2014; Cortese, 2003). The concept of Education for Sustainable Development (ESD)

developed largely from environmental education, which has sought to enable development of behaviors in people to care for their environment (UNESCO, 2017). ESD aims to empower people to make decisions and take action to improve our quality of life without harming the planet by integrating sustainable development associated values into education (UNESCO 2017; Elias 2006). Through the initiatives of ESD, construction universities supply the construction industry with architects that make good designs that improve the quality of life. For instance, the possibility of coming up with building designs that maximize space to allow for socializing, privacy and hobbies. Such good designs like prioritizing air quality and daylighting come along with many health benefits, further contributing to quality of life. Quality, comfort and appearance of our homes is made possible by these professionals. This features effect our mood and our mood has significant influence on overall quality of life.

2 LITERATURE REVIEW

Many documents in the form of agreements and conventions that house approaches and mechanisms for sustainable development in universities have been enacted (Wright, 2002; Elias, 2006). Such documents are listed in Table 1. below.

Table 1: Declarations related to sustainability in higher education (adapted from (Wright, 2002 & Elias 2006).

Year	Declaration
1972	The Stockholm Declaration on The Human Environment
1990	University presidents for a Sustainable Future: The Talloires Declaration
1992	Association of University Leaders for Sustainable Future (founded in 1992 in the USA)
1993	Ninth International Association of Universities Round Table: The Kyoto Declaration
1993	Association of Commonwealth Universities' Fifteenth Quinquennial Conference: Swansea Declaration
1993	The Halifax Declaration
1994	The Conference of European Rectors (CRE) Copernicus Charter
1996	Ball State University (USA) Greening of the Campus Conference
1997	International Conference on Environment and Society – Education and Public Awareness for Sustainability: Declaration of Thessaloniki
1999	Environmental Management for Sustainable Universities (EMSU) conference
2000	Global Higher Education for Sustainability Partnership (GHESP)
2001	Lüneburg Declaration on Higher Education for Sustainable Development, Germany
2004	Declaration of Barcelona
2005	Graz Declaration on Committing Universities to Sustainable Development, Austria
2009	Torino (Turin) Declaration on Education and Research for Sustainable and Responsible Development, Italy
2010	International Sustainable Campus Network ISCN/Global University Leaders Forum (GULF) Charter 2010

Thousands of higher education institutions from all over the world have signed these documents, and as such, shown their commitment to pursue matters of sustainable development. This commitment is evidenced by the high scores by MGSU and other universities on the UI Greenmetric University Rankings. The UI Greenmetric University Rankings rate universities based on six parameters: infrastructure convenience, transport policy, recycling programs, energy efficient technologies, water conservation, and education in the field of sustainable development. The university was recognized as one of the most active national coordinators of the UI Greenmetric World University Rankings Network, whose goal among others is to inform other universities about current rating conditions, conducting awareness and information events, sharing experiences on sustainable development of universities, and demonstrating the best achievements in the field of ecology, resource conservation and environmental education. Such an achievement is an inspiration to other universities to improve energy efficiency, organize separate garbage collection and implement eco-education programmes. However, these achievements are not a common occurrence in all universities.

In many cases however, little success has been recorded thanks to inadequate resources, uncoordinated staff involvement and lack of interest. In such a situation, effective and efficient implementation of the principles of sustainable development remains jeopardized (Elias, 2006). This

means that sustainable development is far more than policy matters. Concrete action should therefore accompany strategies and action plans pursued by universities. For instance, research, campus activities, the curriculum, green and open space management offer a solid platform on which actions geared towards achieving sustainability in universities can be implemented (Elias, 2006). Construction universities are considered to be change agents in many issues including creating sustainability awareness (Miotto et al., 2018).

Research shows that access to quality construction education is crucial and a pre-requisite for the achievement many of the other sustainable development goals. Higher education in the field of construction facilitates social mobility, empowers people through critical thinking and provides them with the skills needed in a rapidly changing labor market. Responsibility; emotional intelligence; interdisciplinarity; future orientation; personal involvement; and the ability to take action are key sustainability competences one can acquire at university (Mochizuki et al., 2018). For instance, Principles for Responsible Management Education (PRME), which is a platform promoting sustainable development at universities around the world by providing students with the ability to make social and environmental changes, underlines the necessity of universities being able to develop business leaders with appropriate skills to meet the complex challenges that society is facing these days (PRME, 2007). PRME member universities aspire to develop

social skills, business skills, personal skills, intercultural skills like volunteering, social responsibility, global mindset, ethical awareness. All these skills promote the wellbeing of people either directly or indirectly (PRME, 2007).

