



## DIVERSIFYING TECHNOLOGICAL INNOVATIONS FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

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### Abstract

*This research examined the influence of diversifying technological innovations for sustainable development in Nigeria. To enrich the researchers were able to review some of the literature on sustainable development, technological innovation and diversification. A survey research design was used for the study. The total population for the study comprises of Higher National Diploma (HND) final year students and Lecturers of School of Business and Management Studies at Federal Polytechnic Offa, located in Kwara State, Nigeria. A sample of 390 respondents were chosen randomly among the respondents. However the total number of students and lecturers that returned their questionnaire were 228. Making a total number of lectures 110 and students 118. The researchers develop three research questions and three purposes for the study. Research question one is made up on 10 questionnaire, research question two is made up of eight questionnaire likewise research question three. The study used descriptive statistics to analyze the questionnaires. The results from the findings shows that: low product cost influences sustainable development, growing industries and market affect sustainable development growing industries and market affect sustainable development and growing industries and market influences sustainable development. The researchers concluded by recommending among others that; the efforts of the Nigerian government and its various agencies towards technological innovation in the country are low and more efforts are required toward boosting technological advancement in the country.*

**Keywords:** *Diversifying, Technological Innovation, Sustainable Development, Nigeria.*

### Introduction

Nigeria, the most populous country in Africa, faces many problems such as poverty, inequality and environmental degradation. But the country has been able to achieve sustainable development and become a leader in international business innovation (Albert & Alex, 2014). According to Ihueze et. (2015), One of the ways to achieve this is to have different technological innovations that can increase economic growth, improve living conditions and solve social and environmental problems in the environment. Technological innovation has the power to transform businesses and improve lives.

In Nigeria, many technological innovations can support economic growth, improve health and education, improve food security and solve environmental problems (Unctad, 2017). It can also increase transparency and accountability in governance, improve public participation and promote sustainable urban development. Although Nigeria has made significant progress in technology development in recent years, with the emergence of startups and innovation hubs in cities such as Lagos and Abuja. However, more needs to be done to diversify innovations in the country and adapt them to the country's needs.

One of the pressing areas where technology can have a significant impact in Nigeria as at today, is the area of agriculture (Enobong, 2024). Nigeria has a large agricultural sector but it is ineffective and inefficient. Technological advances such as precision agriculture, irrigation systems and agricultural software can increase agricultural productivity and improve food security. Another area where technology can have a significant impact is healthcare. Nigeria has a heavy burden of maternal and child health and mortality. Technological advances such as telemedicine, medical diagnostics and health management software can improve health outcomes and enhance the quality of life for Nigerians.

Technological advances can have a major impact on agriculture and health, as well as education. Nigeria's education is very good but it lacks money and resources (Enobong, 2024). Technological advancements such as e-learning platforms, digital resources and learning management software can also improve learning outcomes and improve the quality of life of Nigerians.



Technological developments can significantly affect the energy sector. Nigeria is experiencing energy shortages and many communities do not have access to electricity (Mansir, 2021). However, the advancement of technology can advance new technologies, energy efficiency and smart grid management can increase energy efficiency and improve the quality of life of Nigerians. Beyond these areas, technological advances can have a major impact on governance, transportation and urban planning. Technological advances such as open data platforms, traffic management and urban planning software can improve governance, improve transportation and support sustainable urban planning.

Ejiroghene et. (2022) argued that to achieve technological diversity in Nigeria, the government, private sector and civil society need to work together and create an environment that supports innovation and technology to do business. This requires investing in research, technology and innovation, and establishing policies and programs that support innovation and entrepreneurship. Promote innovation and entrepreneurship. USAID (2022) is of the opinion that the private sector can also play an important role by investing in research and development and supporting new ventures and innovation centers. Citizens can also play an important role by advocating for policies and programs that support innovation and entrepreneurship.

The prospect of Nigeria depends on technological diversity for sustainable development of Nigeria. It can stimulate economic growth, improve living conditions and solve social and environmental problems. The government, private sector and civil society should be able work together to create an environment that fosters innovation and entrepreneurship and ensure that science and technology innovation meets the country's needs. Through technological innovation, Nigeria can achieve sustainable development, become a leader in global economic innovation, and create a better future for its citizens

Diversifying is a strategic approach that involves expanding and varying aspects of a business, investment, team, or individual's skills to reduce dependence on a single element and increase overall resilience and adaptability (Jia, 2024). In today's fast-paced and rapidly changing global landscape, diversifying has become a crucial strategy for achieving sustainable growth and success (Labeat & Ludmilla, 2023).

