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Consolidating the Democratic Gain of Industry Four Point Zero (4.0), Reality in Twenty -First Century Financial Performance of manufacturing firm in Light of Nigeria Economic Dwindling

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ABSTRACT: The advent of Industry 4.0 presents unprecedented opportunities and challenges for economic landscapes worldwide, including Nigeria, where financial performance has been adversely affected by economic dwindling. This paper explores the potential for consolidating democratic gains through the integration of advanced manufacturing technologies and data-driven decision-making. As Nigeria grapples with economic challenges, including fluctuating oil prices and infrastructural deficits, the adoption of Industry 4.0 catalyze sustainable growth and financial performance. The study employed descriptive survey research design. The study was carried out in cross river States Nigeria. The population of the study was 427 Managers and Accountants of manufacturing firms. A sample of 210 registered Managers and Accountants of manufacturing firms was obtained using taro Yemen formula. A structured questionnaire titled "Consolidating Democratic Gain of Industry Financial Performance" (CDGIFPQ), was used for the purpose of collecting data from the respondents. The questionnaire was developed by the researcher. The questionnaire is structured on a four- point rating scale of Strongly Agreed (SA), Agreed (A), Disagreed (SD) and strongly Disagreed (SD) and hypotheses was analyse using independent t-test. The reliability coefficient of 0.82 was ascertained using a cronbach alpha. Three experts validated the instrument. The research question was analysed using mean and standard deviation. The data for the study was collected with the help of three research assistants. The paper proposes strategic policy frameworks for bridging the gap between technological potential and financial realities, thus ensuring that the benefits of Industry 4.0 translate into tangible economic improvements.

KEYWORDS: Industry 4.0, financial performance, Nigeria economic growth and policy frameworks.

INTRODUCTION

The advent of Industry 4.0 has transformed the landscape of global economies, offering unprecedented opportunities for innovation and efficiency. This fourth industrial revolution, characterized by the fusion of digital technologies, automation, and data exchange, presents both challenges and advantages, particularly in the emerging economies like Nigeria. As the nation grapples with economic dwindling, thoughtful the implications of Industry 4.0 on financial performance becomes fundamental.

In Nigeria, where economic instability has been exacerbated by fluctuating oil prices, infrastructural deficits, and governance issues, the potential of Industry 4.0 to foster inclusive growth and democratic gains is significant. According to a report by McKinsey Global Institute (2019), digital transformation add $2.2 trillion to Nigeria's economy by 2025, highlighting the pressing need for strategic integration of these technologies. The democratization of access to information and technology fosters an environment where small and medium-sized enterprises (SMEs), thrive, ultimately contributing to national economic recovery. World Bank (2020) underscores that SMEs play a pivotal role in job creation and economic diversification, essential for Nigeria's recovery trajectory. However, the reality of financial performance remains complex, as many businesses face barriers such as inadequate infrastructure, lack of skilled labor, and insufficient access to finance.

The Fourth Industrial Revolution (Industry 4.0) signifies a profound transformation in manufacturing and production systems, characterized by the integration of digital technologies such as artificial intelligence, the Internet of Things (IoT), and big data. In Nigeria, this technological shift offers potential pathways to economic recovery and growth, particularly as the nation grapples with dwindling financial performance and economic challenges. Nigeria's economy has faced significant hurdles, including fluctuating oil prices, inadequate infrastructure, and governance issues. According to the World Bank (2021), Nigeria's GDP growth has been inconsistent, leading to high

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unemployment rates and increasing poverty levels. The COVID-19 pandemic further exacerbated these issues, underscoring the urgent need for diversification and innovation in economic strategies.

Embracing Industry 4.0 technologies enhance productivity and efficiency in Nigerian industries. For instance, IoT streamline supply chains, while big data analytics provide insights for better decision-making (KPMG, 2020).Transitioning to a digital economy requires new skill sets. Initiatives focused on education and vocational training in technology prepare the workforce for emerging jobs, potentially reducing unemployment rates (UNESCO, 2021). Industry 4.0 provide SMEs with tools to access broader markets through e-commerce and digital platforms, thus enhancing their financial performance (OECD, 2020). By adopting automation and digital tools, industries reduce operational costs and increase productivity. This efficiency can improve profit margins and overall financial performance (McKinsey & Company, 2021).

