

RESEARCH ARTICLE



Employee Motivation and Sustainable Productivity Assessment in Automated Work Environment

Idongesit Oto Eshiett^{1,*} and Oto Eyamba Eshiett²

¹*Department of Marketing, Akwa Ibom State University, Nigeria*

²*Department of Business Administration, ICT University, Cameroon*

Abstract: Motivating employees is vital to the sustainable growth and increased productivity of business concerns. The paradigmatic shift occasioned by the realities of the Fourth Industrial Revolution (4.0), which enhanced the introduction of automated devices (robots and artificial intelligence) in the work environment, has made employee productivity assessment quite challenging. The focal point of this work evaluates employee inducement on sustainable productivity within the framework of an automated work environment. Motivation is a key driver of employee engagement and enthusiasm, leading to enhanced productivity for the attainment of set targets by organizations. Outstanding issues examined include employee skill gap, job design, and inclusiveness. The study was designed to investigate the significant relationship between employee intrinsic/extrinsic motivation and productivity in an automated workplace. A descriptive research design was adopted, in which questionnaires were administered to respondents who were skilled and unskilled personnel, managers, and directors selected from automated disc manufacturing firms in Nigeria. A structured systematic literature review was also adopted to outline each of the hypothetical propositions. Data were collected via email, while additional information was further obtained from respondents through phone calls and short message services on motivation and productivity assessment in their peculiar (automated) work environment. The null hypotheses were tested using Pearson's correlation analysis technique. The results of the study showed that there is an interrelationship between employee motivation and productivity assessments. The findings of the study revealed that there is a significant relationship between employee motivation and sustainable productivity in an automated work environment. The study recommended the need for employees to be skillful in information and communications technology skills, management engagement of employees in an automated work design ecosystem, and addressing issues such as employee training/retraining, health, welfare, and inclusiveness. These will increase employee intrinsic/extrinsic motivation, firm productivity/profitability, and national economic development/industrialization.

Keywords: employee motivation, productivity assessment, automation, work environment, fourth industrial revolution, sustainability

1. Introduction

The main aim of creating business concerns is to achieve strategic corporate goals and set objectives; outstanding successes recorded by any firm are often measured by the overall productivity of all stakeholders [1]. The 4.0 Industrial Revolution has introduced predetermined processes that involve technological interventions in production, with or without human input [2]. The gains of automation have been criticized by the Organization for Economic Co-operation and Development (OECD), which noted that 9% of jobs in 21 member countries have been taken over by machines [3]. Concerns about job replacement due to automation persist [4, 5]. In contrast, reported that management's strategic interest in automation is to enhance productivity rather than replacing human jobs, though this view has faced significant criticism [6].

Moreover, various applications of artificial intelligence (AI) in the workplace have significantly enhanced firms' capabilities, lead-

ing to immeasurable productivity increases [7]. AI has also provided efficient solutions for stressful tasks and hazardous environments detrimental to human health [8]. For sustainable productivity in an automated workplace, it's essential to ensure inclusivity and equitable opportunities for persons with disabilities [9] and to avoid ethnic segregation. The need for automation became increasingly apparent during the COVID-19 pandemic, which led to a global economic shutdown, although institutions with e-learning resources remained operational [10]. Therefore, an automated workplace is becoming a reality in the 21st century, and employees must be motivated to contribute to total productivity and overall profitability.

Frederick Taylor emphasized in his work [11] that employee motivation in a 4.0 industrial revolutionary workplace directly impacts access to the best tools, task completion, and productivity levels. Employees should be motivated accordingly [11]. When employees are offered appropriate motivational schemes, their unique abilities can be effectively harnessed. The attitude and morale of employees depend on the expected rewards for their services, which boosts commitment and overall productivity [12]. It's

*Corresponding author: Idongesit Oto Eshiett, Department of Marketing, Akwa Ibom State University, Nigeria. Email: idongesiteshiett@aksu.edu.ng

crucial for management to engage employees [13, 14] in the pursuit of personal and subjective developmental goals [15, 16]. A positive motivational perception among employees can lead to increased productivity and successful organizational task implementation.

Sustainability, a key term in the 21st century related to human activities and their impact on the planet, connects to the United Nations Sustainable Development Goals (UNSDGs). This study focuses on two specific goals: Sustainable Development Goal (SDG) 8, which promotes decent work and economic growth, and SDG 9, which urges innovation and infrastructure development. This research identifies the information and communications technology (ICT) skill gap in sub-Saharan Africa (SSA) as an educational challenge requiring technological skill acquisition for optimal performance in automated environments.

