Effect of Technical Vocational Skills and Technological Development on the Nigeria's Oil and Gas Industry

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Abstract
This study investigated the effect of technical vocational skills and technological development in the Nigeria's oil and gas industry. A survey research design was adopted, and data were collected from both primary and secondary sources. A Purposeful sampling technique was used to select the oil companies in the study. The study population consists of four (4) selected oil companies namely: Shell, Chevron, Agip and TotalFinaElf operating in Nigeria. Questionnaires, interview, and physical observation were all used to elicit a response from the respondents in this study while simple frequency and chi-square were used in the data analysis with the aid of SPSS 17.0. Questionnaires were properly structured and face validity achieved by the researchers and employers for the instruments used for data collection to ensure they were valid. Test-retest method of reliability was applied, and a reliability index of 0.73 was obtained indicating a high degree of consistency. The results of both the descriptive and inferential statistics indicate that objectives were met. Hypotheses were tested using the Friedman chi-square test to determine the nature of skill and technological development in the Nigeria's oil and gas industry. With a computed Chi-square of 2.120 against the tabulated Chi-square value of 2.2524, the null hypothesis was accepted, and alternate rejected resulting in the conclusion that skill and technological development in the Nigeria's oil and gas industry is not significant. Thus, the study concludes that multinational oil companies have not contributed significantly to the technical vocational skills and technological development in the Nigeria's oil and gas industry which is a critical role in building local capacity for Nigeria's oil and gas industry. The study, therefore, recommends that multinational oil companies should increase their training to acquire the requisite technical skills and competency for operations in the oil and gas industry.
Keywords: Technical Vocational Skills Technological Development and Oil and Gas

Introduction: All over the world, governments, corporate organizations and meaningful individuals are doubling their efforts in promoting vocational and technical education in tertiary institutions, with a very firm and strong conviction that skill formation and acquisition enhances productivity and sustains competitiveness locally and globally. Technical vocational skills and technological development the world all over is the secret to self-sufficiency, empowerment, breakthrough, and sustainability for inclusive growth and development in any economy. Domestication (not nationalization) of oil and gas industry in Nigeria is expected to enhance active local participation in the petroleum business not just in terms of human resources recruitment at the upper management and technical staff but as well as in material resources capable of internalizing significant portions of inputs in upstream operations. It was observed that as the proportion of the expenditures spent locally on the upstream sector increases, its contribution to the gross domestic product of the economy also significantly increases (Iledare, 2007). To achieve self-sufficiency, empowerment, breakthrough, and sustainability for inclusive growth and development, technical vocational education and training are required. The usefulness of vocational-technical education is inestimable as it stretches from an individual to the society at large (Amadi and Dokubo, 2013). Deliberate investment in research and development (R&D) is a key to the generation of knowledge (Bogoro, 2015). Apart from individual being the primary beneficiaries of vocational/technical education, the nation is usually the fundamental beneficiary of this form of education. In other words, vocational-technical education serves as an excellent instrument for making a positive change in individual's life and the society at large (Olaitan, 1996; Amadi and Dokubo, 2013).

Statement of Problem: Despite Nigeria's growing profile and wealth, the Country remains one of the poorest and technologically backward nations in the world. This is basically because the much-perceived wealth has not translated into improved welfare and one of the reasons for this is that over 90 percent of the yearly oil and gas industry expenditures escape the domestic economy as capital flight. The industry has continued to utilize foreign technician through the signing of bilateral agreements with foreign institutions for the provision of technical assistance which would be provided locally. Technical vocational skills and technological development in Nigeria has not received the deserved attention from government and the oil industry it ought to receive. Nigeria appears to have succumbed to the pressure of craving for university degree syndrome to the total neglect of technical and vocational training. The consequence for this is that unemployment rate continues to rise yearly from graduates who cannot find jobs and capital flight resulting from outsourcing of technical manpower also continues to rise yearly. A visit to some technical institutions also reveals that old equipment purchased or donated to the institutions have all rotten or broken down beyond repair as a result of under-utilization of the machines due to low enrolment and lack of experience in handling the machines. Thus, this study is poised to examine the effect of technical vocational skills and technological development in the Nigeria's oil and gas industry.

