

## Innovation as a Critical Success Factor: a Case Study about the Partnership among Polytechnics with Industry in Nigeria

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### Abstract

Interaction between polytechnics and companies is common in Countries considered to be developed and innovative. In Nigeria, this strategy is not widely used, although some relevant actions have produced good results in the agricultural sector. The Nigeria Innovation mandate, which is considered a milestone, created the Technology Innovation Centers (TICs) in universities, Polytechnics, and is seen by the Ministry of Science and Technology in Nigeria as having great strategic promise within the area of engineering and medicine. In this regard, this article seeks to present the findings of an exploratory research project investigating the participation of Nigeria polytechnics in the formation of strategic partnerships focused on the development of machines and equipment, after the advent of the Nigeria Innovation mandate. An exploratory study was used as an instrument of methodological support, whose results allowed the authors to identify some significant reflections structured in the polytechnics-technology industry-government approach.

### Keywords:

Technology,  
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### **Background to the Study**

For the technology industry, innovation is critical. Considered to be science-based, innovation is the main source of intra-industrial competitiveness, and it generates significant impacts on the generality of a Country (Adeoti, 2002), which becomes less dependent on foreign innovations (Bekkers et al., 2008). In addition, for the technology sector, product innovations (such as machines) have much more significant results than technological, marketing or process advances (Ogbu 2012).

It is only through technology innovation that farmers can and do benefit from products output that were unimaginable some time ago. There are still many parameters whose production is not yet perfect, suggesting that there is still much room for technology innovation. Without the efforts of companies and other stakeholders (e.g. polytechnics) to pay greater attention to Research and Development (R&D) in the sector, these benefits would not be possible. (Adeoti, 2014).

### **The Aspects of Innovation in the Nigerian Technology Industry**

Although it ranks low in the world technology market, Nigeria has maintained its machines and equipment production by importing technology, due to its lack of history in innovation. This context demonstrates a fragile reality in the strategy of technological development, since some knowledge must be developed internally. This is the teaching that international experience has demonstrated and the Country has the potential to share scientific and technological research activities, which have been restricted to the academic environment or governmental institutions, not interacting with the business sector that generates wealth (Etzkowitz, 2008).

It is extremely important that the technology sector be prioritized by the Government as a strategic option for composing the Industrial, Technological and Foreign Trade Policy (PITCE). Under this policy, the R&D incentive is one of the foundations to substantiate this sector, which utilizes innovation as a key element for the growth of industrial and domestic competitiveness (Juma, 2006). The willingness to differentiate products, to increment processes efficiency and to enter in new markets represents the main reasons that have driven companies of the sample to innovate. On the other hand, the main obstacle met by companies during development and introduction of innovation is represented by the difficulties to establish partnership with other companies, by financial problems and lack of resources in the company (Ohba, 2007). Additionally, the business environment is not conducive to the research environment and the lack of a culture of innovation, coupled with the pressure to increase the portfolio of new products sacrifices the research, which fails to occur at the rate of production (Bigliardi, 2011).

In Nigeria, the National Science, Technology, and Innovation Policy, of the Ministry of Science and Technology, aims for greater integration between academia and the industrial sector through the “implementation of policies for the development of primary technology production complexes, integrating and strengthening research and technology centers, official laboratories, institutions for higher education, middle school and vocational training, and domestic companies, with emphasis on the research and production of drugs, products, processes and equipment for healthcare” (LEE, 2000).

### **The Polytechnic-Technology Industry Partnership**

A research covering the years from 2000-2014 has shown the technology sector has progressed a little – or almost nothing – during this period: the rate of importation was enormous and no public policies were created to foment a significant change or recuperation in the sector (Bekkers, 2008). Therefore, given the importance of innovation for the economy, the Innovation Mandate of 2004 was considered a breakthrough for the Nigeria Government, in the sense that it increases flexibility and the patent rights of the University and Polytechnic in addition to creating Technological Innovation Centers (TICs) in order to monitor the development stages of a project with potential interest for the private sector and facilitate technology transfer from the university and Polytechnic to the business sector, for example, through licensing (Adeoti, (2002)). In Polytechnics without the management of TICs, a large number of patent requests is abandoned due to expiration of payments (annuities) terms, while in the polytechnics where research has been developed by means of a structured Technological Innovation Centers, the Index of Patents Granting of the polytechnics showed significant increase (Chakravarty, 2008).

