Proceedings of the International Conference on Industrial Engineering and Operations Management

Publisher: IEOM Society International, USA DOI: 10.46254/WC02.20250048
Published: October 14, 2025

Challenges in Adopting Robotic and Automation Systems in Nigeria's Manufacturing Industry

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Abstract

The objective of this research was to investigate the key challenges associated with the sluggish adoption and execution of robotic automation in Nigeria's manufacturing industry. The study focuses on Lagos, Nigeria's largest industrial and economic centre, utilizing a quantitative research approach through a questionnaire survey directed at professionals such as production managers, production engineers, and chief operating officers. Out of the one hundred and fifty (150) questionnaires distributed, one hundred and twenty (120) completed responses were received, resulting in a response rate of 67 percent. Research results were examined with the Statistical Package for Social Sciences (IBM SPSS 28.0), which computed the mean and standard deviation to pinpoint and prioritize major obstacles associated with the inadequate adoption and implementation of robotic automation in Nigeria's manufacturing sector. The study's findings indicated that challenges like insufficient investment in modern technology, restricted access to advanced tools, absence of necessary technological infrastructure for automation, inadequate funding, and limited training opportunities, along with insufficient support for research and development in automation engineering, hinder innovation and growth. These issues are deemed the most significant obstacles related to the poor adoption and implementation of robotic automation in Nigeria's manufacturing sector. In conclusion, the research highlighted the

necessity to fully utilize technological progress, with the Nigerian government's formation of public-private partnerships being vital for economic sustainability and global competitiveness.

Keywords
Challenges, Manufacturing sector, Nigeria, Robotic automation.

1. Introduction
Robotic automation signifies a modern trend in technological advancement with considerable potential and competitiveness in boosting manufacturing efficiency (Aririguzo and Agbaraji, 2016). As stated by Azman and Ahmad (2023), robotic systems operate as devices that carry out industrial functions with great accuracy and speed, and are progressively utilized in a range of automation processes within the manufacturing industry. Consequently, the automation system, on the other hand, serves as an evaluation that reflects the degree of technology utilized to automate manufacturing processes (Azman and Ahmad, 2023). Aririguzo and Agbaraji (2016) stated that robotics involves the design, construction, and use of machines to perform tasks usually performed by humans, whereas manufacturing processes benefit greatly from increased flexibility. Robotic automation can be classified into two categories: fully automated systems and semi-automated systems. Consequently, automation signifies a contemporary movement in technology evolution with notable potential and competitiveness for improving manufacturing efficiency (Aririguzo and Agbaraji, 2016). As stated by Azman and Ahmad (2023), robotic systems serve as a device that performs industrial operations with great accuracy and speed, which are being increasingly utilized in different automation processes within the manufacturing industry. Therefore, the automation system, on the other hand, serves as a measure reflecting the extent of technology utilized to automate production processes (Azman and Ahmad, 2023).

Aririguzo and Agbaraji (2016) noted that robotics involves the creation, construction, and use of machines to perform tasks usually done by humans, while manufacturing processes benefit significantly from increased adaptability. Robotic automation is categorized into two types: fully automated systems and semi-automated systems. A fully automated system is defined as the total execution of tasks by machines in transforming raw materials into finished goods during an entire production cycle (Azman and Ahmad, 2023). This technique requires the involvement of human experts to monitor the operation of the swift robots. On the other hand, robots account for fifty percent of the work process, while the need for human labor, commonly known as operators at each station on the assembly line, remains substantial in semi-automated systems (Azman and Ahmad, 2023). A robot is an electromechanical system operated by a computer or microcontroller with electronic programming (Aririguzo and Agbaraji, 2016). Robots possess adaptability, allowing them to swiftly modify their tasks to satisfy the requirements of either the manufacturer or the customer. In this process, robots carry out three main functions: they "identify" based on environmental signals, then "evaluate" by employing programmed algorithms for decision-making, and finally "implement" using the robots' end-effector (Aririguzo and Agbaraji, 2016). Robots possess adaptability, allowing them to swiftly modify their tasks to fulfill the requirements of both the manufacturer and the consumer. In this process, robots carry out three main functions: they "identify" through environmental signals, then "evaluate" by employing programmed algorithms for decision-making, and finally "act" by operating the robots' end-effector (Aririguzo and Agbaraji, 2016). Nigeria is slowly integrating automation and robotics across various sectors, although the speed remains behind that of more developed nations. The integration of these technologies primarily takes place in sectors such as manufacturing, agriculture, and healthcare, where they are recognized for enhancing efficiency, productivity, and cost-effectiveness (Professions.ng, 2023; Nwamekwe et al., 2024).

