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Greening TVET for Sustainable Skill Development: Opportunities and Challenges in Botswana with a Focus on Quality Education

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Abstract

The need to reorganise economies and the skill sets that individuals will need in the new order is urgent since climate change is impacting the entire planet. TVET systems are required to reskill and provide human capital with environmentally sustainable skills for green economies and jobs. This article investigates potential additional benefits that greening TVET education may offer to students, the employment market, and Botswana as a whole. The study examined current research on Botswana's preparedness for a green TVET industry. Results highlight the crucial role of greening TVET systems in supporting nations to achieve the Sustainable Development Goals (SDGs), particularly in meeting their climate change commitments and ensuring quality education. Investments made concurrently in greening TVET, green industries, and green technology have the potential to prevent significant employment losses and to create a significant number of new jobs for recent graduates. The emphasis should be on occupational green skills and any support mechanisms that may establish a green TVET system to take advantage of the new prospects. Additional findings point to the need for strong labour market data and skills anticipation to pinpoint in-demand green talents and create fresh initiatives focused on the green economy. To lessen potential issues of fragmentation between TVET greening programmes, environmental legislation, and the green job market, countries must have professionals to perform quality assurance and monitoring of the novel synergies between the greening of TVET systems, learner skills, and the job market.

Keywords: *Greening TVET, Green Skills, Green Jobs, Skill Sets, Sustainable Skills*

Introduction

Technical and Vocational Education and Training (TVET) is, by definition, a mix of formal and informal learning that equips people with skills expected for work (UNESCO, 2017). TVET is therefore expected to be a driver of sustainable human green skills development for the changing workplace. A green workplace requires people to have relevant green skills for the production, and service industry whilst being conscious of the environmental and climate change implications of the production process (Marope et al., 2015). Although several global resolutions have been initiated to bring the greening concept into the education system, several countries including Botswana, continue face challenges to realise the ideal education for sustainable development (ESD) to equip learners with sustainable green skills for the green workplace (UNESCO, 2013). According to Tee (2023), the most significant impediment in several developing nations to implementing sustainable green workplace practices is a lack of a staff with sustainability knowledge and training. TVET curricula content is therefore, expected to be realigned to incorporate climate change education and provide learners with sustainability values, skills and practices.

On one hand, there is an increase in the number of graduates from the TVET system in Botswana amongst the 27.4% of the unemployed youths, which may perhaps be attributed to the several structural changes in the workplace (Statistics Botswana, 2023). Although there have been few studies in Botswana on the causes of graduates' employment challenges, recent studies in other developing countries indicate a significant mismatch of TVET graduates' skills to the emergency of green jobs and green workplaces (International Labour Organisation, ILO, 2023). As a result, there is an urgent need to reciprocate the efforts of ESD by greening the TVET curricula, raising awareness and providing training of teaching staff in TVET institutions with the necessary knowledge of the greening concept (Oshima, Makambe & Hondonga, 2023).

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To achieve this, there is need to develop TVET policies which are well supported by other greening policies and funding mechanisms so that training resources may be wasted on churning out a workforce that lacks essential sustainable skills needed for the emerging green jobs for a green economy.

Botswana's Vision 2036 and the National Development Plan (NDP) 11 demonstrate policy direction and commitment to supporting the TVET greening effort (Government of Botswana, 2017). However, some programs, such as the Green Climate Fund are still not directed to TVET. Although Botswana has a draft TVET Policy, it has not been made available to the public for review to examine how it has been created to accommodate green initiatives. The TVET Policy must also link to other greening policies in ministries such as Labour, Environment, and others to demonstrate a collective greening initiative implementation approach. The greening concept and its execution are still novel in many parts of the world, yet every global citizen must take responsibility for minimizing climate change and its consequences (UNESCO, 2017). Greening TVET initiatives must support students to navigate the changing labour markets due to climate change and responsive mitigation measures underway and improve their employability (British Council, & Paradigms, 2023).