### **The Technology Innovative Problem Situation**

In Nigeria, even with the Innovation mandate, of the over 614 companies that manufacture agro-chemical and farm machinery products that implemented innovations, less 100 received governmental support for R&D through tax incentives, only less than 10 of which made partnerships with universities and polytechnics (where 61% used the partnership for R&D and trials for product testing; the target of the technology industries) (Lee, 2000).

Paradoxically, the number of patents and copy rights requested by universities and polytechnics has increased and the petroleum sector is greatly represented (Ogbu, 2012), which indicates that the polytechnics are looking at the market in a more entrepreneurial manner, even if they are not proactively conducting market studies for technological demands (Cozzens, (2012)).

Nevertheless, the polytechnic-company interaction is insignificant and still faces many difficulties in its development. For this relationship to be successful, it is especially important that each side have the desire and willpower to make the relationship happen (Ohba, 2007). This is because the polytechnics, for example, use basic research to contribute to the knowledge of new types of concepts, models and empirical findings (Damain, 2001). Furthermore, there are still, traditionally, conflicts of interest, culture and objectives with the companies (Etzkowitz, 2008).

### **The Government participation**

According to the findings, the responding TICs are primarily funded by the Government. However, there is not a consensus as to whether or not the Government is a facilitator for universities and polytechnics with regard to their encouragement of new technology research, given that number of researchers findings that believe the Government is a supporter equals the number of researchers that described it as “indifferent” or “somewhat active”.

This information also indicates that there is a disconnect between the Government and universities, Polytechnics, and Research institutes for developing innovative technologies, which should be worked on to provide a favorable environment for innovation in this sector. If the Innovation mandate is viewed by the Ministry of Science and Technology (2008) as a great promise “whereby we hope to open a fruitful channel of collaboration between businesses and academic research institutions”, it is necessary to effectively direct the universities and Polytechnics towards this objective.

### **The Pragmatic Skill, Knowledge / Technical Capacity**

According to the TICs, the Polytechnics mainly expressed their knowledge through scientific documents, such as articles, publications in journals and lectures (4.00 on the Likert scale) as opposed to “grey literature”, such as patents (3.14 on the Likert scale), even though some studies are available for licensing by the companies. From the TICs' perspective, there are still significant barriers for knowledge transfer from the universities and polytechnics to the industry, which ends up using a very small amount of the knowledge available in universities and polytechnics. This is because it is difficult to overcome culture factors between polytechnics and the company's commercial interests, since many partnerships are hindered by conflicts between Academia seeking to publish the results and the company, which wants to patent the research. Nevertheless, as discussed by (Adeoti, 2014), such sources of conflict can be bypassed in order to ensure the alliance's success if the inventions have their patent application filed immediately so that the study can then be made available to the scientific community. Below depict the relationship between technology collaborators.



**Figure 1 Showing the Relationship between Collaborators**

However, the universities and polytechnics realize that conducting this type of contract brings income to the polytechnic and disagree that this type of partnership cannot contribute to the development of research and that the industry will not be interested in the knowledge developed in the polytechnic.

Polytechnics recognize that there is no incentive for cooperating with the industry, since the results are measured through scientific publications. With regard to the promotion of technology innovation, this could be an issue to be tackled by the Government, which localizes its resources to prioritize publications instead of aligning the applicability of the research to the needs of the market or the society.

This finding shows that the TICs' vision is optimistic with regard to partnerships with agro chemical and petroleum companies, but it still needs better structural support to allow for a more entrepreneurial profile and, consequently, the implementation of more partnerships between polytechnics and companies in favor of new agro machinery. Thus, from the perspective of the TICs, for the development of new technologies, the Polytechnic is capable of conducting, primarily, research for the development of new formulations of machines and equipment, prototype trials, followed by synthesis/creation of new computer simulations, in addition to in-depth research of ICT to be fabricated, in this order.