The incorporation of automation and robotics is transforming traditional practices in Nigeria. Industries are leveraging these advanced technologies to optimize workflows, as demonstrated in the automotive sector, where automation enhances manufacturing processes. Similarly, manufacturing companies are progressively utilizing robots to improve productivity and minimize human errors (professions.ng, 2023; Nwamekwe et al., 2024). Automation plays a crucial role in the oil and gas sector for exploration, drilling, and maintenance, resulting in improved safety and reduced operational costs. The healthcare industry is undergoing significant changes, as robotics is increasingly utilized in surgeries, patient assistance, and medication delivery. Nonetheless, Nwamekwe et al. (2024) suggest that the incorporation of robotic automation and technologies in Nigerian manufacturing showcases a varied landscape, with initial adopters exhibiting a mix of successes and challenges. These firms have demonstrated the benefits of automating production processes, such as enhanced efficiency and product quality, while also pointing out significant challenges that need to be addressed. These obstacles hinder the effective implementation and utilization of advanced

technologies, ultimately influencing productivity and competitiveness. Consequently, it requires tactical measures to address the difficulties of transitioning to robotic automation (Nwamekwe, et al., 2024).

1.1 Objectives

The objective of this study is to examine some of critical challenges associated with adopting and implementation of robotic automation system in Nigerian manufacturing industry.

2. Literature Review

2. 1 Overview of Automation Industrial and Manufacturing Operations

Ajiga et al. (2024) assert that robotic automation is transforming industrial processes by greatly boosting efficiency, productivity, and operational dependability. The robotic automation enables the simplification of tedious and time-intensive activities by substituting manual procedures with automated systems in the manufacturing industry. Ibrahim (2024) claims that the global economy could gain $13 trillion from robotic automation via artificial intelligence by 2030, particularly within the manufacturing industry, despite the potential loss of 375 million jobs. Ade-Omowaye et al. (2024) mention that the deployment of automation like Robotic Process Automation (RPA) software applications serves as a robotic mechanism to replicate human activities. The RPA robotic system is considerably enhancing the overall productivity and efficiency of the manufacturing industry. Results include: quicker processing, round-the-clock operation, data gathering, improved production efficiency: robots, with their high accuracy and rapid execution of repetitive tasks, contribute to less waste and greater output, lowering risks to human safety; optimal use of resources and boosted flexibility and productivity (Ade-Omowaye et al., 2024). Robotic automation will significantly transform the workplace by optimizing processes, cutting expenses, and improving decision-making and predictive analytics, thereby decreasing accidents in construction and manufacturing (Ibrahim, 2024). The manufacturing sector in Nigeria is set for a change with the incorporation of cutting-edge technologies, especially robotics and automation. According to industry experts, adopting cutting-edge technologies is crucial for manufacturers to stay competitive in a changing global market (Novatia Consulting, 2025; Idoko, 2024). This shift is driven by the need to optimize production processes, enhance product quality, and respond effectively to changing consumer expectations.

2. 2 Potentiality to Enhance Nigerian Manufacturing Sector Through Adoption of Robotic System

The ongoing advancements in robotics and artificial intelligence (AI) are set to revolutionize Nigeria's manufacturing industry's operational landscape. Emerging technologies like machine learning and predictive analytics will allow industries to transform, improve production schedules, and manage inventory more effectively (Stransact, 2024; Hunyemen, 2023). The implementation of robotics will improve processes, leading to increased precision, reduced labor costs, and improved safety in manufacturing environments (Bunmi, 2023). Despite this, the challenges to implementing robotic and automation systems in Nigeria's manufacturing sector are significant and intricate, hindering the country's ability to fully leverage advanced technologies for industrial growth (Professions.ng, 2023). While Nigeria is gradually embracing automation—primarily in areas such as manufacturing, agriculture, and healthcare—the speed of this transition significantly trails that of developed nations, highlighting a gap in technological integration and readiness of the workforce (Professions.ng, 2023). This situation is exacerbated by issues such as inadequate infrastructure, unreliable electricity access, and a shortage of skilled labor, all of which collectively obstruct progress in enhancing operational efficiency and productivity (Adeodun, 2024).

