EXPLORING REFORMS IN POLICY AND GOVERNANCE FOR TECHNOLOGICAL INNOVATION TO ENHANCE INDUSTRIAL GROWTH IN NIGERIA

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Abstract

This paper explored reforms in policy and governance for technological innovation to enhance industrial growth in Nigeria. The specific objectives were to determine the reforms in policy and governance required for technological innovation; and to identify impediments making it difficult for policy and governance to march its goals in technological innovation to enhance industrial growth in Nigeria. Survey research design was adopted. The population consists of 147 made up of 62 technological professionals and 85 organized industrial sector (OIS) employers. The population was randomly selected across the six geopolitical zones that make up Nigeria. Mean and standard deviation were used for data analysis while t-test was used to test the null hypotheses at 0.05 levels of significance with the aid of Statistical Package for Social Sciences (SPSS). The findings revealed among others policy reforms required for technological innovation to enhance industrial growth in Nigeria. These policy reforms include: policy to improve resource allocation, policy to ensure coordination from planning to implementation stages to smooth the pace of training of competent workers, and policy to steer skills development based on the potential of the economy. The conclusion was made that non-achievement of the goals of policy in technological innovation is an indication of the gap between technological innovation policy and governance. This gap has persisted due to non-commitment to putting the policy to effect, poor institutional framework and corruption. The study recommended the need for the ministry of education in collaboration with administrators in technological institutions to formulate effective policies and strategic governance that will strengthen technological innovation especially the implementation of the curriculum towards achieving industrial growth via students' competencies.

Keywords: Reforms, Policy, Governance, Technological Innovation, Industrial Growth.

Introduction

Nigeria with diverse geographic, economic and demographic backgrounds is still struggling with sustainable industrial growth. At the heart of these struggles is skills development through education and training, to fulfil labour market needs. Large amount of evidence by technological professionals and other scholars suggest that technological innovation is a rational and effective mechanism of dealing with these challenges, and

preparing the labour force for the digital age in both formal and informal labour markets, for national development (Olabiyi, 2018).

The Industrial Revolution indeed had profound impacts on development around the world, and in fact changed the conditions of work and affected different spheres of human life. It reduced the reliance on farming and led to urbanization; and also, significantly caused shift to manufacturing where inventions and innovations were characterized by increase in the usage of machines which led to production efficiency, lower pricing and improved wages and improvement in working conditions and workers' welfare (Zancajo & Valiente, 2018). However, as much of the activities that characterized these periods led to spontaneous development, the change in human needs and the fast pace of technological improvement led to ever changing industrial work needs. Reforms in policy and governance for technological innovation are the key to revitalizing skills development in Nigeria and African region in general. Skilled and competent workforce, according to Tripney & Hombrados (2013) and UNESCO (2013) as cited in Minghat, Shahroni & Mustakimis & (2023), is a key to promoting youth employment, national productivity, economic growth, and market competitiveness both regionally and globally. Unfortunately, compared to the newly industrializing countries (NICs) of the world such as Korea, China, Malaysia, India, and Singapore, African continent and Nigeria in particular is yet to produce adequate skilled manpower for advancing digital world of work perhaps due to lack of enabling policies and governance for technological innovation.

Many policies have evolved over the last one decade but with outcomes falling behind expectations. For instance, in Nigerian, while the National Policy on Education stipulates that technical colleges and polytechnic establish and operate production units for on-the-job training, as well as run commercial activities and partner with industries, most technical colleges and polytechnics unfortunately are lacking in adequate facilities and functional workshops to accomplish this mandate (Okorafor & Nnajiofo, 2017). In emerging economies such as Nigeria, only very few institutions engage industries beyond industrial attachment for their students, such as collaboration in the development of curriculum and learning materials, training of instructors, provision of work-place practical training, facility improvement and employment opportunities. This is in addition to much emphasis frequently placed by technological institutions on academic programmes as against manpower need of industries. Coupled with these is insufficient data on skill gaps to enable national manpower planning and implementation, as well as technical assessment and evaluation being largely academic as against industry based (Okorafor & Nnajiofo, 2017). In reality, there is no one universal policy and governance for technological innovation, which will suit Nigerians' need for an improved technical competence tailored towards industrial growth. But technological innovation policy and governance must be in

