

## **Artificial Intelligence in Mechanical Technology a Leverage for Sustainable Development in the Prevailing Economic Uncertainty in Nigeria**

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### **Abstract**

*The study examined Artificial Intelligence in Mechanical Technology as Leverage for Sustainable Development in the Prevailing Economic Uncertainty in Nigeria. In this study, we explore the integration of AI into mechanical technology to solve critical problems in industrial processes, including resource optimization, efficiency, and cost reduction. There is enormous potential of Artificial Intelligence (AI) in fast tracking mechanical technology to propel sustainable development in Nigeria's situation of economic volatility. The power of AI driven innovations such as predictive maintenance, automated manufacturing and intelligent design systems can support productivity and sustainability in Agriculture, Transportation and Energy among the various sectors. AI applications help save operational costs, and minimize resource wastage, which contributes to the economic stability as well as to environmental conservation. The study also calls out barriers as lack of proper infrastructure, lack of technical expertise and regulatory challenges that hinder the use of AI in Nigeria. The focus of recommendations is targeted investment in AI education, policy frameworks to attract private sector participation, and strategic partnerships to foster technology transfer.*

**Keywords: Economic Uncertainty, mechanical technology, artificial intelligence, sustainable development**

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## Introduction

In the past, technology alone has already revolutionized numerous aspects of work, which required much human effort and energy. But with the development and implementation of artificial intelligence (AI) bring about significant and transformative changes that take the field of work to a whole new level. Artificial intelligence (AI) means enabling a machine (hardware) to think, learn and decide like a human (software). By thinking like humans, and ‘reasoning,’ ‘natural language processing,’ and ‘pattern recognition’ humans can free their minds from trivial physical labor and solve complex problems autonomously (Russell & Norvig, 2021). In today's technologically driven world, AI plays an indispensable role in simplifying complex tasks and empowering individuals to achieve greater levels of efficiency and productivity. With the rapid growth and integration of automation, AI serves as a catalyst for transforming traditional work environments into efficient and dynamic spaces.

In mechanical technology, current technological capabilities have been greatly redefined by the rapid progress of Artificial Intelligence (AI), which can optimize processes, increase precision and promote innovation. This is particularly pertinent in Nigeria in the light of the economy's prevailing uncertainty and the need to inventively develop the country via sustainable means. The country has recently been beset with a number of problems arising from mounting unemployment, inflation, and energy deficits (Onuoha, 2023). The underlying economic relationship between Nigeria and oil has been characterized by strong dependency on oil revenue that has exposed Nigeria to large vulnerabilities arising on global oil price fluctuations.

This situation resulted in huge economic uncertainty with the fluctuating oil prices, increasing inflation, high unemployment, infrastructure deficits (Onuoha, 2023), in Nigeria. Manufacturing and agriculture as well as energy, which rely heavily on mechanical technology are being pushed to the point of a breakdown. Mechanical systems in these sectors are inefficient and prone to frequent breakdowns, which further increase production costs, reduce productivity and hinder sustainable development efforts (Abubakar & Idowu, 2022). The drive towards diversification, boosted productivity and economic resilience, necessitated by these challenges, has led to the desire for integrating next generation technologies like AI. Possibilities of application of AI in mechanical technology like predictive maintenance, intelligent manufacturing and energy optimization have great potential to solve above economic challenges (Abubakar & Idowu, 2022).

The gap in adoption of AI as a tool to harness its potential impact in the world of mechanical technology has substance that need thorough and focused investigation to blazon strategies that can leverage AI as tool to activation progress of Nigeria. That's the necessitate for the present study, to x-ray an understanding of the transformative potential of AI in mechanical technology and how it can help solve Nigeria's economic and technological challenges and AI driven solutions that may cushion the fall from economic uncertainties thereby creating new job and industrial growth opportunities (Nwosu & Chukwu, 2023). It will enhance the current body of literature on the utility of AI applications in emerging economies by exploring the AI-technology nexus for mechanical technology and sustainable development (Aina et al., 2023). Provide applicable recommendations that can alleviate stringent bottlenecks like infrastructure shortfall, dearth of training programs, ethics and align AI policy implementation with national development goals (Oluwole et al., 2023, Abubakar, & Idowu, 2022). This is because the study will underscore the need to integrate AI education in technical and vocational curricula for future engineers and technicians who will be using AI in mechanical technology (Eze et al., 2023). This study also supports the global commitment to accomplish Sustainable

Development Goals (SDGs) particularly SDG9 (Industry, Innovation and Infrastructure) and SDG12 (Responsible consumption and production). The study supports efforts to promote sustainable industrialization and environmental stewardship by promoting AI driven innovations in mechanical technology.