Previous researches also indicate that construction universities provide cutting-edge research, high quality education, and ground-breaking innovation, which account for goal 4 and 9 of the SDGs (European Universities Association, 2019). Strong universities are an important part of civil society (Goal 16) and are excellent advocates for global and local partnerships (Goal 17). By contributing to these four goals, universities contribute to all other goals. Notably, universities support students in developing the rigorous scientific thinking, curiosity, and entrepreneurship needed to craft the solutions needed for sustainable development (European Universities Association, 2019). Researchers, faculty and university students work in partnership with citizens, the private and public sectors to collaborate to create knowledge that can provide solutions. It is the combination of these core missions that gives universities a unique place in the common effort to achieve the SDGs (European Universities Association, 2019). A number of universities have incorporated the SDGs into their institutional strategies in both governance and teaching and research. Sustainable campus management has become important to many universities and is often considered part of the institution's social responsibility. Sustainable management can include energy saving measures, resource efficiency and waste reduction, as well as the sharing of services, infrastructure and facilities with other universities or external partners (Calder and Clugston, 2003). A key element in all sustainability strategies is the "whole-institution approach", meaning all parts of the university community, including external stakeholders, are involved in the efforts (Calder and Clugston, 2003).

According to European University Association, higher education contributes in various ways to making people more resilient and able to face various challenges. Recent statistics from the Organization for Economic Co-operation and Development (OECD) confirm that people with a higher education degree are less likely to be unemployed and earn on average 54% more than those who only completed upper secondary education (European Universities Association, 2019). A university education, thus, better protects against poverty. According to the same research, graduates of higher education institutions for which universities form part, are better shielded

from depression as compared to their counterparts without higher education qualifications.

According to (European Commission, 2012), through both formal and non-formal education, universities are able to impart sustainability competencies in learners. Both forms are important given that they allow learners to acquire experience through culture, youth work, and voluntary work as well as sporting activities. Extracurricular activities boost the development of interpersonal, communicative, and cognitive skills, which are strongly connected to sustainable development (European Commission, 2012).

A report by UNESCO also indicated that Education for Sustainable Development contributes to learning for decision-making for an economic, environmental and social future. Supporting the introduction of resilience into curricula in order to achieve more positive perceptions can significantly change learners' attitude towards sustainability (European European Union, 2010). Through this, learners are able to develop ecologically and socially friendly skills and attitudes which are recipe for sustainable development (European Commission, 2012).

3 METHODOLOGY

To explore the role of construction universities in sustainable development, this research used two universities as case studies. The National Research Moscow State University of Civil Engineering and The Technical University of Kenya, are major universities in Russia and Kenya respectively. They train students for their professional careers by offering academic programmes that have a connection to their respective national priorities. This is important given that the knowledge passed to learners is relevant and serving national interests (Molokova, 2020; Panteleva, 2012).

The research objective of this article was to explore how these two universities develop educational programmes and extracurricular activities in order to enable their staff and learners to shape sustainability competencies which are necessary ingredients to promote sustainable development. The study was conducted based on a critical literature analysis on the role of higher education in achieving sustainable development, a desk research analysis of the universities' educational programmes, and quantitative research among representative samples of Heads of Departments, lecturers and students. Semi-structured online

interviews were adopted because the idea in mind was to ask more open-ended questions, allowing lengthy discussions with the interviewees. This method of data collection was thought to present a possibility of obtaining sensitive data that may not have been captured by administering and filling in of questionnaires.

The first target was to establish whether the universities mentioned above offer sustainability-oriented educational programmes. The other target was to find out which extracurricular activities are provided for at the universities for staff and students to promote their well-being. The research analysis enabled us to understand how the two universities offered their students the opportunity to develop competencies that enabled them to identify and address sustainability challenges accordingly; to what extent students engaged in activities related to sustainable development; and the students' perception of non-formal education for sustainable development. The other target was to understand which facilities were available in the university territories that promoted sustainable development.