Moreover, understanding automation's total impact on employees is essential for effective management [17]. Future implications of human-machine interactions need to be considered [18, 19], along with occupational health and safety in automated settings [2, 20]. Management must recognize and reward individual employee skills that contribute to effective performance [21, 22]. Concerns regarding job security due to automation can lead to psychological detachment from work [23] and apprehensions that an automated HR system only reflects employee history [24], as well as worries about maintaining work-life balance [25]. Conversely, demotivated employees may exhibit negative attitudes and reluctance to work if they perceive threats to their jobs [21]. Therefore, management must engage the workforce in an automated environment through both intrinsic and extrinsic motivational programs [26]. Ultimately, motivated employees are likely to develop the necessary skills to help achieve organizational goals within an automated setting.

Motivation plays a crucial role in driving employee commitment to completing work tasks. On the contrary, when employees feel demotivated, it leads to dissatisfaction and ultimately a failure to meet productivity levels. To enhance workplace efficiency, management must focus on effectively engaging its workforce. This study aims to delve into significant challenges that could lead to employee demotivation in an automated work environment, specifically examining employee skill gaps, job design, and workplace inclusiveness.

First, the personnel skill gap is paramount. An employee's productivity hinges on having the right skill set for their tasks. Training and continuous development are essential for boosting productivity. However, when management overlooks the need to address these skill gaps, it can result in negative consequences such as employee fears of job loss due to automation and resistance to necessary changes. Such issues can undermine overall organizational productivity [27–29].

Job design issues also come into play. Clearly defined roles and tasks are critical in automated workflows. If a company fails to outline specific responsibilities during an upgrade of its processes, employees may inadvertently remain tied to outdated task flows. Thus, it is essential for organizations to design work processes that include clear goals and objectives, along with necessary training, rotation opportunities, and incentives from management.

Inclusivity has emerged as an important topic in modern work environments, particularly as businesses adopt more automated systems. International labor conventions enforce principles such as the non-segregation of employees by gender and the employment of individuals with disabilities, ensuring that workplace infrastructure accommodates everyone. Unfortunately, during the hiring process for automated roles, many organizations may disregard these conventions, focusing too heavily on skills and the specific demands of the job, often at the expense of inclusivity.

In light of these issues, the primary objective of this research is to analyze the relationship between employee motivation and productivity within automated work environments. Additional objectives include (i) exploring how skill gaps can be bridged through effective training and retraining initiatives, (ii) assessing the impact of actively engaging the workforce on productivity, and (iii) evaluating the role of inclusiveness in enhancing employee motivation and productivity in these settings. This study was necessitated by the paucity of research in an automated environment in Nigeria. It highlights the need for automated infrastructural facilities provision by the government as a framework for the effective implementation of automation in the country.

Additionally, the concept of automation is still at its introductory stage in the manufacturing sector in Nigeria based on the fact that the agricultural/extractive sectors of the economy, which engage over 70% of the entire working population and provide raw materials for local and foreign industries, are still at a peasant stage and are completely unautomated.

2. Literature Review

2.1. Concept of employee motivation

Motivation is described as the process of creating a means of boosting workers' confidence by creating an enabling atmosphere that encourages employees to carry out their various tasks efficiently and effectively [30]. Human capital managers have evolved a process of adequately compensating workers both intrinsically [23], that is – relationship with co-workers/employee relationships with managers [31] and the well-being of an employee [32], and extrinsically [33], that is – career development training/retraining [34], compensational plans [26], and policies of the organization/work environment. Intrinsic and extrinsic motivational factors could enhance firms' engagement capabilities toward satisfying employee needs and wants, in exchange for increased value-added service to the firm in both traditional and automated work environments.