According to a report by McKinsey & Company, diversification can lead to increased innovation, improved decision-making, and enhanced business performance (Hunt et al., 2015). Moreover, a study by the Harvard Business Review found that diverse teams are more likely to outperform homogeneous teams, and that diversity can lead to increased creativity, productivity, and employee engagement (Sylvia et al., 2013).

Using technological innovation as a case study, diversifying can lead to the development of new and innovative solutions that address a wide range of needs and applications (Felicia, 2004). Furthermore, diversifying an economy can reduce dependence on a single industry or sector, promoting economic growth and resilience (Bill, 2016).

Technological innovation is a vital driver of economic growth, development, and transformation. The rapid pace of technological change presents both opportunities and challenges for businesses, individuals, and societies. To thrive in this dynamic landscape, it is essential to understand the key factors that drive technological innovation and to leverage them effectively.

Real-time information, low product costs, and growing industries and markets are three critical factors that enable technological innovation. Real-time information facilitates swift responses to changing market conditions and customer needs, fueling innovation in areas like artificial intelligence and the Internet of Thing (Stefano, 2020). Low product costs, achieved through advancements in manufacturing and materials science, make new technologies more accessible and affordable for a wider range of people (Kaledio et. 2023). Growing industries and markets, such as healthcare technology and renewable energy, create new opportunities for innovation and investment (Zeina et. 2023)

The impact of technological innovation is profound, transforming industries, creating new business models, and improving lives (Klaus, 2016). Smartphones have revolutionized communication and information access while electric vehicles are reducing carbon emissions and transforming transportation. Advancements in healthcare technology are improving patient outcomes and reducing costs. However, technological innovation also poses challenges, such as job displacement and ethical concerns (Brynjolfsson & McAfee, 2014). To mitigate these effects, it is crucial to invest in education and retraining programs that prepare workers for the changing job market.

Sustainable development is how we must live today if we want a better tomorrow, by meeting present needs without compromising the chances of future generations to meet their needs. Sustainable development is a crucial concept that has gained significant attention in recent years. It refers to a development model that meets the needs of the present without compromising the ability of future



generations to meet their own needs. Sustainable development encompasses three key dimensions: economic growth, social inclusion, and environmental protection.

The concept of sustainable development was first introduced in the 1987 report "Our Common Future," also known as the Brundtland Report (Rebecca, The report emphasized the need for a development approach that balances economic, social, and environmental considerations. Since then, sustainable development has become a widely accepted framework for guiding development policies and practices.

Sustainable development is essential for ensuring a prosperous and healthy future for all. The benefits of sustainable development include:

- Improved quality of life
- Reduced poverty and inequality
- Enhanced economic growth and job creation
- Protection of the environment and natural resources
- Improved health and well-being

Achieving sustainable development requires a multidimensional approach that involves governments, businesses, civil society, and individuals. Some strategies for achieving sustainable development include:

- Transitioning to renewable energy sources
- Promoting sustainable agriculture practices
- Reducing waste and pollution
- Investing in education and skills development
- Supporting sustainable infrastructure development

The researchers have developed conceptual frameworks depicted in figure 1 after reviewing other studies and understanding the objectives and concepts of the research. The picture in figure 1 shows how the different factors in this study are connected. The study looks at different factors such as real time information, low product costs, and growing industries and market. The main factor being studied is sustainable development.