As a result, this paper examined how Botswana has embraced the greening of TVET for long-term sustainable skills development in the face of structural changes in the workplace caused by climate changes and environmental conscious means of production. Furthermore, the paper investigated the extent to which the greening TVET concept is inclusive (Chinengundu and Hondonga, 2024), and how it has influenced the disadvantaged individuals and those with disabilities to participate in the green workplaces. The challenges of greening TVET as well as the potential for creating more employment opportunities by enhancing the quality of TVET education were also determined.

Literature Review

The majority of manufacturing methods have been influenced by climate change, making it urgently necessary to equip workers with the sustainability skill sets demanded by the modern labour market. Systems of Technical and Vocational Education and Training (TVET) are in charge of reskilling and providing human capital with environmentally sustainable skills so that they may work in environmentally friendly economies (ILO, 2023). The degree to which TVET systems in various nations react and adjust to this swift change differs. As Tee (2023) suggests, integrating green knowledge and knowledge management into entrepreneurial education in higher education institutions (HEIs) is a key starting point to support sustainability and ensure future success in the industry. However, there remains a gap in empirical research within the context of environmental sustainability (Tee, 2023).

Human activities must broadly change as governments struggle with different strategies to deal with the burden of catastrophic climate change and harsh weather conditions. The necessary 'green shift' will bring with it both new challenges and possibilities. All aspects of TVET programmes, including policies, curriculum, research projects, campus operations, and community participation, must embrace the greening idea and transition (Mochizuki & Fadeeva, 2008).

TVET can help build capacity in areas such as renewable energy, energy efficiency, and sustainable agriculture, which can reduce greenhouse gas emissions and increase adaptation to the impacts of climate change (Jayaprakash, 2024). As action to reach net zero is happening on a global scale, it requires the collaboration of world governments, private sector as well as TVET institutions. Net zero refers to the balancing of greenhouse gases emitted into the atmosphere with the greenhouse gases being removed from the atmosphere (United Nations Environment Programme, 2023). TVET has the responsibility to achieve Education for Sustainable Development (ESD).Therefore TVET institutions in Botswana and elsewhere, have to rethink, reinvigorate research efforts and come up with sustainable means of smart generation of electricity, production of electric cars, and smart agriculture to mitigate climate change effects, amongst other innovations.

While investment in new green businesses and technology has the potential to create significant numbers of jobs, some jobs in carbon-intensive industries will be lost, and young people must be prepared for labour

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market shifts. Surkarti and Norizan (2023) posit that TVET institutions must green their curricula and be responsible for sustaining the greening transformation agenda to equip learners with green skills. Learners must be taught knowledge and skills that make them conscious of the impact of industrial and human activities on the environment and climate change (Sterling 2004). Furthermore, greening TVET systems plays a critical role in enabling countries to fulfil the Sustainable Development Goals (SDGs 6, 7, 9, 11, 12, 13, 14, and 15) and Climate Change commitments (UNESCO, 2017). As a developing country, Botswana continues to rely on low-technology means of producing and processing its products; thus, this study sought to investigate how greening TVET for human capital development can create the best employment opportunities for graduates and improve sustainable production despite numerous challenges. TVET can possibly lower levels of primary joblessness and supply the work market with able workers, thus working as a vital driver of socio-economic development and global competitiveness (Paryono, 2017).

Methodology

The study reviewed previous studies, government papers, and published research publications to investigate if there is an existing framework in Botswana for greening TVET programs, identify challenges and opportunities for greening TVET, and Botswana's readiness to green its TVET system. The inclusion of the papers in the desktop study was also determined by the relevance of the studies and publications to the greening of TVET. This was done to guarantee that only credible and empirical findings and recommendations are included in this paper. The majority of the research literature on the TVET greening concept was published in 2010, however, empirical investigations were limited to those conducted from 2015, when the chorus of climate change, its effects, and the hunt for mitigation measures became more prominent. However, the research papers' origins were divided into two groups: developed countries and developing countries, because the level of readiness for greening varies according to these countries' economic levels. Ideas from all studies were examined, but not compared. Policy documents and studies from authoritative sources such as the United Nations, UNESCO, and ILO were reviewed alongside Botswana TVET policies.