A robust technological framework attract foreign direct investment (FDI), essential for economic growth. Investors are more likely to engage with economies that demonstrate technological advancement and innovation (PwC, 2022). Industry 4.0 promotes sustainable practices through the efficient use of resources and energy. This sustainability can lead to long-term financial stability and compliance with global standards (Deloitte, 2021). Despite the potential benefits, several challenges hinder the successful adoption of Industry 4.0 in Nigeria: Inadequate power supply and poor internet connectivity can impede the integration of advanced technologies (Nigerian Communications Commission, 2021). There is a critical need for investment in education and training to equip the workforce with necessary digital skills (African Development Bank, 2020).An outdated regulatory environment stifle innovation. Policymakers must create conducive policies that encourage technological adoption (NBS, 2021).

Statement of Problems

Nigeria, as one of Africa's largest economies, faces significant challenges in leveraging the benefits of Industry 4.0 amidst ongoing economic dwindling. The integration of advanced technologies offers potential solutions but also exposes problems that must be addressed to achieve meaningful financial performance and democratic gains. Nigeria's inadequate infrastructure hampers the effective implementation of Industry 4.0 technologies. Poor power supply, unreliable internet connectivity, and insufficient transportation networks limit businesses' ability to adopt digital solutions (World Bank, 2020). The existing workforce often lacks the necessary skills to navigate Industry 4.0 technologies. A report by the International Labour Organization (2021) indicates that over 50% of Nigerian workers are unprepared for the digital economy, which stifles innovation and productivity. Nigeria’s economic policies have been marked by volatility, affecting investor confidence. The World Economic Forum (2021) notes that inconsistent government policies deter foreign investment crucial for technological advancements and economic recovery. A significant digital divide exists in Nigeria, with rural areas experiencing limited access to technology and the internet. National Bureau of Statistics (2022), only about 40% of the population has reliable internet access, which exacerbates inequalities and limits the benefits of Industry 4.0. Corruption remains a persistent challenge, undermining efforts to implement Industry 4.0 solutions effectively. Transparency International (2021) highlights that corruption in public institutions diverts resources away from essential technological investments, stalling economic progress. Small and medium enterprises (SMEs) often struggle to access financing for technological upgrades. The Central Bank of Nigeria (2020) reported that less than 20% of SMEs receive adequate funding, constraining their capacity to adopt innovative practices. Ongoing socio-political unrest and security issues, particularly in regions like the Northeast, create an unstable environment for economic activities. The United Nations Development Programme (2021) stresses that these challenges hinder investment and industrial growth.

Investment in reliable electricity, high-speed internet, and transportation networks is crucial. The Nigerian Communications Commission (2022) reports that expanding broadband access can significantly boost economic productivity. Aligning educational curricula with Industry 4.0 skills—such as data analysis, programming, and automation—will prepare the workforce for future demands. World Economic Forum (2022), countries that invest in education for technology skills experience higher economic growth. Consistent and transparent economic policies foster a conducive environment for investment. The Nigerian government should focus on creating long-term strategies that encourage foreign and local investments in technology. The Organisation for Economic Co-operation and Development (OECD, 2021) emphasizes that stable policies attract investment and spur innovation.

Efforts to bridge the digital divide, particularly in rural areas, are crucial for inclusive economic growth. Programs that promote access to technology and digital literacy empower underserved communities. A report by the International Telecommunication Union (2021) indicates that digital inclusion significantly enhance economic participation and social equity. Enhancing governance and reducing corruption are vital for building trust in public institutions. Establishing transparent processes and accountability measures can ensure that resources are allocated effectively for technological advancements. Transparency International (2021) highlights that strong governance can improve economic performance and investor confidence. Creating mechanisms for improved access to financing for SMEs will enable them to adopt Industry 4.0 technologies. Initiatives such as government-backed loans, grants, and venture capital funds can support innovation and growth in the sector. The Central Bank of Nigeria (2021) has noted that increased access to finance can drive economic recovery. Encouraging investment in R&D is essential for fostering innovation. Partnerships between government, academia, and industry can drive technological advancements that support Industry 4.0. The National Office for Technology Acquisition and Promotion (2020) advocates for increased funding for R&D to stimulate local innovations.

