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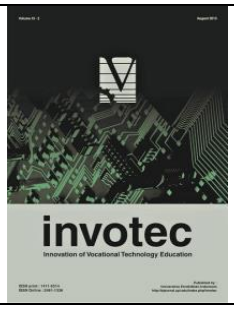

TVET–Sustainable goals linkage: Inclusive education for a sustainable development

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ABSTRACT

Technical, Vocational, Education and Training spans our educational systems, from toys for infants to sending children to school to learn Science, Engineering, and Technology. An inclusive society needs real-world education. Equal access for balanced empowerment may be achieved via two techniques. TVET and SDGs work if done well. TVET-SDGs Linkage is a major problem that must be addressed if Nigeria is to fulfil its UN duties, especially in building an inclusive society as outlined in Objectives 4, 5, 8, 10 and 16 of the 17-Point Agenda of the Sustainable Development Goals with 169 goals. Inclusive education promotes a just and equitable society as envisioned by the UN through mobilising stakeholders. The article discusses leveraging TVET to meet Nigeria's SDGs via inclusive education. Secondary schools, vocational centres, technical colleges, polytechnics, and universities must have high-quality teaching and training facilities and highly-trained teaching staff.

1. Introduction

TVET or Technical and Vocational Education and Training spans through our educational structures starting from the informal form of giving toys to babies and sending children to schools to go through various facilities for teaching instructions from primary school education to tertiary institutions most especially in the areas of Science, Engineering and Technology. Their application through true life situation demands for the practical experience of every graduate of our schools.

Skill development is a practical acquisition of the three domains of education Competency (Psychomotor), Knowledge (Cognitive) and Attitudes (Affective) necessary to perform a trade or occupation in the labour market. King and Palmer (2007) submitted that skills can be acquired through formal public or private schools, institutions or Centres, informally traditional apprenticeships or Non-formal semi-structured trainings. TVET goal falls into this category and has been a part of development strategies since the beginning of international development cooperation. since 1950s and 60s, TVET has been an important field supported by bilateral and multilateral agencies as modernization strategies for developing countries (NORRAG et al, in UNESCO, 2015). Various developments on skill acquisition and TVET have taken place over the years: (1) Jomtien World Conference (1990) on Development strategy based on the Universal vision of the Education For All (EFA) covering formal and informal skills. (2) Dakar World Education Forum (2000) on youth and adult skills on Goal 3 through equitable access to appropriate learning and life skills programmes as well as ensuring measurable learning outcomes of Goal 6 on Literacy and Numeracy in quality

education. (3) UNESCO, ILO and ADB/OECD worked on skills development for youth interaction of TVET in Sustainable Development or TVSD. (4) Articulation of Goals 4.4, 8.5 and 8.6 to impact on TVET/TVSD policy design and implementation of the International, Region and National Levels.

2. Method

This paper is therefore centred on harnessing the opportunities of Technical Vocational Education and training (TVET) in achieving the 17 points Agenda and 169 Targets of the Sustainable Development Goals for the purpose of achieving Nigeria Sustainable Development. United Nations effort should be appreciated in ensuring that every Nation develops through the Millennium Development Goals, MDG (2000 – 2015) which most nations fail despite foreign grants. For the SDGs (2015 – 2030) achievement by Nigeria, the paper is on exploring Technical and Vocational Education and Training, TVET as a vital source, if well developed, for the actualization of Sustainable Development Goals as benefit of functional democracy in the promotion of justice, equity, peace, security and prosperity (employability and employment issues). However, for effective contributions of TVET to SDG, the following areas of TVET in Education must be well equipped with high and adequate facilities for teaching and trainings as well as with well-trained teaching staff in all cadres of educational segments or levels:

a. **Secondary Schools**: TVET materials must be supplied to meet the technical demand of effective teaching and service delivery for adequate skill acquisition for prospective world of entrepreneurship. Curriculum update is equally important at this stage of educational development.
b. **Vocational Centres**: This has to do with taking care of the unemployed ones as a form of empowering them. The goal is for the necessary skill acquisition and self-employment/job creation of the graduates. Artisans from this end should be encouraged to go into Technical Colleges for formal education and training for better job finishing.
c. **Technical Colleges**: The focus must be in producing graduates for self-employment, job creation and as raw materials base for higher institutions of learning in the relevant fields Polytechnics and Universities. Integration of Education for Sustainable Development (ESD) into TVET is necessary here to produce thoroughbred graduates. It is interesting to note that Developed countries/Industrial Nations depend so much on the technical services of NABTEB certificate holders the Craftsmen. This is the appropriate segment of our educational institution that can promote solid TVET foundation for SDGs hence Government should create more Technical Schools with relevant and adequate facility.
d. **Polytechnic**: The structure of the Polytechnic favours entrepreneurship at vocational/trade level considering the National Diploma Certificate (ND) and high tech of design, research and development for the graduates and holders of Higher National Diploma (HND) using the advantages of the offered entrepreneurial courses, the Entrepreneurship Centres and available skill as equipment for TVET relevance.
e. **University**: The policy of 30:70 practical/theory ratio needs to be upgraded for the technical content of Universities of Technology to run effectively TVET through entrepreneurship Education to meet up with the SDGs need to provide jobs and employment. The Entrepreneurship Development Centres must be run to meet up with TVET which must be extended to the Artisans for improved proficiency in the technical application/vocation.

3. Results and Discussion

3.1. TVET Development Challenges in Nigeria, Challenges of Education Systems

Education has three domains that are expected to have direct impact on human culture, civilization and development. They are measures of graduate level of thoroughness and thoroughbred level of reliance and competence:

a. **Affective –** Reading, writing and identification ability characteristics of culture of primary school/secondary school learning that directly influence the behaviour and character building of the growing child at his impressionable age. Habits, permanent future character or personality

trait of human is determined in this regime. This is a period of identification, numeracy and literacy.

b. **Cognitive Domain –** this is knowledge acquisition that has a characteristic development profile from primary to Polytechnic and University. PhD. level is more of possible attitudinal disposition, competence and application and ability to effect development. Professorial cap that is research and experience based is the height of knowledge acquisition and development initiative and management in any of the disciplines available in the world.
c. **Psychomotor Domain –** Note the academic/vocation/professional development structure of 6-3-3-4 or 9-3-4 for basic education approach. This is a knowledge based education with affinity for skill acquisition leading to application of science and products of Engineering and Technology – industry, infrastructures, basic amenities for sustainable development.

Note that the psychomotor domain dominates the target achievement of Polytechnic education that is more of practical content based bias in admission 70:30 in favour of Technology over Management and Curriculum 60:40 practical-theory ratio. How impactful has our education been to the society in view of the climate of impunity, corruption and indiscipline against the expected claim of standard and civilization? The chart below shows the various disciplines in education. All of the disciplines interconnect in project execution demanding policy plan implementation, project design, due process in construction, manufacturing or production, Inventory, Marketing and Sales which is the import of TVET-SDG linkage. However, effective and functional administration enhances versatility and increase contributions in TVET-SDG linkage on project production and services to enhance Nigerian Sustainable Development. Everybody is a stakeholder in this respect even with National Diploma Certificate. There is myriad of challenges of barriers confronting TVET development and Efficiency level in Nigeria ranks them as follows.