According to Nwamekwe et al. (2024), Nigeria's manufacturing sector includes industries such as food and beverages, textiles, chemicals, and automotive, facing significant challenges like insufficient skilled labor, deteriorating infrastructure, and limited access to advanced technologies. Research on the influence of Foreign Direct Investment (FDI) on growth in Nigeria's manufacturing sector highlights the importance of outside investments in improving sector performance (Idoko & Taiga, 2018 cited by Nwamekwe, et al., 2024). A considerable need exists for strategic actions to address infrastructure deficits and skill shortages to improve the strength and competitiveness of Nigeria's manufacturing sector. Gareth (2024) claims that state-led initiatives are crucial for encouraging the uptake of robotics and automation. This includes establishing technology parks, industrial centers, and monetary incentives aimed at encouraging companies to invest in cutting-edge technologies. These efforts are essential for tackling infrastructure limitations and enhancing the general manufacturing landscape in Nigeria. Nwaimo and others, (2024). A significant barrier to the adoption of technology in Nigeria is the limited financial resources and the shortage of skilled workers. The insufficiency of proper ICT infrastructure and resources poses a major obstacle to the integration of technology within Nigerian governmental institutions (Nwaimo et al., 2024). Therefore, lacking the required infrastructure and resources, government agencies encounter difficulties in adopting and efficiently utilizing technology to enhance their

operations and service delivery (Nwaimo et al., 2024). The financial implications of utilizing these technologies are significant. The combination of robotics and automation is expected to improve productivity and support economic development in Nigeria (Onwuamaeze, 2023; Adeodun, 2024). Companies that successfully incorporate advanced manufacturing technologies are likely to see higher revenue and profit margins from their investments, positioning themselves favorably in both domestic and international markets (Novatia Consulting, 2025; Idoko, 2024). As a result, Nigeria's manufacturing sector is poised for transformation through the integration of advanced technologies, particularly robotics and automation. Industry experts stress that embracing cutting-edge technologies is essential for manufacturers to maintain their competitiveness in an evolving global marketplace (Novatia Consulting, 2025; Idoko, 2024). This shift is driven by the need to enhance production techniques, raise product quality, and respond effectively to changing consumer preferences

2. 3 Challenges in adoption and Implementation of robotic automation in Nigeria

Nsude (2020) states that despite a positive trend, the incorporation of robotics and automation faces challenges such as inadequate infrastructure, budget constraints, and a lack of skilled labor in the workforce. Addressing these challenges necessitates a thorough approach that encompasses governmental support, skill enhancement, and greater funding for infrastructure (Nsude, 2020). Addressing these issues will be crucial for maximizing the benefits of automation and ensuring a smooth transition for Nigeria's workforce and economy as a whole. Nonetheless, the implementation of robotic and automation systems in Nigeria's manufacturing sector faces numerous significant challenges. These obstacles hinder the effective adoption and utilization of advanced technologies, ultimately impacting productivity and competitiveness. A major barrier to the successful integration of robotic and automation systems is the lack of adequate infrastructure. Several manufacturing facilities in Nigeria face challenges with outdated machinery, insufficient power supply, and irregular internet connectivity, all of which are crucial for the effective functioning of contemporary automated systems (Nsude, 2020; Onwuamaeze, 2023). The irregular availability of electricity, specifically, poses a major difficulty, as reliable power is essential for the continuous operation of robotics and automated systems (Novatia Consulting, 2025). The financial pressure associated with acquiring robotic systems and automation technologies also presents a significant challenge. The significant upfront costs related to purchasing, installing, and maintaining these systems might dissuade manufacturers, particularly small and medium-sized enterprises (SMEs), from adopting these technologies (Professions.ng, 2023). Limited funding options and restricted access to financial resources exacerbate this issue, hindering many manufacturers from investing in modern automation technologies (Nwaimo et al., 2024).

