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Strategies for Improving Partnership Between Universities of Technology and Manufacturing Industries for National Development

M. U. Cyril*

Department of Technology Education, Modibbo Adama University of Technology, Yola, Nigeria

Abstract

Provision and the utilization of manpower needs is paramount to economic development of Nigeria. These needs called for partnership that will bring mutual benefits between the universities of technology and the manufacturing industries in developing and sustaining manpower needs. This study provided strategies for the universities of technology and the manufacturing industries to partner in order to developed and sustained industrial work force in the 21st century. The study was a survey and was conducted in the 6 geopolitical zones of Nigeria. Two universities of technology and the manufacturing industries were purposively selected in these zones. The population of the study was 650. The sample of the study comprises of 240 university of technology lecturers and 50 supervisors of the manufacturing industries across the 6 geopolitical zones. The instrument of the study was a structured questionnaire designed by the researcher and was faced validated by 3 experts in the department of technology education, ATBU Bauchi; FUT Minna and MAUTECH Yola. Three research questions were raised and two null hypotheses were formulated to guide the study. Mean and standard deviation were used to answer the research questions, while Z-test was used to test the hypotheses at 0.05 level of significance. The results of the study revealed that there are skills mismatch by the graduates of universities of technology and those required by manufacturing industries. The study also revealed that there is no significant difference between the mean responses of Universities of Technology lecturers and supervisors of manufacturing industries on the skills mismatch. The study concluded by making recommendations that includes manufacturing industries should share their long time and short time goals with the universities and vice versa among others.

Keywords

Strategies, Improving, Partnership

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1. Introduction

The persistent unemployment in manufacturing sector is not only attributed to inadequate vacancies but also by a mismatch of skills between what manufacturing industries seek and what potential employees can provide (Osterman & Weaver, 2014). Cyril (2002) noted that technical education programmes in Nigeria have not produced the required skilled personnel for industrial consumption. This is evident in the increased number of joblessness by the graduate of technical institutions. He further suggested that programmes offered and skills acquired in technical institutions should be based on the skills needed by industrial organizations. A survey conducted by the National Association of Manufacturers (NAM) and Deloitte, in 2011 reported that 74 percent of manufacturers have agreed that lack of skilled workers had had a significant negative impact on company's ability to expand operations or improve productivity (Deloitte, 2011). Hence there is a need for the suppliers of skills and competencies and those demanding for

* Corresponding author
E-mail address: ubalecyril@yahoo.com

skill graduates (employers) to agree in order to solve this skills mismatch.

The skills needed within manufacturing and industries are virtually rising across all occupations due to factors such as scientific and technological advances, automation, regulatory requirements, new ICTs and the drive for continuous improvement (Halligan, 2013). These factors according to Halligan demand for increased levels of skills across the production workforce. It calls for both skills upgrading within the existing workforce and for ensuring that skills supplied by mainstream education and training are sufficient and relevant to industrial requirements.

Thus, globalisation and emerging trades; scientific and technological advancement; shifting demographic and consumption trends; environmental and energy concerns; cost competitiveness; managing the global value chain; research, development and innovation (RDI); impact of ICT; sustainable manufacturing processes and practices are the major drivers of change in skills of the workforce in manufacturing industries which calls for improvement in partnership with the universities.

In Ireland for instance, the strategies to tackle the skill gaps in the manufacturing industries is through the scheme called skillnets. Skillnets funds and facilitates training through networks in private sector companies, in a range of sectors and regions. Each network delivers training that is driven by specific industry and member company needs. Some Skillnets are organised on a regional basis whereas others have a segmental focus. One of the key skillnet is uLearning which is similar to SIWES in Nigeria some respects. The objective of uLearning is to bring industrial experts and academics together to generate key competencies that stimulates employability skills. The network focuses on the need to integrate industry and education in order to ensure courses at Level 7, 8 and 9 are meeting the needs of industry in the areas of Science, Engineering and Technology. ULearning skillnet offers a number of these courses to industry and provides unemployed individuals the opportunity to also take part in the courses. Examples of programmes available in Ulearning among others include: MSc Technology Management/MSc Strategic Quality Management - Lean Sigma Systems; BEng in Mechatronics; BSc in Manufacturing Management; BEng in Polymer Processing; Certificate in Automation and Instrumentation; Specialist Diploma in Medical Device Science.