The objective of the Study: The main objective of this study was to examine the effect of technical vocational skills and technological development in the Nigeria's oil and gas industry. However, specific objective sought in the study are: to determine the extent of collaboration between the oil companies operating in Nigeria and the universities and other research institutions on research and development and; to assess the nature of skill and technological growth in the Nigeria's oil and gas industry. The research question is "to what extent do oil companies collaborate with universities and other research institutions in Nigeria on R&D?" and "what is the nature of skill and technological growth in the Nigeria's oil and gas industry?

Conceptual Framework: Vocational and Technical Education generally Defined: Technical vocational education and training are those experiences whereby an individual learns to carry on successfully any useful occupation (Okoro, 1999). It is that aspect of education that exposes the learner to the acquisition of demonstrable skills that could be transformed into economic benefits (Akerele, 2007). Vocational education is an education programme that prepares students mainly for occupations requiring manipulative skills or non-technical occupations in such fields as agriculture, business education, home economics, painting, decorating and others, organized to secure confidence and experience by the individual students (Danko, 2006). Thus, we may, therefore, define technical vocational education as a carefully designed programme aimed at preparing an individual towards becoming a more productive and self-reliant in order to contribute meaningfully to socio-economic growth and development of a nation. Technical vocational education and training thus equip people not only with technical and vocational skills but with a broad range of knowledge, skills, and attitudes that are now recognized as indispensable for meaningful participation in work and life (Ayonmike and Okeke, 2015).
Technical Education stresses the engineering aspects of vocational education, such as electrical/electronic, mechanical and automobile trade. It involves understanding and practical application of the basic principle of mathematics and science (Danko, 2006; Amoor, 2011). Vocational and Technical Education is basic for rapid technological advancement (Okorie, 2001). In Nigeria, there has been an emphasis in recent times on improving vocational and technical education in tertiary institutions basically for combating unemployment and poverty, as well as improve the economic performance of the nation. The task of technical education is the transmission of ideas, skills, values of work and environment and what individual can do with his or her life (Olaitan, Nwachukwu, Igbo, Onyemachi and Ekong, 1999).
Odu (2011) state that for vocational education to be self-reliant and productive, it needs not be operated in a vacuum but rather, it has to be hooked unto factors that will help learners and all stakeholders in vocational-technical education to be practical and not just theoretical in their approach so as to make vocational-technical education a meaningful and life-long experience.
Factors that will help Learners and All Stakeholders in Vocational Technical Education to be Practical

The following factors according to Ezekiel and Usoro (2009) cited in Odu (2011) will help learners and all stakeholders in vocational-technical education to be practical:

i. Appreciation of dignity of work
ii. Utility and culture in vocational education
iii. Democracy in vocational education
iv. Plights of school drop-outs
v. Economics of vocational education
vi. Needs of youths and adults
vii. Needs of the society
viii. Basic rights of the citizenry

Other factors this study identify as critical include: government policy, the political will to support vocational-technical education, a partnership with relevant institutions and international agencies, political climate, economic and social environment as well as peoples' orientation towards skill acquisition which vocational-technical education is all about.

Technology Transfer: Technology transfer is the process of sharing skills, knowledge, technologies, methods among governments and other institutions. This ensures that scientific and technological developments are accessible to a wider range of users, who can then further develop and exploit the technology into new products, processes, applications, materials or services (Liu, Yuan, and JiaqiXue, 2009; Mohamed and Barjoyai, 2013). Technology transfer is closely related to and may arguably be considered a subset of knowledge transfer. Oil and gas industry is globalizing its products and operations due to its sophistication and universal needs. On the other hand, technology brokers are people who discover how to bridge the disparate worlds and apply scientific concepts or processes to new situations or circumstances (Madujibeya, 1976; Mohamed and Barjoyai, 2013). Related terms, used almost synonymously, include "technology valorization" and "technology commercialization." While, conceptually, the practice has been utilized for many years including the ancient times where Archimedes was notable for applying science to practical problems (Matutinović, 2009; Mohamed and Barjoyai, 2013), whereas the present-day volume of research, combined with high-profile failures has led to a focus on the process itself (Mohamed and Barjoyai, 2013).