#### **The Polytechnic as a Strategic partner**

From the viewpoint of the Polytechnics, in the past 13 years, partnerships for new technology R&D did not occur very often with private companies, which are confirmed by the (Etzkowitz, 2008) data. In order to identify the perception of the Polytechnic itself, through the TICs, with regard to its preparation for meeting the needs of the technology market, thus it shows that the polytechnics and universities believe they advertise their services and they are easily accessible. They also believe that their physical resources are relevant and they have access to researchers with highly qualified "know-how" and the expertise and reputation to develop research and meet the companies' expectations, which can paint a better picture for the companies and reduce costs and/or risks.

However, the polytechnics, through the TICs, disagree that they cannot guarantee confidentiality/patent protection, that they are slow or bureaucratic, that they have long-term, non-feasible projects, and that they are unpredictable or lacking professionalism. Thus, the results of this study show that although most of the studies that reach the TICs to be licensed are in the technology innovative area and are based on applied research, partnerships with private companies after the Innovation mandate were poorly represented. While the representatives of the TICs believe that the polytechnics feature the technical ability and knowledge to contribute to any stage of new technology development, there is no guidance for this type of research since it lacks cooperative involvement between the polytechnics, the needs of market and the government's technology innovative policies. Research also showed that the TICs believe that partnerships with the private sector still present difficulties, but they can bring new experiences and income to Academia, whose government incentive for technology research and development, which can bring practical improvements to industry and quality of product, is still unsubstantial.

## **Conclusions**

This study resembles, in a general way, the Nigeria empirical studies that discuss the partnership between polytechnics and companies, aiming to contribute, in a more specific way, to the sectoral study of the Nigeria technology industry, one of the priorities of innovation in the Country. This article shows that the TICs formed few partnerships/licensing with private production companies after the Innovation mandate and still believe there to be strong barriers with the private sector, despite real cases of success achieved in the market; the objective of this partnership. A more direct support is needed for the TICs, which should have greater autonomy and participation with the Polytechnic, such as the American offices of technology transfer that actively seek technology developed by the universities and Polytechnics to bring to the market, raising funds for the development of further research within the polytechnic. Government still needs to encourage a new way of measuring Academia's results and be more assertive in relation to the goals and technology innovation programs within the universities, polytechnics, and research institutes where the results are still (mostly) measured through scientific publications and where many studies are developed (and sometimes patented), but did not arouse the interest of any stakeholders.

## **Recommendation**

The recommend that educational institutions should not be dictated by market or commercial objectives, as believed by Cuatrecasas (2006), but the applied studies should, realistically, be more relevant within society. The TICs, acting through offices linked to the Polytechnic, have a professional structure that most closely matches the requirements of the technology market and they can be important propagators of the technical capacity of their polytechnic and their ability to add to the Nigerian economy and to companies through the development of products. Although they require greater support from the government, the polytechnics must overcome the barriers to achieve partnerships, developing abilities that result in greater expressivity of entrepreneurial interactions.

It is therefore important that the TICs make available their abilities, services and studies for licensing in a channel that is closely related to and accessible by the pharmaceutical market. Within the institutions and the Polytechnics, the TICs can and should be an important channel for disseminating entrepreneurship within Academia, in addition to further advertising the Innovation mandate itself. Thus, there is fertile ground for Polytechnics as viable strategic partners, given that, from the point of view of the TICs, this type of partnership enriches research and attracts investment for the Polytechnic.

Close to 10 years since the Innovation mandate's enactment, it is necessary to change the view of (Ogbu Osita et al., 2012), who claimed that the polytechnics do not have a tradition of forming relationships with companies and do not bother to communicate research findings with the private sector, so as to contribute to the production of innovations. Our country is dying for innovations, while traditionally the engineers and technologist remain in universities and Polytechnics because there is no closeness with Academia. In Nigeria, the only genuinely Nigerian product has so far been developed with the help of Nigerian Polytechnics and this is an indication that this type of partnership could also work here. Therefore, the research article try to proposed objectivity and, inferring from this study, investigations that seek a more in-depth or even the viewpoint of the technology innovative companies in this type of partnership, could generate new findings.

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