

# Collaboration and Commercialization of University and Industry in Public Universities in South East, Nigeria

Uzonwune, Jovita Onyinye & G.G. Kpee (Ph.D.)

*Department of Educational Management, University of Port Harcourt, Nigeria*

**Abstract:** - The study investigated collaboration and commercialization of university and industry in public universities in south east, Nigeria. Two research questions and two null hypotheses guided the study. This study adopted a descriptive survey design. The population for the study is two thousand, three hundred and seventy-three (2373). This is made up of 668 administrative staff and 1705 Chief Executive Officers. The study was a descriptive survey design. The sample size was 894 (467 administrative staff and 427 CEOs). The sample was drawn through multistage sampling procedure using cluster and disproportionate stratified random sampling techniques. Collaboration and Commercialization in University-Industry Questionnaire (CCUIQ) was used for data collection. Face and content validities were ensured by experts. Internal consistency through Cronbach alpha gave reliability coefficient of 0.89 for CCUIQ. Mean, standard deviation and z-test were used for data analysis. It was found among others that the ways collaborative training programmes can contribute to funding of universities are: industrial funding of training programmes for staff of universities. Moreso, the ways commercialization of research from universities to industries contributes to university funding are through: sale of research findings; sale of intellectual property right; licensing of intellectual property (patent licensing); payment of royalties and Sell of products of technologies developed by industries. The universities should develop functional websites where they can advertise and market their research findings; intellectual property and sell of products of technologies to industries. The university should always sign a memorandum of understanding with any industry of interest on the modus operandi in order not to have a bridge of contract.

**Keywords:** Collaboration, Commercialization, University, Industry and Partnership

## I. INTRODUCTION

Universities' role in conducting basic research as a logical extension of teaching activities to advance knowledge as well as contributing to the development and assimilation of technology is being hampered by meager funds from the government. Application of science for the purpose of devising commercial technologies has had a more uneven passage. The pursuit of science and research in universities, which opens doors to technology with commercial applications, seems unrealizable in Nigeria due to lack of funds. These knowledge spillovers from institutions of higher learning are lagging behind as a result of inadequate funding from the government.

University-industry partnership can take various forms and levels of partnerships from contract/sponsored/commissioned research, to commercialization of research, endowment of professional chairs, donation of scientific equipment to creating opportunities for student placements, staff exchange, and joint curriculum development. Today universities are considered not only as centres of knowledge and learning, but as key institutions in national innovation systems (Nelson, 2006). In order to carry out their role within the innovation system, universities need to be well-linked to enterprises, other research institutes, and supported by government policies.

The strategic linkages forged between university and industry has existed for a long time, in a form of students' internship or even faculty exchanges (Perkmann & Walsh, 2008). The reasons for these linkages are also diverse and ranging from student practical training to institutional widespread attention among researchers in recent years; because the rapidly changing business environment demands industries to continuously enhance production and commercialization of new products. However, such collaborations have their efficiency as well as productivity (Perkmann, King & Pavelin, 2011; Sugandhavanija, Sukchai, Ketjoy, & Klongboonjit, 2010; Thurs by, Fuller & Thursby, 2009). The escalating costs of equipping the existing manpower with necessary skill, knowledge and abilities as well as undertaking research have strategically pushed further and the necessitated strong partnerships between universities and industries (Orthman & Omar, 2011). The place of collaboration between university and the industry cannot be swept under the carpet.

Fostering collaborative university-industry partnerships to enhance commercialization efforts has emerged as a critical imperative to sustaining global competition. In universities in Nigeria, Network Industries like MTN, Glo and Etisalat; Oil and Gas industries like Mobil, Shell Total, Fina and Elf partner with Universities to enhance activities taking place in the institutions for global competitiveness. These partnerships are established to improve institutional performance through proper assistance in the provision of facilities in the school system and research development. The findings of researches carried out in the institutions are used in the industries for quality productions.

Also students that graduate from the university are employed in these industries to contribute their quota in societal development. Collaborative training programme is a type of collaboration that exists between universities and industries whereby the industries engage the universities to develop the manpower of industries through trainings while the industries on their own part expose students to real life situations through industrial training programmes. Collaborative training programmes between universities and industries may be more or less intense and focus mainly on training or research activities. It may be formal or informal; from human capital development, publications, to interactions in conferences and expert groups, among others (Hagedoorn, Link & Vonortas, 2000). This type of collaboration creates a medium for effective knowledge transfer channels between the universities and industries for individual and societal development. It also serves as a medium through which universities can generate funds to augment the meagre funds which the government provides.