Transfer Process: Because of the potential complexity of the technology transfer process, technology transfer organizations are often multidisciplinary, including economists, engineers, lawyers, marketers, and scientists. The dynamics of the technology transfer process has attracted attention in its own right, and there are several dedicated societies and journals (Mohamed and Barjoyai, 2013). Many companies, universities, and governmental organizations now have a research and development department dedicated to identifying research, which has potential commercial interest and strategies for how to exploit it (Ibrahim, 2012; Mohamed and Barjoyai, 2013). Many research result may be of scientific and at the same time have substantial commercial interest. However, patents are usually issued for practical processes; and so someone, not necessarily the researchers, must come up with a specific practical process. Another consideration is commercial value. Those with commercial value are the ones that generate more income than others. Similarly, research departments may work on behalf of research institutions, governments, and even large multi-nationals. Where start-ups and spinouts are the clients, commercial fees are sometimes waived in lieu of an equity stake in the business (Creswell, 2012; Mohamed and Barjoyai, 2013).

Transfer Instrument and Human Resource Development: When many people think of the oil and natural gas industry, they hardly think of "high-tech." In fact, they probably think of an old-fashioned, dirty industry using technology from decades ago. Most people do not realize how outdated these images are (Hutchison, Johnston, & Breckon, 2010; Mohamed and Barjoyai, 2013). The oil and gas industry has advanced in its operation long ago, and in fact, the industry is one of the few in the world where you never actually "see" the product from the well to the refinery and to the gas tank of your vehicle. Petroleum products are safely and efficiently produced and transported in a totally enclosed environment (Mohamed and Barjoyai, 2013). The most important interface in technology transfer is, however, the human resources. Thus, the key point in technology transfer is how to transform human resources into an idea of the interface (Mohamed and Barjoyai,

2013). According to European Union (EU) Report (2008), the development of human resources in technology transfer could be conducted in two ways:

i. From a macrocosmic point of view, the training is done through project-based learning;
ii. From a microcosmic point of view, the training is done through self-development. Self-development is still indispensable to project-based learning.

To conduct the technology transfer into technology exchange, the technology receiver has to organize a learning group to learn the ideas and methods of the technology provider. Without systematic learning, the receiver will find himself actually benefiting nothing from technology transfer. Generally, of the two ways of training, project-based learning is more systematic for training (Mohamed and Barjoyai, 2013). According to Hargadon (2003) in Hong (1994), it involves:

i. Confrontation: At this stage, some people may reject new technology because the apparent shortcomings associated with the original technology.
ii. Problem Identification: The functions of the original technology are reviewed in terms of its effectiveness and efficiency.
iii. Design of new functions: The functions of the new system are either integrated into those of the original system or replaced.
iv. Simulation: The effectiveness of technology transfer is tested.
v. Evaluation: The effectiveness of technology transfer is appraised, and the standards of similar technology are set.

Moreover, the trainees in technology transfer have a different task at each of the five stages. On this note, they must:

i. Collect directly and indirectly relevant information (such as space requirements and supply of materials) and classify the collected information during the confrontation stage;
ii. Develop mechanical and applicable information during the problem identification stage;
iii. Arrange out the functions and operating logic of each part of new technology during the designing stage of new operating approaches of function;
iv. Make a structural analysis of the mechanism of the operating system during the simulation stage;
v. Stress the assembly and maintenance of the functions of the operating system, and examine the possibility of simplification during the evaluation stage (Hong, 1994; Krein, 2009; Mohamed and Barjoyai, 2013).

From a microcosmic point of view, at each stage of technology transfer, the trainee can accomplish the transfer of "idea interface" only by self-development. In other words, each stage has its own approach and key points (Ahia and Saleh, 2008; Mohamed and Barjoyai, 2013).

