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THE ROLES OF POLYTECHNICS IN SUSTAINING SKILL/MANPOWER CREATION THROUGH TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET) IN NIGERIA INDUSTRY

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Abstract

Technical vocational education and training (TVET) refers to a deliberate intervention to bring about learning which would make people more relevant and productive in designated areas of economic and technological activities. The contribution of polytechnics in skilled technical manpower training in Nigeria has been investigated by considering the number of NBTE accredited Science, Technology, Engineering and Mathematics (STEM) programs offered by state and federal owned institutions. The percentage of STEM graduates in total graduate produced by Yaba College of Technology was in the 10 years period was also investigated. The percentage of STEM graduate at ND and HND level at Yaba College of Technology averaged at 40 and 41% respectively indicating a poor contribution which might be due to low carrying capacity in STEM programs and limited available facilities. Therefore, TVET requires acquisition of certain relevant skills, attitudes and talents under lecturers of gainful employment and proper integration into the society

Keyword's: *Technical and Vocational Education and Training (TVET), Entrepreneurship Education, Skills/Manpower, Sustainability, Polytechnic, STEM and Nigeria*

Introduction

Technical and Vocational Education and Training (TVET) has a transformative and crosscutting roles in addressing the individual, social,

economic and environmental challenges that were identified in the sustainable development agenda and UNESCO medium-term strategy (British Council, 2017). It can also be identified as education procedural and training that gives students the opportunity to acquire skills and vital knowledge needed for employment through learning modes that are formal, non-formal and informal training (Msiska, 2016; Pierce et al., 2017). The 2018 UNESCO UNEVOC global learning forum mapped out the cycle of disrupting innovation and transformation particularly in the area of entrepreneurship digitalization in the workplace and green economic transition in which citizen is reshaping societies and business lives and work (Gauthier, 2021). Diverse policies have been put in place in the past for TVET transformation in Nigeria. These policies have not been accomplished in transforming Nigeria TVET system to an elevated status. The 2018 UNESCO and UNEVOC forum also brought five debates around the current scale and speed of change, which requires a new level of response and called upon TVET institutions to lead the change from bottom to top (Majumdar, 2020)

TVET is misunderstood by the society as an educational programme for the 'never do well' or students that are academically deficient. This poor perception of TVET according to Sofoluwe, (2015) has resulted to low recognition of craftsmen graduated from TVET institutions. Ogwo & Oranu, (2006) in their report corroborated TVET as a highly useful education as its occupation content is such that the students acquire skills, attitudes, interest and knowledge to perform socially and economically work that is beneficial to themselves and the society.Twenty first century pedagogy and employability skills has accepted global certifications, publicprivate partnerships, and program outcomes which have the potential of increasing the workforce prepared to flourish in rapidly changing times (Poirier & Remsen, 2017).

Therefore, TVET requires acquisition of certain relevant skills, attitudes and talents under lecturers of gainful employment and proper integration into the society (Sofoluwe, 2015). In Nigeria, TVET constitute two sub-sectors which are characterized by their purposes, levels of institutions, course offerings, organisation and control. The three types of institutions distinguishable in the technical education sub-sector include: University, Polytechnic or Colleges of Technology and Monotechnic (Monodisciplinary, tertiary colleges and colleges of education. The roles of the institutions and hierarchical status in the national education system is as designated below Table 1:

Level	*Institution Type*	*Primary Manpower Production Level*
Tertiary	University, Polytechnic /Monotechnic Colleges of Education (Technical).	Professional (i.e., high level manpower) Technologists and Technician (i.e., Middle Level Manpower).
Secondary	Technical College	Technical (middle) level technical teachers Craftsmen and Master Craftsmen (i.e., Low level Manpower).
Post-Primary	Business and Engineering Skills Training	Operatives and Artisans (i.e., Low Level Manpower).
Primary	Primary-School	Basic Education

(Sofoluwe, 2015)

The qualified graduated Higher National Diploma (HND) students can secure better jobs if the practical skills acquired from the polytechnics are resourceful to sustain economic development. Many Nigerian polytechnic Students have the notion that once you graduated with HND from polytechnic you're rated as second-class graduate to Bachelor degree holder (BSc). Research has shown that most polytechnic graduates have little or no idea of their roles and job prospects after acquiring the higher national diploma from Polytechnic (Sule et al., 2010). This has lowered the aggressive drive-in pursuing notion of learning attitude for industrial growth and development. Without a doubt, the HND courses are structured around gaining and developing the hands-on skill needed in the industry. This vocational qualification is tied to the National Board for Technical Education (NBTE)'s