Furthermore, another major challenge is the lack of qualified and skilled individuals who can operate and maintain robotic systems. Nigeria's workforce faces significant skill gaps in advanced manufacturing technologies, as numerous workers lack vital technical knowledge and training (Novatia Consulting, 2025). The absence of sufficient training initiatives hinders the effective use of robotic systems, causing organizations to struggle in finding skilled individuals capable of operating these technologies proficiently (Ibrahim, 2024). Resistance to change in organizational cultures can also hinder the implementation of robotic and automation systems. Many stakeholders may hesitate to embrace new technologies due to fears of job loss or skepticism regarding the benefits of automation (Professions.ng, 2023). This resistance can create an environment that stifles innovation, leading to reluctance in adopting robotic solutions (Tanimu, 2025). Legal and regulatory challenges complicate the implementation process further. Unclear policies and outdated regulations can create obstacles for producers looking to adopt innovative technologies (Hunyemen, 2023). Regulatory structures need to evolve to encourage the integration of automation and robotics in the manufacturing sector (Stransact, 2024). Similar to numerous technological implementations, concerns regarding data security and privacy present additional obstacles. The integration of robotics and automation often involves the collection and management of sensitive data, raising issues regarding cybersecurity and compliance with data protection regulations (DesignersX Inc, 2025). Producers must address these challenges to ensure the secure execution of robotic systems.

3. Methods

This study aimed to critically assess the key challenges related to the adoption and successful implementation of robotic automation in Nigeria's manufacturing sector, specifically concentrating on Lagos state, the country's primary industrial center. This research employs a quantitative method based on positivist epistemology, guaranteeing objectivity and a degree of generalizability in results (Park et al., 2020). Consequently, this research utilized a quantitative methodology to accomplish the established goal. This study utilizes a quantitative approach grounded in positivist epistemology, ensuring objectivity and a level of generalizability in findings (Park et al., 2020). As a result, this study employed a quantitative approach to achieve the set objective. A quantitative research survey is an organized

method for collecting data from a sample of individuals by asking questions pertinent to the research objective. In a study employing quantitative research, it is crucial to accurately measure specific characteristics of the phenomena. Thus, this study collected data through a carefully crafted questionnaire given to 150 participants employed as industry professionals in sectors related to manufacturing companies in Lagos State, Nigeria, comprising positions such as production managers, production engineers, and chief operating officers, securing a steady response rate of 120 from the 150 questionnaires sent out to assess and pinpoint critical factors perceived as barriers to the effective adoption and implementation of robotic automation in Nigerian manufacturing companies, utilizing a 5-point Likert scale where one represented minimal influence and five indicated significant influence. The data obtained from the 120 completed and valid questionnaires were examined using descriptive statistics. The normality of the gathered data was evaluated using the Shapiro-Wilk test, while Cronbach's alpha was utilized to assess the reliability coefficient of the data collection tool. The selected cut-off alpha for this study was 0.70, and an alpha value of 0.865 was obtained, indicating that the gathered data is reliable and valid for pinpointing the key factors that hinder the successful adoption and implementation of robotic automation in manufacturing companies in Nigeria. In conclusion, the study utilized a 5-point Likert scale to determine the primary factors. Thus, a 5-point Likert scale is employed, where 5 denotes very high influential factors, 4 denotes high influential factors, 3 represents average influential factors, 2 indicates low influential factors, and 1 indicates very low influential factors. One hundred fifty (150) questionnaires were sent out, and one hundred twenty (120) were returned and considered suitable for analysis. The research utilizes data analysis techniques such as percentages, frequency, average item score, and standard deviation.

3.1 Respondents Demographics

Total of one hundred fifty (150) questionnaires were distributed Among the respondents which consists of production managers, production engineers, and chief operating officers, and one hundred twenty (120) were received back and deemed appropriate for analysis, thus indicating 67% response rate, which is statistically satisfactory. Table 1 shows the respondents' background profile with regard to professional positions, qualifications, and years of industry experience.