Consequently, this study sought to fill the gap by examining the use of AI as leverage for sustainable development in Nigeria through the transformation of mechanical technology to address economic uncertainties. It further seeks to investigate applications and challenges in AI, benefits and barriers of its deployment, and draws actionable insights for policy makers, educators, and industry stakeholders.

### **1. Economic Uncertainty in the Nigerian Context**

Economic uncertainty is a state, when people, businesses or governments are confronting the unpredictability about future economic conditions including economic growth, inflation, and employment or investment opportunities. For example, this unpredictability is usually due to policy instability, geopolitical events or other factors of global market volatility (Baker, Bloom & Davis, 2016). The challenge of economic uncertainty in Nigeria is a multi faceted challenge that is influenced by the fluctuating global economic conditions, domestic policy inconsistencies, insecurity, inflation and foreign exchange volatility (CBN, 2023; Okeke & Umeh, 2023; World Bank, 2023). Hence, the combined effect of these factors impede decision making, diminishes investor confidence, diminishes household purchasing power, dampens economic growth.

#### **1. Inflation and Volatility.**

But Nigeria's battle with high inflation rate, which emasculates the worth of money and reduces the buying power of its citizens has been a meaningless fight. Last year, inflation surged past 24%, spurred by food and energy prices, according to the National Bureau of Statistics (NBS). Furthermore, the naira's value to foreign currencies has been volatile, as a result of speculative activities and shortage of foreign exchange reserve to the extent that economic uncertainty has continued among the population (CBN, 2023).

#### **2. Insecurity and its Economic Impact**

Nigeria's economic instability is still largely due to insecurity. Insurgents, kidnappers and bandits in different parts of the country disrupt agricultural production, reduce investor confidence and stifle economic development. Adebayo and Ogundele (2023) reports that insecurity in the northern region meant about 25% drop in agricultural output in 2022.

#### **3. Policy inconsistency and the governance challenge.**

Since Nigeria has been not been able to attract and retain foreign investment, it has been constrained by frequent policy reversals and lack of a clear long term economic strategy. For example, uncertainty in fuel and electricity tariff subsidy policies affects businesses and households (Okeke & Umeh, 2023). It expands on another issue, governance, and poor institutions and corruption make it very difficult to institute reforms.

#### **4. Global Economic Factors**

Nigeria is highly dependent on the money it brings in from oil production and global economic conditions such as fluctuating oil prices have a large effect on Nigeria. In times of low oil prices, government revenues fall as budget deficits crank up while public investment dwindles. As Adeola and Akinyemi (2023) point out, Nigeria has become woefully dependent on oil, rendering it vulnerable to external shocks which emphasizes the need for Economic diversification.

#### **5. Impact on Key Sectors**

As with key sectors such as manufacturing, agriculture and services, economic uncertainty has not been kind. Industrial growth has been constrained by high production costs, limited access to credit and erratic power supply. At the same time, job losses and underemployment are increasing in the country, magnifying already poor living conditions (World Bank, 2023).