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Purpose of the Study

The general purpose of the study was to determine the Consolidating the Democratic Gain of Industry Four Point Zero (4.0) and the Reality in Twenty -First Century Financial Performance in Light of Nigeria Economic Dwindling: Specifically, the study determined the influence of:

1. Internet of Things on the Reality in Twenty -First Century Financial Performance in Light of Nigeria Economic Dwindling
2. Artificial Intelligence on the Reality in Twenty -First Century Financial Performance in Light of Nigeria Economic Dwindling
3. Big Data on the Reality in Twenty -First Century Financial Performance in Light of Nigeria Economic Dwindling
4. Cloud Computing on the Reality in Twenty -First Century Financial Performance in Light of Nigeria Economic Dwindling

Research Questions

The following research questions guided the study:

1. What is the influence of Internet of Things on the Financial Performance **of manufacturing firm** in the Twenty -First Century Nigeria Economic dwindling?
2. What is the influence of Artificial Intelligence on the Financial Performance **of manufacturing firm** in Twenty -First Century Nigeria Economic dwindling?
3. What is the influence of Big Data on the Financial Performance **of manufacturing firm** in Twenty -First Century Nigeria Economic dwindling
4. What is the influence of Cloud Computing on the Financial Performance **of manufacturing firm** in Twenty -First Century Nigeria Economic dwindling

METHODOLOGY

The study employed descriptive survey research design. The study was carried out in cross river States Nigeria. The population of the study was 427 Managers and Accountants of small and medium scale Enterprises. A sample of 210 registered Managers and Accountants of Small and Medium Scale Enterprises was obtained using taro Yemen formula. A structured questionnaire titled "Consolidating Democratic Gain of Industry Financial Performance" (CDGIFPQ), was used for the purpose of collecting data from the respondents. The questionnaire was developed by the researcher. The questionnaire is structured on a four- point rating scale of Strongly Agreed (SA), Agreed (A), Disagreed (SD) and strongly Disagreed (SD). The reliability coefficient of 0.82 was ascertained using a cronbach alpha. Three experts validated the instrument. The research question was analysed using mean and standard deviation. The data for the study was collected with the help of three research assistants.

PRESENTATION OF RESULTS

1: What is the influence of Internet of Things on the Financial Performance of manufacturing firms in the Twenty -First Century Nigeria Economic dwindling?

Table 1: Mean and Standard Deviation of Respondents on the influence of Internet of Things on the Financial Performance of manufacturing firms in Twenty -First Century Nigeria Economic dwindling.

s/no	Items statement	N	MEAN	SD	DEC
1	IoT Technology enables businesses to monitor, manage operations remotely in real-time, leading to improved efficiency.	**210**	3.0048	.98066	**A**
2	IoT generates vast amounts of data that, when analyzed, can offer valuable insights into consumer behavior, market trends as well as operational bottlenecks	**210**	2.9190	.94748	**A**
3	In industries where resources are scarce or expensive, IoT can help optimize usage as well as reduce waste.	**210**	3.2952	.85195	**A**
4	In a country like Nigeria, where a significant portion of the population remains unbanked or underbanked, IoT has the potential to drive financial inclusion,	**210**	3.0810	.82897	**A**
5	IoT enables real-time tracking of goods and products, enhancing logistics and reducing delays.	**210**	3.2286	.88320	**A**
6	IoT-based solutions can improve urban infrastructure management, including traffic control, waste management, utilities, contributing to better quality of life as well as economic productivity	**210**	2.6667	.80865	**A**
7	IoT also opens up opportunities for new business models As Well as revenue streams	**210**	2.7429	.88072	**A**

Data on table 1 shows the **Mean and Standard Deviation of Respondents on the influence of Internet of Things on the Financial Performance of manufacturing firm in Twenty -First Century Nigeria Economic dwindling**. The result showed that the items have