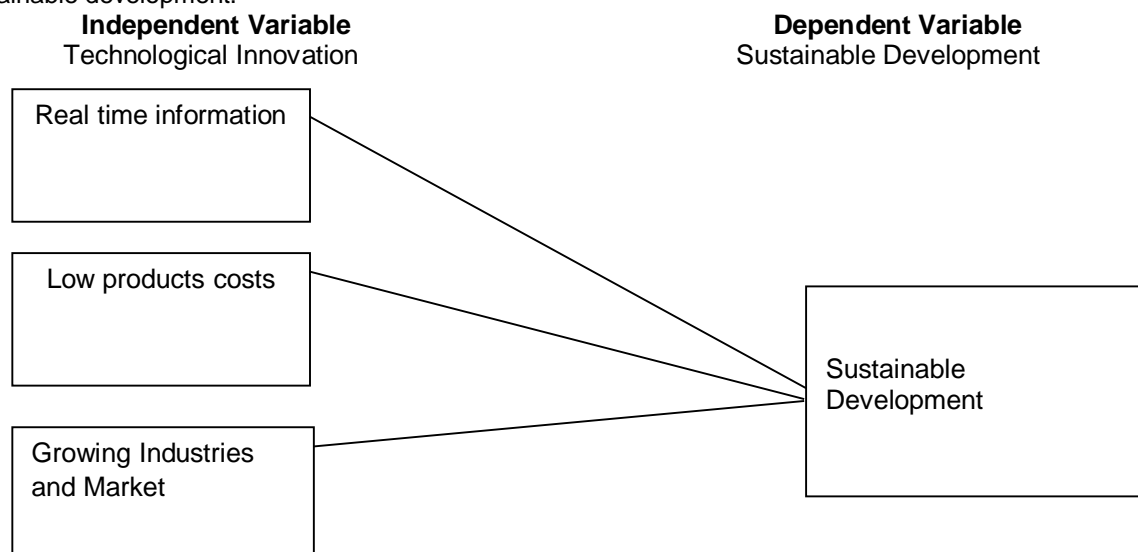


Figure 1: Conceptual Framework 2023  
Source: Field Survey, 2023

The previous summary outlines the relationship between sustainable development and factors such as up-to-date data, affordable production expenses, and expanding industries and markets. The factors that affect sustainable development are called independent variables, while sustainable development itself is called the dependent variable. Sustainable development is achieved through new methods, creating value, and developing new products.

### Statement of the Problem

Technological innovation has been a driving force for social and financial change for decades, since the late 1700s, serving as a catalyst for economic advancement and breakthroughs in the fields of



science and technology, which focus on creating new processes, new products, value creation, and services that ensure customers receive value for their money. Innovative development has become a key driver for progressing advancement in emerging economies, helping to tackle societal challenges within the realm of job creation, poverty reduction, and improving the standard of living.

Despite the significant contributions of innovative development to society, the sector still faces numerous challenges, including: lack of innovation culture, funding, expertise, innovative capacity, fear of change, lack of ownership, cyber security risks, skills gap, data protection, and trade coherence, to name a few. These are the major challenges plaguing the technological development sector today. These challenges have hampered most innovation efforts to convey real-time data exchange, influence modern product costs, and businesses development and marketing nowadays.

Additionally, the sector has been hampered by ethical issues ranging from ethical quality, human rights violations, and fairness, from the early stages of technological transformation to this era of genetic engineering, mechanical technology, nanotechnology, and artificial intelligence (AI) for tackling societal issues. Based on the foregoing, this study expected to examine diversifying technological innovations for sustainable development in Nigeria.

### Research Questions

The following research questions guided the study:

1. to what extent does real time information transfer influence sustainable development
2. how does low product cost affect sustainable development
3. to what extent does growing industries and market affect sustainable development

### Method

Descriptive survey design was adopted for the study. The researchers considered this design appropriate for this study since it intended to collect data from Higher National Diploma (HND II) final year students of school of business and management studies Federal Polytechnic, Offa, Kwara State and Lecturers school of business and management, federal polytechnic, Offa, Kwara State. The population for the study is 300 students and 120 lecturers making a population of 420 respondents.

The instrument for data collection was a structured questionnaire tagged “Diversifying technological innovation for sustainable development in Nigeria”. The instruments were validated by three experts in business education and business administration department. The comments enhanced the content validity of the instrument.

The questionnaires was structured into five point rating scale with response categories as “**Strongly Agreed**”, “**Agreed**”, “**Undecided**”, “**Disagree**” and “**Strongly Disagree**”. The administrations of the questionnaire were personally carryout by the researchers with the aid of four research assistants. 228 copies out of 420 were retrieved and used for Data Analysis. Making a total population of 118 students and 110 lecturers.

Data collected regarding the research questions were analyzed using descriptive statistics (mean and standard deviation). In other to determine the diversifying technological innovation for sustainable development in Nigeria, a decision rule based on mean rating between 4-5.00 was adopted by students and lecturers as Strongly Agreed. An item with mean rating of 3.50-4.49 was required to be Agreed and item with 2.50 – 3.49 was required to be undecided also item with rating of 1.50 – 2.49 and 0.50 – 1.49 represent Strongly Disagreed.

**Research Question 1.** To what extent does real time information transfer influence sustainable development?

**Table 1: Mean response of respondent on the extent of which low product cost influences sustainable development N = 228**

S/NO	Effects of Low Product Cost	Mean	SD	Remark
1.	Market Influence	4.23	0.73	Agreed
2.	Affordability and Accessibility	3.91	0.86	Agreed
3.	Consumption pattern	4.06	0.78	Agreed
4.	Quality and Durability	4.13	0.83	Agreed
5.	Ethical Consideration	4.71	0.87	Agreed
6.	Innovation and research	3.89	0.91	Agreed
7.	Global Market	3.89	0.91	Agreed
8.	Regulatory and policies implication	3.75	0.84	Agreed



9. Externalities	4.02	0.84	Agreed
10. Consumer Education	3.76	0.90	Agreed
<b>Grand Mean</b>	<b>4.0</b>	<b>0.85</b>	<b>Agreed</b>

The data presentation in Table 2 reveals the mean rating of all the items ranged between 3.75 to 4.71 with a mean of 4.0. This indicates that the respondent “Agreed” that low product cost affects sustainable development. The standard deviation for all the 10 items is within the same range.