agreement with designing, delivering, adapting and managing information technology in response to global trends in industrial growth. Within the armpit of these policy and governance are answers to question such as: how can technological innovation respond to stakeholders and customers' increasing expectations, for best practices in information technology, to support industrial growth. Ultimately, the effectiveness and responsiveness of a sound Nigerian policy and governance on technological innovation should be one measured by its impact on the social and economic development of the Nigerian nation. In view of the above statements, the need arise to determine policy and governance reforms for technological innovation to enhance industrial growth in Nigeria.

Statement of the Problem

After a period of neglect, technological innovation is now firmly on the agenda of governments around the world. Youth unemployment, social exclusion and poverty have led many decision-makers to refocus their attention on providing skills development opportunities that respond to evolving social and economic demands. Far from being the weakest link in education systems, technological innovation is emerging as a cornerstone for the transformation of the industrial sector. Indeed, the development of skills through technological innovation is now one of the most often-cited priorities by ministers of education in both developing and developed countries.

This has drawn the interest of many developing nations like Nigeria to reform policy and governance for technological innovation in particular as an integral part of national development strategy. However, for more than three decades that Nigeria embraced information technology, the country is yet to, at least, produce adequate skilled middle-level manpower to attain modest stage of self-reliance. Technological innovation being a rational and effective mechanism of dealing with skills development for industrial growth and national development has long been acknowledged in Nigeria. Therefore, several policies regarding technological innovation towards addressing the skill gap of Nigerians, for national development, have been evolved over the last one decade. However, outcomes of these reforms have fallen behind expectations perhaps due either to their poor formulation and implementation, thus, the concern of this paper.

Research Objectives

The general objective of the study was to determine the reforms in policy and governance for technological innovation to enhance industrial growth in Nigeria. Specifically, the study sought to determine the:

1. Policy reforms required for technological innovation to enhance industrial growth in Nigeria.

2. Strategic governance approach to help institutions achieve key policy goals of technological innovation towards sustainable industrial growth in Nigeria;
3. Impediments making it difficult for policy and governance to march its goals in technological innovation to enhance industrial growth in Nigeria.

Research Questions

1. What are the policy reforms required for technological innovation to enhance industrial growth in Nigeria?
2. What are the strategic governance approaches to help institutions achieve key policy goals of technological innovation towards sustainable industrial growth in Nigeria?
3. What are the impediments making it difficult for policy and governance to march its goals in technological innovation to enhance industrial growth in Nigeria?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

1. There is no significant difference between the mean responses of technological professionals and the organized industrial sector employers on the policy reforms required for technological innovation to enhance industrial growth in Nigeria.
2. There is no significant difference between the mean responses of technological professionals and the organized industrial sector employers on the strategic governance approach to help institutions achieve key policy goals of technological innovation towards sustainable industrial growth in Nigeria.
3. There is no significant difference between the mean responses of technological professionals and the organized industrial sector employers on the impediments making it difficult for policy and governance to march its goals in technological innovation to enhance industrial growth in Nigeria.

Methodology

The study adopted a survey research design. According to Nworgu (2015) survey research design is one in which a group of people or items are studied by collecting and analysing data from only a few people or items considered to be representative of the entire group. The design was considered necessary because of the wide distribution of the respondents and the polychotomous structured instrument used for data collection. The area of the study was Nigeria, West African Region. Nigeria is one of the West African countries with 36 States grouped into six geopolitical zones, the North Central (NC), North East (NE), North West (NW), South West (SW), South East (SE) and South-South (SS). The population consists of 147 made up of 62 technological professionals and 85 organized industrial sector (OIS) employers. The number was manageable hence, there was no sampling. Structured questionnaire containing a total of 18 items was the instrument for data

collection. The items in the instrument were structured in four points rating scale of, Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) with numerical values of 4, 3, 2, and 1 respectively. The instrument was validated by three experts and the reliability of the instrument was determined using Cronbach Alpha reliability coefficient method which yielded 0.82. Data collected were analysed using mean and standard deviation, while t-test was used to test the null hypotheses at 0.05 level of significant. Decisions were made using the real limits of the scale values 1 to 4 on a four-point scale as follows:

Strongly Agree (SA) - 3.50 - 4.00
Agree (A) - 2.50 - 3.49
Disagree (D) - 1.50 - 2.49
Strongly Disagree (SD) - 1.00 - 1.49

The standard deviation was used to determine the homogeneity or otherwise of the opinions of the respondents. For the t-test statistics, the t-test result was compared with the significant value at 0.05 level of significance and at appropriate degree of freedom. The null hypothesis was not rejected where the significant value was less than the 0.05 significant level at appropriate degree of freedom, otherwise the null hypothesis was rejected.

Results

Research Question One: What are the policy reforms required for technological innovation to enhance industrial growth in Nigeria?

Table 1: Mean and standard deviation concerning policy reforms required for technological innovation to enhance industrial growth in Nigeria.

S/N	Item statements	technological professionals N=62		OIS employers N=85		Overall		Decision
		X_1	SD_1	X_2	SD_2	X_G	SD_G	
1	Formulate policy to improve resource allocation to make technological innovation more efficient	3.36	0.78	3.39	0.94	3.38	0.86	Agree
2	policy to ensure coordination from planning to implementation stages to smooth the pace of	3.46	0.66	3.31	0.66	3.39	0.67	Agree

	training of competent workers							
3	Policy to steer skills development based on the potential of the economy	3.17	1.06	3.25	0.81	3.23	0.94	Agree
4	Policy to narrow the gap between theory and practical through field trips/excursions	3.42	0.92	3.13	0.78	3.28	0.85	Agree
5	Policy to ensure that technological institutions assessment is largely industry as against academic based	2.99	1.02	3.22	0.71	3.11	0.87	Agree
6	Policy to enforce collaboration in the development of curriculum and learning materials, and training of instructors	3.44	0.93	3.55	0.83	3.49	0.88	Agree
	Grand Mean/Pooled Standard Deviation	**3.28**	**0.86**	**3.33**	**0.79**	**3.31**	**0.82**	**Agree**

The result presented in Table 1a shows that the respondents overall mean response ranges from 3.11 to 3.49 which shows that the items are the policy reforms required for technological innovation to enhance industrial growth in Nigeria. The overall cluster mean of 3.31 further indicated that the respondents totally agreed to the items as the policy reforms required for technological innovation to enhance industrial growth in Nigeria. The low pooled standard deviation of 0.82 shows that the respondents' responses do no differ remarkably.

Hypothesis One: There is no significant difference between the mean responses of technological professionals and the organized industrial sector employers on the policy reforms required for technological innovation to enhance industrial growth in Nigeria.

Table 1b: t-test analysis of mean responses of technological professionals and the organized industrial sector employers on the policy reforms required for technological innovation to enhance industrial growth in Nigeria.

Variables	N	X	SD	df	T	Sig (2- tailed)	Decision
Technological professionals	62	3.28	0.86	73	1.05	0.17	Not Significance
OIS employers	85	3.33	0.79				

Table 1b above shows that the t-value at 0.05 level of significant and 73 degree of freedom for the nine items is 1.05 with significant value of 0.17. Since the significant value of 0.17 is less than the 0.05 level of significant the null hypothesis is not significant. This invariably depicts that there is no significant difference on the mean responses of technological professionals and the organized industrial sector employers on the policy reforms required for technological innovation to enhance industrial growth in Nigeria.

Research Questions Two: What are the strategic governance approaches to help institutions achieve key policy goals of technological innovation towards sustainable industrial growth in Nigeria?

Table 2a: Mean and standard deviation on strategic governance approaches to help institutions achieve key policy goals of technological innovation towards in Nigeria.