3.1.1. Challenges of Adequate Funding

At present, public schools being run by Government reveal a lot of lapses due to poor funding. Various authors, Yusuf and Soyemi (2012), Ogba and Wobi (2010) observed the following constraints which adequate funding could remove:

a. Poor perception of TVET.
b. Low enrolment against graduates of Technical schools.
c. Low quality training
d. Training and labour demand mismatch
e. Discriminative attitude towards TVET graduates.
f. Weak monitoring, Assessment and Evaluation to affirm quality standard and employability and societal/company acceptability.
g. Shortage of qualified and experienced teachers.
h. Poor teaching and learning facilities.
i. Teacher centred approach
j. Poor management and supervision
k. Underfunding

3.1.2. Dysfunctional Subsystems Challenge

With functional education, religion is better activated and articulated to realise the set objectives of peace and development by reforming the man into scripture compliance and thoroughbred achievers. However, in a situation of mix-up, religion becomes loaded with substance of bias and hatred. This is because issues are trivialized and personalized rather than promoting fairness and values. Nigeria in the past and even now has suffered from misusing religion in some cases as weapons of bias, persecution in selection, choice, evaluation and promotion exercises. Consider the spheres of these subsystems arrangement for a matrix mix to generate sustainable development – Education for capacity building, religion for personal reformation, and politics for the transformation of the society (Figure 1).

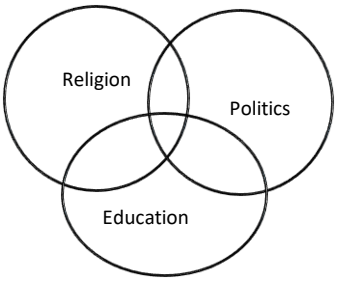

Figure. 1 Matrix Mix of Religion, Politics and Education for Sustainable Development

3.1.3. Transformation Need for Academic Success

The visible impacts of educational deficiencies in our tertiary institutions on the society can be enumerated as follows:

a. Poor maintenance of our infrastructural facilities like water, electricity, roads, telecommunication gadgets and transports etc. hence the need for social transformation. To achieve this, the Nation had adopted education as an instrument per excellence (FGN, 2004), Equally the Federal Government had initiated a transformation agenda. Unfortunately, our education system which is supposed to be the pivot of development is also facing some challenges.
b. Need to review the curriculum of some core professional disciplines to reflect the modern needs of the industries.
c. Ensure timely and continuous student assessment on the lectures and weekly evaluation of conducted practical with model marking scheme to ensure uniformity and standard.
d. Introduction of more quantitative internship programmes to some professional training like SIWES (4 months), IT (6 months) etc. sabbatical leave (1 year) for qualified cadres of lectures.
e. Establishment of entrepreneurial training to tertiary institutions curriculum.
f. Introduction of student work-study programme in colleges.
g. Make our counselling centres more functional to solve student psychological problems.
h. Intensify more on the capacity building needs of the entire Engineering family: Craftsman, Technician, Technologist and Engineers for the purpose of effective service delivery.
i. Ensure membership of professional bodies for each staff as well as participatory attendance of seminars, conferences and workshops relevant to staff discipline.
j. Ensure the end users that are primary stakeholders in Engineering education have 100% input to the kind of equipment/facility needed to be procured or supplied through ETF, NBTE or Federal Government.
k. Monitoring the network to ensure work schedule compliance must be developed and adhered to, to ensure competence and standard are achieved for the entire Engineering staff.
l. Working towards achieving the goal and strategic objectives of each department and that of the institution.

Enhancing basic skills and competence largely depends on well trained and certified staff. Effective service delivery in terms of teaching and conduct of practical is a function of facility update, time table compliance, appropriate capacity building for the staff, curriculum review, and up to date to meet up with modern trends in education. Our goal must centre on product development absorbable by the industries that need the students as well as graduate competence to create jobs. This must apply to TVET-SDG linkage. It is quite obvious that one thing that can help us achieve rapid social transformation in Nigeria is sound education leading to academic success (Durosaro, 2011). Research has shown that workers who were academically successful were more stable in their employment, less likely to engage in criminality, more active as citizens, charitable volunteers, happy and healthier workers. There is a need to shift from certificate-driven to employment –driven, functionalism and social transformation by promoting academic success through moulding aright the learners as well as rebranding staff integrity working through the ethics of the profession. All of us must as stakeholders ensure we correct all lapses in the process of producing our graduates for self-

reliance and job creation. Professional colleagues; full attainment is an attitudinal change on the part of all the stakeholders.