## **2. AI as a Tool for Economic Resilience**

Rule of thumb is that despite these hurdles, AI can make a huge difference in economic resiliency. The advantage of AI applications, Abubakar and Idowu (2022) point out, is that it can help diversify industrial activities and reduce Nigeria's vulnerability to oil price fluctuations. By automating mechanical technology processes, an increase in production level, cost reduction and aid to economic stability in the presence of external shocks is achieved. Like Nwosu and Chukwu (2023), AI driven innovations can give Nigerian industries a competitive edge in the global market, increase export performance and generate new revenue streams. For Nigeria, this is particularly important, as Nigeria seeks to diversify its economy away from an reliance on oil and strengthening non oil sectors such as manufacturing, agriculture and construction. The empirical research shows that AI has a huge potential to revolutionize mechanical technology in Nigeria and contribute to sustainable development in the face of economic uncertainty. The optimization of mechanical systems via AI use, energy efficiency, productivity, and the key challenges in economic development include high operational costs, inefficient resource use, and energy deficits. However, these large barriers for integrating AI into mechanical technology, with inadequate infrastructure, lack of qualified staff; and lack of access to capital, must be overcome. To realize the positive potential of AI for development of Nigeria, these challenges must be addressed by targeted policy interventions combined with investment in education and development of robust technological infrastructure.

## **3. AI and Mechanical Technology: Synergies for Development**

Mechanical technology is the principles, techniques and devices used in the design, manufacture and maintenance of mechanical systems. This involves putting physics, engineering and material science to work in order to design machines, tools and systems to resolve practical problems in transportation, manufacturing, and construction (Kumar, 2018). AI can be of great benefit to mechanical technology, a cornerstone for development of industrial and infrastructural tools. Predictive analytics using AI driven solutions improve the reliability and efficiency of mechanical systems. Take, for example, AI enabled predictive maintenance which ensures equipment downtime decreases dramatically and machinery lives on longer thereby yielding cost saving(s) (Eze et al., 2023). Just like manufacturing, AI applications in manufacturing help streamline production processes they are automated and robotic ensuring speed and precision all at once. These developments are vitally important in Nigeria for industries like agriculture, automotive manufacturing and energy production, where the bulk of activities revolve around mechanical systems. Intelligent systems, for example, in their utilization in agricultural machinery can increase the efficiency of planting and harvesting processes and thus increase productivity and food security (Aina et al., 2023). AI has been empirically demonstrated to greatly improve their mechanical technology through automation, predictive maintenance, and production efficiency. Abubakar and Idowu (2022) prefer an integration of AI in mechanical systems, mainly in the manufacturing and agricultural machinery, which will lead to more efficient operations and drastically reduced operational cost. The study shows that AI powered predictive maintenance has reduced machinery downtime by 30 percent, enabling firms to cut maintenance costs and increase overall equipment effectiveness. This is particularly a crucial one for Nigeria's industries which often

grapple with high failure costs due to mechanical failures and less efficient equipment management.

In addition to this, writing about the work of Eze et al. (2023), they point to the ability of AI managers to enhance the mechanical design, manufacturing and obtaining processes. AI algorithms can help simulate and test mechanical systems before physical prototypes are built, saving costs and time in product development, they argue. This shows how the speed and precision of manufacturing has been improved, which means that not only might Nigeria's manufacturing sector catch up with international manufacturing competition, but become more competitive.

#### **4. AI Applications in Mechanical Technology in Nigeria**

Nigeria is beginning to introduce AI to improve processes, increase efficiency, as well as its contributions in sustaining the developmental industrial pursuits of the country. This discussion focuses on AI applications in mechanical technology in the Nigerian context, its benefits and challenges.

##### **1. Mechanical Systems Predictive Maintenance**

AI algorithms are used in predictive maintenance to monitor conditions of machinery, predict failures and schedule repairs actions in advance. It reduces downtime and cut down on maintenance costs. AI based maintenance tools are being adopted by manufacturing plants in Nigeria to monitor equipment health using sensors and IoT data. Predictive maintenance offers operational efficiency and prolongs that machinery life especially in resource constrained settings such as Nigeria (Eze et al., 2023). AI driven systems are used by the Nigerian National Petroleum Corporation (NNPC) to monitor pipelines, reduce leakages and equipment failures (Onyema & Nwosu, 2022).

##### **2. Robotics and Automation**

In Nigeria's industries, particularly through assembly lines and material handling; robots are being transformed by AI powered robots. AI driven robotics are used in the automotive industry to help with welding, painting, and assembly processes, which are precise and reduce waste (Adebayo et al., 2023). Automation speeds up the process on the one hand and decreases human error in the other.