The purpose of this study is to evaluate the content and structure of the HND Curriculum designed by National Board of Technical Education (NBTE) in Nigeria harmonizing it with the roles and job prospects of these aspiring HND graduates for industrial development. Therefore, contributing positively towards resolving a myriad of challenges that are ravaging the shortage of skills and manpower in Nigeria industries, the following relevant and valuable objectives must be looked

into in providing necessary solutions to the job seekers and entrepreneurial education biasness imbroglio.

- To clarify the suitability of the curriculum in preparing HND graduating students for the anticipated roles and job prospects for certified Students as professional in the industry.
- To appraise the consciousness level of HND graduating students on their anticipated roles and their job prospects in the industry.
- To evaluate the level of Skill and Capabilities of HND graduating students that is needed by industry.

The importance of Skills/Manpower in Nigeria Education

Skills/Manpower and individual should be the core of the Nigeria economic prosperity (British Council, 2017). Equipping everyone with the skills and behaviors, right knowledge sets them up for sustainable work and progression, promotes a more equal society, supports social mobility, and means business that can grasp new prospects in driving growth and productivity (British Council, 2017). It is important that employer have the manpower they need to enable them to grow and prosper in a global economy, employer and learners need skills and training facility to be both of high quality and relevant.

Globally, the system of TVET is to prepare individual for the biosphere of work, providing them with the skills related to a specific industry, occupation, or trade (British Council, 2017) TVET in Nigeria is delivered in a variety of ways including through full or part-time study at a recognized polytechnic or any tertiary institution where students gain national-certified skills relevant to the industries. These will make them have prerequisite of full active participation in labor market and also contributing innovative experience and prosperity.

Methodology

The role of polytechnics in producing technical manpower in Nigeria is investigated by determining the number of Science, Technology, Engineering and Mathematics (STEM) courses accredited by NBTE in each Federal and State Polytechnic. This data is collected from the directory of accredited programs offered in Polytechnics, Technical and Vocational institutions in Nigeria (NBTE, 2021). NBTE categorized courses as;

i. Agriculture and Related Technology
ii. Art, Printing and Related Technology
iii. Business, Management and Related Studies. iv. Engineering and Related Technology
v. Environmental Design and Related Studies
vi. Finance and Related Studies

vii. Hospitality and Related Technology
viii. Information and Related Studies
ix. Science, Computing and Related Technology

For this study, the programs under Agriculture and Related Technology, Engineering and related Technology and Science, Computing and related Technology are regarded as STEM programs.
The percentage of STEM graduates in the total turn-out of students for Yaba College of Technology, Lagos, Nigeria in the last 10 years was also analyzed from the annual NBTE Data Capture forms for TVET institutions collected from the Academic Planning unit (APU) of the institution.

Result and Discussion

The summary of the total number of tertiary institutions accredited by NBTE is presented in ***Table 1***. The South-Western have the highest number of Polytechnics in the country while the North-east has the least. Federal Polytechnics are more concentrated in the South-South of the country while the South-West dominates the number of state-owned Polytechnics in the country.

Table 1:Summary of the total number of Tertiary Institutions accredited by NBTE in different geo-political zone **(NBTE, 2021)**

INSTITUTIONS/ TYPE	NORTH WEST			NORTH EAST			NORTH CENTRAL			SOUTH WEST			SOUTH EAST			SOUTH-SOUTH			TOTAL
	FED	STA	PRI	FED	STA	PRI	FED	STA	PRI	FED	STA	PRI	FED	STA	PRI	FED	STA	PRI	
POLYTECHNICS	6	8	0	4	5	0	5	7	15	5	11	29	5	5	9	7	12	12	145
COLLEGES OF AGRICULTURE	4	3	0	2	4	0	6	3	0	5	0	0	2	0	0	0	1	0	30
COLLEGES OF HEALTH SCIENCE	4	2	2	2	5	0	5	5	4	6	6	5	5	2	0	5	4	0	59
SPECIALISED INSTITUTIONS	7	2	0	1	2	0	2	1	1	5	0	5	5	0	0	2	0	2	30
IEIs	1	0	16	0	0	0	6	5	20	1	1	60	0	0	19	0	0	21	150
VEIs	2	0	11	0	0	0	5	5	6	0	1	10	0	0	11	0	0	19	70
TECHNICAL COLLEGES	2	24	0	1	17	0	2	16	1	5	19	1	1	14	0	2	23	0	126
TOTAL	26	39	29	11	32	0	29	38	47	25	43	107	14	24	39	17	39	54	632
	KEY: FED. - FEDERAL STA. - STATE PRI. – PRIVATE																		