3.1.4. TVET – SDGs Linkage and the Concept of Education for Sustainable Development (ESD)

In order to discuss TVET-SDGs Linkage, the concept of Education for Sustainable Development (ESD) must be viewed. UNESCO definition of ESD is that of a vision of Education that seeks to balance human economic wellbeing with cultural traditions and respect for the earth's natural resources (UNESCO, 2005). This implies a desire to train and guide learners towards Income- Generating Activities (IGA) and the development of lifelong skills for survival. TVET as Technical and Vocational Education and Training is therefore a means of supplying the necessary technical tools and competent technical staff to actualize the objective of ESD for the purpose of producing Technical graduate that will be relevant and capable of contributing to the realisation of the Sustainable Development Goals. To realize these, the following barriers must be addressed as identified by many interviewees:

Curriculum perfection, streamlining and update of courses

a. Requirements of professional associations
b. Students understanding of the real issues and targets
c. Confusion over what to be taught
d. Lack of market for students
e. Lack of relevant course examples
f. Lack of staff expertise and the need to acquire new knowledge
g. Lack of staff awareness
h. Lack of institutional drive and commitment.

Addressing them would enhance ESD integration into TVET, as well as correcting the thinking of the Principals, Head of Department and Instructors as workforce for the trainees to be responsive by adopting positive attitudes on issues and challenges of sustainability. Graduates of TVET institutions are expected to develop technical knowledge, skills and attitudes that will require them to live and work in a sustainable way. The table 1 below refers to the specifics.

Table 1. Generic Experience Across TVET Specialists towards Sustainable Development.

S/n	Experience	Characteristics
1	Knowledge (Cognitive)	To seek solution in real life situations To develop social and experimental responsibility To identify, understand and evaluate values conducive to sustainable development. To understand different methodologies of the humanities.
2	Skills (Psychomotor)	Creativity in inter-disciplinary teams Critical judgement Participation in a creative environment Transformative learning
3	Attitudes (Affective)	To manage change To create a stimulating and supportive environment Application of the importance of social, environmental and economic contexts Self reflection.

Furthermore, the International Labour Organisations, ILO recommendation for TVET defines the three major aspects of Sustainable Development in which TVET prepares people for employment, ie Social Environment and Economics:

a. Socio-economic and Environmental considerations as fundamental parameters.

b. Social consideration on respect for other cultures taking into consideration distributional equity, adequate provision of social services including health and education, gender equity, establishing a suitable working atmosphere and working with a group.
c. Use of resources wisely and minimization of waste and pollution for clean and safe environment.
d. Presently, the integrity of the environment and the welfare of others.
e. The Economic aspect involves the development of a better understanding of sustainable production and services and knowledge of ways in which resources can be conserved and waste managed through recycling and reuse.

3.1.5. Inclusive Education for Inclusive Society

The case of marginalised Women, Girl child and People Living With Disabilities' (PLWDs) empowerment issue deserve empathy rather than sympathy in any strategic plans of the stakeholders taking into consideration their mandates. Inclusive Education is therefore desired to cut across variety of disadvantaged groups ranging from PLWDs, ethnic minorities, persons living below the National Poverty Line, Vulnerable women, School drop outs and internally Displaced Persons.