In line with recommendations made by the United Nations report on Africa's strategy for promoting skills acquisition in commerce and industry, Industrial Training Fund (ITF) was established in 1971 under the military decree no. 47 (ITF, 2002). ITF through Students Industrial Work Experience Scheme (SIWES) was founded in 1973 to bridge the gap between the theory and the practice among students of technical and science related discipline in higher institutions in Nigeria. It is intended to equip the learners with the industrial experience as well as complimenting the practical skills that is lacking in tertiary institutions programmes (ITF, 2011). To this end, training institutions and industries partner together with a view to produce indigenous trained manpower sufficient enough to meet the needs of the economy. According to Adebayo (2005), school – industry partnership in Nigeria lacks adequate attention it deserve from the stakeholders in achieving its objectives and this has resulted into the dearth of skilled workers. A well develop training programme, proper supervision of students on attachment by industry-based school supervisors and proper funding of Student on SIWES can stimulate competent technical workforce in Nigeria. Atsumbe (2006) also noted that poor coordination and administration of SIWES have debilitated the partnership. Another factor is the scope of SIWES. The scope of SIWES is limited to undergraduate students with no room for the post graduate students, lecturers and technical staff. Hence, opportunity to acquire skills in research, development and innovations are the missing link in this partnership. Masters students who are supposed to be highly skilled manpower and specialist in the industries and Doctoral Students who are supposed to engage in research and testing of new innovations can be accommodated in the partnership. Most lecturers on graduation were employed as graduate assistants and they grow in their carrier with no industrial experience. How can they relate their theoretical knowledge with the skills required in the industries? No teacher impacts knowledge or skills he does not have (Cyril, 2010). Thus, it is paramount that lecturers should have industrial experience as well as pedagogical knowledge so as to produce graduates with relevant skills needed in today's industries.

Partnership is an arrangement were parties agree to cooperate to invest their resources for mutual interest (Harris & Wilkes 2013). While school-industry, is a contractual relationship between educational institutions and industry towards (Atsumbe, 2006). Strategic partnership between universities is the dynamic and interactive mutual collaboration between training institutions and industries in terms of training skills, ideas, research and innovations leading to a seasoned manpower generation and development for industrial competitive workforce. Partnership between Universities of technology according to Davey (2013), will results in:

i. The design and delivery of programmes that are relevant to current and future industrial needs.

ii. Graduates confident in their ability as knowledge and skills are integrated to be relevant to their academic careers and the world of employment.

iii. An enterprising and entrepreneurial culture amongst university students and staff, where success in enterprise and entrepreneurship is celebrated, rewarded and promoted;

iv. Effective and efficient production workforce through updating employee skills and recognizing universities as a natural ground for expertise;

v. Graduate recruitment matches industrial need with graduate skills that meets the divers' objectives of employers.

vi. Sustaining world-class research within our universities, attracting the best talent, developing research informed leaders in both universities and industries that will ensures constant exchange between the academics and the industrialist.

vii. A culture of pursuing the application of university-based research excellence, ensuring that university research capabilities are fully exploited in generating economic wealth, optimising the use of government support in research, innovation and development;

viii. Collaboration with government agencies to undertake regular forward looks to co-identify areas of future knowledge and capability creation, where research investment should be allocated and, wherever possible, collaboratively developed and resourced;

ix. The creation of economic growth through partnership with government agencies and Local Enterprise Partnerships (LEPs), leveraging each university's capabilities to support indigenous companies and to attract inward investment (Davey, 2013).