Table 1. Respondents Demographics Profile

Demography	Item/Classification	Frequency (n=120)	Percentage (%)
Age	21-30 years old	35	29.20
	31-40 years old	57	47.50
	41 years old and above	28	23.30
	Total	**120**	**100%**
Gender	Male	101	84.17
	Female	19	15.83
	Total	**120**	**100**
Current Job Position	Production Manager	63	52.50
	Production Engineer	43	35.83
	Chief Operation Officer	14	11.67
	Total	**120**	**100%**
Highest Qualifications	ND/HND Diploma	60	50.00
	BSc Degree	47	39.20
	Master's Degree	10	8.30
	PhD Degree	3	2.50
	Total	**120**	**100**
Industry Experiences in Nigerian Manufacturing Sector	3- 6 years	12	10.00
	7- 10 years	43	35.83
	11- 14years	51	42.50
	15 years and above	14	11.67
	Total	**120**	**100**

Source: Fieldworks (2024)

Table 1 shows that a substantial portion (47.50%) of respondents are aged between 31 and 40 years, with roughly 84% being male, highlighting a male-dominated field. Additionally, around 52% hold positions as production managers,

35.83% as production engineers, and approximately 11% serve as chief operating officers. In terms of qualifications, approximately half (50%) of the respondents hold a Diploma, while around 39% possess a Bachelor's degree, and about 8.30% and 2.50% have Master's and PhD degrees, respectively

4. Results and Discussion

The results from the analysis conducted to achieve the study's objective are presented below; see Table 2. The study utilizing the Statistical Package for Social Sciences (IBM SPSS 28.0) computed the mean and standard deviation to determine and prioritize major challenges associated with the inadequate adoption and implementation of robotic automation in Nigeria's manufacturing sector.

Table 2. Critical Challenges Associated in Adoption and Implementation of Robotic Automation in Nigerian Manufacturing Industry

Critical Challenges Associated in Adoption and Implementation of Robotic Automation	**Mean Scores**	**Standard Deviation**	**Rank**
Insufficient investment in advanced technology	4.54	0.843	1
Restricted access to advanced technology	4.43	0.846	2
Absence of essential technological infrastructure needed for advanced automation	3.82	0.968	3
Lack of investment in advanced technology	3.81	1.218	4
Inadequate infrastructure support.	3.79	0.989	5
Insufficient power supply and strong internet connectivity	3.76	1.164	6
Inability to attract foreign direct investments	3.74	1.159	7
Inadequate funding, and insufficient training opportunities	3.73	1.150	8
Unstable economic environment causes high cost of importation of technological assets	3.71	1.145	9
Inadequate support for research and development in automation engineering limits innovation and growth	3.69	1.196	10
High cost of acquiring automation engineering skills	3.65	1.199	11
Scarcity of skilled automation engineers in Nigeria	3.63	1.233	12
Retaining qualified professionals poses a challenge	3.60	1.110	13
Skilled automation engineers often seek better opportunities abroad, depleting the talent pool	3.58	1.122	14
Limited opportunities for practical experience and exposure to automation technologies during academic studies	3.56	1.118	15
Lack of awareness and limited educational opportunities for robotic automation skills	3.54	1.011	16
Lack of specialized automation engineering programs in universities and colleges.	3.53	1.078	17
Lack of industry-academia collaboration,	3.52	1.135	18
Insufficient emphasis on continuous professional development for automation engineers after graduation.	3.50	1.078	19
Lack of cutting-edge tools and software	3.49	1.236	20
Outdated infrastructure	3.48	1.204	21
Budget constraints that limit investments in automation	3.47	1.120	22
The limited access to advanced technology stifles the creativity and innovation of automation engineers in Nigeria.	3.46	1.140	23
Automation engineers require exposure to advanced technology to enhance their skills and knowledge.	3.45	1.132	24
Lack of awareness among policymakers and education stakeholders about the importance of automation education.	3.44	1.273	25
Constantly evolving automation technologies make it challenging to keep up with the latest advancements.	3.43	1.328	26

High cost of updating infrastructure and laboratories to match the requirements of automation engineering.	3.42	1.115	27
Increased reliance on manual processes	3.41	1.123	28
Inadequate funding for automation projects	3.40	1.125	29
Navigating the complex regulatory landscape and ensuring compliance with safety, security, and quality standards can be a significant	3.38	1.241	30
Inability to meet global standards	3.37	1.141	31

