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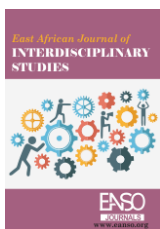
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Bridging the Gap between TVET Training and Industry Needs

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Aligning the Technical and Vocational Education and Training (TVET) programs to meet the industry requirements is a crucial matter if TVET is to foster economic growth through workforce development. TVET institutions globally have been known to bolster economic growth by rejuvenating small but key industrial sectors that cut across the formal and non-formal sectors. A disturbing fact, however, is that there still exist many TVET graduates who struggle to meet the expectations of the employers even after undergoing the full training as per the curriculum provided. This has been attributed to outdated curricula, limited practical exposure, and a lack of industry partnerships. This may arise as a result of the curriculum design that may not have been reviewed for quite a long period of time, and therefore may not have lived up to the dynamics of the varying job market demands. This paper explored how targeted reforms and collaboration between educational institutions, industries, and policymakers could help in bridging the skills gap. The study focused on TVET institutions and Curricula in use and the mode of delivery, extent of exposure of students and collaborations and linkages with the industry, as well as technological gaps occurring as a result of inadequacy of modern equipment that have become inhibitive to students who would rather be gaining practical skills with industry-standard tools. These challenges, as well as strategies for bridging the gap, have been reviewed. Best practices from developed economies have also been examined, and the gains are presented herein. A collaborative model incorporating current industry-driven curricula, skill-oriented learning, and policy interventions focusing on training a workforce that aligns with industry demands is recommended.

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INTRODUCTION

Technical and Vocational Education and Training (TVET) is a critical component of education systems worldwide, designed to equip individuals with practical skills and knowledge needed for the labour market. It includes formal, non-formal, and informal learning programs that prepare learners for various trades, industries, and professions. TVET enables the acquisition of workplace skills. Universally, it is seen as a key driver of economic and technological advancement through skills development for the socio-economic and technological development of countries. (Jane *et al.*, 2017). As noted by the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2024), TVET is an essential component of lifelong learning and plays a key role in ensuring equitable, sustainable and peaceful individual as well as economic and social development. Reports from Asian countries indicate that it is also through TVET institutions that inclusive growth, poverty reduction and tackling of unemployment and underemployment can be addressed (Organization for Economic Cooperation and Development-OECD, 2018). Kutto highlights the necessity of green skills that have to be embraced by TVET institutions (Kutto, 2020). The skills promote environmentally friendly practices in industries whose ultimate goal is, for instance, to attain energy efficiency & renewable energy, waste reduction, reuse & recycling, sustainable agriculture & organic farming, green construction & eco-friendly materials, water conservation & management, responsible production, and climate change adaptation strategies.

Global Trends in TVET

Globally, the devastating nature of the COVID-19 pandemic not only wreaked havoc on the lives and

health of humanity but also on the labour market, world economy and educational sector (Harry *et al.*, 2021). This forced learning institutions around the world to have a paradigm shift to new approaches in curriculum delivery. Online learning and teaching became a reality in many institutions. Digitalisation transforms economies and societies and triggers new policy challenges. Information and Communication Technologies (ICT), Artificial Intelligence (AI) and robotics are profoundly changing the world of work and the way people work and interact with one another (Achuodho & Pikó, 2024). With this development, many countries are integrating ICT, online platforms, and virtual simulations in TVET programs.

There is also a growing focus on apprenticeships, internships and industry collaboration. This can only happen in institutions that have embraced work-based learning. Research and evaluation show a correlation between outputs and impacts (outcomes) of graduates with the structure of learning provided by schools and industry as experienced in the workplace (Hafid *et al.*, 2019). Notably, learning has been enhanced by institutions with this kind of set-up because the curriculum is normally designed so as to address the needs of the industry.

This was, however, not without challenges, as many institutions did not have the required infrastructural facilities or policies to guide. Studies indicate that across the world, online learning was marred by technical issues that ranged from teachers' lack of technical skills and their teaching style that improperly adapted to the online environment to a lack of contemporary pedagogical knowledge, such as teaching techniques and methods used in technology-based learning. On the side of the students, the challenges included accessibility,

connectivity, lack of appropriate devices (Tartari & Kashahu, 2021).

In line with the changing trends globally, there is a need for the adoption of lifelong learning approaches. The ever-changing technology, training approaches, automation of services, as well as issues brought by climate change, globalisation, changing demography, immigration and emigration, dynamic labour markets, and disruptions resulting from infectious diseases demand continuous up-skilling and re-skilling of employees and employers (TESDA, 2022). For TVET institutions, it is an activity that cannot be wished away.

