

Natural Resource Management in Greening TVET for Environmental Sustainability: A Case Study of Wote Technical Training Institute

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Abstract

Natural resource management encapsulates sustainable consumption and production in terms of promoting resources and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all. Conserving natural resources is a basic requirement for sustainable development and improving the quality of human life. A practical guide for institutions proposes that there is greater priority to ecological principles with regard to greening TVET by pursuing knowledge and practices with the intention of becoming more environmentally friendly, to enhance decision making and lifestyle in more ecologically responsible manner that can lead to environmental protection and sustainability of natural resources for current and future generations. The objective of the study was to examine the effectiveness of the green natural resource management projects initiated at Wote Technical Training Institute. The research adopted a descriptive survey design via structured questionnaires administered to 200 respondents comprising 100 staff members and 100 students. The findings revealed that 55% supported the greening initiatives while 45% opined that greening TVETs had helped mitigate climate change and created a green economy. Wote Technical Training Institute has successfully initiated the following greening short courses of study such as solar water heating and cooling systems training, rain water harvesting, compost manure making, tree planting, fabrication and use of waste segregation bins, landscaping technology and e-waste management systems.

Key words: *Greening, sustainable, TVET, landscaping, development*

Introduction

The green economy is a new economic paradigm that aims to achieve development while protecting the environment. Greening the economy does not impede wealth creation nor employment opportunities. Instead, relevant sectors can present opportunities for investment, growth, and jobs given the necessary conditions during transition. Transitioning to a green economy can help mitigate the adverse impact of rapid population growth in the depletion of natural resources (UNEP, 2011). Furthermore, the latest OECD (2017) report provides an analysis of how low-emission and climate-resilient development can be achieved without compromising economic growth, competitiveness, or well-being.

Green growth can open up opportunities for enhanced productivity through more efficient use of natural resources and energy; for optimizing their value for innovation made possible by favorable policies that enable enhancing values of assets and protecting the environment; and for new markets brought about by emerging demands for green technologies, goods, and services, thereby creating new jobs (World Bank 2012, OECD 2011).

A holistic approach to sustainable development has always been emphasized but always comes short of being realized. However, Education for Sustainable Development has permeated in the agenda of many countries since the UN Education for All (EFA) and the UN Decade of Education for Sustainable Development (ESD) have been set as international agenda. The development of greening skills to support this realization has similarly generated high interest from many players.

Technical and Vocational Education and Training (TVET) is one of those avenues to achieve the objectives of ESD. In 2004, the Bonn Declaration on Learning for Work, Citizenship and Sustainability became crucial in defining the role of TVET to sustainable development, stating that: “Since education is considered the key to effective development strategies, technical and vocational education and training (TVET) must be the master key to reducing poverty, promote peace, conserve the environment, improve the quality of life for all and help achieve sustainable development.”

By 2002, the World Summit on Sustainable Development followed. It resulted in the establishment of a special framework called the United Nations Decade of Education for Sustainable Development (UN DESD) from 2005-2014 that aims to make sustainable development central to all education and training in all sectors by refining and promoting the transition to a sustainable future through all forms of education, public awareness and training. In 2009, a comprehensive review of progress was undertaken.

Greening TVET is considered as one of the holistic frameworks for smooth transition to sustainable and low-carbon world in the TVET sector. Greening TVET involves the first dimension called the *Green the Campus* which is based on the philosophy of practicing what is being preached in managing campus resources such as energy, water and waste resources. This is with an aim to reduce the carbon footprint of students, teachers and staff within the TVET institutions. The second dimension touches upon programs on *Green the Curriculum* adopting green technologies to meet upcoming skills for clean and green jobs. The third dimension is *Green the Community* to cascade sustainable development best practices at the community level so that the movement of TVET institutions is extended to the society at large. The fourth dimension is on *Green the Research* to foster the development of a research culture in relevant areas of sustainable development such as the Kenya’s big 4 agenda in affordable housing, food security, manufacturing and universal health coverage. Through greening TVET we also endeavour to promote a *Green Culture* to focus on strengthening values education, ethical

standards, attitudes and behavior that respects ecological resources and values the future requirements of the future generation (Majumdar, 2011).