Through collaborative training programmes with an industry, universities strive to establish new practices and methods for industries to take advantage of while industrial funding of training programmes becomes the responsibility of the industries. This creates strong channel for knowledge building and skill development. The channels of university-industry interaction are: research support; technology transfer; knowledge transfer; and cooperative research (Santoro, 2000).

The industries provide the universities with necessary funds for the provision of facilities and staff development through training and development programmes (Nwabueze & Onyenandu, 2015). These processes and collaborations help to build strong system for the universities to carry out their duties efficiently such as management, teaching and research, as well as equip the staff and students with the entrepreneurial skills/innovations needed for the growth of individuals and the society at large.

As pointed out by Altbach (1998), university-industry collaborative training programmes can also come in the form of consultancy services. Universities have to engage in a number of special manpower training programmes with industry, as well as many research projects relating to local industrial needs, in which university academic staff frequently act as consultants, with the encouragement of university authorities. By doing this, universities will ultimately gain additional funds to carry on their operations. University-Industry collaborative training programmes helps to facilitate the use of technology in simulating real-life business environments. This form of collaboration benefits both organisations in different ways; for the University, the students are given the opportunity to apply what they learnt in theory which has to successfully facilitate students' exposure to a sample industry environment as well as the development of middle level manpower skills. The new graduates are therefore more skill-ready for the employment market. Apart

from collaborative services rendered by the industries to the universities, there is a strong place for fund provision.

Funding means money provided, especially by an organization or government, for a particular purpose. Funding is the act of providing financial resources, usually in the form of money, or other values such as effort or time, to finance a need, program, and project, usually by an organisation or government. Generally, this word is used when a firm uses its internal reserves to satisfy its necessity for cash, while the term financing is used when the firms acquires capital from external sources.

Research funding according to Yusuf (2012) is critical to the ability of tertiary institutions to conduct research in the first place and ultimately to the quality and impact of this research. Most research activities in Nigeria are sponsored by government through government funding agencies like the National Science and Technology Fund (NSTF), the Education Trust Fund (ETF) etc, as well as a number of federal/state ministries, boards and parastatals which directly fund researching institutions or research projects under them. In addition, research projects are occasionally funded by international and philanthropic organisations by way of sponsored research support, endowment funds, foreign aids, fellowships, donations, etc.

It has been advocated that all the multinational companies operating in Nigeria need to partner with the various university institutions towards funding education in areas such as contributing money for the development of institution, encouraging research and consultancy services in universities, providing laboratory equipment, computers and laptops in schools to help ameliorate the bottleneck in the funding of education, as well as providing scholarships and products for school development.

Basically there are two broad sources of funding educational programs in Nigeria. They are: Government sources and Non-Governmental sources.

Government sources: These are the sources of fund that come from the government through budgetary allocation. Government provides allocation and funds for education through grants. Grants can be categorized into three groups which are:

- a. Capital Grants, which are the bulk of payments to educational institutions for the construction of new buildings and major repair of old ones.
- b. Recurrent Grants, which are for expenditure that occurs every year in the budget. They include salaries, allowance, maintenance, travelling and transport expenses, and expenditure on student meals and so on.
- c. Special Grant, which could be seen as an aid by the federal or state government to service schools. Some government give special grants to enable schools improve the quality of education, structure special

programmes and much more. It should be noted that the grant is not meant for every school as it is only given after certain considerations. Grants for tertiary educational institutions are usually received and disbursed by regulatory institutions.

Non-Governmental sources: Non-governmental sources of funding for educational programmes in Nigeria include:

- a. School fees: This is a source of financing education in Nigeria. The components of school fees known as sundry & service charges include medical fees, examination fees, sport fees, and identity card fees.
- b. Proceed from school activities: A large portion of economic activities which are internally generated activities, for example farming, baking, etc help in financing school activities. Also, institutions run part time programmes to generate funds. This is referred to as an alternative source of educational funding.
- c. Community efforts and Donations: This includes parent-teachers association (PTA), activities such as donations of buildings, donation of infrastructural facilities, donations in cash and kind, recruitment of teachers, building of halls, hotels, etc.
- d. External aids: External aids are assistance given to educational institutions from outside the country. It may be in the form of equipment and manpower through bilateral and multilateral relations. External aids could come from organizations such as the World Bank, UNESCO, USAID, Ford Foundation, PTF etc.
- e. Tertiary education tax fund (Tetfund) formally known as Education tax fund(ETF). It was introduced in 1993 to raise fund for the education sector. TetFund was established as an intervention agency under the TETFund ACT–Tertiary Education Trust Fund Act, 2011; charged with the responsibility for managing, disbursing and monitoring the education tax to public tertiary institutions in Nigeria. The Tetfund act requires all registered companies in Nigeria to pay a tax of 2% on their assessable profit. The money is shared in the ratio 50:25:25, with Universities getting 50% and colleges and polytechnics each getting 25% apiece.
- f. Industries: Industries assist university institutions with funds for the provision of educational facilities, construction of buildings, grants for research engagements, as well as scholarships for students. They do this by partnering with universities for productivity and school development.

Funding of Universities in Nigeria is very necessary for optimum growth and societal development. Fund is needed in universities to procure educational materials, physical facilities and staff management. Funding of Nigerian higher education is imperative because of the costs involved in maintaining an institution. John and Parson (2004) observed that, the continuing cost of governance is ascribed to

increasing higher educational bills of many countries of the world especially, the developing countries coupled with growing overhead costs. This study concentrated on commercialization of research and collaborative training programmes.

Commercialization cannot be mentioned without attaching monetary value to it. It is synonymous with money. In this light, commercialization is the process of feeding in the market products or methods for sale. To Derek (2003), it refers to what Universities do to make profit from their teachings, researches, and other activities that they manage. To the researcher, it is the process of bringing to the public any products of the University with the motive of selling them for profit maximization. It is also a way of generating revenue for Universities, through products that would be of assistance to customers.

Commercialization of research serves as a therapy that cures the virus of under-funding that is eating-up Nigerian universities in general, and those in the South East in particular. This issue of under-funding is orchestrated by the ebb in the price of oil in the global market. This by extension has affected the coffers of government, thereby reducing its financial support to public universities in particular. The short fall in financial allocation to public universities from the coffers of the government, has informed universities to use commercialization of research as a way of improving universities' funding base. This may be possible through the sale of their research finding tailored towards solving teething problem to the public or industries. In tune with this, Uche and Ahunanya (2011) describe commercialization of research as the process whereby universities sell the findings of their research(es) to the public or industries to produce new goods or improve on the existing goods. This implies that members of the public and industries pay for research findings of universities to improving their products. Little wonder, Worgu (2017) illuminates that industries pay universities for their products (research findings). This payment from industries is one of the ways universities improve their funding base (Chesbrohgh, 2003). The importance of university-industry collaboration and commercialization cannot be undermined. University-industry collaboration and commercialization of research products are significant in the development of university manpower and realization of funds and finance for the smooth running of the university. Based on this backdrop, the researchers investigated university-industry collaboration and commercialization of research products in universities in South East Nigeria.

#### *Statement of Problem*

University education is becoming very expensive to run as a result of the state of inflation and the declining purchase power of Naira. It is obvious that government alone cannot bear the burden of financing education and this is why the highly resisted University-Industry Partnership (UIP) Initiative in the funding of education need to be re-examined.

On the part of the industries, it appears that majority of industries in Nigeria do not encourage universities through financial channels expansion, staff training and researches. Moreover, industries in Nigeria are not being encouraged to adopt “open” innovation systems that favour collaboration, partnerships, alliances, consortia and coordination of research with universities. Again, many firms attach more importance to informal contacts with universities that relate to the recruitment of graduates, internships, and consulting, and in some cases, industries seem to be having difficulty with aggressive behavior of universities regarding sharing of property rights and licensing. In addition, due to absence of intensive research in Nigerian universities, majority of the universities in the country seem not to commercialize the fruits of few existing research results through transfer of knowledge, spinoffs, and equity in stakes in start-ups. Hence, the researchers are bothered and investigated university-industry collaborative training and commercialization in universities in South East Nigeria.

*Aim and Objectives*

The study was aimed at investigating university-industry collaborative training and commercialization in universities in South East Nigeria.

1. find out how collaborative training programmes contribute to funding of universities in South East Nigeria.
2. assess how commercialization of research results from universities to firms contribute in funding universities in South East Nigeria.

*Research Questions*

The following research questions were answered in this study.