Each group needs specific access and support strategies in order to meet their needs. TVET and Skill development providers therefore need to transform into Inclusive Institutions and work with the stakeholders to be able to increase the access of disadvantaged persons to TVET courses (Olagoke, 2016). TVET capacity building for the vulnerable and others as spelt out below needs such training that will make them employment, create jobs or go into self employment with reliable products that will be able to stand the test of consumer's taste, standard and quality. Considerations for the following topics for the stakeholders vetting and development is therefore imperative for promotion of Inclusive societies:

a. Inclusion of women in TVET to reduce or exterminate cases of victims of human trafficking.
b. Accessibility of people living in rural areas to Education (TVET) will be an asset of skills to disadvantaged groups.
c. Inclusion of PLWDs in TVET
d. Inclusive employment of PLWDs and TVET and post conflict regions or countries.
e. Success in i–iv will translate to enhancing the SDGs

Application of TVET Objectives by the Stakeholders and SDGs Agenda 1,2,6,9 and 12 and TVET Relevance in table 2 and 3.

Table 2: Application of TVET Objectives by the Stakeholders

1	Research Institutes	▪ Develop indigenous raw materials into values for patronage (promotion and of values and culture) ▪ Entrepreneurship for self-reliance and develop into employers of Labour ▪ Economic promotion – productive in skilful conversion of raw materials for the home consumption and exports thereby promoting National economy through foreign earnings.
2	Government	▪ Employment generation and employability. ▪ Poverty alleviation strategy in Agriculture, and as craftsman in Construction works, Mining etc ▪ Economic promotion – productive in skilful conversion of raw materials for the home consumption and exports there by promoting National economy through foreign exchange earnings. ▪ Develop indigenous raw materials into values for patronage (promotion and of values and culture)
3	Financial Institutions	▪ Employment generation and employability ▪ Industrial development support through skilfulness and competence ▪ Poverty alleviation strategy in Agriculture, and as craftsmen in Construction works, Mining etc. ▪ Entrepreneurship for self-reliance and develop into employers of Labour ▪ Economic Promotion – productive in skilful conversion of raw materials for the home consumption and exports thereby promoting National economy through foreign exchange earnings.

4	NGO	▪ Poverty alleviation strategy in Agriculture, and as craftsmen in Construction works, Mining etc. ▪ Entrepreneurship for self-reliance and develop into employers of Labour
5	Donor Agencies	▪ Entrepreneurship for self-reliance and develop into employers of Labour ▪ Industrial development support through skilfulness and competence ▪ Economic promotion – productive in skilful conversion of raw materials for the home consumption and exports thereby promoting National economy through foreign exchange earnings.
6	Educational Institutions	▪ Industrial development support through skilfulness and competence ▪ Entrepreneurship for self-reliance and develop into employers of Labour ▪ Poverty alleviation strategy in Agriculture, and as craftsman in Construction works, Mining etc
7	Professionals	▪ Industrial development support through skilfulness and competence
8	International Community	▪ Poverty alleviation strategy in Agriculture, and as craftsman in Construction works, Mining etc ▪ Entrepreneurship for self-reliance and develop into employers of Labour ▪ Economic promotion – productive in skilful conversion of raw materials for the home consumption and exports thereby promoting National economy through foreign exchange earnings.

Table 3: SDGs Agenda 1,2,6,9 and 12 and TVET Relevance

Sustainable Development Goals (SDGs)				
Goals	**Agenda**	**Goal Statement**	**TVET Relevance**	**Management Challenge**
1	No poverty	End poverty in all its forms everywhere	Field, Laboratory, Institution, SMEs and Simple constructions. Supervision and Maintenance of flow lines industries.	Resource processing Food, shelter, clothing processing through Technology, Science and Management, Commerce and Entrepreneurship
2	Zero hunger	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	Artisan, Craftsmen, Technicians on simple processing equipment maintenance and repair. Fabrications of domestic utensils and farm implements. Establishment of cottage industries for self-employment and job creation.	Resource processing Establishment of Vocational centres and Technical colleges to offer related courses with high practical content for skill acquisition in the relevant areas of society or community needs TVET in Entrepreneurship, SMEs etc.
6	Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all	Graduate of TVET must be able to participate in drilling well, borehole and treatment of water and work in Water Works.	Resource processing Training of craftsmen, Technicians within area, most