Results and Discussion

Based on a recent government-commissioned pilot study conducted in Botswana by (British Council, & Paeradigms, 2023) a SWOT analysis was performed to identify the strengths and weaknesses of green Botswana's TVET system. The piloting tool had 60 questions divided into the following sections; policy consistency and vision, labor market information and skill forecasting, employer participation, curriculum and assessment, learner engagement and assistance, institutional strengthening for TVET institutions and workplaces, financing possibilities, quality assessment, and monitoring and evaluation. Based on the pilot study data and reviewed documents, a SWOT analysis was done and Table 1 shows the results:

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Table 1. SWOT Analysis on Botswana's Readiness to Green the TVET Sector

Strengths	Weaknesses	Opportunities	Threats
Strong country political will.	Fragmentation between greening initiatives and TVET systems.	TVET system is ready to accept greening initiatives.	Lack of role clarity amongst all stakeholders.
Existing information dissemination channels.	Lack of existing frameworks to support the greening initiatives.	Curriculum innovators are also implementers.	Deskilling of existing employees who fail to adapt to new green job profiles.
Existing infrastructure and human resources.	Lack of robust quality assurance, monitoring and evaluation systems.	Existing collaborative partners between the TVET sector and its stakeholders.	Loss of jobs and distortions in the labour market.
		Enhanced staff development activities	Significant changes to curricula which may be costly.
		Improved awareness of the greening concept. Spillover of the greening initiatives into communities and the informal sector. Increased career guidance for greener jobs.	Existing equipment and infrastructure in the TVET training sector may be rendered obsolete. Learners lack awareness of what green jobs are

Even though Botswana has the Human Resource Development Council (HRDC), which is responsible for supplying labour market information on skills demands, this is the general country's overall labour market monitoring obligation. HRDC's mission for the Labour Monitoring Observatory (LMO) may also need to be refocused to help identify green skills in demand and examine TVET programmes for the green economy (ILO, 2023). Based on the opportunities identified in Table 1, it is possible to conclude that Botswana's TVET system provides an excellent chance for quick policy direction adjustments to influence greening TVET activities and support existing TVET institutions across the country. However, greening activities between ministries of education and TVET training, as well as those of the environment and employment, are fragmented, posing a significant danger to reaching the desired green skill sets for green jobs and the labour market. The necessity for a uniform framework to promote the greening of the country's TVET system becomes obvious with a defined road map (UNESCO, 2013). This would allow for synergies between existing policy aspects in various ministries, resulting in a holistic plan for 'greening' Botswana's TVET industry. Continuous communication must be with all stakeholders, including TVET providers, the Ministry of Labour, employers, and employee associations. The focus will be on explaining the impact and distortions that will occur in the labour market as a result of green initiatives. Employers will be able to identify how they can retool existing employees to conform to new green job profiles while reducing the impact of new green skill set requirements. If this is not done correctly, the data in Table 1 show that there is a considerable risk of some workers losing their employment.

On the one hand, it may be accepted that the issue of improving institutional and staff capacity for a green transition is in its early stages in various countries (UNESCO-UNEVOC, 2013), as well as in Botswana. Based on the findings of the pilot study, suggestions can be made to expedite the re-tooling and up-skilling of TVET trainers on greening the curricula and other support skills. At the same moment, employers will also need to consider how to retool existing employees to adapt to new green job profiles while the impact of new green skill requirements (British Council, & Paeradigms, 2023). Functional mechanisms for engaging with employers can still be sought through organizations like Business Botswana.

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The findings of a pilot research conducted in Botswana to check on the country's readiness to green its TVET system by the British Council, & Paeradigms (2023) indicate that funding for a just transition, particularly for retraining at-risk workers, reforms in TVET delivery for green skills, should be expanded. Table 1 shows that the findings pose a threat to the country's efforts to green its TVET system. Botswana, on the other hand, has a good opportunity in that several finance structures are in place to assist with greening TVET activities. For example, the HRDC Training Levy, government support (including curriculum creation and in-service training), and industry funding all exist. The HRDC Training Levy is said to be underutilized in most cases.