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mean ratings of; 3.0048, 2.9190, 3.2952, 3.0810, 3.2286, 2.6667 and 2.7429 with standard deviations of; .98066, .94748, .85195, .82897, .88320, .80865 and .88072. These mean ratings are above the criterion level of 2.50 set for accepting an item, this means that the following; IoT technology enables businesses to monitor as well as manage operations remotely in real-time, leading to improved efficiency, generates vast amounts of data that, when analyzed, can offer valuable insights into consumer behavior, market trends, operational bottlenecks, In industries where resources are scarce or expensive, IoT can help optimize usage as well as reduce waste, In a country like Nigeria, where a significant portion of the population remains unbanked or underbanked, IoT has the potential to drive financial inclusion, IoT enables real-time tracking of goods and products, enhancing logistics as well as reducing delays. IoT-based solutions can improve urban infrastructure management, including traffic control, waste management, utilities, contributing to better quality of life and economic productivity, IoT also opens up opportunities for new business models and revenue streams. The **Mean and Standard Deviation of Respondents** agreed that **Internet of Things influence the Financial Performance of manufacturing firm in Twenty -First Century Nigeria Economic dwindling**

2. What is the influence of Artificial Intelligence on the Financial Performance **of manufacturing firm** in Twenty -First Century Nigeria Economic dwindling?

Table 2: Mean and Standard Deviation of Respondents on the influence of Artificial Intelligence on the Financial Performance of manufacturing firm in Twenty -First Century Nigeria Economic dwindling

s/no	Items statement	N	MEAN	SD	DEC
8	AI-driven automation can streamline production processes, reduce manual errors, and speed up manufacturing cycles	**210**	2.7619	.86421	**A**
9	AI can enhance supply chain management by forecasting demand, optimizing inventory, as well as identifying the best suppliers.	**210**	2.9643	.46033	**A**
10	AI tools can process large datasets to identify trends, predict market movements, and suggest optimal financial strategies.	**210**	2.8476	.83901	**A**
11	AI can help manufacturing firms design and develop products that are more closely aligned with consumer demand by analyzing market trends and customer preferences	**210**	3.0476	.76253	**A**
12	AI can assist in workforce planning by helping firms assess labor requirements based on production schedules	**210**	2.9762	.75419	**A**
13	AI tools can analyze macroeconomic, political, as well as social factors to forecast risks that might affect the firm's operations or market	**210**	2.9905	.80066	**A**
14	AI can also play a significant role in helping Nigerian manufacturers compete in the global market by improving the quality, price, as well as distribution of their products.	**210**	2.8524	.81969	**A**

Data on table 2 shows the **Mean and Standard Deviation of Respondents on the influence of Artificial Intelligence on the Financial Performance of manufacturing firm in Twenty -First Century Nigeria Economic dwindling**. The result showed that the items have mean ratings of; 2.7619, 2.9643, 2.8476, 3.0476, 2.9762, 2.9905 and 2.8524 with standard deviations of; .86421, .46033, .83901, .76253, .75419, .80066 and .81969. These mean ratings are above the criterion level of 2.50 set for accepting an item, this means that the following; AI-driven automation can streamline production processes, reduce manual errors, and speed up manufacturing cycles ,AI can enhance supply chain management by forecasting demand, optimizing inventory, and identifying the best suppliers, AI tools can process large datasets to identify trends, predict market movements, and suggest optimal financial strategies, AI can help manufacturing firms design and develop products that are more closely aligned with consumer demand by analyzing market trends and customer preferences, AI can assist in workforce planning by helping firms assess labor requirements based on production schedules, AI tools can analyze macroeconomic, political, as well as social factors to forecast risks that might affect the firm's operations or market and AI can also play a significant role in helping Nigerian manufacturers compete in the global market by improving the quality, price, and distribution of their products. The **Mean and Standard Deviation of Respondents** agreed that **Artificial Intelligence influence the Financial Performance of manufacturing firm in Twenty -First Century Nigeria Economic dwindling.**

3. What is the influence of Big Data on the Financial Performance **of manufacturing firm** in Twenty -First Century Nigeria Economic dwindling

Table 3: Mean and Standard Deviation of Respondents on the influence of big data on the Financial Performance of manufacturing firm in Twenty -First Century Nigeria Economic dwindling

S/NO	ITEMS STATEMENT	N	MEAN	SD	DEC
15	Big Data analytics allows manufacturers to analyze and identify inefficiencies in production processes, helping optimize workflows.	210	2.9048	.86421	**A**