1. In what ways would collaborative training programmes contribute to funding of universities in South East Nigeria?

2. In what ways would commercialization of research from universities to industries contribute to university funding in South East Nigeria?

*Hypotheses*

The following hypotheses were tested at 0.05 level of significance.

1. There is no significant difference between the mean rating score of administrative staff and Chief Executive Officers of industries on contribution of collaborative training to funding of universities in South East Nigeria.
2. There is no significant difference between the mean scores of administrative staff and Chief Executive Officers of industries on contribution of commercialization of research to funding of universities in south East Nigeria.

**II. METHODOLOGY**

The population for the study is two thousand, three hundred and seventy-three (2373). This is made up of 668 administrative staff and 1705 Chief Executive Officers. The study was a descriptive survey design. The sample size was 894 (467 administrative staff and 427 CEOs). The sample was drawn through multistage sampling procedure using cluster and disproportionate stratified random sampling techniques. Collaboration and Commercialization in University-Industry Questionnaire (CCUIQ) was used for data collection. Face and content validities were ensured by experts. Internal consistency through Cronbach alpha gave reliability coefficient of 0.89 for CCUIQ. Mean, standard deviation and z-test were used for data analysis.

**III. RESULTS**

*Research question 1:* In what ways would collaborative training programmes contribute to funding of universities in South East Nigeria?

Table 1: Weighted mean and standard deviation on the ways collaborative training programmes contribute to funding of universities in South East Nigeria

s/n	the ways collaborative training programmes contribute to funding of universities	Administrative Staff			Chief Executive Officers		
		Mean	std	decision	Mean	Std	decision
1.	Industrial funding of training programmes for old staff of industries	3.13	.48	Agreed	3.38	.45	Agreed
2	Payment for consultancy services	3.15	.67	Agreed	3.19	.45	Agreed
3	Payment for provision of guidance information	3.16	.73	Agreed	3.08	.45	Agreed
4	Payment for recruitment of workers	3.32	.56	Agreed	3.43	.49	Agreed
5	Payment for training of new workers/orientation programmes	3.09	.52	Agreed	3.42	.49	Agreed
	<b>Grand mean and standard deviation</b>	<b>3.17</b>	<b>0.59</b>		<b>3.30</b>	<b>0.47</b>	

Table 1 revealed that items with serial numbers 1 to 5 have their various mean values above the criterion mean value of 2.50 and were agreed by the respondents as the ways collaborative training programmes contribute to funding of universities in South East Nigeria. The ways collaborative

training programmes contribute to funding of universities in South East Nigeria are through: industrial funding of training programmes for old staff of industries; payment for consultancy services; payment for provision of guidance

information; payment for recruitment of workers and payment for training of new workers/orientation programmes.

*Research question 2:* In what ways would commercialization of research from universities to industries contribute to university funding in South East Nigeria?

Table 2: Weighted mean and standard deviation on ways commercialization of research from universities to industries contribute to university funding in South East Nigeria

s/n	Ways commercialization of research from universities to industries contribute to university funding	Administrative Staff			Chief Executive Officers		
		Mean	std	Decision	Mean	std	decision
6	Sale of research findings	2.69	.54	Agreed	3.56	.46	Agreed
7	Sale of intellectual property right	2.64	.55	Agreed	3.25	.45	Agreed
8	Licensing of intellectual property (patent licensing)	2.52	.80	Agreed	3.17	.49	Agreed
9	Payment of Royalties	2.92	.47	Agreed	3.29	.43	Agreed
10	Sell of products of technologies developed by industries	3.24	.23	Agreed	3.42	.42	Agreed

Table 2 showed that items with serial numbers 6 to 10 have their various mean values above the criterion mean value of 2.50 and were agreed by the respondents as the ways commercialization of research from universities to industries contribute to university funding in South East Nigeria. The various ways commercialization of research from universities to industries can contribute to university funding in South East Nigeria are through: sale of research findings; sale of

intellectual property right; licensing of intellectual property (patent licensing); payment of royalties and sell of products of technologies developed by industries.

*Hypothesis 1:* There is no significant difference between the mean rating score of administrative staff and COEs on contribution of collaborative training to funding of universities in South East Nigeria.