4 RESULTS AND DISCUSSION

Translating provisions of international declarations into institutional responses requires adjustments to academic priorities, organizational structures, financial and audit systems (Gemma et al., 2017). This means that the changes advocated for do not just happen, but, they must be led (Elias, 2006). A web search reveals that there are several leadership for sustainability initiatives across the two universities used as case studies; MGSU and TUK. These initiatives target managers from various departments in the universities. The availability of these leadership development opportunities for managers in various departments justifies the good progress towards sustainability in these two institutions. For example the Students Association of the Technical University of Kenya (SATUK) leadership forms part of the management of the university. These students absorb the sustainability culture induced on them by initiatives put in place by the university; and as such could become sustainable leaders of tomorrow (Alshuwaikait and Abubakar, 2008). They may guide organizations to pass through an adaptive process of learning towards a more sustainable state, capable of dealing with complexity and goal conflicts between the social, economic, and environmental aspects.

Official data published by the universities on their websites indicates that these universities created a

wide range of formal education possibilities by offering courses that address the various aspects of sustainable development. These courses are taught both at undergraduate and postgraduate studies. For instance, at the Technical University of Kenya, in the School of Architecture and the Built Environment, Bachelor of Building Construction is offered. In the first year of the programme, learning is focused on the fundamental principles of construction, including visits to construction sites. The second year concentrates on the building construction practice while at the same time preparing the students for an optional industry based learning that spans a period of three months. This industry-based learning is emphasized as it enables learners to establish a link between classroom content and actual industry practice as well as aid in preparing them for subsequent academic years. In the course of study, among many others, 'critical and creative thinking' is offered as a compulsory study subject. Other subjects taught further into the degree programme include communication skills, society and culture, health education, appropriate technologies in construction, environmental management among others. These subjects aim to impart in learners competencies that are advocated for by PRME. These skills include (UN General Assembly, 2015).

- Social skills like teamwork, communication, presentation skills;
- Business skills like marketing, sustainability enhancement, entrepreneurship, project management; -
- Personal skills: critical thinking, self-awareness, decision making, leadership, among others
- Intercultural skills such ability to conduct academic research, business models, planning and coordination;
- Service skills like volunteering, social responsibility, global mindset, ethical awareness

The same can be said about MGSU, where the first two years of Bachelor of Civil Engineering cover the basics of construction engineering. The third and fourth years lay emphasis on the practical aspects of civil engineering programme in the real world. These last two years are considered formative years for students to visit other European countries for exchange programmes. In the course of study, MGSU offers modules that give an overview of the green, sustainable and high-level technologies of the construction industry such as; urban sustainability, sustainable urban transportation, social aspects of sustainable urban development among others

(Molokova, 2020). These programmes prepare graduates to become conscious of sustainability (European European Union, 2010).

MGSU has also incorporated The BREEAM Approved Graduate (AG) programme into its courses. The BREEAM AG refers to a programme that has been created and designed for Higher and Further institutions of learning that offer built environment study areas such as; architecture, urban planning and design, construction engineering and technology, surveying, facility management, construction management, environmental sciences and many more; and wish to feature a thorough and practical programme that trains learners in sustainability and prepares them to be job-ready. BREEAM AG offers 5 lectures covering the following subjects (Corcoran and Wals, 2004).

- Lecture A – Reasons to talk about sustainability
- Lecture B – Mitigating life-cycle impacts
- Lecture C- Incorporating best practice with environmental frameworks
- Lecture D – Integrating BREEAM throughout the design process
- Lecture E – Learning for the online test.

By providing learners with a thorough understanding of both theory based and practical skills based on the lectures listed above, graduates of this programme are well equipped with the education and vision required to help create a sustainable future for the construction industry (Corcoran and Wals, 2004). Learners have a good understanding of the broader principles of sustainable development while also understanding the reasons and processes behind the development of environmental assessment methods (Corcoran and Wals, 2004).

MGSU offers the module ‘Environmental design and assessment of buildings and structures according to green standards’ to students in the design of buildings and structures master’s programme. This module, aims at equipping the learners with the competences required to address the challenges facing humanity in response to climate change, availability of resources, environmental degradation and consumption of energy. This module has caused widespread awareness of the role that buildings play in the current climate crisis, together with the technical requirements arising from new regulations. (Telichenko et al., 2018). The end result is the production of graduates who enter the job market as professionals with advanced skills in sustainable design and energy efficiency.