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16	Big Data helps manufacturers predict future demand more accurately by analyzing historical sales data, seasonal trends, and consumer behavior	210	2.8952	.83493	**A**
17	Big Data provides manufacturers with deeper insights into their financial performance by analyzing sales, expenses, and profit margins across different segments.	210	2.9905	.73198	**A**
18	Big Data can be used to analyze macroeconomic factors like inflation, exchange rates, as well as consumer confidence, allowing manufacturing firms to forecast potential risks.	210	2.9510	.47293	**A**
19	Big Data allows manufacturers to analyze consumer preferences, buying patterns, and feedback	210	2.9619	.83493	**A**
20	In a country like Nigeria, where electricity supply is often unreliable expensive, Big Data can help manufacturers analyze their energy usage patterns, identify ways to reduce consumption	210	2.9429	.81056	**A**
21	Big Data enables the customization of products to fit specific customer needs	210	2.9238	.82073	**A**

Data on table 3 shows the **Mean and Standard Deviation of Respondents on the influence of big data on the Financial Performance of manufacturing firm in Twenty -First Century Nigeria Economic dwindling.** The result showed that the items have mean ratings of; 2.9048, 2.8952, 2.9905, 2.9510, 2.9619, 2.9429, and 2.9238 with standard deviations of; .86421, .83493, .73198, .47293, .83493, .81056 and .82073 respectively. These mean ratings are above the criterion level of 2.50 set for accepting an item, this means that the following; Big Data analytics allows manufacturers to analyze and identify inefficiencies in production processes, helping optimize workflows, Big Data helps manufacturers predict future demand more accurately by analyzing historical sales data, seasonal trends, and consumer behavior, Big Data provides manufacturers with deeper insights into their financial performance by analyzing sales, expenses, and profit margins across different segments, Big Data can be used to analyze macroeconomic factors like inflation, exchange rates, and consumer confidence, allowing manufacturing firms to forecast potential risks, Big Data allows manufacturers to analyze consumer preferences, buying patterns, and feedback, In a country like Nigeria, where electricity supply is often unreliable and expensive, Big Data can help manufacturers analyze their energy usage patterns and identify ways to reduce consumption and Big Data enables the customization of products to fit specific customer needs. The Mean and Standard Deviation of Respondents agreed that big data influence the Financial Performance of manufacturing firm in Twenty -First Century Nigeria Economic dwindling

4. What is the influence of Cloud Computing on the Financial Performance **of manufacturing firm** in Twenty -First Century Nigeria Economic dwindling

Table 4: Mean and Standard Deviation of Respondents on the influence of Cloud Computing **on the Financial Performance of manufacturing firm in Twenty -First Century Nigeria dwindling. Economic.**

S/NO	ITEM STATEMENT	N	MEAN	SD	DEC
22	The pay-as-you-go model of cloud computing means firms only pay for the computing power, storage, and services they actually use	210	2.9619	.85755	**A**
23	Cloud computing enables manufacturers to scale their operations easily without the need for significant upfront investment	210	2.7381	.80249	**A**
24	Cloud computing allows manufacturing firms to store as well as analyze large amounts of data in real time	210	2.7476	.79959	**A**
25	Cloud-based tools improve collaboration across departments	210	2.7524	.85034	**A**
26	Cloud computing enables employees to access systems and data remotely	210	2.9095	.85639	**A**
27	Cloud service providers often have robust security protocols in place to protect data, including encryption, secure authentication, and continuous monitoring	210	2.8693	.38858	**A**
28	Cloud computing enables manufacturers to gain real-time visibility into their supply chain activities	210	2.7667	.92174	**A**
29	Cloud computing accelerates the innovation cycle by providing manufacturers with the computing power to conduct simulations, analyze market trends, and test new product designs more efficiently	210	2.7429	.94872	**A**
30	Cloud platforms provide manufacturing firms with access to global markets without the need for large investments in physical infrastructure	210	2.7714	.97094	**A**

Data on table 4 shows the **Mean and Standard Deviation of Respondents on the influence of Cloud computing on the Financial Performance of manufacturing firm in Twenty -First Century Nigeria Economic dwindling.** The result showed that the items have mean ratings of; 2.9619, 2.7381, 2.7476, 2.7524, 2.9095, 2.8693, 2.7667, 2.7429 and 2.7714 with standard deviations of; .85755, .80249,