UNESCO has undertaken greening TVET initiative in line with the United Nations Decade of Education for Sustainable Development (2005-2014) and the UN Framework Convention on Climate Change (UNFCCC COP15). While the work remains in progress, serious focus must now begin by considering a framework that will define the participation and ascertain the role that needs to be played by relevant sectors. TVET, being one of these sectors, will be the particular focus of this initiative.

Technical and vocational education and training (TVET) is steadily gaining popularity at the global debates and government priorities for education and national development agendas (Marope, Chakroun, & Holmes, 2015). TVET is also considered highly in strategic and operational priorities of the G20, the Organisation for Economic Co-operation and Development (OECD), and of multilateral organizations such as the International Labour Organization (ILO), UNESCO, ASEAN, and SEAMEO. To realize its potential to impact development, however, TVET systems need transformation and revitalization. This was reflected in Shanghai Consensus (UNESCO, 2012).

Greening TVET in Various Sectors

Maclean, Jagannathan & Panth (2017) have analyzed various sectors that are key contributors to the greening process namely in the agricultural sector where the main green growth objective in agriculture is to boost productivity through natural resource-efficient technologies, agricultural inputs, and organic farming practices such as conservation agriculture. They further opine that the key areas in improving resource efficiency in manufacturing in a green economy are green innovations in designing and developing products, material and energy substitution, and modification and control of processes using new, cleaner technologies.

Greening the building sector opens up opportunities for job creation and job transformation in the areas of new construction and retrofitting, as well as opportunities for increased production of green construction materials and products like appliances and equipment; expansion of renewable energy sources and generation; energy-efficient operation and maintenance and other related activities such as recycling, waste management, and water and sanitation. Transiting to more environment-friendly means of transport and improving vehicle and fuel technology to reduce negative effects, such as depletion of resources and pollution, are crucial in greening the transport sector. The greening of the waste management and recycling sector means a significant shift to the 3R approach (reduce, reuse, and recycle) and minimal use of waste disposal methods like incineration and landfills and waste to energy. The concept of sustainability has become the current answer to solving the world of its environmental and economic crisis in the 21st century (Mensah & Castro, 2004). They further posit that the word sustainability has become a global buzzword as a potential solution for the many international, regional, and local problems facing the society today.

Sustainability is therefore seen as a dynamic concept based on the attitude and flexibility not the final solution to utopia on earth but sustained growth globally. Sustainability is the process suggested to improve the quality of human life within the limitations of the global environment.

The practical guide for institutions on greening TVET states that technological and societal developments and growing concerns about climate change, environmental degradation and scarcity of resources are changing the nature of work (Majumdar, 2011). These developments demand that TVET develop skills and provide knowledge to ease transitions to green economies and societies. In light of the Sustainable Development Goals (SDGs), TVET underpins many of the proposed goals and the achievement of sustainable development. TVET is crucial in reorienting society to adopt the low-carbon mentality so essential to addressing climate change. It is also impossible to think of making gains in poverty reduction, job creation and decent work provision without transforming TVET. For example, Goals 4, 6 and 8 of the SDGs are directly related to TVET, with many of the targets capable of being supported by a well-designed TVET system and targeted skills-development interventions (CEDEFOP, 2012).

The analysis of international reports that highlight the importance of education and training in the pursuit of green growth strategies (CEDEFOP 2012; Strietska-Ilina et al 2011; OECD 2011) provides evidence that introduction of specific green-related training programs varies across the countries. More than half the countries that participated in the OECD (2011) survey reported they had implemented such programs and indicated that green education and training programs will play a significant role in enabling workers to participate in the green economy. Hofmann, Durán Haro, & Jeon (2011) concludes that in many developing countries governments and formal TVET providers have not yet responded to the skill challenges associated with environmental issues and climate change. Training responses are often isolated and sporadic, and their impact on the greening of industries as well as the overall economy remains limited (Strietska-Ilina, Hofmann, Haro, & Jeon, 2011).

Direct government support at the level of policy coordination and TVET reform is identified as one of five enabling factors. In addition, the governments' role in stimulating and supporting all other dimensions such as industry greening; direct influence on TVET curriculum development; stimulation of stakeholders' active involvement; and awareness creation amongst the whole population is crucial. In addition to raising the general awareness about environmental issues in populations as a whole, awareness and capacity development of TVET stakeholders is required in many countries. To achieve change in greening development agents of change are required at all levels: people across society should be involved in communication/education processes relevant to green growth and green skills development. Governments play an important role in TVET developments in the region.