##### **3. Smart Manufacturing and Industry 4.0**

An AI is a fundamental element in Industry 4.0, where smart factories combine AI to automate real-time monitoring and optimization of production processes. According to (Oluwole et al., 2023) some Nigerian factories are using AI to analyze production data, improve production workflows and lower energy consumption. Along with competitiveness in global markets, AI smart manufacturing also improves quality, and reduces costs.

##### **4. Mechanical Design and Simulation with AI**

Generative design software is an AI based design tool that allows engineers to design optimized mechanical components. Different variants of these tools have considered different constraints, including material strength and environmental impact. In the arena of machine and infrastructure designing in Nigeria, Nigerian engineers leverage on AI platforms such as Solid Works and Autodesk to come up with new designs (Abubakar & Idowu, 2022). It reduces design time and encourages cost effective solutions.

##### **5. Quality Control and Defect Detection**

Computer vision and pattern recognition based AI systems are used on products to perform quality assurance by finding defects as the products are manufactured. In Nigeria's cement and steel industries, AI driven systems inspect and grade products for uniformity and durability.



Quality control is enhanced as it reduces wastage and at the same time satisfy the customer (Eze et al., 2023).

#### 6. Renewable Energy Systems

Renewable energy projects are also visible in AI applications in mechanical systems. Their winds turbines and solar panels are optimized for maximum energy output through the use of AI. Injection AI algorithms are utilized in the Kaduna Renewable Energy Project to monitor and manage solar energy systems (Onuoha, 2023). Sustainable energy solutions are promoted by AI to solve Nigeria's energy challenges.

#### 7. Education Sector

Mechanical skills are trained with AI powered virtual reality (VR) and augmented reality (AR) systems. AI based simulators are being adopted by technical colleges in Lagos for training in welding and machine operation (Nwosu & Chukwu, 2023). These tools close the skills gap and strengthen workforce readiness.

### 5. AI as a Catalyst for a Sustainable Development

Sustainable development is development that satisfies human requirements without undermining the potential to satisfy human needs in the future. It is the integration of economic, social and environmental dimensions to achieve long term global well being (Brundtland Commission, 1987). Beyond mechanical technology, AI can be used to address Nigeria's economic uncertainties in broader developmental goals. Somebody or something it can create new job opportunities for, new skill development, new resource efficiency. Nevertheless, most of these outcomes cannot be attained without surmounting challenges in infrastructure deficits, a paucity of skilled labour force and weak policy frameworks (Oluwole et al., 2023).

Apart from influencing mechanical technology, AI improves sustainability including energy efficiency and environmental impacts. Chukwu and Nwosu (2023) investigate the possibility of using AI for achieving sustainability in the Nigerian energy sector. According to them, AI based energy management systems can help optimize the use of renewable energy sources, which is important for Nigeria, where energy deficits are a perennial problem. AI algorithms can help us forecast energy demand patterns; optimize energy distribution; and reduce waste to make energy distribution more sustainable. This research is in line with global efforts to reduce carbon emissions and responsible consumption (SDG 12) and industrial growth and sustainability.

A study by Aina et al. (2023) indicates use of AI to enhance resource utilization in mechanical systems. According to them, AI driven technologies in mechanical production lines can dynamically adjust manufacturing processes in real time to reduce waste and use raw materials more efficiently. Such innovations could be useful in the context of Nigeria's manufacturing sector, which is often inefficient in resource use, and could help industries reduce costs, lower environmental impact, and contribute to long term sustainability goals.

### 6. AI Powered Mechanical technology for Sustainable Economic Development in Nigeria

Mechanical technology is agent of sustainable development through AI addressing environmental, economic and social challenges. The global shift towards sustainable development is to reduce waste, improve energy efficiency and promote environmentally friendly technologies. These objectives of AI are aligned with those of reducing resource consumption and environmental impact for innovations distributed across the world. For example, AI driven energy optimization systems can dramatically reduce industrial energy use, resulting both in cost savings and environmental sustainability (Onuoha, 2023).