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.79959, .85034,. 85639, .38858, .92174, .94872 and .97094 respectively. These mean ratings are above the criterion level of 2.50 set for accepting an item, this means that the following; the pay-as-you-go model of cloud computing means firms only pay for the computing power, storage, and services they actually use, Cloud computing enables manufacturers to scale their operations easily without the need for significant upfront investment, Cloud computing allows manufacturing firms to store and analyze large amounts of data in real time, Cloud-based tools improve collaboration across departments ,Cloud computing enables employees to access systems and data remotely, Cloud service providers often have robust security protocols in place to protect data, including encryption, secure authentication, continuous monitoring and Cloud computing enables manufacturers to gain real-time visibility into their supply chain activities, Cloud computing accelerates the innovation cycle by providing manufacturers with the computing power to conduct simulations, analyze market trends, and test new product designs more efficiently and Cloud platforms provide manufacturing firms with access to global markets without the need for large investments in physical infrastructure. The Mean and Standard Deviation of Respondents agreed that Cloud computing influence the Financial Performance of manufacturing firm in Twenty -First Century Nigeria Economic dwindling.

DISCUSSIONS OF FINDINGS

The exploration of Industry 4.0 in Nigeria reveals both significant potential and substantial challenges in the context of democratic gains and financial performance. Industry 4.0 technologies—such as IoT, AI, and big data—have the capacity to enhance operational efficiency and drive economic growth. As highlighted by Gnanapragasam (2020), these technologies streamline production processes, reduce waste, and enable real-time decision-making, all of which are crucial for improving Nigeria's economic performance amidst dwindling resources. However, the rate of adoption in Nigeria remains slow, primarily due to infrastructural deficits and limited access to digital skills (Ndukwe, 2021). Industry 4.0 create new job opportunities, it also necessitates a skilled workforce capable of operating advanced technologies. Adeyemi (2022), there is a pressing need for educational reforms in Nigeria to equip the younger generation with relevant skills in technology and engineering. The failure to address this skills gap could exacerbate unemployment, undermining democratic gains by fueling socio-economic disparities (Okereke & Ogbu, 2021). The integration of digital technologies in governance enhance transparency and accountability, reinforcing democratic processes. Olayanju (2022) indicates that the use of data analytics in public service improve resource allocation and minimize corruption. However, the political landscape in Nigeria presents significant barriers to such initiatives, including entrenched interests and resistance to change (Akinwumi, 2021). Effective policy frameworks are essential for fostering an environment conducive to Industry 4.0. Eze & Ndubisi (2020) emphasizes the importance of government policies that promote technological innovation and protect intellectual property. Yet, inconsistent regulatory frameworks and lack of incentives for businesses hinder investment in advanced technologies (Ogunleye, 2023). These issues is vital for maximizing the financial performance associated with Industry 4.0. The adoption of Industry 4.0 offers pathways to sustainable economic practices, particularly in resource management. As noted by Abubakar (2021), smart manufacturing techniques lead to reduced carbon footprints and more sustainable resource use. This aligns with global sustainability goals, which are increasingly important for democratic legitimacy and economic stability.

CONCLUSIONS

The integration of Industry 4.0 into Nigeria's economic landscape presents a transformative opportunity to consolidate democratic gains and enhance financial performance. This study highlights several critical insights:

1. The adoption of advanced manufacturing technologies significantly boost productivity and efficiency in Nigeria's struggling economy. However, realizing this potential requires addressing infrastructural challenges and fostering a culture of innovation within both public and private sectors.
2. Investing in education and vocational training is essential for preparing the workforce for the demands of Industry 4.0. Bridging the skills gap will not only enhance employability but also empower citizens, contributing to a more equitable society that supports democratic values.
3. The effective use of digital tools in governance lead to greater transparency, accountability, and citizen engagement. For Nigeria to capitalize on these benefits, it is crucial to strengthen institutional frameworks and eliminate corruption, ensuring that the advantages of technological advancements are widely distributed.
4. Comprehensive and consistent policies that promote technological innovation, protect intellectual property, and encourage investment are vital for sustaining growth. Policymakers must prioritize creating an ecosystem that nurtures entrepreneurship and supports startups, particularly in technology-driven sectors.
5. Industry 4.0 provides an opportunity for Nigeria to align its economic strategies with global sustainability goals. Emphasizing eco-friendly practices in manufacturing and resource management enhance the country’s competitive edge while contributing to broader environmental objectives

Conflicts of Interest: The authors declare no conflicts of interest.

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