### Research Question II

To what extent does growing industries and market affect sustainable development?

**Table 2 Mean response of respondents on the extent of which growing industries and market affect sustainable development**

S/NO. Effect of growing industries and market	Mean	SD	Remark
1. Economic growth	4.33	0.94	Agreed
2. Technological advancement	4.29	0.89	Agreed
3. Market demand	4.27	0.88	Agreed
4. Innovation and knowledge sharing	4.19	0.92	Agreed
5. Infrastructural development	4.33	0.85	Agreed
6. Increased in investment	4.12	0.97	Agreed
7. Job creation and skill development	4.21	0.96	Agreed
8. Economic diversification	4.21	0.93	Agreed
Grand Mean	4.2	0.9	Agreed

As indicated above, the grand mean of 4.2 in table 2, indicates that the respondents ‘Agreed’ that growing industries and market affect sustainable development.

### Research Question III

To what extent does growing industries and market affect sustainable development?

**Table 3 Mean response of respondents on the extent of which growing industries and market affect sustainable development**

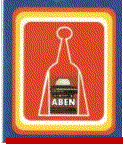
S/NO. Effect of growing industries and market	Mean	SD	Remark
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5. Infrastructural development	4.33	0.85	Agreed
6. Increased in investment	4.12	0.97	Agreed
7. Job creation and skill development	4.21	0.96	Agreed
8. Economic diversification	4.21	0.93	Agreed
Grand Mean	4.2	0.9	Agreed

From table 3, the respondents agreed that growing industries and market influences sustainable development

### Discussion

The results of the analysis on table 1 show that the various respondents agreed that real time information transfer influences sustainable development. Sustainable development is about meeting the needs of the present without compromising the ability of future generation to meet their own needs. Real time information can help in achieving this by providing u to date insights on various aspects of sustainable development such as the environment, economy and society.

The results of the analysis on table 2 shows that the respondents agreed that Low product cost can influence sustainable development. However it is not sufficient on its own to guarantee sustainability. If the production of low-cost products involves using low-quality materials or ignoring environmental and social impacts, then the product is not sustainable. True sustainability requires a balance of economic, environmental, and social considerations. Many times the actual cost of the product may not be reflected in



the price consumers pay and the true cost in terms of environment, social or health impacts is often externalized into society and ecosystem. This can lead to long term consequences such as a degradation of natural resources, pollution and health problems associated with the use of these products.

Results from table 3 shows that the respondents also agreed that growing industries and market affect sustainable development. Economic growth can provide opportunities for poverty reduction, job creation, and soaring standards of living for the population. Industries create raw material, goods, and products which meet the demand of consumers and provide products that may satisfy both their needs and wants.

Therefore, it is essential to promote sustainable development policies and practices that consider both economic growth and environmental sustainability. Sustainable practices in industries can help mitigate negative impacts on the environment and society while fulfilling the demands of growing markets. It is important for industries to embrace a circular economy approach that emphasizes the reuse and recycling of resources to reduce resource depletion and environmental damage.

### **Conclusion**

The study attempted to investigate diversifying technological innovation on sustainable development in Nigeria. The study therefore found that almost all the variables used to measure sustainable developments are reliable that contributed effectively on economic growth and improved sustainable development.

1. The study concludes that real time information low products costs and growing industries and market improved technological innovation on sustainable development.
2. That Nigerian government should diversify and invest more on technology innovation of our country for the betterment of our nation and put more efforts and investment on technological innovation that will guarantee sustainable development.
3. Borderless economy that focus on technological innovation is the best way to go for introducing new products and services

### **Recommendations**

The study suggests that:

1. Efforts of the Nigerian government and its various agencies towards technological innovation in the country are low and more efforts are required toward boosting technological advancement in the country.
2. Nigerian government should pay more attention on diversifying the economy through investment on technological innovation.
3. Technological innovation remains a leeway for the sustenance of positive economic development that create jobs, poverty reduction, improved efficiency and expansion of economic activities of a nation.
4. Government and non-governmental organizations should design policies that will expand and grow the market for sustainability and economic development.

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