Sustainable Development Goals (SDGs)				
Goals	**Agenda**	**Goal Statement**	**TVET Relevance**	**Management Challenge**
				especially on water treatment for fishery, snailry etc and drinkable water is essential.
9	Industry, Innovation and Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation	TVET graduate on innovation. TVET products as support TVEY graduates to work at the lower rung of the ladder Promotion of Entrepreneurship for SMEs is essential TVET products in the areas of Building, Environment and Civil Engineering are active in Road Construction.	Resource processing Government to be more aggressive on functional infrastructure most especially Power and Road Network and Communication Government need to focus on sustainable development
12	Responsible consumption and production	Ensure sustainable consumption and production patterns	TVET success will eradicate consumerism syndrome and ensure we are productive to value chain level. TVET graduates are skilful and relevant in the areas of maintaining and repair of utilities household utensils. They are crucial in the Agro Allied productionnand products – Fishery, Planting and Harvesting, Snailry, Piggery, Grass cutter, rearing Rabbit etc.	Resource processing Diversification of the economy is in dire need Government need to be aggressive in funding through CBN and commercial Banks and cause of Vocation and Entrepreneurship. Government must invest on agricultural revolution for production of food in abundance. Patronage of home made goods must be addressed through policies.

3.2. Education Model for TVET

Functional education must be devoid of examinations failure, drop out syndrome, school mindedness, mis-education, poor schooling, poor teaching, poor resources, Bad policies, substandard curriculum, Lack of schools, lack of teachers, lack of education know how (Olagoke, 2017). It must have the following characteristics:

Education must cut across the following abilities; Reading, Writing, Arithmetic or Numeracy, Revising (Recapping), Remembering (Memory recall), Reasoning (Deep though), Recognizing (identification), Relating (Interesting) Re-examining (Revisiting), Reminding (Recall), Reflecting, Reformatting (Reporting). TVET goal is on applicability of acquired knowledge and skill hence TVET

graduates must possess the twelve (12) characteristics as well, to be functional and thoroughbred in supporting SDGs (Figure 2).

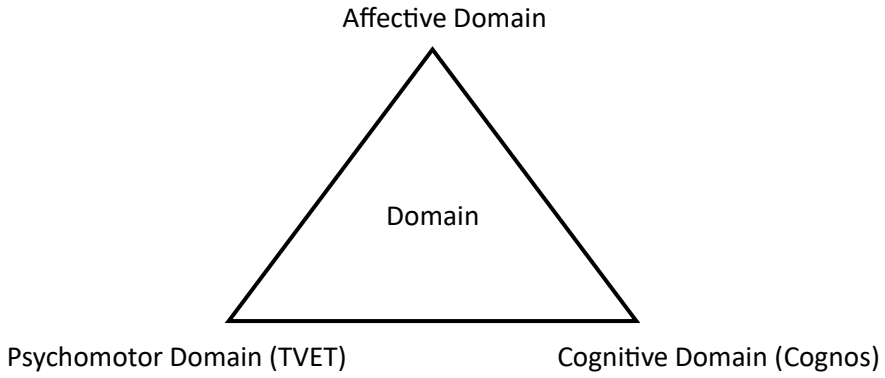

Figure. 2 Domains of Education

3.3. TVET – SDGs Linkage for Sustainable Development

Education is a right for everyone, for knowledge acquisition through which a society is cultivated, cultured, constructed and developed. Vocational and Technical Education emphasises the development of occupational skills needed for the promotion of dignity of labour hence it is a useful part of education that provides lifelong learning to live, work and develop through economic, industrial growth, employment generation and by implication, alleviate poverty. For TVET to produce graduates for sustainable development, the general societal abuse, lack of awareness, inferiority complex issues, acute shortage of vocational and technical teachers (Oguniyi, 2013), absence of basic facilities such as furniture, laboratories, running water, electricity, machines and ICT (Computers) characterizing almost more than 50% of the institutions running vocational and technical education programmes must be provided for, to ensure quality and standard to develop the Nation and the overall development of the individual and the society.