There is a global concern about challenges arising due to unchecked economic development and environmental abuse. Obviously, a new strategy for development is needed to address the urgent issues of deforestation, careless resource depletion, climate change, and outright waste. To achieve real sustainability, we need more than just technology and money. Instead, a combination of environmentally friendly tools with a skilled labour force is necessary (Shalini, 2024). Only by working together in peace can we create a future that can support everyone. TVET institutions play a crucial role in the adoption of new technology and teaching students about current trends in the industry.

In the current times, it is expected that the TVET institutions, through their trainers, are continuously trying to deliberately adapt to new technology and education that helps in transitioning from carbon-intensive to carbon-light technologies. The natural resources available and forest cover on our planet are increasingly dwindling due to high population pressure, wastage and other unfriendly environmental practices. This definitely has an adverse impact on livelihoods and must at all costs be curbed. While some nations are endowed with the technological resources and infrastructure, others, especially the less developed, are struggling with their meagre resources that have slowed adoption of technology and yet on the other hand are

the most hit when pandemics and climatic calamities strike. Technical colleges and schools must therefore take decisive action to infuse green technology skills, expertise and training into their curricula, research and delivery of services. The trainees must graduate with expertise in green technology; come up with products that can be recycled, reused and made from minimal resources obtained using green processes. This will not only ensure that we reduce greenhouse gas emissions, protect our environment, but also have graduates who are well prepared to fit into green jobs and careers, green infrastructure and embrace renewable energy, circular economy, sustainable wastewater disposal systems and environmentally friendly practices (Gerke, 2023).

TVET Skills Gap

Curriculum Reforms

Globally, one crucial area as far as skills gap is concerned, is the disconnect between TVET curricula and industry requirements. Rapid technological advancements and evolving job markets exacerbate this mismatch, necessitating adaptive educational frameworks (UNESCO, 2021). Many curricula in many countries, especially the less developed, have not been reviewed over a long period of time, making it difficult for the trainers and trainees to cope with the emerging issues and the changing technologies. This is particularly the case when the curricula require one to train using old machinery and equipment, for example, yet in the market or possible place of work, new and probably different ones exist. It has been noted that there are significant curriculum gaps in some trade areas. These gaps included soft skills development, industry alignment and technological updates. In a case study done in Thika Technical Training Institute in Kenya, it was revealed that while students acquire technical skills, there was still some deficiency in soft skills such as communication, teamwork and problem solving, which employers highly valued (Wahungu, 2022). Additionally, outdated training equipment and

limited exposure to modern automotive technologies contributed to the mismatch between graduate competencies and industry expectations. Addressing this gap requires dynamic curricula that align with current industry standards and future workforce needs.

Partnership Models

The mismatch between TVET curricula and industry requirements is gradually being addressed through the curriculum designs and review that pay keen attention to the market demands so that it is responsive to the challenge and provides room for industrial practice during the training. Germany's dual training system, a process that allows trainees to alternate between being trained at a vocational college and also gain hands-on experience in an industry for a specified duration, is gaining momentum in a number of countries, among them Kenya. Effective collaboration between TVET institutions and industries ensures curricula remain relevant. Public-private partnerships facilitate apprenticeships, internships, and real-world training opportunities, enhancing graduates' employability. Such collaborations also aid in curriculum development, ensuring that training aligns with industry expectations. Some of the main reforms in Kenya involve the development of Competency Based Education and Training (CBET) Curricula, which are more skill-oriented and the recruitment of trainers to bridge the gap witnessed in most of the TVET institutions. Additionally, the Kenya School of TVET, in collaboration with Colleges and Institutes Canada (CICan), has been conducting training of trainers on CBET curriculum delivery (Ododa, 2024).

Youth Empowerment Initiatives

Integrating digital technologies into TVET programs is crucial for preparing learners for contemporary workplaces. Embracing online learning platforms, virtual simulations, and digital tools enhances accessibility and equips students with the necessary digital competencies (UNESCO,

2021). However, disparities in digital infrastructure, especially in developing regions, pose challenges to widespread implementation.

Government Policy

Government policies play a vital role in shaping responsive TVET systems. Establishing national qualifications frameworks, quality assurance mechanisms, and funding models ensures alignment between training programs and labour market needs (CEDEFOP, 2020). Institutional autonomy and leadership are also critical for fostering innovation and responsiveness within TVET institutions.

The Case of Kenya

Kenya has undertaken significant reforms to address the skills mismatch in its TVET sector in a number of ways. A few examples have been highlighted in this paper. Firstly, the government has mandated the adoption of Competency-Based Education and Training (CBET) across all TVET institutions, emphasising practical skills and industry relevance. As of September 2023, all TVET admissions are under the CBET framework (Ministry of Education, 2023). Secondly, in line with the new Curriculum being rolled out, the Technical and Vocational Education and Training Curriculum Development Assessment and Certification Council (TVETCDACC) has developed over 400 competency-based curricula in collaboration with industry experts, ensuring alignment with labour market demands (Ministry of Education, 2024). In addition to this, there is a concerted effort to strengthen industry Partnerships. Collaborations with industries, such as the partnership between Eldoret National Polytechnic and Rivatex, facilitate dual training models where students split their time between classroom instruction and industry-based training (Kenya News Agency, 2023). Another institution that has adopted and implemented the idea of dual training is Kericho Township Technical and Vocational Training College. The college had signed Memorandum of Understanding (MoUs) with quite a number of industry partners by 2025.