Literature Review

Natural Resource Management Green Appropriate Technologies and the Economy

The green benefit in the economy will be achieved only if access to new training as part of the greening TVETs is made available and accessible to the disadvantaged youth, women, persons with disabilities, rural communities and the aged (UNEP, 1997; Hansmann, 2010). Preparation for new occupations and growth of new occupations and growth in demand for others at expense of others is vital for preparing young people for the labor market (UNEP, 2011). Green appropriate technologies growth is a way to pursue economic growth and development, while preventing environmental degradation, biodiversity loss and unsustainable natural resource use (OECD, 2010; UNEP, 2011) It's however noted that green economy activities and technologies are likely to proliferate the employment demand, but will not lead to significant changes in the work and worker requirements. There is growing concern about the environmental unsustainability practices of past and current economic growth patterns and the risk of irreversibly altering the environmental base needed to sustain economic prosperity (OECD, 2010; CEDEFOP (2010).

Appropriate Technologies in Greening Wote Technical Training Institute

The institute in collaboration with the Ministry of Education, Total Kenya Limited, NEMA, JKUAT, Ministry of Environment & Forestry have enabled the Wote Technical Performance Contracting target leader for Environmental Sustainability. In order to actualize the under listed greening appropriate technologies namely, building and construction green technologies, and by utilizing waste plastic bottles for making concrete walls to build low cost housing in both rural and urban centres to address informal settlements. Further, conservation Agriculture is done by utilizing water retainer fertilizers to cut down water consumption by 50% and conserving moisture for trees and flowers for dry spells in the semi-arid (TARDA Statistics 2015). where Wote Technical Training Institute (Wote TTI) has enhanced the drainages and sewerage systems as per Water Regulations 2009 gazette by NEMA. Also, the institution has adopted and planted environmentally friendly plant species namely, some being *Morus alba* (White Mulberry) for commercial silk production and medicinal use to cure dental caries, *Oxytenanthera* genus of African Bamboo in the family grass and *Thevetia* Grass used to produce perfumes. Recycling of waste sewage and drainage water in the septic tanks is also practiced. Wote TTTI introduced green procurement by encouraging purchases of energy saving bulbs to enhance energy efficiency and cutting electricity costs.

Research Objectives

The general objective of the study was to examine the effect of green natural resource management project on environmental sustainability. Specific objectives of the study were to explain value of appropriate technologies in greening Wote TTTI and explaining the cost effectiveness of greening the institution.

Methodology

The research took place at Wote Technical Training Institute located in Makueni County which borders Kajiado to the West, Kitui to the North East, Machakos to the North West and Taita Taveta to the South. This study adopted a descriptive survey design via structured questionnaires administered to 200 respondents comprising of 100 staff members and 100 students.

The sample size was 140 (70%) of the target population (Mugenda and Mugenda, 2003). Stratified random sampling was used to obtain 14 elements for the study. This is because the population comprised of different types of elements. Simple random sampling was used to select 14 elements from each stratum. First hand data for this study constituted primary data. Primary data for this study was collected directly from specific by use of structured questionnaires. The questionnaires contained both open and closed-ended questions.

Findings

The findings revealed that 55% of the respondents supported the greening initiatives in all TVETs while 45% opined that greening TVETs had helped mitigate climate change and created a green economy. A rating of 60% of the respondents agreed that natural resource management encapsulates sustainable consumption and production in terms of promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all. And 40% of the respondents felt that, conservation of natural resources in TVET institutions was a basic requirement for improving the quality of human life. Greening of TVET was considered a viable panacea to contemporary and future occupations as well as for environmental issues.

Conclusion and Recommendations

Environmental sustainability is a collective and individual responsibility in order to spur greening TVET, therefore innovative scientific solutions ought to be derived to bolster green growth, green jobs, green economy, combat climate change, increase agricultural production, and spur economic growth. Research institutions should always endeavour to proffer creative solutions to contemporary environmental crises. The researcher proposes implementation of greening TVET initiatives to spur youth employability skills; Competency Based Education and Training curriculum geared towards inculcating greening skills in environmental conservation to awaken people's environmental awareness and consciousness for environmental sustainability;

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