Types of Industry-University Partnerships: The following are access to parties in an industry-university partnership: Physical Access/Resources: laboratories, equipment and facilities; Human Resources: highly skilled and experienced staff; Financial Resources: own research funds or access to public funds and; Other Knowledge Resources: information, database, libraries, processes, ideas, contacts, etc (Afuwoqi and Wu, 2011).

Benefits of IT-Related Partnerships

In an IT-related partnership, the following are some of the benefits to both universities and industries alike:

Benefits for Industry	Benefits for Universities
a. Thinking longer term by gaining an inside track on emerging trends and enabling technologies developed in universities	Improving market awareness by gaining insights into the research problems or interests to industries
b. Benefiting from new ideas and past experience	Enriching teaching programs
c. Going global by linking up the global academic networks	Maintaining research momentum in the IT sector
d. Outsourcing through saving costs and letting universities handle research	Applying knowledge and skills to solving real business IT-related problems
e. Access to IT skills within universities that company staff lack	Learning new IT skills and techniques developed in the industry
f. Accessing a range of IT disciplines at once in a university	Learning new approaches to managing projects and how industry works
g. Bringing additional financial resources to bear on research and thereby spreading costs	Drawing on a wider range of private funding and access to public funds requiring industry collaboration
h. Reducing risk by sharing costs, finding out what others are doing	Building on excellence and reputation
i. Complementing the company's physical resource base	Complementing the university's resource base
j. Recruitment made easy	Sourcing job opportunities for IT graduates

Source: Afuwoqi and Wu (2015). Promoting Industry-University Partnership in Information Technology, https://arxiv.org/ftp/arxiv/papers/1111/1111.1429.pdf

Local Content Policy in Nigerian Oil and Gas Industry: The concept of a local concept is global and not restricted to Nigerian, as it has previously been undertaken in several other oil-producing countries. Warner (2007) views Local Content from an angle of 'community content'; stating that "ultimately, community content is about realising a competitive advantage for an oil and gas development company in the eyes of both the local population and the country's guardians of economic policy" (Ugwushi, Ajayi & Eloji, 2009). The term Local Content (LC) aptly christened 'Nigerian Content' has been defined as 'the quantum composite value added or created in the Nigerian economy through the utilization of Nigerian human and material resources for the provision of goods and services to the petroleum industry' (NNPC Website; Ugwushi, Ajayi & Eloji, 2009).

Stakeholders in the Nigerian Content Development: Section 58 of the Nigerian Oil and Gas Industry Content Development Act lists eight stakeholder groups to be represented in the Nigerian Content Consultative Forum: Fabrication; Engineering; Finance services, legal and insurance; Shipping and logistics; Materials and manufacturing; Information and communication technology; Petroleum Technology Association of Nigeria (PETAN) and; Education and training. A fabrication subgroup was formed under the NCCF in 2010 chaired by Chukwuma Henry Okolo of Dorman Long Engineering. Most part of the organizations mentioned above is regularly consulted by the NCDMB. More recently, the Board has also has begun specific joint initiatives with many of these groups, in particular with OGTAN and PETAN (Ovadia, 2013).

Industry Stakeholders in the Nigerian Oil and Gas Industry Content Development Act are: Oil Producers Trade Section (OPTS), Lagos Chamber of Commerce and Industry (LCCI); Nigerian Content Consultative Forum (NCCF); Petroleum Technology Association of Nigeria (PETAN); Manufacturers Association of Nigeria Local Content Group (MANLOC); Council for the Regulation of Engineering in Nigeria (COREN); Oil and Gas Design Engineers of Nigeria (OGDEN); National Insurance Commission (NAICOM); Oil and Gas Trainers

Association of Nigeria (OGTAN); Nigerian Chamber of Shipping (NCS); National Association of Small and Medium Enterprises (NASME); Equipment Leasing Association of Nigeria (ELAN); National Association of Small Scale Industrialists (NASSI); Nigerian Economic Summit Group (NESG); Nigerian Bar Association and; the Chartered Institute of Bankers of Nigeria (Ovadia, 2013).