S/N	Item statements	technological professionals N=62		OIS employers N=85		Overall		Decision
		X_1	SD_1	X_2	SD_2	X_G	SD_G	
7	Collaboration with the industrial sector employers in organizing seminars and workshops for both students and staff	3.39	0.87	3.37	0.92	3.38	0.89	Agree
8	Investing in research and development and providing incentives for students and staff that invented in new technical ideas	3.17	0.84	3.47	0.73	3.32	0.79	Agree
9	Setting up task forces to monitor compliances with technological policies to ensure the integration of the skills and competency required for industrial growth	3.44	0.97	3.45	1.01	3.45	0.99	Agree

10	Granting industry visit to various institutions for relevant exposure in practical work	3.15	1.01	2.94	0.73	3.05	0.87	Agree
11	Disabled learners and gender equity require preferential admissions, for inclusive preparation of manpower towards industrial growth	3.44	0.82	3.42	0.67	3.43	0.75	Agree
12	Provision of industrial attachment on interval basis as against one time basis	3.28	0.98	3.17	0.79	3.23	0.89	Agree
	Grand Mean/Pooled Standard Deviation	**3.31**	**0.91**	**3.30**	**0.79**	**3.31**	**0.85**	**Agree**

The result of data analysis shows that the overall mean response of the respondents' ranges from 3.05 to 3.46 indicating that the respondents agreed on the items as the strategic governance approaches to help institutions achieve key policy goals of technological innovation towards sustainable industrial growth in Nigeria. The overall cluster mean of 3.31 further shows that the respondents agreed in all the items. The low pooled standard deviation of 0.85 obtained from the analysis indicates that the respondents have consensus opinion in their responses to the items.

Hypothesis Two: There is no significant difference between the mean responses of technological professionals and the organized industrial sector employers on the strategic governance approach to help institutions achieve key policy goals of technological innovation towards sustainable industrial growth in Nigeria.

Table 2b t-test analysis of mean responses of technological professionals and the organized industrial sector employers on the strategic governance approach to help institutions achieve key policy goals of technological innovation towards sustainable industrial growth in Nigeria.

Variables	N	X	SD	Df	T	Sig (2- tailed)	Decision
technological professionals	62	3.31	0.91	73	1.38	0.43	Not Significance
OIS employers	85	3.30	0.85				

The result of data analysis in table 2b shows that the t-value at 0.05 level of significant and 73 degree of freedom for the nine items is 1.38 with significant value of 0.43. Since the significant value of 0.43 is less than 0.05 level of significant, the null hypothesis is not significant. The implication is that there is no significant difference between the mean responses of technological professionals and the organized industrial sector employers on the strategic governance approach to help institutions achieve key policy goals of technological innovation towards sustainable industrial growth in Nigeria. Therefore, the second null hypothesis is upheld.

Research Questions Three: What are the impediments making it difficult for policy and governance to march its goals in technological innovation to enhance industrial growth in Nigeria?

Table 3a: Mean and standard deviation on the impediments making it difficult for policy and governance to march its goals in technological innovation in Nigeria.

S/N	Item statements	technological professionals N=62		OIS employers N=85		Overall		Decision
		X_1	SD_1	X_2	SD_2	X_G	SD_G	
13	Frequent changes in government and politics in Nigeria and lack of political will	3.28	0.61	3.37	0.75	3.08	0.87	Agree
14	Cancerous growth of corruption in Nigeria is spreading fast across the education sector	3.23	0.84	3.28	0.61	3.23	0.94	Agree
15	Inability to foster a culture of commitment i.e. thoughtful over-communication and being open to feedback	3.42	0.92	3.13	0.78	3.28	0.85	Agree
16	Outdated curriculum that do not meet the modern labour	3.23	0.84	3.37	0.75	3.28	0.74	Agree

	market/industry skill demand							
17	Lacking in adequate facilities and functional workshops to accomplish policy mandate	3.15	1.01	2.94	0.73	3.30	0.79	Agree
18	Problem of confusing school-industry collaboration with industrial training (IT)	3.17	1.06	3.25	0.81	3.28	0.61	Agree
	Grand Mean/Pooled Standard Deviation	**3.29**	**0.88**	**3.32**	**0.77**	**3.31**	**0.83**	**Agree**

The result presented in table 3a indicates that the respondents overall mean response ranges from 3.08 to 3.47 which shows that the items are the impediments making it difficult for policy and governance to march its goals in technological innovation in Nigeria. The overall cluster mean of 3.31 further indicated that the respondents totally agreed to the items as the impediments making it difficult for policy and governance to march its goals in technological innovation in Nigeria. The low pooled standard deviation of 0.83 shows that the respondents' responses do no differ remarkably.

