Export Processing Zones and Technology Transfer in Nigeria: A Critical Appraisal

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Abstract
The paper examined the extent to which export processing zones have aided technology transfer in Nigeria. Nigeria adopted the EPZ strategy via Decree No 63 of 1992 with the setting up of the Calabar Free Trade Zone. The objectives of the strategy, among others, are to attract foreign direct investments and transfer technologies to local actors at the zones. Hence, the purpose of work is to ascertain the level of technology transfer through the zones in Nigeria. By 2008, there were 25 zones registered with NEPZA, the regulatory agency. Out of this number 11 are functional, 9 under construction and 5 merely declared. Four (4) zones were randomly selected out of the functional zones for the study, namely Calabar, Oil and Gas, Snake Island Integrated Free Trade Zone and Alscon Export Processing Zone. Two hundred and ninety copies of questionnaire were administered on 290 participants selected from 54 Free Zone Enterprises and 4 zonal management boards. Out of the 290 copies of questionnaire 242 copies were properly completed and returned. These 242 copies of questionnaire served as primary source of data, while textbooks, journals and other print materials formed the secondary sources of data. The study revealed that whereas EPZs have helped in the acquisition of utilitarian skills, they have not contributed to transfer of technologies to local actors at the zones. The reason for the failure of the zones to achieve technology transfer in Nigeria is the absence of institutions and R and D activities at the zones to make innovations in any line of production. Thus, the study recommends that there should be massive investments in the establishment of research institutions and R and D activities, and R and D activities must be made compulsory at the zones in Nigeria.

Keywords: *Technological Backwardness, Technology Transfer, Skill Acquisition, Organization, Innovation and Patent.*

Introduction

In development literature technological backwardness has been adduced as one of the bane of low level industrialization and underdevelopment in the third world countries, including Nigeria. The implication is that Nigeria, like most other developing nations, has depended on the advanced capitalist countries for the most of her industrial products, if not all, over the years. This has taken its toll on the nation's overall development, sapping the country of the much needed resources for development at the home front. Consequent upon this, the Nigerian government has made frantic efforts to acquire modern and foreign technologies to grow the nation's manufacturing and industrial sectors and improve her socio-economic status, so as to reverse the trend of development in the country.

As part of its policies on technology acquisition the Nigerian government adopted the EPZ strategy of development via Decree No. 63 of 1992, to among other things, attract foreign

direct investments which will in turn come with managerial, entrepreneurial and technological competencies and transfer same to local actors at the zones (NEPZA, 2008). To achieve this the Calabar Free Trade Zone (CFTZ) was established in 1992, however, it was fully completed in 1999 and commenced operations in 2001 (Harry, 2016). So far a total of 25 zones have been registered with the Nigerian Export Processing Zones Authority (NEPZA), the regulatory agency in the country. Out of this number 11 are operational, 9 under construction and 5 mere declared. However, fifteen (15) years after the official commissioning and commencement of the zone operations in the country, there is little or no evidence that the zone strategy has contributed substantially to the transfer of technologies to the extent of improving the technological capabilities of local actors. The objective of this paper, therefore, is to find out the extent of technology transfer through the zones in the country. The paper would argue that EPZs have not enhanced technological capabilities in Nigeria. The rest of the paper would be developed under the following headings: the concept of EPZ, the concept of technology transfer, discussion, conclusion and recommendation.

The Concept of Export Processing Zone

To Afeikhana (1996) export processing zone are special enclaves created within a country where firms, mostly foreign, may manufacture or assemble goods for export without being subjected to the normal customs duties on imported raw materials and finished products present in that economy; firms operating within the zones are normally exempted from industrial regulation applying within the domestic economy, especially with regard to foreign ownership of firms, repatriation of profits, employment of nationals, access to foreign exchange, etc. More precisely, EPZs are industrial zones with special incentives to attract FDI in which imported materials undergo some degree of processing (value addition) before being exported again. As Gerardo, Mauricio and Felipe (1998:5) have observed, EPZs are established in the geographic zones which are outside the customs territory of a particular country where products can be stored, processed and manufactured without the payment of import duties, and with the intention of exporting most of the output.