Vocational Technical Education and Poverty Alleviation

The usefulness of vocational-technical education is inestimable as it stretches from an individual to the society at large vocational/technical education serves as an excellent instrument for making a positive change in individual's life and the society at large. Thus, vocational/technical education alleviates poverty through so many ways such as: training millions of young people and adults to participate in the world of work; development of apprenticeship method beginning from full-time vocational/technical schools and then to vocational education programmes in public high schools; reduction of unemployment amongst the citizenry through self-employment; stimulation of production of competent or capable workers who would utilize available materials to develop the country; provision of youths with saleable skills which will enable them not only become employable but to establish their own industries and business; refining of individual's attitude to work by raising individual's self-ego and; it encourages both cognitive and psychomotor skills (Amadi & Dokubo, 2013).

Philosophical Concepts of Vocational Technical Education

Philosophy is a particular set of beliefs resulting from the search for knowledge about life and the universe (Hornby, 2000). In the same vein, philosophy can also be regarded as a set of beliefs guiding the conduct or practice of a particular group, field, events or phenomena. The philosophy vocational-technical education according to Okorie (2001) are:

i. The occupational choice of individuals should be based on the orientation of the individual such as interests, aptitude, and ability among others.
ii. All honorable and honest occupations are worthy of considerations in making the decisions about life's work.
iii. Each individual should have the opportunity to select an occupation in harmony with his orientation and the opportunities for employment in that occupation.
iv. The worth of an individual to society grows out of his contribution of skills, knowledge and applied productive capacity to tasks that need to be completed rather than out of artificial status connotation attached to some glamorous jobs.
v. Resources for education must be provided to develop all human resources. Otherwise, some individuals may possibly menace other individuals.
vi. Allocation of resources must reflect the needs of people.
vii. Priorities must be adjusted to provide resources in direct proportion to the cost of the investment required (Odu, 2011).

However, Prosser (1949) cited in Odu (2007) list the following as philosophical concepts of vocational-technical education:

i. For vocational-technical education and training to be effective, the training should be fashioned in the same way, same operations using the same tools and the machines in respect of the occupation being prepared.
ii. Vocational-technical education is effective to the extent that the individual is trained directly and specifically in the thinking and manipulative habits required in the desired occupation.
iii. The environment in which the trainees are prepared should resemble the environment he must eventually get employed.

iv.   Forever occupation, there is a minimum level of preparation needed in order to enable the trainees to obtain and retain employment in that occupation, and if the preparation is not attained up to that level, the occupation will neither benefit the trainee nor the society (Odu, 2011).

Theoretical Framework: Many theories have been propounded to underpin the concept of technical vocational skills and technological development. However, this study was anchored on human capital theory. Thus, most research works in the field of education adopt the human capital theory of Schultz (1975) as their theoretical foundation because it presumes that education or training has the potential for stimulating economic growth, technological progress, and productivity because it transfers useful knowledge, dexterities and skills for better lifetime earnings (Becker, 1964; Schultz, 1975; Robert, 1991; Ladipo, Akhuemonkhan and Raimi, 2013). From another viewpoint, Klein and Cook (2006) state that investment in people is a form of human capital which propels changes in the society. Like other forms of human capital, hands-on human ability can be increased through education, training, experience, health care, and so on" (Akhuemonkhan, Raimi and Dada, 2014).