In Botswana, the Botswana Qualification Authority (BQA) is responsible for overall quality assurance, monitoring, and evaluation (BQA, 2020). It is unclear how well the quality assurance process is informed about the green economy strategy/policies, as they may not be included in the present quality standards due to the new initiative. BQA quality assurance standards may need to be amended to embrace those standards for green skills and internal ministry and institutional quality assurance be revised accordingly to align with revised BQA quality standards. Professional bodies such as the Engineering Registration Board (ERB) must also be involved in the process to verify that their quality requirements are met.

UNESCO (2017) implores that one of the most important approaches to greening the curricula and TVET is to create awareness about the greening concept amongst stakeholders which include the learners, communities, the institutional culture, campus activities and research activities. Since the greening concept is relatively new in Botswana, this may not be known amongst several stakeholders and this poses a serious threat to the greening efforts as also shown in Table 1. It is imperative, through the awareness campaigns to increase people's knowledge on the causes and effects of climate change to the environment and their lives, and their role to mitigate the climate change effects (OECD, 2012). Career awareness of school learners must also be enhanced in the TVET institutions for them to understand the changing skill requirements in the job market. Naturally, people tend to resist change if they are not aware of the rationale and their role in the change management process. People's actions must also be matched with other mitigation measures being taken by other sectors of the economy, for example the historic Conference of Parties (COP) 21 international climate agreement of 2015 in Paris to which most countries agreed (UNFCCC, 2015).

Conclusions

Despite several problems found in attempting to green the TVET industry in Botswana, there are various chances that can improve the measures to be implemented. The TVET sector is fully prepared to accept and implement the initiative as it is backed by strong political will, government support, and existing infrastructure that may require minor tweaks and human resource mobilisation. Botswana's government has measures in place to promote sustainable educational institutions, and it is a signatory to international climate treaties. The current communication and information dissemination channels around the country can also be used to educate communities and learners about the notion of greening to get their support for greening activities. The country's centralized TVET education system makes it easier to create, package, and disseminate initiatives into the user system with full support, monitoring, and evaluation processes. The Botswana Qualification Authority (BQA), the country's education quality assurance agency, can also make changes to its quality assurance and certification system to better prepare its staff and incorporate green initiatives into accrediting quality requirements. This ensures that quality requirements are met when the initiatives are executed. Existing consultative forums between government agencies and various labour market sectoral committees, employers, and employee associations can be used to spread greening concept initiatives, impacts, and long-term advantages. This awareness may also urge many stakeholders to fund the greening of the TVET sector. The existing HRDC and LMO will supply additional labour market knowledge as well as an overall labour market monitoring responsibility on the green skills demand and impact on existing employees.

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Recommendations

This Labour Market Observatory (LMO) in Botswana which was established in October 2022, should also focus on the TVET green skills and changing nature of job opportunities in the labour market. Results must be regularly analysed and communicated with all key stakeholders, including sectoral arms, employee associations, industry and commerce, and other private sector associations. The focus will be on explaining the impact and distortions that will occur in the labour market as a result of green initiatives. Information dissemination channels to school leavers about the greening idea for curriculum and employment must be strengthened so that they can make informed career decisions and comprehend the changing skill requirements in the labour market. The annual HRDC Career Fairs and Tertiary Education Road Shows, which traverse the entire country, can be among the public awareness possibilities for students pursuing tertiary education. TVET institutions must provide sufficient curriculum resources, as well as enable TVET teachers to include sustainability in their teaching methods. Skills institutions and industry should collaborate on knowledge sharing to align objectives and labour market demands, reducing skill mismatch and improving competency quality, with success reliant on strategic approaches (Ashari & Rasul, 2014).

Above all, additional development partners need to be encouraged to participate in the finance mechanism to accelerate the implementation of the "greening TVET" project. The country should create a strategy and action plan for "greening" the TVET sector at the policy, industry, and implementation levels. All central participants in TVET ought to be planned and carried out with a legitimate aim to reinforce the worth of TVET and be proactive to defeat the negative discernment and shame towards TVET in Botswana.

Authors' Contributions

All the authors collaborated in producing the introduction, review of literature, conclusions and recommendations of the article. Jerald Hondonga specifically looked at the SWOT analysis of Botswana TVET.

Author Ethical Declarations

We confirm that the work has not been published elsewhere in any form or language

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Declaration of Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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