#### a. Renewable Energy Optimization

Renewable energy systems are made more efficient by prediction of weather pattern and energy storage and distribution optimization, thanks to AI. Models formulate the control problem as optimization of either the operation of wind turbines and solar panels, aiming to maximize energy production (Oluwole et al., 2023). The AI systems then optimize the Energy consumption in Mechanical processes resulting to waste and carbon emission decrease (Eze & Adetunji, 2023). And green manufacturing in mechanical engineering and technology adopts such eco friendly materials and processes with the help of AI.

#### b. Waste Management and Recycling

AI powered smart systems are better at sorting and recycling waste increase recycling rates and reduce waste in mechanical manufacturing which help reduce landfill use and promote circular economies. In Europe, AI powered robots separate recyclable materials efficiently, increasing recycling rates by 20% (Aina et al., 2022).

#### c. Resource Optimization

AI algorithms tackle resource allocation in industries reducing waste and maximizing efficiency. Further in Eze et al. (2023), AI powered supply chain management tools help companies reduce excess inventory, minimize transportation costs, reduce carbon footprints and increase profitability. AI cuts out production costs because it increases precision, reduces errors and automates repetitive work. Mechanical technologies driven by AI make Nigerian industries more competitive globally by improving product quality and reducing production lead times.

#### d. Innovation and Job Creation

AI does the repetitive things well but leaves more space for time consuming things, such as, data science, robotics etc. In order to cope in the AI economies, workers need to be upskilled (Nwosu et al., 2022). AI automates some of these tasks, but simultaneously creates new opportunities for intelligence analysis, new job opportunities in developing AI, machine maintenance, and so on (Onyeka, 2022).

#### e. Education and Skills Development

Education and Skill Development are the two primary objectives which determine the nation's progress. Personalized learning platforms powered by AI close the education gap and will help with lifelong learning. In technical education and training programs, adoption of these kinds of AI applications as Coursera and Duolingo to deliver personalized learning experience will give graduates the skills they need to move forward in an AI driven economy (Nwosu et al., 2022). Also, improved safety awareness that when using robotics in mechanical engineering fields is less hazardous for human workers where AI driven robots can do the job.

#### f. Financial Inclusion

Fintech powered by AI helps to make financial services more easily accessible to people that are under banked. For example, AI based mobile apps for credit scoring used in developing micro loans to rural entrepreneurs (Adebayo and Adetunji, 2023).

#### g. Environmental Sustainability

Environmental sustainability can be promoted by AI, i.e. climate change, resource conservation and biodiversity protection. Climate patterns are predicted by AI models and the impacts of mitigation strategies are analyzed. With AI, Google's Deep Mind uses AI to optimize energy use in data centers for a 30% drop in energy consumption (Onuoha, 2023).

#### h. Healthcare Improvements

Both AI driven diagnostic tools and telemedicine platforms improve access to health care, but particularly in the underserved areas. AI algorithms can also see a way to detecting diseases

like tuberculosis, or even malaria, at a high level of accuracy, and also help with timely intervention (Abubakar & Idowu, 2023).

#### i. Social Inclusion

Applications of AI in translation and accessibility tools for language help make the world a little more inclusive and assist people with challenges related to hearing, seeing and thinking.

### **7. Challenges to AI Adoption in Nigeria**

There have been recent initiatives, such as the setting up of the National Center for Artificial Intelligence and Robotics (NCAIR), which show increasing recognition of AI's importance to national development (Nwosu & Chukwu, 2023). On the other hand, partnerships with global tech companies are gradually helping in the making of AI technologies available, which will lead to new innovations in mechanical technology. Whilst there is potential for AI adoption in Nigeria, empirical research finds several barriers to the use of AI in the country, like the costs of implementation, lack of access to cutting edge technologies and hence lower awareness amongst stakeholders.

#### 1. Infrastructure Deficiencies

This is one of the major impediments to the full scale implementation of AI in Nigeria's mechanical technology sector (Oluwole et al., 2023). Many industries today are prevented from adopting AI solutions because the electricity is unreliable, internet is poor, and the machinery is outdated. The problem is particularly acute in rural and semi urban areas where industries are vital to local economies.