Hypothesis Three: There is no significant difference between the mean responses of technological professionals and the organized industrial sector employers on the impediments making it difficult for policy and governance to march its goals in technological innovation to enhance industrial growth in Nigeria.

Table 3b: t-test analysis of mean responses of technological professionals and the organized industrial sector employers on the impediments making it difficult for policy and governance to march its goals in technological innovation in Nigeria

Variables	N	X	SD	df	T	Sig (2- tailed)	Decision
technological professionals	62	3.29	0.88	73	1.23	0.44	Not Significance
OIS employers	85	332	0.77				

Table 3b above shows that the t-value at 0.05 level of significant and 73 degree of freedom for the nine items is 1.23 with significant value of 0.44. Since the significant value of 0.44 is less than the 0.05 level of significant the null hypothesis is not significant. This invariably

shows that there is no significant difference between the mean responses of technological professionals and the organized industrial sector employers on the impediments making it difficult for policy and governance to march its goals in technological innovation in Nigeria.

Discussion of Results

Based on the findings of this study, the majority of technological professionals and OIS employers are generally in agreement over the policy reforms required for technological innovation to enhance industrial growth in Nigeria. Those policy reforms considered as pertinent to technological innovation include: formulation of policy to improve resource allocation to make technological innovation more efficient, policy to ensure coordination from planning to implementation stages to smooth the pace of training of competent workers, policy to steer skills development based on the potential of the economy, policy to narrow the gap between theory and practical through field trips/excursions, policy to ensure that technological institutions assessment is largely industry as against academic based, policy to enforce collaboration in the development of curriculum and learning materials, and training of instructors.

In line with the finding, ILO (2010b) and ILO (2011a) as cited in Olabiyi & Uzoka (2020) believe that to develop students' competencies will include formulating higher educational requirements for prospective trainees; competency-based training based on occupational standards, and expanded supply of qualified instructors. The finding also supports the assertion of Lai, Adib & Lee (2018) that there is need to develop framework structures for human resource development involving government, employers, workers, and technological institutions to facilitate the exchange of information towards developing students competency.

The first null hypothesis sought whether any significant difference between the mean responses of technological professionals and the organized industrial sector employers on the policy reforms required for technological innovation to enhance industrial growth in Nigeria, was accepted. It was therefore concluded that there was no significant difference between the mean responses of technological professionals and the organized industrial sector employers on the policy reforms required for technological innovation to enhance industrial growth in Nigeria. The findings in respect of hypothesis one support previous study carried out by Ibrahim (2023) who found out that to develop technological students' competencies will include formulating high policies to guide the institutions training of prospective trainees, competency-based training based on occupational standards, and expanded supply of qualified instructors.

The second finding discovered that the respondents agreed on the strategic governance approaches to help institutions achieve key policy goals of technological innovation towards sustainable industrial growth in Nigeria. These approaches include: collaboration with the industrial sector employers in organizing seminars and workshops for both students and staff, investing in research and development and providing incentives for students and staff that invents new technical ideas, setting up task forces to monitor compliances with technological policies to ensure the integration of the skills and competency required for industrial growth, granting industry visit to various institutions for relevant exposure in practical work, disabled learners and gender equity require preferential admissions, for inclusive preparation of manpower towards industrial growth, and provision of industrial attachment on interval basis as against one time basis. The result is in support of the assertion of Anene-Okeakwa, Chukwurah & Ikenga (2020) and ILO (2015) who emphasized that competency-based training based on occupational standards, qualified instructors and regulations should be adopted towards improving the competency of the workforce.