Graduates of TVET institutions must be trained to focus on SDGs with adequate orientation on the demand of Entrepreneurship with adequate level of education on the technical implication of venturing into business or project taking into consideration the financial demand with accessing power, product development, marketing feasibility and business profit and continuity (Olagoke, 2006).

Polytechnic education, university education and other TVET Centre institutions must be industry-driven through intimate bridges between the institution and the industry identifying problem and fostering understanding of mutual problems and requirements to proffer feasible engineering solutions to advance industrialisation. Enthronement of collaborative approach for effective product development and entrepreneurship establishment based on the areas of need and use is fundamental to practical realisation of polytechnic goals in the following respects:

a. Institution – Industry Partnership
b. Engineering Family collaboration of Craftsman-Technician-Technologist and Engineers at Departmental, School and Institutional level as adaptable to other Faculties Environmental Studies, Applied Sciences, etc
c. Inter-professional based research within each Department: Mechanical Mechatronics, Chemical and Lecturer Technologist Technical research based.

4. Conclusion

To the above effect, registration with Professional bodies, subscription to local and International journals, industry based sabbatical leave and flair for research must be the orientation for staff and students for TVET focus appreciation and actualisation of SDGs.

TVET aligns academic imagination to align with industrial reality for graduates to be self-reliant and innovative into entrepreneurship so that Nigeria would move forward technologically. There is a need for Technical Colleges upgrade and proliferation to all local government areas. The 17 Points Agenda with its 169 targets of the SDGs are achievable to the benefit of Nigeria sustainable development clime if education is appropriately funded to enhance TVET in promoting self-reliance

and SMEs on job creation to facilitate industrial development for the Nation. Our Work attitude or Productivity and Efficiency must follow how and what obtains in China, Singapore and Malaysia for sustainable development.

TVET can play an instrument role in developing a new generation of individuals who will front the challenge of achieving sustainable socio-economic development because TVET as an integral component of life-long learning has a crucial role to play in this new era as an effective tool to realise the objectives of a culture of peace, environmentally sound sustainable development, social cohesion, and International citizenship (UNESCO, 1999). Vocational Education and Training is therefore an important lever to implement sustainability because it reaches people at the interface between learning and work. In addition, TVET puts theoretically acquired skills into implementation of practical importance.

5. Recommendation

The following recommendations will enhance TVET-SDGs Linkage for Nigeria Sustainable Development challenges: TVET programmes and policy implementation must be based on Curriculum review of provider Institutions to direct focus on Sustainable Development Goals while TVET provider staff must attend capacity building programmes that would empower them to deliver curriculum effectively by comprehending Education role in Sustainable Development, ESD. Access to Bank loan at low interest rate and TVET training for the youth and the senior citizens at retirement state age paramount empowerment strategy to facilitate SDGs.Government and the society must remove the barriers of; Dearth of experts on vocational training, Poor public impression and apathy to vocation, Poor funding, Poor remuneration of Vocational Teachers, Facility/Equipment update challenge for adequate training and Poor practical aspect of vocational education. Creativity, Innovation and in the production of Home Made Goods. while Government put up a policy ban on foreign goods we can produce for mass patronage of the home goods. Government policy must be implemented through the Identification of equipment needs in all institution for supply. Government must encourage TVET and Entrepreneurship through policies that will arrest and address. Macro-economic constraints (low GDP and Disposable Incomes). Government should resuscitate our industry/factories and replace importation with aggressive manufacturing of most of them. Stabilize the power sector to favour industrial resuscitation. Entrepreneurs and TVET graduates on their part must use the advantage of population trends; changing consumer life style and profiles; health concern and collaboration opportunities among professionals. All stakeholders must uphold professional ethics while product development must be encouraged to operate within the set standard and quality of global best practices.

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