##### a. Power Supply

One of the biggest blocks to Nigeria adopting the AI has to do with the lack of a stable electricity supply. In sectors such as manufacturing and healthcare, AI systems need to be powered consistently to work well. Example: The operational costs of maintaining AI driven systems are increased by frequent power outages, which discourages adoption by small and medium sized enterprises (Onuoha, 2023).

##### b. Digital Infrastructure

The deployment of AI solutions is hindered by inadequate internet connectivity and limited access to high performance computing resources. The benefits of AI (Aina et al., 2022) are excluded from rural areas, where digital infrastructure is often non-existent.

#### 2. High Implementation Costs

As the Nigerian government is yet to release policy that encourages adoption of AI in industries and offer financial incentive for the adoption of AI in commerce. According to Eze et al., (2023) barriers, such as the high costs of AI technologies and inadequate infrastructure, exist in these countries and thus are often faced with the inability for AI to be adopted on a widespread level. Onuoha (2023) further describes how financial constraints hampered the adoption of AI by Nigerian industries that often lack the capital to support the AI adoption. Limited access to financing, along with high upfront costs for AI technology, has inhibited strong AI adoption to the mechanical technology. He calls for more investment from the government and private sector to help integrate AI.

#### 3. Working with Global AI Leaders

Knowledge transfer and accelerated adoption of AI in Nigeria's mechanical technology sector can happen through partnership with global AI firms. In addition, they note in Eze et al. (2023) that the Nigerian workforce is challenged in simply being equipped with professionals trained in AI and other related fields. The gap in this limits the ability of local industries to effectively integrate AI into their operations. He says that they will need to invest substantially in



education and training programs to train up a workforce capable of using and maintaining AI systems in mechanical technology.

#### 4. Ethical Concerns

AI is also an ethical question (bias in algorithms, danger of replacing people with machines). For these concerns to be addressed, however, relies on transparent and inclusive AI development processes involving readable, testable mathematical models (Adebayo & Adetunji, 2023).

#### 5. Data Privacy and Security

The use of large datasets means two risks inherent to the use of AI: data privacy and cyber security. Sensitive information is only protected by strong policies and regulations (Oluwole et al., 2023).

### **8. Recommendations for Leveraging AI for Sustainable Development in Nigeria**

The possibility of making AI play a big role in shaping explanations of sustainable development in Nigeria is huge, but this only holds if there is a strategic intervention in the areas of education, infrastructure, policy, and inclusivity. To maximize the potential of AI in mechanical technology, Nigeria must adopt strategic measures:

#### 1. Strengthening AI Infrastructure

a. Investment in Digital Infrastructure: For AI development it is crucial to broaden internet connectivity, data centers and the cloud computing infrastructure. Similarly, it is said that Nigeria's broadband penetration is still very low, and most are not able to access AI powered services, especially in rural areas (Aina et al., 2023). Example: Wide spread of AI adoption can be made possible by expanding 5G networks and giving subsidies for digital infrastructure.

b. Reliable Power Supply: But Nigeria suffers from persistent power shortages, which means that AI systems rely on uninterrupted electricity. By investing in renewable energy like solar or wind, it makes for an alternative for AI systems. (Onuoha, 2023).

#### 2. AI Education and Research

a. Curriculum Integration: The deployment of AI solutions requires and develops a skilled workforce and AI can be incorporated at secondary and tertiary levels to develop this workforce. Example: Covenant University has also started offering courses on AI, which institutions are following (Eze et al., 2023).

b. Starting AI Research Centers: That progress, however, can be accelerated by dedicated research centers that create innovation specific to Nigeria's specific challenges like agriculture, healthcare and renewable energy. Example: Local AI research and development comes naturally through the National Center for AI and Robotics (NCAIR) set up in Abuja.