2.2. The fourth industrial revolution: automation

The unique realities and capabilities of the Fourth Industrial Revolution necessitate the process of programmable (production, product handling, and quality control) in the manufacturing sectors and business processes (highway systems, financial transactions, customer service management, and logistics/distribution) in the service sector, to be conducted with anticipation of increased efficiency and productivity [35]. This concept originated in Germany, and it involves the integration of the IIoT to augment manufacturing processes using robots [4, 36]. This process involves the deployment of robots, which obtain instructions from software, electrical, and mechanical systems to enhance accuracy, speed, and precision beyond human capabilities [37]. This technology is applicable in various production floor activities, such as material handling, equipment assembling, industrial painting, and industrial welding [38]. Robots can work 24/7 with little or no maintenance costs. According to PricewaterhouseCooper's 2017 report, an estimated 1.8 million robots were in use, showing a 39% increase from 700,000 since 1997, and in recent times, the integration of the capabilities of AI and robotics in manufacturing and service sector [39, 40] has resulted in super performance, such as in agriculture [41, 42], cybersecurity [43, 44], education [45], finance [46], automated gaming processes [47, 48], manufacturing [49], and the oil and gas sector [50]. Before the advent of automation, all operational activities were performed by humans, and with automation,

various concerns have been raised by scholars and industrial practitioners on various issues. According to the World Bank's World Development Report of 2019, the net value of new technological breakthroughs (automation) exceeds the economic value of personnel job losses [51–53]. Additionally, the claim that the rising anxiety among workers due to the exceptional performance of an automated system has led to protests [5, 54–56], with organized labor questioning threats to jobs by automation, with a 2% employment-to-population ratio, with a 42% effect on wages [57]. Frey and Osborne [58] argued that work with well-defined tasks can be easily handled through programmable instructions to automated machines; hence, such jobs could be easily replaced by an automated system. McKinsey's methodological proposition has been criticized based on its subjectivity and non-translucency [6], and the OECD report evaluating 21 member countries shows automation in 9% of jobs [3]. However, research has further shown that the demand for skilled, automation-inclined employees has risen more than that of unskilled employees [59, 60], translating into cheaper societal product and service development [61], with higher wages payable to an employee with the required automated skill labor [62]. The foregoing emphasizes the urgent need for this study, as it is essential in filling the literature gap in automated-driven skills lacking among employees. Management of automated firms should create an inclusive atmosphere that encourages the development of sustainable careers by engaging employees in acquiring certain skills based on evolving technological trends in the industry.

Motivation is described as the process of creating a means of boosting workers' confidence by fostering an enabling atmosphere that encourages employees to carry out their various tasks efficiently and effectively [30]. Human capital managers have developed a process for adequately compensating workers both intrinsically [23] – including the relationships between co-workers and with managers [31], as well as considering employee well-being [32] – and extrinsically [33], which encompasses career development, training/retraining [34], compensational plans [26], and organizational policies regarding the work environment. These intrinsic and extrinsic motivational factors can enhance a firm's engagement capabilities toward satisfying employee needs and wants in exchange for increased value-added service in both traditional and automated work environments. In the Fourth Industrial Revolution – Automation, the unique realities and capabilities require the programmability of production, product handling, and quality control in manufacturing sectors, as well as in business processes such as highway systems, financial transactions, customer service management, and logistics/distribution within the service sector, all aimed at increasing efficiency and productivity [35]. This concept, which originated in Germany, involves integrating the Industrial Internet of Things (IIoT) to enhance manufacturing processes through automation with robots [4, 36]. These robots receive instructions from software, electrical, and mechanical systems to achieve accuracy, speed, and precision that exceed human capabilities [37].

This technology applies to various activities on the production floor, such as material handling, equipment assembly, industrial painting, and industrial welding [38]. Robots are capable of operating 24/7 with minimal maintenance costs. According to a 2017 report by Price waterhouse Coopers, approximately 1.8 million robots were in use, marking an increase of 39% from 700,000 since 1997. Recently, the integration of AI and robotics in both manufacturing and service sectors [39, 40] has led to significant enhancements in various fields, including agriculture [41, 42], cybersecurity [43, 44], education [45], finance [46], automated gaming processes [47, 48], manufacturing [63], and the oil and gas sector [50].

Before automation, all operational activities were performed by humans, and with the advent of automation, various concerns have arisen among scholars and industrial practitioners. The World Bank's World Development Report of 2019 states that the net value of new technological advancements outweighs the economic value lost through job reductions caused by automation [51–53]. Furthermore, concerns about employee anxiety over the superior performance of automated processes have led to protests [5, 54–56]. Organized labor is increasingly questioning the threat automation poses to jobs, with only a 2% employment-to-population ratio and a 42% impact on wages [57]. Frey and Osborne [58] argue that jobs involving well-defined tasks can be easily taken over by automated systems.