The landscape of partnership consists of a wide variety of domains where there is real expertise and strength, often of a highly specialised kind. These domains are wide ranging: From future-oriented research in advanced technologies, to in-house upgrading of employees; from providing progression routes to higher-level apprenticeships, to enhancing the skills of post-doctoral staff for their transition into the business world; from improving enterprise skills amongst our undergraduates, to enabling small companies to recognize the value of employing a first graduate, inter alias.

1.1. Statement of the Problem

Looking at the challenges faced by the manufacturing industries, there is a greater need for innovations in product and service development, for heightened corporate efficiency and risk management in investment (Wilson, 2012). Hence there is need to focus on securing, retraining and developing talented workforce.

Universities and other higher institution are primarily the supplier of workforce needed in manufacturing industries. Workforce that has the capability to support industrial growth and enhance economic Development of Universities are the source of strength in the knowledge-based economy for the twenty-first century (Dearing, 2002). According to Wilson (2012) a thriving knowledge of economy depends upon its universities in three critical dimensions: the application and exploitation of research capability; the enterprise and entrepreneurial culture that is developed amongst its students and the applicability of the knowledge and skills of all its graduates.

The university sector cannot achieve excellence in these roles by itself. A strategic partnership between universities of technology and the manufacturing industries that foster supply of workforce to excel in job performance is therefore needed. This partnership has to be strong and resilient with constant communication in both directions and in operations and strategies that ensures common understanding of the objectives of the two parties. The partners have to be willing to change the existing practices to meet the needs of their partnership through transparency and respect for boundaries of capabilities. This article is aimed at correcting the weaknesses in the present university and industry collaborations in workforce supply chain and attempted to identify strategies that will strengthen the weak links. Therefore, the study investigated the strategies for improving partnership between universities of technology and the manufacturing industries in Nigeria.

1.2. Purpose of the Study

The purpose of the study was to determine the strategies for improving partnership between universities of technology and the manufacturing industries in Nigeria. Specifically, the study sought to find out:

i. The relevance of skills acquired by graduates of universities of technology in manufacturing industries.

ii. Current strategies used in recruiting and selecting of technical manpower by manufacturing industries in Nigeria to fill the skills gap.

iii. Strategic partnership by the universities of technology and the manufacturing industries to develop a 21st century industrial work force.

1.3. Research Questions

i. How relevant are the skills acquired by graduates of universities of technology to industries?

ii. What are the current strategies used in recruiting and selecting of technical manpower by Nigerian manufacturing industries to fill the needed skills gap?

iii. What strategic partnerships are needed by the Universities of Technology and the Manufacturing industries in developing an industrial work force?

1.4. Hypotheses

H0₁. There is no significant difference between the mean responses of Universities of Technology lecturers and supervisors of manufacturing industries on the relevance of skills acquired by the graduates in the manufacturing industries.

H0₂. There is no significant difference between the mean responses of Universities of Technology lecturers and supervisors of manufacturing industries on the strategic partnership needed between the Universities of technology and the Manufacturing industries in developing industrial work force.

2. Methodology

A survey design was used for the study. The population of the study was 650 made of 600 lecturers across the 12 selected universities of technology in the six geopolitical zones and 50 industrial supervisors in 11 viable manufacturing industries registered with the Nigerian Capital market (Nigeria Stock Exchange, NSE, 2015). A stratified random sampling technique was used to select the universities of technology because the universities were already located in the six geo-political zones. The sample of the study was 290. There was no sampling for the industrial supervisors in the manufacturing industries while the sample of 240 for the universities lecturers was determined using Yaro Yamane formula as thus: $n = \frac{N}{1+N(e)^2} = \frac{600}{1+600(0.05)^2} = 240$, where: n is the sample size, N finite population; e is the significance level and 1 is the constant. Furthermore, a proportionate sampling technique was used to determine the number of lecturers identified from each university. The instrument for data collection was a 5 points Likert scale structured questionnaire developed by the researchers which was face validated by three experts from the department of technology education MAUTECH Yola, ATBU Bauchi and FUT Minna. The instrument was pilot-tested on 10 industrial supervisors from two manufacturing industries other than those on the floor of the Nigerian capital market and 20 university lecturers from conventional universities where technology education is taught. The reliability of the instrument yielded 0.91 using Cronbach Alpha method to determine internal consistency of the instrument. The questionnaire had 30 items in three sections. Section A, sort information on the relevance of skills acquired by the graduates of universities technology in today's manufacturing industries. Section B, sort information on the current strategies used in recruiting and selecting of technical manpower in manufacturing industries; and section C, elicited information on the strategic partnership between universities of technology and the manufacturing industries. The researchers used two research assistants that assisted in the distribution and collection of the questionnaire in three geopolitical zones, namely: North East, North Central and North West. While in the other geopolitical zones questionnaires was administered and collected using electronic media (twitter). Questionnaire were sent to the respondents on twitter, they downloaded, filled and sent it back through the same medium. With the electronic medium 100% retrieval of the questionnaire was realized and faster than the direct distribution where 94% of the questionnaire was returned. The data collected was analysed using mean and standard deviation for research questions while the null hypotheses were tested using z-test at 0.05 level of significance.