The numbers of STEM programs run-in State-Owned Polytechnics and Federal Government owned polytechnics are presented in ***Table 2*** and ***Table 3*** respectively. The highest number of STEM HND programs is offered by Lagos State Polytechnics which has been recently converted to Lagos State

University of Science and Technology (LASUSTECH) while Delta State Polytechnic, Lagos State Polytechnic and Rufus Giwa Polytechnic offer the highest number of ND programs in STEM courses.

Table 2: Number of Science, Technology, Engineering and Mathematics (STEM) programs in Nigeria state owned polytechnics

S/N	*Institutions*	*Year Established*	*No of STEM Programs*	
			ND	HND
1	Abdu Gusau Polytechnic, Zamfara State.	1992	8	10
2	Abia State Polytechnic, Aba,	1992	9	5
3	Abraham Adesanya Polytechnic, Ogun State.	2004	5	1
4	Abubakar Tatari Ali Polytechnic, Bauchi,	1988	9	11
5	Adamawa State Polytechnic, Adamawa	1991	7	3
6	Adeseun Ogundoyin Polytechnic, Eruwa	2013	7	7
7	Akwa Ibom State College of Art & Science, Akwa Ibom State Polytechnic	1997	2	0
8	Akwa Ibom State Polytechnic, Akwa Ibom State	1991	6	9
9	Anambra State Polytechnic, Anambra State	1980	8	0
10	Bayelsa State Polytechnic	2014	4	0
11	Benue State Polytechnic, Ugbokolo,	1976	8	9
12	Binyaminu Usman Polytechnic, Jigawa Polytechnic	2016	12	6
13	Cross River State Institute of Technology And Management (CRITM)	2012		
14	D.S. Adegbenro ICT Polytechnic, Ogun sate	2004	5	5
15	Delta State Polytechnic, Ogwashi-Uku,	2002	13	10

16	Delta State Polytechnic, Otefe-Oghara, P.M.B. 03, Otefe-Oghara, Delta State	2002	8	14
17	Delta State Polytechnic, Ozoro,	2003	14	20
18	Delta State School of Marine Technology, Burutu,	2017	1	0
19	Edo State Polytechnic, Usen.	2002	5	2
20	Ekiti State College of Agriculture and Technology, Ekiti State	2021	3	0
21	Enugu State Polytechnic, Iwollo	2017	7	1
22	Gateway Polytechnic, Saapade. Ogun state	2004	6	7
23	Hassan Usman Katsina Polytechnic (HUK),	1983	12	7
24	Imo State Polytechnic	1978	12	16
25	Institute of Management and Technology, Enugu,	1965	11	15
26	Isa Mustapha Agwai Polytechnic Lafia,	2001	3	2
27	Jigawa State Polytechnic, Dutse	1991/2008	5	2
28	Kano State Polytechnic, Kano,	1976	11	10
29	Ken Sarowiwa Polytechnic, Rivers state	1988	6	11
30	Kogi State Polytechnic, Lokoja, Kogi state	1993	9	8
31	Kwara State Polytechnic, Ilorin	1973	11	16
32	Lagos State Polytechnic, Lagos	1977	14	22
33	Mai-Idris Alooma Polytechnic, Yobe state	2002	4	0
34	Moshood Abiola Polytechnic, Abeokuta	1979	9	11
35	Nasarawa State College of Agriculture and Technology, Nasarawa State	1996	5	8
36	Niger State Polytechnic, Zungeru,	1991	6	13
37	Nuhu Bamalli Polytechnic, Kaduna state	1989	7	7
38	Ogun State Institute of Technology, Igbesa	2004	8	8
39	Ogun State Polytechnic, Ipokia	2018	6	0