Source: Fieldworks (2024)

Table 2 Table 2 illustrates the key difficulties linked to the adoption and execution of robotic automation in Nigeria's manufacturing sector. Using a 5-point Likert scale ranging from very low to very high, respondents were asked to rate the factors/statements to evaluate and ascertain the perceptions of significant challenges facing the Nigerian manufacturing sector's sufficient capacity and capability for adopting and implementing robotic automation. The outcomes were ranked from 1 to 31, with the strongest factors listed first and the weakest last. The top 15 ranked factors identified as significant challenges hindering the effective adoption and implementation of robotic automation in Nigeria's manufacturing sector include insufficient investment in advanced technology (MS=4.54, SD=0.843, R=1); restricted access to advanced technology (MS=4.43, SD=0.846, R=2); absence of essential technological infrastructure needed for advanced automation (MS=3.82, SD=0.968, R=3); lack of investment in advanced technology(MS=3.81, SD=1.218, R=4); inadequate infrastructure support (MS=3.79, SD=0.989, R=5); insufficient power supply and strong internet connectivity(MS=3.76, SD=1.164, R=6); inability to attract foreign direct investments(MS=3.74, SD=1.159, R=7); inadequate funding, and insufficient training opportunities(MS=3.73, SD=1.150, R=8); unstable economic environment causes high cost of importation of technological assets (MS=3.71, SD=1.145, R=9); and inadequate support for research and development in automation engineering limits innovation and growth (MS=3.69, SD=1.196, R=10. The top 10 ranked factors viewed as crucial challenges related to the adoption and implementation of robotic automation in manufacturing highlight important influential elements and situations that obstruct the Nigerian manufacturing sector from achieving substantial progress in the integration of robotic automation into their factory processes.

In addition, the 10-lowest ranked factors considered as critical challenges associated with effective adoption and implementation of robotic automation in Nigerian manufacturing sector (See Table 2) are outdated infrastructure (MS=3.48, SD=1.204, R=21); budget constraints that limit investments in automation (MS=3.47, SD=1.120, R=22); limited access to advanced technology stifles the creativity and innovation of automation engineers in Nigeria (MS=3.46, SD=1.140, R=23); automation engineers require exposure to advanced technology to enhance their skills and knowledge (MS=3.45, SD=1.132, R=24); lack of awareness among policymakers and education stakeholders about the importance of automation education (MS=3.44, SD=1.273, R=25); constantly evolving automation technologies make it challenging to keep up with the latest advancements (MS=3.43, SD=1.328, R=26); high cost of updating infrastructure and laboratories to match the requirements of automation engineering (MS=3.42, SD=1.115, R=27); increased reliance on manual processes (MS=3.41, SD=1.123, R=28); inadequate funding for automation projects (MS=3.40, SD=1.125, R=29); navigating the complex regulatory landscape and ensuring compliance with safety, security, and quality standards can be a significant (MS=3.38, SD=1.241, R=30); and inability to meet global standards (MS=3.37, SD=1.145, R=31). These factors highlight significant challenges that restrict the Nigerian manufacturing sector's ability to properly adopt and implement robotic and fully automated operating systems to enhance its productivity, global competitiveness, and sustainability. Therefore, the empirical recognition and assessment of factors viewed as significant challenges linked to insufficient adoption and implementation of robotic automation in Nigeria's manufacturing industry are essential preliminary measures for fostering awareness and preparedness for the successful integration of robotic technologies to enhance productivity, grow in response to local market needs, and leverage global markets.

The study revealed that the main challenges hindering the successful implementation and adoption of robotic automation in manufacturing are lack of investment in advanced technology, limited access to such technology, a lack of necessary technological infrastructure for advanced automation, and insufficient infrastructure support. These findings bolster the assertions made by Nsude (2020); Onwuamaeze (2023); Novatia Consulting (2025); and Tanimu (2025), highlights that a major obstacle to the effective integration of robotic and automation systems is inadequate infrastructure. Many factories in Nigeria experience issues with outdated machinery, insufficient power supply, and unreliable internet access, all of which are crucial for effectively operating modern automated systems. The

inconsistency of electricity supply, in particular, poses a major challenge, as reliable power is essential for the continuous operation of robotics and automated systems