Empirical Review:

Ekpulu, Donwa, and Mgbame (2015) focused on economic growth from oil and gas contributions. The broad objective of the study was to examine the contributions of oil and gas sector to economic growth. This study gave theoretical contributions of oil and gas sector to economic growth in Nigeria. The study contributes to the body of knowledge in the harmonization of literature on oil and gas sector contribution to economic growth is worthwhile as it provides a more comprehensive literature in this area of interest. Usman, Madu, and Abdullahi (2015) conducted a study depicting evidence of petroleum resources on Nigerian economic development (2000-2009). The main objective of the study was to examine the impact of petroleum on Nigeria's economic development. The variables were two, that is, crude oil revenue and the Gross Domestic Product GDP. The study relied on secondary data sourced from the Central Bank of Nigeria Statistical Bulletin and National Bureau of Statistics. The data used was a ten years record of GDP and Oil Revenue, 2000-2009. The tool of analysis used was simple linear regression model with the aid of Statistical Packages for Social Sciences (SPSS). The relationship was established between petroleum and the economy using the variables that can most represent petroleum and the economy. The study found that petroleum has a direct and positive significant relationship with the economy.

Nathaniel (2008) focused on technological capacity building in the Nigeria's Oil and Gas Industry. The objective of the study among others was to identify and analyze the determinants of the technological capacity building in the Nigeria's oil and gas industry. The methodology adopted in the study involved extensive literature search which was complemented with interviews during a visit to the industry and other institutions. The study found that partnering and alliance formulation are important tools in the development of the oil and gas industry, especially where the required capital and indigenous technical capacity are relatively in short supply. Chima, Owioduokit, and Ogoh (2002) examined the nature of technological capabilities formed in the Nigerian oil industry and the effects of government policy on technological capability building in the oil industry. This study was premised on the need to evaluate the transfer and acquisition of oil technology in Nigeria through the effort of the government and the oil companies. The broad objectives of this study are to: characterize the core capabilities in NNPC (production, investment, linkage, minor change, major change and strategic marketing); study the historical experiences of NNPC in acquiring and developing these capabilities; study the impact of technical change and government economic policy on the performance and capacity of NNPC to acquire, develop and upgrade these technologies. The main concern of the study was to examine the nature and magnitude of technological capabilities acquired by or transferred to Nigeria's oil monopoly, the NNPC. The study focused on Nigerian National Petroleum Corporation (NNPC) and its four refineries in Nigeria. It evaluates the strategy and effort of training adopted by the Nigerian government as a means of transferring the acquisition of oil technology by Nigerians. The study also evaluated the impact of technical change on the production and financial performance of the NNPC. Surveys were conducted on NNPC and its refineries. Data were sourced from extensive archival studies. The failure of the industry and the consequent domestic energy crises in Nigeria in the last decade are attributable to the weathering of these capabilities.

Terje, Alabi, and Richard (2012) examined how local content can be enhanced in the oil and gas industry in a developing country like Nigeria. The aim of the study was summarized into two questions: which actors are relevant for increasing local content in the Nigerian oil and gas industry and how are the capabilities provided by the actors interrelated, and why? The methodology adopted was open-ended face-to-face interviews. The empirical base was 18 in-depth interviews with professionals directly or indirectly related to the Nigerian oil and gas industry. The interviews revealed barriers for indigenous companies in accessing the industry. These were related to three major capabilities; capital, competence and delivery possibilities. The study found that some foreign companies are not ready to support any studies on enhancing competitiveness by local peers, either by product or process assessments or through questionnaires, interviews, fieldworks or any other means of data collection. The study also found that formal networking is weak due to many problems: economic and social infrastructural inadequacies; weak legal infrastructure; weak financial sector; low level of trust among major actors in the industrial network due partly to the weak legal infrastructure; low level of support for local suppliers by foreign oil companies; absence (until recently) of a local content law that encourages and even forces the major actors to consider local companies in supply contracts; low level of support for the local industry by the government; weak managerial competencies of local companies; low level of indigenous R&D and weak links between local universities, research institutions and companies. Many indigenous companies are not conversant of the need for such while many of the foreign companies are afraid of the effects on their operational interests as they are not sure of what would happen if the results are contrary to required 'best practice' in the industry. The study revealed that there are significant knowledge gaps between the indigenous companies, foreign competitive suppliers, and foreign oil companies as buyers. The gaps are in two major areas. The first is related to lack of skills and technical competencies in areas such as welding, engineering, general technological competencies, as well as management competencies such as project management, contractual skills, quality assurance, and legal requirements. The second is related to incompetency based on fundamental attitudes. One of these is the perception of quality and how this is manifested in terms of preventive and operational maintenance. However, both parties acknowledge the need for building local competence, knowledge transfer and exchange through direct interaction and joint ventures with foreign suppliers. Competencies of particular interest include project and contract management, contractual skills, quality assurance, safety performance, legal requirements and technological development.