Table 1. Mean and standard deviation of the lecturers and the industrial supervisors' responses on the relevance of skills acquired by the graduates of universities of technology.

S/N	Items	$\bar{X}_1$ N_1=240	δ_1	$\bar{X}_2$ N_2=50	δ_2	Remark
1	Most of the skills learned by universities graduates are more divergent than being specific.	4.47	0.66	4.74	0.44	Agreed
2	Most of the universities graduates lack basic practical skills.	4.49	0.64	4.66	0.56	Agreed
3	Most graduates of universities of technology graduates from the universities through rote learning.	4.40	0.70	4.62	0.64	Agreed
4	Most university graduates hardly practice what they learn on graduation.	4.32	0.72	4.54	0.76	Agreed
5	What make graduates of universities of technology most outstanding is the ability to demonstrate the acquired skills and knowledge in the society.	4.34	0.73	4.48	0.73	Agreed
6	Most graduates of university of technology find it difficult to put what they learned into practice.	4.31	0.74	4.46	0.86	Agreed
7	Most of the skills learned are either not relevance or mismatch with the skill require in the manufacturing industries.	4.36	0.71	4.52	0.74	Agreed
8	Most university of technology graduates are after university certificate rather than acquiring knowledge and skills.	4.36	0.69	4.74	0.53	Agreed
9	Graduate of universities of technology may not favourably compete with their colleagues across the globe.	4.33	0.69	4.62	0.57	Agreed
10	With the kind of graduates produced by universities of technology cost effectiveness of university education cannot be justified	4.30	0.72	4.48	0.79	Agreed
	$\bar{X}_g$= 4.405		δ_g= 0.14			

Key: N_1= number of lecturers. N_2 = number of supervisors. $\bar{X}_1$= mean responses of lecturers. δ_1= Standard deviation of lecturers. $\bar{X}_2$= mean responses of supervisors. δ_2= Standard deviation of supervisors. $\bar{X}_g$= grand mean and grand standard deviation.

Research question 1

How relevant are the skills acquired by graduates of universities of technology to industries?

The data presented on table 1 indicated that the respondents have agreed on all the 10 items with grand mean and standard deviation of 4.405 and 0.14 respectively.

Research Question 2

What are the current strategies used in recruiting and selecting of technical manpower by Nigerian manufacturing industries to fill the needed skills gap?

Table 2. Mean and standard deviation of industrial supervisors on the strategies used in recruiting and selecting of technical manpower by Nigerian manufacturing industries to fill the needed skills gap.