5. Conclusion and Recommendations

The research explored the significant obstacles preventing adequate adoption and execution of robotic technology and automation in Nigeria's manufacturing industry, focusing on comprehending the extent of awareness issues. Furthermore, to some extent, to foster understanding from a practical perspective and the need for a vigorous appeal to promote strategic and effective approaches nationally and within the industry among key stakeholders to tackle challenges and secure the national agenda for sustainable economic development and global competitiveness. The research finds that the main obstacles preventing the Nigerian manufacturing industry from successfully adopting and executing robotic automation are lack of investment in cutting-edge technology, limited access to these technologies, a lack of necessary technological infrastructure for advanced automation, inadequate funding, and scarce training opportunities. Moreover, insufficient backing for research and development in automation engineering hinders innovation and progress. The study indicated that stakeholders in Nigeria's government and manufacturing sector should acknowledge and understand that upcoming advancements in the manufacturing industry will likely entail significant advancements in automation and robotics technologies. Industrial robots are equipped with sophisticated sensors and AI-driven technologies that enhance precision and efficiency in production methods. These innovations enable faster production schedules and reduced error rates, vital for maintaining high-quality outcomes. As organizations adopt these technologies, they must focus on employee training to ensure that workers are equipped to work alongside advanced machines, thereby facilitating a smoother transition into this tech-oriented landscape. The study further identified and recommended that government initiatives are expected to play a crucial role in promoting the incorporation of robotics and automation in Nigeria's manufacturing sector. These duties encompass the development of tech parks, industrial centers, and financial incentives aimed at encouraging businesses to invest in cutting-edge technologies. These actions are crucial for addressing infrastructure challenges and improving the overall manufacturing environment in Nigeria.

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Biographies

Engr. Jachike Chineme ANUGWO. is a Mechanical Engineer with a bachelor's degree in Mechanical and Production Engineering from Enugu State University of Science and Technology in Enugu, Nigeria. Eng. Jachike has approximately 20 years of industry experience in manufacturing as a Mechanical Engineer, with expertise in the installation, operation, and scheduled maintenance of factory and production line systems. Engr Jachike has trained and provided tools for new technicians and operators, along with mechanical and production engineers, using his expertise in automation and in the operation and upkeep of manufacturing production systems.

Engr. Chioma Ada Omattah. is employed as a Data Engineer at Bluechip Technologies Ltd and is linked to Enugu State University of Science and Technology (ESUT), situated in Enugu, Nigeria. Engineer. Chioma possesses professional qualifications and certifications such as OCP – Oracle 10G DBA (OCP) Certified Professional, OCA - Oracle 10G DBA (OCA) Certified Associate, a completion certificate in Oracle Data Integrator (ODI), OCI - Oracle Cloud Database Services 2021 Certified Specialist, ADB - Oracle Autonomous Database Cloud 2021 Certified Specialist, OCI - Oracle Cloud Infrastructure 2021 Certified Architect Associate, OCI - Oracle Cloud Database Migration and Integration 2021 Certified Specialist, along with Certified Data Engineer Associate. With almost 12 years of experience in the industry, Engr. Functions as a Data Analytics Engineer. Chioma has initiated and finalized multiple specialized IT projects by leveraging her distinct IT expertise in the software development lifecycle (SDLC), OMAPP Management System, and Enterprise Risk Management Data Warehouse & Analytics.

Mr Onyekwelu C. ANUGWO. works as an IT Business Analyst for Anmath Consulting Ltd in Lagos, Nigeria. Mr. Onyekwelu has participated in specialized IT initiatives and has been responsible for identifying and assessing IT system capabilities, as well as creating models and system requirements for customized IT systems or software solutions, with limited oversight for principal stakeholders in both government and corporate entities

Dr. Iruka Chijindu Anugwo. serves as a senior lecturer in the Department of Construction Management and Quantity Surveying at the Durban University of Technology in South Africa. Dr. Anugwo possesses a PhD in Construction Management and has authored more than 45 research papers in his fields of interest. He possesses substantial expertise in practice, research, training, and instruction. He presently possesses more than 15 years of experience in research and teaching related to construction safety, smart built environments, facilities management, construction engineering, and sustainable construction.