According to Stein, EPZs are different from FTZs/FPs in that EPZs include a variety of measures aimed at encouraging investments in manufacturing capacity exclusively for export. Stein argues that export exclusivity seems to be ubiquitous or universal, with one prominent exception the Manaus Free Zone in Brazil where production seems to be aimed largely for the domestic market. In addition, EPZs are characterized with exemption from duties on imported intermediate goods, raw materials and export of finished goods. Also, taxation and industrial regulations are typically more generous than elsewhere in the country, infrastructure is well developed and often subsidized, lower wages subsist and unionization discouraged. Other distinguishing features of EPZs are the Labour-intensive nature of means of production leading to the use of non-complex manufacturing processes with heavy emphasis on assembly operation (Stein, 2008, Sachs, 2005, and Johansson, 1994), and the prevalence of textiles and garment production and electronics assembly. As Sachs (2005:264) has argued, it is the labour-intensive nature of production in the EPZs that helped their rapid increase in China. Similarly, UNCTAD (1993) discloses that in the early 1990s textile and garment production accounted for almost 90 percent of employment in EPZs in Jamaica, Mauritius and Sri Lanka, while electronics assembly accounted for 74 percent of employment in Malaysia.

The Concept of Technology Transfer

The desire to acquire modern technology has been the dream of many third world countries' leaders; while some have made head-way in this regard others obviously have not achieved

much in this noble course of technology transfer. Technology is defined in terms of high-level manpower in scientific, technical and engineering fields, and expenditure on research and development as a percentage of gross domestic products (Ake, 1985). Harry (2013) observes that technologies, most often, are invented or developed in one country but utilized and enjoyed in different parts of the world. The process whereby technology developed one country or organization is utilized, enjoyed, adopted, modified and applied in other parts of the world or organizations is what is generally referred as technology transfer or technology diffusion. According to Bozeman (2000), technology transfer is the movement of know-how, technical knowledge or technology from one organizational setting to another. It follows therefore that technology transfer is not just mere movement of product(s), but in actual fact the movement of technical knowledge, its use, adoption and application, from one organization to another within the same country or outside the country of origination. Presenting a broader view on the subject matter, Mittleman and Pasha (1997) described technology transfer as the movement of knowledge, skill, organization, values, capital from the point of generation to the site of adaptation and application. It is important to note that, to achieve technology transfer, that is movement or transfer of technical skills/knowledge, involves concerted investments in research and manpower development. Hence, Ake argues that technological capability is defined in terms of the technological innovation as reflected in patents granted. In other words, for Nigerians to be said to have acquired a particular technology they must have made an innovation in the production of such commodity and have secured patent for the modified product. To achieve this, massive investments in research and development activities is critical. This was what the East Asian countries did to acquire modern, scientific and technical knowledge to grow the industrial sector of their economies.

Methodology

The research design for this work is descriptive survey method, also known as quasi-experimental research, thus it was both qualitative and quantitative in nature. The population of the study comprised all the 261 Free Zone Enterprises (FZEs) operating in the four (4) zones (Calabar Free Trade Zone, Oil and Gas Free Trade Zone, Onne, Snake Island Integrated Free Trade Zone, Lagos and Alscon Export Processing Zone, Ikot Abasi), selected out of the 11 functional zones in the country. Twenty percent (20%) proportional probability sample of the 261 FZEs was used a sample for the study. This added up to 54 FZEs from the 4 zones. Also, 5 members of staff were purposively selected from the 54 FZEs and the 4 zonal management boards. This gave a total of 290 participants, which was the actual sample used in the study.