S/N	Items	$\bar{X}_2$	δ_2	Remark
1	My organization hired consultant firms to recruit and employ technical staff.	4.34	1.08	Agreed
2	My organization employ technical staff that have relevant experience with at least three years working experience.	4.16	1.35	Agreed
3	My organization has to expend more money on professional training for fresh graduates before job schedule and job placement.	4.06	1.39	Agreed
4	My organization does not directly employ fresh graduates even if they study the required discipline in the universities.	4.10	1.39	Agreed
5	My organization employs graduate from any discipline that successfully complete our graduate professional training course.	3.92	1.38	Agreed
6	My organization does not employ post graduate students who do not have professional training.	3.89	1.35	Agreed
7	My organization employs post graduate students with not less than 8 years working experience.	3.86	1.55	Agreed
8	My organization contracts technical manpower to consultants and sisters' firms when required skills are not found in the labour market.	4.10	1.58	Agreed
9	My organization retrain new workforce because of lack of relevant skills in the labour market	43.81	1.24	Agreed
10	Most of the researches in my firm were done by consultant firms because of the shortage of the workforce in that area.	4.44	1.03	Agreed
$\bar{X}_g = 4.21$		$\delta_g = 0.21$		

The data presented on table 2 revealed that the respondents have agreed on all the 10 items with grand mean and standard deviation of 4.21 and 0.21 respectively.

Research Question 3

What strategic partnership is needed by the Universities of Technology and the manufacturing industries in developing an industrial work force?

Table 3. Mean and standard deviation of the lecturers and the industrial supervisors responses on the strategic partnership between universities of technology and the manufacturing industries.

S/N	University &Industry	$\bar{X}_1$	δ_1	$\bar{X}_2$	δ_2		
1	Partners in Curriculum Development to cover short and long time goals of industrial workforce.	4.20	0.90	4.00	1.43	Agreed	
2	Jointly build a core instructional programme that includes qualified teachers, a high standards and expectations from youths and industries.	4.10	1.02	3.52	1.67	Agreed	
3	Jointly introduce one year SIWES for undergraduates and post graduates for general industrial experience and in specific area of specialization respectively.	4.20	0.81	3.96	1.11	Agreed	
4	Jointly introduce twelve months mandatory SIWES for PhD. Students in Research, Development and Innovation (RD&I).	4.25	0.78	4.06	1.20	Agreed	
5	Jointly introduce one year industrial experience for universities lecturers for upward mobility (promotion).	4.20	0.85	4.22	1.04	Agreed	
6	Jointly organize graduates job fair at the end of each academic session.	4.17	0.90	4.16	1.10	Agreed	
7	Jointly identify reputable and experienced industrial workers that are active but due for retirement be engaged in as university lecturers on contract basis.	4.22	0.83	3.96	1.29	Agreed	
8	Partner in Research, Development and Innovation (RD&I).	4.10	0.92	3.60	1.23	Agreed	
9	Share complementary skills and areas of expertise to create a seamless and comprehensive set of learning supports for graduates and inflow of industrial workforce.	4.14	0.85	3.78	1.20	Agreed	
10	Proportionate funding of the strategic scheme by interested parties (Universities, industries ITF and TETFund).	4.10	0.93	4.08	1.04	Agreed	
$\bar{X}_g = 4.23$		$\delta_g = 0.20$					$\delta_g = 0.21$

The data presented on table 3 revealed that the respondents have agreed on all the 10 items with grand mean and standard deviation of 4.23 and 0.20 respectively.

Table 4. Z-test analysis of the mean differences between the responses of lecturers and supervisors on the relevance of skills acquired by the graduates in the manufacturing industries.

Respondent	Mean	δ	N	Df	Standard Error	Z-cal	Z-critcal	Decision
Lecturers	4.37	0.07	240	288	0.05	5.473	1.968	Rejected
Supervisor	4.59	0.11	50					

Table 4 shows the Z-test analysis of the mean differences between the responses of lecturers and supervisors on the relevance of skills acquired by the graduates in the manufacturing industries. Z-test value of 5.473 at 0.05 level of significance was greater than the table value of 1.968. Hence, the null hypothesis was rejected.

Table 5. Z-test analysis of the mean responses of lecturers and supervisors on the strategic partnership between the universities of technology and the manufacturing industries.