40	Oke-Ogun Polytechnic, Oyo state	2013	10	12
41	Osun State College of Technology	1991	9	11
42	Osun State Polytechnic, Iree,	1992	10	9
43	Oyo State College of Agriculture and Technology, Igbo Ora	2018	12	14
44	Plateau State Polytechnic, Barkin-Ladi,	1978	12	13
45	Port-Harcourt Polytechnic, Rivers state	1991	5	2
46	Ramat Polytechnic, Borno state	1976	10	8
47	Rufus Giwa Polytechnic, Ondo state	1979	14	20
48	Taraba State Polytechnic, Suntai	2017	4	0
49	The Polytechnic Ibadan, Oyo state	1970	9	15
50	Umaru Ali Shinkafi Polytechnic, Sokoto,	2000	8	11
51	Zamfara State College of Arts and Science	2000	1	0

Federal Polytechnic Ado Ekiti and Federal Polytechnic Nekede offer the highest number of STEM program at HND level among Federal polytechnics while the highest number of STEM ND program is offered by Federal Polytechnic Nekede.

Table 3: Number of Science, Technology, Engineering and Mathematics (STEM) programs in Federal Government owned polytechnics

S/No	*Institutions*	*Year Established*	*No Of STEM Programs*	
			ND	HND
1	Akanu Ibiam Federal Polytechnic Unwana, Ebonyi State.	1981	10	16
2	Auchi Polytechnic, Auchi, Edo State.	1973	13	19
3	Federal Polytechnic Ado Ekiti, Ekiti State.	1977	13	23
4	Federal Polytechnic Bali, Taraba State.	2007	9	4
5	Federal Polytechnic Bauchi, Bauchi State.	1979	12	14

6	Federal Polytechnic Bida, Niger State.	1977	12	21
7	Federal Polytechnic Damaturu, Yobe State.	1993	7	8
8	Federal Polytechnic, Daura, Katsina State	2019	-	-
9	Federal Polytechnic Ede, Osun State.	1992	8	10
10	Federal Polytechnic Ekowe, Bayelsa State	2007	6	5
11	Federal Polytechnic Idah, Kogi State.	1977	8	12
12	Federal Polytechnic Ilaro, Ogun State.	1979	12	16
13	Federal Polytechnic Ile-Oluji, Ondo State	2016	8	0
14	Federal Polytechnic Kaura Namoda, Zamfara State.	1983	7	9
15	Federal Polytechnic Kaltungo, Gombe State	2019	-	-
16	Federal Polytechnic Mubi, Adamawa State.	1979	15	18
17	Federal Polytechnic Nasarawa, Nasarawa State.	1983	9	10
18	Federal Polytechnic Nekede, Imo State.	1977	20	23
19	Federal Polytechnic Offa, Kwara State.	1992	8	17
20	Federal Polytechnic Oko, Anambra State.	1982	11	16
21	Federal Polytechnic of Oil and Gas Bonny, Rivers State	2014	4	0
22	Federal Polytechnic Ukana, Akwa Ibom	2014	2	0
23	Hussaini Adamu Federal Polytechnic, Jigawa State.	1991	4	5
24	Kaduna Polytechnic, Kaduna.	1956	15	21

25	National Institute of Construction Technology Uromi	2014	5	0
26	Waziri Umaru Federal Polytechnic, P.M.B. 1034, Birnin Kebbi.	1976	9	15
27	Yaba College of Technology, P.M.B. 2011, Yaba, Lagos State.	1947	18	20
28	Federal Polytechnic Ayede, Oyo State	2021	-	-
29	Federal Polytechnic Munguno, Borno State	2021	-	-
30	Federal Polytechnic N'yak, Shendam, Plateau State	2021	-	-
31	Federal Polytechnic Ohodo, Enugu State	2021	-	-
32	Federal Polytechnic Ugep, Cross Rivers State	2021	-	-
33	Federal Polytechnic Wannune, Benue State	2021	-	-
34	Airforce Institute of Technology (AFIT), Kaduna	1977	4	7
35	Petroleum Training Institute Effurun, Delta State	1972	8	12
36	Nigerian Army College of Environmental Science and Technology, Benue State	1960	6	1
37	Nigerian College of Aviation Technology (NCAT), Kaduna State	1964	2	2

The total number of STEM graduate from Yaba college of Technology in the last ten years is presented in ***Table 4***.