Data for this work were derived from both primary and secondary sources. The primary data were gathered with the aid of questionnaire. Two hundred and ninety (290) copies of questionnaire were administered on the respondents, out of which 242 were properly filled and returned. On the other hand, the secondary data were drawn from text-books, journals official documents, etc. Descriptive statistics such as frequency, average, and percentage were used for data analysis in the study.

Result and Discussion

The research question for which the result and discussion centered on is: How have EPZs contributed to technology transfer in Nigeria?

Data Presentation and Analysis

First and foremost, the participants were asked to foment on the level of technology transfer to Nigerians in the firms at the zones. The respondents presented various accounts as regards the success of this. Their submissions are captured in table 1 below.

Table 1: Technology Transfer to Nigerians at the Zones

Variables	Frequency	Percentage
Very high	66	27.3
High	119	49.1
Low	53	22
very low	4	1.6
Total	242	100

Source: Field Survey, 2015

As seen in table 1, 49.1 percent, claimed that technology transfer to Nigerians at the zones is high, while 27.3 percent are of the opinion that technology transfer is very high at the zones. On the contrary, 22 percent of the participants stressed that EPZs contribution to technology transfer in Nigeria is low. Evidently, a great majority of the respondents that is 76.4 percent consider the rate of technology transfer at zones to be reasonably high. Following the above assertion, the researcher asked the participants who are staff of the sampled enterprises to provide information on the number of Nigerians trained in the technical areas of their firms at the zones. Below are their responses.

Table 2: Number of Nigerians Trained in the Technical Areas of Firms' Operations at the Zones

Variables	Frequency	Percentage
1 – 20% of the staff	20	8.8
21 – 40% of the staff	29	12.8
41 – 60% of the staff	50	22.1
61 – 80% of the staff	91	40.3
81 – 100% of the staff	36	16
Total	226	100

Source: Field Survey, 2015

In table 2, 40.3 percent of the respondents stressed that their firms are committed to the technology transfer to Nigerians as a result 61 to 80 percent of their staff have been trained in the technical areas of their firms. Similarly, 22.1 percent of them posited that 40 to 61 percent of their firms' staff has been trained in the technical areas of their firms, whereas 16 percent claimed that 81 to 100 percent of their staff has been trained. Also, on indigenous staff training, 12.8 percent and 8.8 percent of the participants disclosed that 21 to 40 percent and 1 to 20 percent of their staff have been trained in the technical areas of their firms operations respectively. What has become very clear from the responses elicited from the participants is that different organizations at the zones have embarked on different levels of indigenous staff training, especially in the technical areas of their operations.

It is expected that training activities would enhance research and development (R and D) and ultimately result in technological innovations at the zones. Hence, the participants were asked to disclose technological innovations made by firms at the zones. Below is a list of technological innovations the respondents claim firms in zones have made.

Table 3: Technological Innovations made by Firms at the Zones

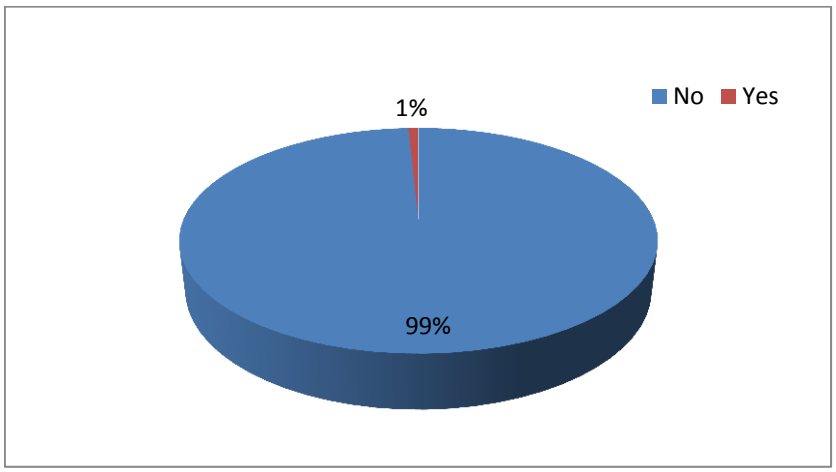
Innovation	Firm	Zone
Medical incinerator, safety boxes and syringe barrels	First Medical & Sterile	CFTZ
Improved Acoustic Enclosure, and CNC Machines for Computerization of Production Processes	M-Saleh Engineering FZE	CFTZ
Improved pipe threading method	Pipe Coaters Nigeria Ltd	OGFTZ
Reduce sound emission and low consumption water chiller	Air Control and Cooling Service Ltd.	OGFTZ
7,00t of USAN FPSO topside model and 2,500t of Integrated offshore platform	SMIT LAMNALCO Nigeria FZE	SIIFTZ
Improved pots cut-in and safe short-down of pots during gas shortage	Rusal – ALSCON	AEPZ