On youth employment initiatives, the Kenya Youth Employment and Opportunities Project (KYEOP) has provided training and business support to over 310,000 youth, with 86% of beneficiaries securing employment or self-employment opportunities (World Bank, 2023). And on the new curriculum, there has been continuous retooling of trainers in line with the emerging issues that will be encountered in the course of their service delivery. Reports indicate that over 1,500 TVET trainers have undergone retooling programs to enhance their pedagogical skills and familiarity with modern equipment, as well as ensure effective CBET delivery. (Kenya News Agency, 2025).

Despite these advancements, challenges persist, including inadequate infrastructure, limited access to modern equipment, and regional disparities in training quality. Continued investment in infrastructure, trainer development, and industry collaboration is essential for sustaining progress.

Case Studies of Successful TVET-Industry Integration

Several countries have successfully bridged the gap between TVET training and industry needs. For instance, Germany's Dual Education System is one worth emulating. This is a model where students have institution-based learning for half of their time and industry apprenticeships in the other half. This model guarantees immediate employability on completion of the course. Another case is Singapore's Skills Future Initiative. This is a government-driven program that promotes lifelong learning and aligns TVET courses with evolving industry demands. The alignment closes the mismatch between the curriculum and the industry's needs. Lastly, Canada's Cooperative Education Programs also feature among the successful nations where TVET-Industry integration plays a key role. In their system, a structured learning approach where students gain practical industry experience before graduation is emphasised.

METHODOLOGY

This study employed a qualitative literature review methodology to examine global and local efforts to bridge the skills gap in Technical and Vocational Education and Training (TVET), with a particular focus on Kenya. The review drew upon scholarly articles, policy documents, and institutional reports. Sources were identified using academic databases such as Google Scholar, UNESCO and OECD repositories, as well as official government and development agency websites. They included recent publications that addressed themes such as industry-TVET collaboration, competency-based education, digital integration, policy frameworks, and labour market responsiveness. Kenyan-specific interventions, including CBET reforms and trainer retooling programs, were examined through verified news articles, government and institutional reports.

The findings were thematically analysed to extract recurring strategies, challenges, and best practices relevant to addressing the skills gap in TVET. The study is purely based on secondary data analysis to provide a synthesised and policy-relevant understanding of current trends.

SUMMARY OF THE FINDINGS

Gaps in TVET-Industry Alignment

Challenges in TVET-Industry Alignment still exist in quite a number of countries, especially the less developed. Among the leading factors that contribute to the mismatch between TVET training and industry needs are the use of outdated curricula. Many TVET institutions follow traditional syllabi that do not reflect current technological advancements and industry trends. Another case is the limited industry exposure. Quite a number of institutions still produce students who often lack hands-on training, and where they did the machines they were exposed to were old and out of touch with the latest technology, making it difficult for them to transition smoothly into the workforce. Cases of insufficient collaboration were also noted. A lack of

partnership between TVET institutions and industries hinders the development of relevant training programs. A technology gap is also another area of concern. Many training centres lack modern equipment, preventing students from gaining practical experience with industry-standard tools.

Strategies for Bridging the Gap

To ensure TVET graduates are job-ready, this study recommends the following strategies for implementation. Firstly, the curriculum is supposed to be reviewed to be in line with current emerging issues and trends in modernisation. It is of the essence to update courses to incorporate emerging industry trends such as automation, artificial intelligence, and green technologies. Secondly, industry partnerships must be strengthened. Apprenticeship programs, internships, and industry-led training initiatives that give students real-world experience must be established. Work-Integrated Learning (WIL) is also another area that needs to be enhanced. Encouraging cooperative education models where students alternate between classroom learning and on-the-job training. The curriculum must lay emphasis on industrial attachment as an important component. Though many institutions are faced with financial challenges, there should be a deliberate effort to invest in technology. Equipping TVET institutions with modern tools and simulation-based learning will undoubtedly provide students with valuable hands-on experience. Lastly, another area that can help in bridging the gap is policy support. Governments should implement policies that promote continuous skill development, encourage industry collaboration, and provide funding for TVET enhancement.

CONCLUSION

Bridging the gap between TVET training and industry needs requires a multi-stakeholder approach. By modernising curricula, fostering industry partnerships, integrating work-based learning, and investing in technological advancements, TVET institutions can better prepare

graduates for the workforce. Policymakers, educators, and industry leaders must collaborate to create a dynamic and responsive training system that meets the ever-changing demands of the global economy.

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