Respondent	Mean	δ	N	Df	Standard Error	Z-cal	Z-critcal	Decision
Lecturers	4.17	0.05	240	288	0.05	0.011	1.968	Accepted
Supervisor	4.13	0.08	50					

The Z-test analysis on table 5 revealed that Z-cal value of 0.011 was less than the value to Z-table at 0.05 level of significance. Consequently, the null hypothesis was upheld.

Major finding

The following major findings among others were made.

1. Skills learned by universities graduates are more divergent than being specific.
2. Graduates of universities of technology lack basic practical skills.
3. There were mismatch of skills required in the manufacturing industries and those produced by the universities of technology.
4. Industries do not directly employ fresh graduates even if they students studied the required discipline in their universities.
5. Organizations employ graduates from any discipline that successfully completed post graduate professional training courses offered by consultant firms and industries.
6. Universities and industries to partner in curriculum development to cover short and long time goal of industrial workforce.
7. Building core instructional program that includes qualified teachers, a challenging curriculum, and high standards and expectations for youth and industries.
8. Twelve months mandatory SIWES for undergraduates and post graduates Students.
9. One year industrial experience for universities lecturers for upward mobility (promotion).
10. Organizing graduates job fair at the end of each academic session.
11. Commitment in sharing complementary skills and areas of expertise to create a seamless and comprehensive set of learning supports for graduates and inflow of industrial workforce.

3. Discussion of the Findings

The findings of the study revealed that skills taught in the universities of technology are less relevance for the growth of the 21st century manufacturing firms. This agrees with the statements of Okonjo Iweala in Egole (2012) and Sanusi Lamido in Ugwu (2012) which said that Nigeria universities produced half-baked graduates. It also collaborates with an earlier statement made by Atsumbe (2006) that the universities are at risk of producing poorly trained graduates who cannot fit in the world of work. This means that the skills learned by the graduates of the universities of technology are no longer relevant in the manufacturing industries.

Moreover, the findings of the study which indicated the extension of SIWES period to one year and its scope to cover post graduate students is quite revealing. This will afford students ample time to be well groomed and skilled in relevant fields. The post graduate students on the other hand, will acquire practical skills in specialised areas to enable them professed and be master of relevant technologies. The results also revealed that partnering in Research, Development and Innovation will afford industries and universities to come up with new concepts and noble innovations for economy and national development. The foregoing findings are in line with Barbier, et al. (2014), Davey, (2013) and Zakaria, Yee & Chong (2009) views who saw strategic collaboration between the universities and industries as an impetus for intellectual properties which leads to industrial and socio-economic development.

Furthermore, the study revealed that universities should engage experienced industrial workers as part time lecturers. Nevertheless, the clarion call for such partnership will go a long way in equipping learners with latest industrial techniques. At least, Harris and Welkes (2013) concurred with this findings when they said that individual partners work with one another to combine resources strategically and align goals of curriculum. In doing so, they create a seamless web of supports to provide students with a holistic learning experience that helps to ensure positive academic and non-academic learning outcomes.

4. Conclusions

The study showed that for the universities to trained graduates with skills needed for the 21st century manufacturing industries that can compete in the global workforce, there is need to partner between universities and industries. The partners have to agree to share their short and long time goals and ensure transparency and respects of boundaries in their partnership. Partnership that will ensure strategic network of intellectual properties, equipment and machineries and other fundamental resources for the growth of educational and industrial sectors that ensures viable economic development of the nation. Thus, this will bring about highly skilled and cracked workmanship in the industries.

Recommendations

Base on the findings of the study the following recommendations were made.

1. The universities of technology and the industries should be committed to strategic partnership.
2. The duration of students' industrial works experience scheme in Nigeria should be extended to one year.
3. National University Commission (NUC) should ensure that the scope of SIWES is widened to include post graduate students.
4. Universities should not only focus on published articles and academic activities for promotion but also on practical experience to be exhibited by lecturers.
5. Lecturers should go for industrial attachment once in every 4 years.
6. Universities should engage the services of reputable and industrial experts as visiting or part time lecturers.
7. Industries, universities and government should proportionately finance and support the partnership.

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