Critiques have been leveled against the McKinsey methodological proposition for its subjectivity and lack of transparency [6], while the OECD report reveals that an evaluation of 21 member countries found automation applicable to 9% of jobs [3]. Research indicates that demand for skilled workers proficient in automation has risen disproportionately compared to unskilled labor [59, 60], leading to the cheaper development of societal products and services [61] and higher wages for employees with the necessary automated skill sets [62].

This overview highlights the pressing need for this study, which aims to address the gap in the literature concerning the lack of automated-driven skills among employees. Management in automated enterprises should cultivate an inclusive atmosphere that promotes sustainable career development by engaging employees in acquiring skills aligned with the technological trends impacting their industries.

2.3. Concept of sustainability

Sustainability has become one of the most frequently used terms in the 21st century, especially concerning humanity and human activities on the planet. The UNSDGs is a set of objectives introduced by the United Nations to guide global development efforts. This study focuses on two specific sustainable goals out of the 17 UNSDGs: SDG 8, which pertains to decent work and economic growth, and SDG 9, which encompasses industry, innovation, and infrastructure [64]. The goals aim to create a work environment that effectively addresses the need to mitigate or eliminate poverty in human work-life.

Sustainable productivity in an automated work environment refers to achieving inclusive and sustainable economic development within a framework of technologically driven innovative productivity, all within a secure and safe work ecosystem. According to the UN Economic and Social Council's projections, the skill gap in information technology and financial exclusion in SSA is expected to widen, leading to a projected 28-fold reduction in total output compared to developing nations. This situation could result in significant unemployment in the region [65]. Consequently, this study highlights the ICT skill gap in SSA as a critical issue that needs to be addressed comprehensively through education and the progressive acquisition of necessary technological skills to thrive in an automated work environment [66].

2.4. Concept of productivity assessment

Productivity is a crucial concept linked to goods and services, referring to the efficiency of measurable outputs relative to a specific unit of input within a designated timeframe. In a workplace context, worker productivity can be evaluated using gross development product (GDP) per worker, which examines the labor ratio to productivity [67]. This measurement can highlight the

contributions of each employee to overall profitability within an industry [67] and can also reflect the enhanced productivity observed in the retail service sector [68]. Labor productivity specifically assesses the workforce's input, considering factors such as (i) the time taken by a worker to complete a specific task, (ii) the skill level required, and (iii) the effort exerted, with overall hours worked being a key component in calculating productivity.

When analyzing productivity improvements stemming from technological or organizational innovations [64, 69, 70], total factor productivity, also known as multiple factor productivity, serves as a growth accounting metric that evaluates intermediate outputs based on the effective combination of labor and capital [71], along with efficient energy generation and fair billing practices. Solow [72] outlined that technical change represents a significant transformation in production processes, influencing production levels and motivating employees to develop automated skills, thereby enhancing competitiveness among industry rivals [72, 73]. Solow's [72] perspective on technical change helps elucidate the challenges associated with productivity increases and underscores the necessity for skilled employees to fill skill gaps through the acquisition of relevant competencies in automated work contexts, ensuring their value in the workforce. This approach enables management to effectively assess employee contributions based on perceived value and GDP per worker [69], providing a framework for applying either intrinsic or extrinsic motivation models in employee evaluations.

2.5. Research gap

The Vroom's [74] theory of valence, instrumentality, and expectancy emphasizes the importance of understanding what motivates employees, especially in automated work environments. Developed by Vroom [74] in 1964, this theory posits that employees are motivated by the expected outcomes of their efforts in achieving specific tasks. This motivation is influenced by intrinsic factors, like relationships with colleagues and managers, as well as the overall well-being of the employees, and extrinsic factors such as career development opportunities, compensation plans, and organizational policies.

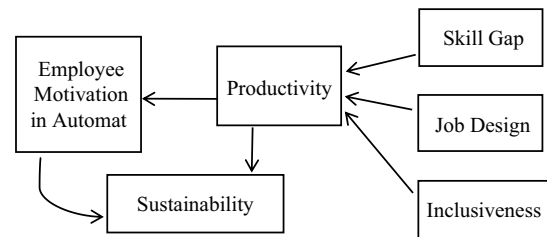
The theory suggests that employees are more likely to be motivated when they can see a clear link between their performance and the results they expect to achieve. This perspective is reinforced by Porter and Lawler's [75] work from 1968, which highlights the importance of having positive responses to questions regarding performance expectations and measuring outcomes.