Fajana (2005) examined essential elements for good industrial relations in the oil and gas sector. The study focused on the positive contribution social dialogue can make towards promoting mutual respect, trust, and confidence between the social partners and the government of Nigeria. Data collection for the study was both primary and secondary. The study revealed that there are at least 8,000 expatriate workers, who account for about 12 percent of the overall workforce in the oil sector. Mohamed and Barjoyai (2013) in a study titled "the effect of technology transfer on human resource development in oil and gas industry" examined the impact of technology transfer in the oil and gas sector of the Libyan economy between 1996-2010. Both quantitative and qualitative approaches were adopted in investigating the impact technology transfer had on the general economy during this period. The quantitative approach involved the use of times series data of some key economic indicators in the oil and gas industry while the qualitative approach was based on focus group discussions and interview of some major stakeholders in the oil and gas industry. Statistical package for social science (SPSS software) was used to analyze the quantitative data while NVivo9 software was used to analyze the qualitative data. The study found that technology transfer had both negative and positive impact on the oil and gas industry and some other sectors of the national economy. Similarly, findings from the study revealed that there was a drop in the generation of power due to lack of spare parts and expansion of the existing plants. However, the positive impact was that local engineers and technicians were brought in to some key positions which hitherto were under the dominance of foreign expatriates. The BDIT as propounded by study serves as a pivot upon which the impact of technology transfer could be assessed in any sphere of the national economy.

Results/Discussion of Findings

Table 1: What is the nature of skill and technological development in the Nigeria's oil and gas industry (see appendix 1)

Table 1 Evaluates the nature of skill and technological development in the Nigeria's oil and gas industry. Majority of the respondents affirm that activities of the Oil Companies have not encouraged the adaptation of local technology wherever possible in their operations in Nigeria. This submission is again verified at 3.9 significant mean response rate. The empirical descriptive evidence above at 90 percent agreement and 3.9 mean response confirms that Oil Companies prefer foreign skills and technical manpower rather than develop local skills and technology in the Country for their operations. Hence, they deny the Country of the requisite skills and technical manpower in the oil and gas industry.

Test of the Research Hypotheses:

H_a Skill and technological development in the Nigeria's oil and gas industry are significant.

Similarly, the mean responses and the standard deviations for the four questions (5-8) administered to achieve objective two were considered relevant for testing hypothesis two. The non-parametric Chi-square statistics were employed, and the result is presented below (see appendix 2):

The evaluation reveals a calculated Chi-square result of 2.120. This is less than the critical Chi-square result of 2.2524. Therefore, the null hypothesis should be accepted, and alternative hypothesis rejected accordingly. This result is also significant as asymp. Sig is $0.000 < 0.05$. Based on this Chi-square result, the study holds that skill and technological development in the Nigeria's oil and gas industry is not significant.

Research Key Objective: The results of both the descriptive and inferential statistics again indicate that objective two was met. Hypothesis two was tested using the Friedman chi-square test to determine the nature of skill and technological development in the Nigeria's oil and gas industry. With a computed Chi-square of 2.120 against the tabulated Chi-square value of 2.2524, the null hypothesis was accepted, and alternate rejected resulting in the conclusion that skill and technological development in the Nigeria's oil and gas industry is not significant.