Table 3: z-test analysis of the mean scores of administrative staff and CEOs on contribution of collaborative training to funding of universities in South East Nigeria

Category	N	$\bar{x}$	Sd	Df	z-cal.	P-val.	Alpha level	Remarks
administrative staff	467	15.85	2.96	781	3.42	.00	0.05	Null hypothesis is rejected
Chief Executive Officer	427	16.50	2.33					

Table 3 shows that administrative staff have mean and standard deviation scores of 15.85 and 2.96 while the Chief Executive Officers have mean and standard deviation scores of 16.50 and 2.33 respectively. With a degree of freedom of 781, the calculated z value of 3.42 is significant because the probability value of .00 is less than the alpha level of 0.05. Therefore, the null hypothesis was rejected. By implication, there is a significant difference between the mean

rating score of administrative staff and COEs on contribution of collaborative training to funding of universities in South East Nigeria.

*Hypothesis 2:* There is no significant difference between the mean scores of administrative staff and chief executive officers on contribution of commercialization of research to funding of universities in south East Nigeria.

Table 4: z-test analysis of the mean scores of administrative staff and CEOs on contribution of commercialization of research to funding of universities in south East Nigeria

Category	N	$\bar{x}$	Sd	Df	z-cal.	P-val.	Alpha level	Remarks
Administrative staff	467	14.01	2.59	781	15.76	0.00	0.05	Null hypothesis is rejected
Chief Executive Officer	427	16.69	2.25					

Table 4 shows that administrative staff have mean and standard deviation scores of 13.53 and 2.79 while the Chief Executive Officers have mean and standard deviation scores of 16.69 and 2.25 respectively. With a degree of freedom of 781, the calculated z value of 15.76 is significant because the probability value of .00 is less than the alpha level of 0.05. Therefore, the null hypothesis was rejected. By implication, there is a significant difference between the mean scores of junior and senior administrative staff on contribution of commercialization of research to funding of universities in south East Nigeria.

#### IV. DISCUSSION OF FINDINGS

##### *Ways Collaborative Training Programmes Contribute to Funding of Universities*

The study revealed that ways collaborative training programmes can contribute to funding of universities are through: industrial funding of training programmes for old staff of industries; payment for consultancy services; payment for provision of guidance information; payment for recruitment of workers and payment for training of new workers/orientation programmes. University lecturers who go to industries for one training or the other come back to increase and improve the quality of their products and services. This in return increases the enrolment rate.

This study is in tandem with Nwabueze and Onyenandu (2015) who reported among others that the influence of staff professional development programmes on the delivery system of Universities include: educating staff on the latest reform in the school curriculum, enabling them learn new teaching techniques available in education, assisting them learn how to operate new learning resources like ICT gadgets, helping to improve the qualification of the academic and administrative staff, understand how to improvise teaching aids on their own, enabling them adapt to new techniques of teaching, helping them possess good understanding of the subject to teach, encouraging staff to share knowledge and ideas among themselves, and increasing the involvement of staff in school activities. It was still in the same line of thought that Onaolapo, Uche and Raimi (2013) reported that SPDC-University collaboration in itself, is an innovative process that is capable of springing national development via research and development.

##### *Ways Commercialization of Research from Universities to Industries Contribute to University Funding*

It was found that the ways commercialization of research from universities to industries contributes to university funding are through: sale of research findings; sale of intellectual property right; licensing of intellectual property (patent licensing); payment of royalties and Sell of products of technologies developed by industries. Commercialization of researches from universities to industries can attract huge amount of money to the university. The study is supported by Allison (2008) who found four major ways higher institutions

can generate fund which are proceed from contract research from well meaning individuals, business organizations and research institutions; judgment research from the school administrators.

The above will not only improve the staff intellectual ability but also improve the revenue base of the schools to augment grants which usually run short of expectations. Still in support to these findings were Moeliodihardjo, Soemardi, Brodjonegoro and Hatakenaka (2012) who investigated university-industry-government partnership in Indonesia. Found that collaborative activities have been carried out to include: service and training, patenting, collaborative research and development, networking events, industrial collaboration for education, incubators, SME support, and science parks.

#### V. CONCLUSION

Based on the findings of this study, it was concluded that commercialization of university products to industries, training of universities human resources and the collaboration are very important in enhancing the funding models of the industries to the universities.

#### VI. RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

1. The universities should develop functional websites where they can advertise and market their research findings; intellectual property and sell of products of technologies to industries.
2. The university should have a stipulated amount of money that will be remitted to them from payment to their staff on various services rendered to the industries.
3. The university should always sign a memorandum of understanding with any industry of interest on the modus operandi in order not to have a bridge of contract.

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