Source: Field Survey, 2015

From the table a number of technological innovations were highlighted by the participants as achievements made by firms in the zones. For instance, First Medical and Sterile Products FZE operating in the CFTZ claimed to have made technological innovations in medical incinerator, safety boxes and syringe barrels. Similarly, M-Saleh Engineering FZE also in the CFTZ was said to have made technological innovations in improving acoustic enclosure designed for machines. Furthermore, Pipe Coaters Nigeria Ltd located at the OGFTZ claimed to have made improvement in pipe threading method, while Air Control and Cooling Service Ltd in the same zone presented reduction in sound emission and consumption water chiller as its technological innovation. In addition, SMIT LAMNALCO Nigeria FZE at the SIIFTZ disclosed that it has made technological innovation in 7,500t of USAN FPSO topside model and 2,500t of integrated offshore platform. Lastly, Rusal-Alscon located at the AEPZ claimed to have made innovation in improving pots cut-in and safe short down of pots during gas shortage in its operations.

For technological innovation(s) to be the property of the innovating firm(s) it must be a product of extensive research that sets it apart from the existing technology and secure the necessary/relevant patent. Thus, those who claimed to have achieved technological innovations in their operations were requested to disclose if they have secured patents for their innovations. Their views are presented in the figure below.

Figure 1: Patents on Innovation Granted Nigeria Firms on Products at the Zones.



The figure shows that 99.2 percent of the participants asserted that they do not know firms that have gotten patterns for technological innovations they have achieved. On the other hand, a paltry 0.8 percent of the participants claimed they have knowledge of firms which have secured patents for their technological innovations, but they were unable to specify such firms. The implication of this assertion is that none of the firms in the zones have gotten patent for innovation made on their products; therefore they cannot claim ownership of such technology and to that extent it is safe to assert that the zones have not achieved technology transfer to local actors in the country.

Discussion of Findings

One of the major argument in support of the adoption of the EPZ strategy in Nigeria is the believe that EPZs will attract FDIs, and FDIs come in form of entrepreneurial skills, managerial skills and technological inputs. With local staff working in the zones, in the foreign firms that would be set up there, they would acquire the relevant technologies. So, the question is: to what extent have the zones contributed to the transfer of technology in the country. For a fact the zones have not contributed substantially in transferring technologies in the country, though some Nigerians have acquired functional skills through the operations of the zones. Obviously, as evident in table 1, 76.4 percent of the participants hold the view that there has been high level of technology transfer in the zones. However, this is not quite the reality of the situation on the ground. The participants revealed that Nigerians have been trained in the different technical skills areas of their firms' activities and they are actively involved in doing these technical works in their firm's production. Hence their assertions of high level technology transfer at the zones. A good example cited at the OGFTZ, Onne, was in the Pipe Coater Nigeria Limited. It was revealed that the Argentinean company started its operations with 22 expatriates doing the technical works; but today, there are no more expatriates, all the tasks, including technical works, are done by Nigerians. While this is impressive, at best it can only be described as skill acquisition and not technology transfer. Thus, it is clear that the respondents were misunderstanding and mistaken skill acquisition for technology transfer.