This result is in line with the works of Nathaniel (2008) in his paper at the 19th Annual International Information Management Association conference in San Diego, CA, shows that Multinational Oil Companies operating in Nigeria have usually shown a preference for imported technology instead of developing the technical skills of Nigerians. Chima, Owioduokit, and Ogoh (2002) found that the success of the oil industry in the early years after 1975 are attributable to initial capabilities that were developed in the industry. In the same vein, the failure of the industry and the consequent domestic energy crises in Nigeria in the last decade are attributable to the weathering of these capabilities. Terje, Alabi, and Richard (2012) revealed that there are significant knowledge gaps between the indigenous companies, foreign competitive suppliers, and foreign oil companies as buyers. Terje et al. (2012) showed that Multinational Oil Companies in Nigeria are reluctant in adhering to the local content initiatives of the government in the oil and gas industry and have not committed themselves seriously in developing local capacity in manpower in the Oil and Gas industry.

Summary of Findings/Conclusion: The nature of skill and technological development in the Nigeria's oil and gas industry was not significant**.** However, skill and technological development in critical areas of the industry were found to be grossly inadequate to move the oil industry to the enviable position of self-sufficiency. In this study, it has been established that skill and technological development of Nigerians in the industry are grossly inadequate as the dominance of highly skilled expatriate manpower and technology still hold sway in the industry.

Recommendations: Based on the findings of this study on the effect of technical vocational skills and technological development in the Nigeria's oil and gas industry, multinational oil companies have a critical role to play in building local capacity for Nigeria's oil and gas industry. Nigerian employees should be trained to acquire the requisite technical skills and competency for operations in the oil and gas industry. In other words, multinational oil companies should lead skill development in Nigeria with their huge human and material resources. The tendency of multinational oil companies resorting to foreign expatriates in matters where local capacity could be developed should be discouraged. Nigerians should be trained and developed to be masters of their own economic destiny while outsourcing should be used rather sparingly.

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Appendix 1

Questions 1, 2, 3, & 4	SD (%)	D (%)	U (%)	A (%)	SA (%)	Total	Mean	Std. Dev
1. Oil companies have encouraged the adaptation of local technology wherever possible in their operations	37 (10)	45 (12.1)	3 (0.8)	252 (68)	34 (9.2)	371	3.6	1.12
2. Oil companies encourages the training of Nigerians in technical areas both on the job and outside the country	0 (0)	34 (10)	34 (10)	238 (70)	34 (10)	371	3.8	0.75
3. Skills and technological development in project, facilities, contract management and contractual skills, refineries maintenance are excellent	34 (10)	0 (0)	68 (20)	102 (30)	136 (40)	371	3.7	1.01
4. The technology initiated and achieved through the Petroleum Technology Development Fund (PTDF) by oil companies are sufficiently moving the industry forward	0 (0)	0 (0)	34 (10)	306 (90)	0 (0)	371	3.9	0.30
Overall Mean							**(153.8)**	**3.17 (0.8)**

Source: Researcher's Computation, 2016.

Appendix 2

NPar Tests

Table 2:1 Descriptive Statistics					
	N	**Mean**	**Std. Dev**	**Min**	**Max**
Oil companies have encouraged the adaptation of local technology wherever possible in their operations	34	3.4	0.92	1.00	5.00
Oil companies encourage the training of Nigerians in technical areas both on the job and outside the country	34	2.5	1.21	2.00	4.00
Skills and technological development in project, facilities, contract management and contractual skills, refineries maintenance are excellent	34	3.4	0.92	1.00	5.00
The technologies initiated and achieved through the Petroleum Technology Development Fund (PTDF) by oil companies are sufficiently moving the industry forward	34	3.5	1.29	2.00	4.00

Source: Researcher's Computation, 2016.

Friedman Test

2.2: Ranks	
	Rank
Oil companies have encouraged the adaptation of local technology in their operations	3.35
Oil companies encourage the training of Nigerians in technical areas both in Nigeria and outside the country	2.05
Skills and technological development in project, facilities, contract management/contractual skills and refineries maintenance are excellent	3.55
The technologies initiated and achieved through the Petroleum Technology Development Fund (PTDF) by oil companies are sufficiently moving the industry forward	2.65

SourceSource: Researcher's Computation, 2016

Test Statistics[a]

N	340
Chi-Square	2.120
Df	4
Asymp. Sig.	.000

    a. Friedman Test

Source: Researcher's Computation, 2016