However, there are notable gaps in current research. Employees must gain the necessary skills to thrive in automated environments, and management should align employee tasks with the overall value they bring to the organization. Additionally, engaging employees to alleviate concerns about changes in the workplace is crucial for fostering productivity and addressing behavioral adaptations. The future implications of automation on human-machine interactions and occupational health and safety must also be considered.

To navigate the challenges of Industry 4.0, managers should employ both intrinsic and extrinsic motivational models to effectively transform employee behavior and align it with the evolving work landscape. This study was necessitated by the paucity of research on the automated environment in Nigeria. It highlights the need for automated infrastructural facilities provision by the government as a framework for the effective implementation of automation in the country.

Additionally, the concept of automation is still at its introductory stage in the manufacturing sector in Nigeria based on the fact that the agricultural/extractive sectors of the economy, which

Figure 1
Employee motivation and sustainable productivity in automated workplace 4.0 industrial revolutionary work environment



engage over 70% of the entire working population and provide raw materials for local and foreign industries, are still at a peasant stage and are completely unautomated.

Figure 1 presents the proposed framework for employee motivation and sustainable productivity in an automated work environment. This framework addresses key issues, including (i) skill gap, (ii) job design, and (iii) inclusiveness, as strategic approaches to enhance employee motivation and sustainable productivity within the context of the 4.0 Industrial Revolution.

2.6. Skill gap

The critical factor that ensures employee relevance and boosts productivity in an automated work environment is the acquisition of necessary skills to effectively perform assigned duties. Various obstacles can hinder this goal, including management's reluctance to engage in employee training and retraining. This negligence can lead to dissatisfaction, depression, frustration, stress, and burnout [21, 25]. Additionally, employees may resist acknowledging the reality of a 4.0 Industrial Revolution workplace [2]. Furthermore, management's failure to engage employees constructively, instead of relying on threats and discriminatory practices, can exacerbate the situation [21]. Moreover, there is often an inability to enforce international labor regulations pertinent to automated settings, with punitive measures applied for errors stemming from an employee's lack of necessary skills being unjust [2]. Instead, accountability should lie with superior officers when applicable [17]. Thus, the proposed hypothesis regarding the skill gap can be stated as follows:

Proposition 1: Skill gap in an automated environment has no significant effect on employee motivation and productivity assessment.

1) Employee job design

In a 4.0 Industrial Revolution workplace, one of the most critical elements influencing productivity, is management's innovative capacity to design roles that are both creative and challenging [64]. This can be achieved through several processes: (i) establishing standardized but easily attainable tasks, (ii) offering employees a range of goals, (iii) creating opportunities for periodic task rotation, and (iv) integrating motivational aspects within tasks. Numerous studies have explored the need for effective job design, utilizing questionnaire data to assess how such design can motivate employees [76, 77]. Work redesign and enrichment are recognized as strategies to enhance job quality and overall productivity. Dunham [78] also emphasized the connection between job design and employees' ability to complete tasks and how this relates to

remuneration [79]. Hackman and Oldham [80] contended that job design should be strategically employed by management to foster intrinsic employee motivation through the following aspects: (i) the variety of skills required for a job, (ii) the alignment of job design with broader project goals, (iii) the impact of job design on the roles of others, (iv) the degree of autonomy given to employees in task completion, and the specificity and implementability of job design. Consequently, management in automated firms should leverage job specifications to create value-added roles [81] conducive to career development and employee well-being, in line with Maslow's [30] hierarchy of needs – specifically self-actualization [82, 83]. Therefore, this study posits a hypothetical relationship between employee job design and productivity assessment in automated work environments:

Proposition 2: Job design in an automated environment has no significant effect on employee motivation and productivity assessment.

2) Inclusiveness

The UNSDGs is an international initiative aimed at achieving specific targets by 2030, referred to as “Agenda 2030.” One of its key objectives is the promotion of universal social, political, and economic inclusion, ensuring equal opportunities for all individuals regardless of race, culture, gender, or disability [84]. This agenda encourages automated workplaces to uphold fundamental human rights, adhere to international labor regulations, and embrace tolerance and inclusiveness in all aspects, including service delivery. Furthermore, workplaces should ensure that youth, individuals with disabilities, and marginalized groups can contribute meaningfully without facing stigma, highlighting that women can excel in science, engineering, and technology fields [66]. Thus, efforts should be made to support and empower them in sectors traditionally dominated by men [84]. Encouraging mainstream education over specialized or single-sex education can facilitate better integration of different genders and individuals with disabilities into future work environments. Additionally, incorporating assistive technology can enhance the performance of individuals with disabilities [85]. Therefore, the hypothetical link between inclusiveness and productivity assessment in automated work environments is as follows:

Proposition 3: Inclusiveness in an automated work environment has no significant effect on employee motivation and productivity assessment.