Strictly speaking, technology transfer is quite different from skill acquisition. As Ake (1985) has observed, technology transfer is defined in terms of the technological innovations reflected in patents granted. In other words, for there to be any claim of technology transfer, Nigerians (individuals or firms) must acquire the technical knowledge, modify and adopt such know-how through extensive research resulting in innovations and patents for the products secured. Two examples in this regard would suffice. First, through intensive research an Indian pharmacy modified and produced a generic version of the cancer drug-Glivee, originally produced by Swiss drug giant, Novartis, - for which the India pharmacy secured patent. The Indian version is known as Imatinib Mesylate 100 and 400 (Harry, 2013:173-124). Second, in Thailand, the makers of "Est" after partnering with American beverage giants Coca-Cola and Pepsi for some time, the Thai partners adopted and modified the technology through intensive research to produce their local alternative called "Est" for which they have the patent (Harry, 2013:125).

While the participants were quick to mention some technological innovations made by Nigerian firms at the zones they were unable to identify any firm that has been granted patent on such innovation. Indeed, 99.2 percent of the participants could not mention one product for which a Nigerian firm has secured patent in the zones. This is not surprising, because of the absence research and development activities at the zones. For EPZs to contribute significantly in making technological innovations and ultimately transfer technology in an

economy there must be concerted efforts at research and development activities at the zones. It follows that there must be substantial investments in R and D related activities at the zones. But, this is not the case in Nigeria. Worst still, is the fact that in Nigeria there are no research institutions and no investments – both public and private – in research and development activities at the zones across the country. It is this none existence of research institutions and none engagement or involvement in R and D activities that have denied the firms at the zones in particular and the country in general the much needed technological upgrades using the EPZ strategy. Hence, skill acquisition has not transmogrified into technology transfer at the zones in the country.

In countries where the EPZ strategy has contributed immensely in the transfer of technology concerted efforts are made to establish research institutes at the zones, which are also heavily funded. Simply put, in countries where there is huge investment in R and D activities high level of technology transfer is usually achieved. This is the situation in most of the East Asian economies. For instance, to achieve rapid technological advancement China established the high-tech industrial development zones (HIDZs), which are primarily concerned with technology based research and development activities. According to Fu and Gao (2007:27) the HIDZs is one of the important policy measure that has been introduced deliberately to enhance technological advancement and innovations in China. They further disclosed that the HIDZs expenditure on R and D in 2002 stood at31.4 billion RMB Yuan and shares 24.4 percent of China's total expenditure on R and D. According to them, by 2006, that is four years later, the HIDZs expenditure on R and D tripled to 105. 4 billion Yuan and the share rose to 35.1 percent of China's total expenditure on R and D. Evidently, with such huge deliberate investments in R and D activities at the zones, China has attained high level technological upgrades, made innovations and giant strides in manufacturing and industrialization. No doubt, this has tremendously contributed to the socio-economic development of China.

Conclusion

From the foregoing, it is obvious that, one of the major objectives of adopting the EPZ strategy in Nigeria was to bring about technology transfer. However, after about fifteen years of formal operation, there is little or no evidence that the zones have achieved this noble objective. The main reason for the failure of the zones to achieve technology transfer in Nigeria is the absence of R and D activities at the zones to make generation of new ideas modify existing ones and make innovations in products produced at the zones. For EPZs to make significant contribution to technology transfer there must be concerted efforts to invest substantially in the establishment of research institutes and R and D activities at the zones across the country. This was what the Chinese did to achieve massive technology upgrades through the zones.

Recommendations

Based on the findings of the study, the paper makes the following recommendations:
First, R and D activities must be made central to the EPZs' operations in Nigeria.

Second, government should make massive investments in the establishment of research institutions and R and D activities at the zones, in the Chinese model of High-Tech Industrial Development Zones to embark on extensive research in science and technology.

Lastly, firms operating in the zones should be encouraged to pursue and secure patent for any technological innovation made through their R and D activities at the zones.

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