#### 3. National AI Policies Development

a. Comprehensive AI Strategy: The development cannot happen without a clear national AI strategy which shapes priorities, ethical rules of engagement and regulations. Example: In fact, Nigeria should follow Rwanda's National AI Policy that integrates AI as part of governance, health, and education (Adebayo et al, 2023).

b. Ethical and Regulatory Frameworks for proposed innovations in medical and health care is explained. To build trust in AI systems, guidelines need to be established to address ethical issues like data privacy, algorithmic bias, and accountability.

#### 4. Encouraging Industry-Academia Collaboration

Academic-Industry partnerships can fill the gap between AI research and practice. Example: Universities collaboration with technology companies like Microsoft Nigeria will boost tech innovation in sectors such as fintech and agriculture (Oluwole et al., 2023).

## 5. Fostering Public Private Partnerships (PPPs)

a. Investment in AI Startup: Grants and tax incentives can be offered by the government to the AI focused startups that are working on Healthcare, Energy and Transportation solutions. Example: Kudi.ai and Data Science Nigeria are some of the startups using AI to develop new solutions to financial inclusion and education.

b. Multinational Collaborations: With the ability to harness partnerships with industry leading global AI leaders, the tools and training can advance. For Instance, Google's AI lab in Ghana has developed AI research in Africa and this model is what Nigeria can also adapt (Nwosu & Chukwu, 2023).

## 6. Key Sectors Targeted AI applications

a. Agriculture: Farming practices can be optimized by AI driven tools, weather patterns can be predicted and supply chain can be better managed through AI driven tools. Example: Hello Tractor, an AI powered platform that connects farmers with tractors improves their productivity and reduce their costs (Abubakar & Idowu, 2022).

b. Healthcare: The application of AI can facilitate better diagnosing, optimize hospital resource, and enable remote consultation or can help the work of telemedicine. Example: AI helps Life Bank connect hospitals to blood sources and save lives in emergencies.

c. Energy: AI can supply energy distribution and allow renewable energy sources to be incorporated into the grid. Example: In Kaduna, AI driven energy management systems are being tested to reduce energy waste and improve reliability (Onuoha, 2023).

## 7. Building Trust and Creating Awareness

Myths can be dispelled, as well as the acceptance of AI technologies, through public awareness campaigns. Example: Organizations such as Data Science Nigeria bring stakeholders up to speed on the benefits and the risks of AI (Aina et al., 2023) through workshops and seminars.

## 8. Addressing Data Challenges

a. Building Local Data Repositories: Creating sector specific data repositories for AI development focused on local needs would be able to harness this resource. Example: If agriculture and healthcare data hubs are established in Nigeria then AI applications in these areas will be easier.

b. Data Privacy and Security Assurance: Global standards for data protection will help businesses and people to trust AI systems.

## 9. AI Development and Gender and Inclusivity

Collaborating with a diverse set of groups builds a solution on equity and for the many. Example: Inclusivity can also be promoted through programs encouraging women and others in underrepresented groups to pursue careers in AI (Eze et al., 2023).

## 10. Using AI for Governance and Policies Development

AI brings potential governance improvement through boosting decision making, monitoring public services, and counteracting corruption. Example: Data analysis tools based on AI can help identify ineffectiveness of public spending making it transparent and accountable (Adebayo et al., 2023).

## 10. Conclusion

Artificial Intelligence (AI) has become a technology that has attracted a lot of attention as a transformative technology that can solve many socio economic challenges including those of countries like Nigeria. Artificial Intelligence (AI) capabilities hold the potential to revolutionize the mechanical technology; from making the machines more intelligent, through predictive maintenance to energy optimization. AI application can help boost productivity, optimize resource management and create sustainable development under economic

uncertainty in mechanical technology. However, due to the lack of infrastructure, the lack of skilled personnel, and no government policy to encourage the adoption of AI in critical sectors (Eze et al., 2023), the adoption of AI in Nigeria is still restricted and evident benefits will not be achieved. Furthermore, there is little research on how AI can be strategically integrated into mechanical technology to solve Nigeria's unique economic problems. Failure to target the adoption and application of AI stands to further push already struggling industries in Nigeria further into the gulf in terms of lost opportunities for competitiveness and sustainability indices in world benchmarks.

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