The analysis of the t-test between the mean responses of technological professionals and OIS employers on strategic governance approaches to help institutions achieve key policy goals of technological innovation showed that the null hypothesis was accepted. This implies that there is no significant difference between the mean responses of technological professionals and the (OIS) employers on the strategic governance approaches to help institutions achieve key policy goals of technological innovation towards sustainable industrial growth in Nigeria. The finding agreed with the submission of Olabiyi & Uzoka (2020) that institutions should device innovative strategies to help students achieving key policy goals of technological innovation

Further result revealed that the majority of technological professionals and OIS employers are generally in agreement over the impediments making it difficult for policy and governance to march its goals in technological innovation in Nigeria. These impediments includes; frequent changes in government and policies in Nigeria and lack of political will, cancerous growth of corruption in Nigeria which is spreading fast across the education sector, inability to foster a culture of commitment, outdated curriculum that do not meet the modern labour market/industry skill demand, lacking of adequate facilities and functional workshops to accomplish policy mandate, and problem of confusing school-industry collaboration with industrial training (IT).

In line with the finding is the assertion of Okorafor & Nnajiofor (2017) that it is obvious that chanting policies will not take a country anywhere, if there are no good structures and governance to put the policies to practice. It is not enough to predict the future; rather it is

better created. The finding also aligns with that of Ibrahim (2023) who discovered that a number of factors have hindered technological innovation in Nigeria to march its policies. Some of these factors are: faulty policy and institutional frameworks, policy somersaults arising from instability of the political environment, and lack of political will compounded by the haemorrhage of rampant corruption.

The analysis of the t-test between the mean responses of technological professionals and OIS employers shows that the third null hypothesis was accepted. This implies that there is no significant difference between the mean responses of technological professionals and the (OIS) employers on the impediments making it difficult for policy and governance to march its goals in technological innovation in Nigeria. The finding agreed with the result of Onuoha & Àmadi (2023) that there is no significant difference between the mean rating of lecturers and industry personnel on the challenges hindering the schools-industry synergy to enhance the skill development of students for matching industry skill demand in South-East Nigeria.

Recommendations and Conclusion

This paper determined policy reforms for technological innovation to enhance industrial growth in Nigeria. The result of this study suggested that there are policy reforms required for technological innovation to enhance industrial growth in Nigeria. The study identified the need for policy to steer skills development based on the potential of the economy; while it particularly established strategic governance approaches to help institutions achieve key policy goals of technological innovation towards sustainable industrial growth in Nigeria. Furthermore, this study presented a window of opportunity to closely examine the impediments making it difficult for policy and governance to march its goals in technological innovation in Nigeria.

Formulating policies is one thing and putting the policies to practice is another. Actualizing the goals of the policy indicates effective practice of the policy and verse visa. Therefore, based on the findings of the study, the conclusion was made that non-achievement of the goals of technological innovation policies in Nigeria is an indication of the gap between policy and practice. This gap has persisted due to non-commitment to putting the policy to effect, poor institutional framework, faulty policy, corruption, etc.

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

a) Effort should be made by the ministry of education in collaboration with administrators in technological institutions to formulate effective policy and strategic governance approach that will ensure technological innovation especially the implementation of the curriculum towards achieving industrial growth via students' competencies.

b) The government should expand and diversify investment in information technology by making adequate provision for funds and facilities required for effective implementation of technological innovation policies and governance approaches to supply skilled workers to sustain high industrial growth.
c) At the same time, the role of stakeholders at local and school level is essential, and it is the linking of the two that may be able to create reforms that can address the needs of the people. This process is twofold and goes in both directions- policy makers learn from innovative practices, practitioners learn from each other (peers) and policy makers consult practitioners and challenge them for more useful innovation.
d) The federal ministry of education needs to decentralize to states and local government levels in order to observe, understand, monitor, control and review policies and curriculum on a regular and consistently diligent basis. UNESCO-UIS (2009) demonstrated that indigenous peoples also have the potential to be active players in policy, advocacy, adaptation and ethical elements which could be beneficial.
e) Finally, federal and state ministries of education need to take a holistic approach to improve their policy implementation efforts. The foundations on which to build success include:
    - Ensuring that enough time and money is spent on putting the policy into effect.
    - Carefully putting together policy formulation, planning, and execution i.e. prepare for new policies far enough in advance.
    - Ensuring those at the top of the hierarchy are in the best position to provide the clarity and direction that is vital to success.
    - Fostering a culture of commitment i.e. thoughtful over-communication and being open to feedback.

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