This study also found that both TUK and MGSU engage in social responsibility issues. The universities engage in extracurricular activities and support socially responsible actions like making learners take it upon themselves as responsible citizens of the world to donate blood, and contribute to charity organizations that serve community in various responsible ways. Events concerned with environmental and animal protection, health and safety as well as equality and social inequalities in the communities that we live in, are a common occurrence at TUK. These activities support communities and their health systems in safe and sustainable ways.

A section of the respondents from MGSU believe that the fact that MGSU facilitates people-to-people contact, presents a platform on which sustainable development can thrive. Thousands of mobile students and professors cross borders to gain and exchange knowledge in construction and bring understanding of sustainable construction practices in their own countries to their hosts, through programmes like Erasmus+, DAAD programme “Strategic partnership”, DFG programmes. This can be attributed to the fact that MGSU has broad international relations with universities, scientific institutions, and construction companies from both former USSR states and other countries. For instance, currently, MGSU cooperates actively with 108 foreign higher educational institutions from 35 countries (Molokova, 2020). This cooperation around the globe, enables building networks and developing the know-how needed to sustain innovation worldwide thus working towards the achievement of goal 16 and 17 of the SDGs (European Universities Association, 2019).

A section of respondents from TUK argued that university facilities have influence in shaping sustainable development. For instance, university healthcare facilities play a significant role in the public healthcare system. They train new generations of professionals in the medical field, provide care to thousands of patients and conduct research that helps find innovative solutions to cure and prevent diseases of all nature. This can be supported by the fact that TUK has a dispensary within the university premises that partially contributes to this. Other facilities like sports complexes as seen in MGSU contribute to the wellbeing of staff and students within its environments.

This study found out that these universities are closely connected to their regions, playing a crucial role in the education, innovation, culture and civic life of their local communities. These universities are also

employers, and as such make considerable economic contributions to their regions.

The research also found out that MGSU and TUK can partner to promote better understanding, and more effective implementation of strategies for the incorporation of ideas that support sustainable development in both institutions and set an example for other higher education institutions, both in Kenya and Russia. The two universities can work together towards identifying, sharing and disseminating effective strategies, models and good practices for promoting the knowledge they offer for sustainable development (Telichenko et al., 2018). This can be partly achieved by both universities committing to support exchange programmes for their students and staff.

5 CONCLUSION

Sustainable development is a multi-faceted agenda for which construction universities have a role to play. External pressure for the construction industry to become more sustainable is piling and educating the industry's key resource - its people is viewed as the best response. To achieve this, higher education institutions should incorporate sustainability content into their construction programmes by covering environmental issues and material in the already existing areas of study, by offering particular sustainable development courses, by offering sustainable development as an area of specialization in the faculty of construction, or by offering sustainable development in construction as a study program both in undergraduate and post graduate levels of study.

When this agenda is implemented effectively, its integrating potential is significant. However, achieving change for sustainable development from universities is challenging, and requires more than knowledge of or commitment to principles of sustainable development. Despite the fact that it's challenging, the academics at MGSU and TUK seem to be in possession of a strong will to learn and discuss the role of these universities in sustainable development theme. The cutting edge researches, government incentives, socio-economic expectations, partner platforms, student leadership, etc. contribute to change. Leaders of these universities must now help bring together these points of activity in a way that aligns core practices with sustainability innovations in the institutions. At the moment, senior management teams are key to transforming higher education so that it can play its part in transforming

social, economic and environmental practices and contribute to more sustainable construction practices.

Universities also should strive to become ambassadors for sustainable development. Except in a few cases, university campuses often cover large tracts of land, providing excellent starting points for authentic learning about nature and biodiversity. That means campuses can restore an emotional affinity to nature by getting students and staff to become stewards of campus open space and natural areas, turn the campus into a site showcasing examples of sustainability, such organic food production, consumption and climate smart technologies and combine all these ideas to increase access to higher education for economically and socially disadvantaged groups.

RECOMMENDATIONS

The researchers involved in this study recommend that MGSU and TUK enter into a Memorandum of Understanding (MOU) given that both universities offer construction-related programmes and are involved in research that can be considered beneficial to mankind. Based on this MOU, the two universities are tipped to offer exchange programmes and perform joint studies, researches and other learning activities of mutual interest.

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