Table 4: STEM graduates from Yaba College of Technology

Academic session	*STEM*		*Total No of graduates*	
	ND	HND	ND	HND
2010/2011	485	386	1234	928
2011/2012	497	315	1270	768
2012/2013	723	494	1725	1310
2013/2014	511	329	1447	1066

2014/2015	2455	2169	6185	4772
2015/2016	815	972	2172	2205
2016/2017	887	1184	2038	2733
2017/2018	881	1151	2040	2667
2018/2019	769	1168	1869	2875
2019/2020	987	1042	2362	2206

The percentage of STEM programs in the total number of graduates ranges between 35 – 43 % in the 10 years period of study as depicted in ***Figure 1***. This number greatly depend on total number of accredited streams for each program by NBTE.

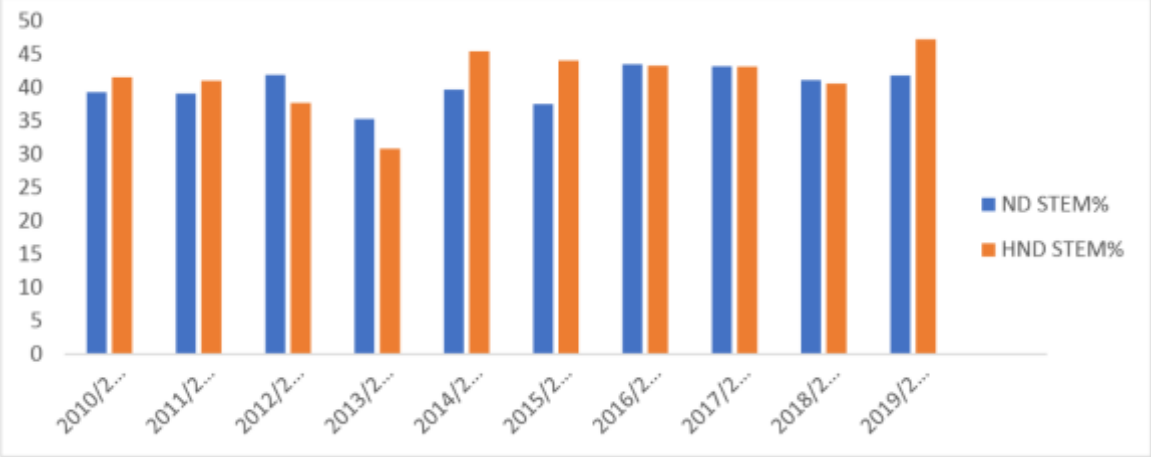

Figure 1: Percentage of STEM program in the total number of graduates

Conclusion

The contribution of polytechnics in skilled technical manpower training in Nigeria has been investigated by considering the number of NBTE accredited Science, Technology, Engineering and Mathematics (STEM) programs offered by state and federal owned institutions. The percentage of STEM graduates in total graduate produced by Yaba College of Technology was in the 10 years period was also investigated. The South-West Nigeria has the highest number of polytechnic as well as state owned and private polytechnics in the country while Federal polytechnics are dominant in the South-South region. The North-East has the lowest number of polytechnics with no accredited private polytechnics as also observed in North-West. Delta State Polytechnic, Lagos State Polytechnic and Rufus Giwa Polytechnic contribute mostly to technician training as they offer highest number of ND programs in STEM courses. The high skill manpower training among the state-owned schools is led by Lagos state polytechnics. The highest contribution to STEM training at high manpower level among federal

polytechnics is jointly by Federal Polytechnic Ado Ekiti and Federal Polytechnic Nekede while the highest number of STEM ND program is offered by Federal Polytechnic Nekede. Also, state owned polytechnics It can be concluded that both Federal and State government contribute significantly to development of technical manpower in Nigeria. The percentage of STEM graduate at ND and HND level at Yaba College of Technology averaged at 40 and 41% respectively indicating a poor contribution which might be due to low carrying capacity in STEM programs and limited available facilities.

Recommendation

Although most federal and state polytechnics offer significantly high number of STEM program but the percentage contribution of STEM graduates in the total number of graduates is below average. It is recommended that NBTE should increase the carrying capacity of STEM program as well as government should invest heavily in STEM training facilities to improve the standard even if the carrying capacity and number of streams are increased.

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