3. Methodology

A descriptive research design was adopted as the appropriate statistical approach in analyzing data for the study by Mishra et al. [86] and as a means of drawing inferences on productivity assessment in an automated work environment [17, 18]. This approach aimed to enhance the process of generalization based on the study propositions [87].

A structured systematic literature review was also conducted to outline each of the hypothetical propositions [88] related to the creative integration of employee motivation and productivity assessment within automated work environments [79, 89]. This effort aimed to facilitate a systematic review of previous research on automation technologies [90, 91] and to compare traditional approaches with semi-automated/automated reviews as an update of research evidence [92]. A systematic sampling technique was further applied to enhance the data collection process through the

administration of questionnaires to respondents [93]. In addition, interviews were conducted – both online and offline – with employees and staff of disc manufacturing firms in Nigeria to extract more detailed information from respondents, particularly because the sensitive nature of their jobs did not permit physical interaction [94]. The data collection process was carefully managed to avoid any form of bias [95].

The study population comprised 135 employees and management staff of disc manufacturing firms in Lagos, Nigeria. A random sampling technique was adopted, utilizing primary sources of data collection to ensure that respondents had an unbiased opportunity to be selected. A structured questionnaire was administered, and in-depth interviews were also conducted (both online and offline) for those whose job responsibilities did not allow for easy access. Subsequently, the data collected were analyzed using the Pearson correlation analysis technique. The null hypotheses were tested to affirm the relationship between the independent and dependent variables.

The data collection involved the administration of questionnaires and in-depth interviews to enhance the process of obtaining further information from respondents who could not provide detailed information through the questionnaire alone. A breakdown of the data collection is presented in Table 1, indicating that a total of 135 questionnaires were administered to respondents, of which 114 (84%) were valid, 7 (6%) were invalid due to cancellations and mutilation by respondents, and 14 (10%) were not returned at all.

The reliability and validity of the research instruments were affirmed by industry professionals and marketing scholars before the research instruments were deployed by the researcher for data collection purposes. The reliability test signified a Cronbach's alpha of 70%. This attested that the data collection procedure was within set standards.

Table 1
Respondents schedule

Questionnaire	Respondents	Percentage
Valid	114	84%
Invalid	7	6%
Non-remitted	14	10%
Total	135	100%

4. Results

Hypothesis One:

Skill gap in an automated environment has no significant effect on employee motivation and productivity assessment.

The analysis using Pearson's correlation analysis technique as shown in Table 2, indicates a significant relationship between skill gap and employee motivation in automated manufacturing firms in Nigeria. The computed p -value of 0.000 is less than the 0.05 alpha level, with a correlation index of $r = 0.988$ and degrees of freedom (df) = 112. Consequently, the null hypothesis, which states that there is no significant association between motivational factors and employee job performance, is rejected. This suggests that the skill gap is directly related to employee motivation within the automated manufacturing sector in Nigeria.

Hypothesis Two:

Job design in an automated environment has no significant effect on employee motivation and productivity assessment.

The Pearson correlation analysis technique shows a significant relationship between job design and employee motivation in

Table 2
Correlation

		Employee motivation	Skill gap
Employee motivation	Pearson correlation	1.000	0.988**
	Sig. (2-tailed)		0.000
	N	114	114
Skill gap	Pearson correlation	0.988**	1.000
	Sig. (2-tailed)	0.000	
	N	114	114

Note: **. Correlation is significant at the 0.01 level (2-tailed). $df = 112$

Table 3, with a computed p -value of 0.000, which is lower than the 0.05 significance level. The correlation index (r) is 0.809, with a degree of freedom (df) of 112. As a result, the null hypothesis stating that there is no relationship between job design and employee motivation should be rejected. This suggests that job design is directly related to the level of motivation among employees in the automated manufacturing sector in Nigeria.

Table 3
Correlation

		Employee motivation	Job Design
Employee motivation	Pearson correlation	1.000	0.809**
	Sig. (2-tailed)		0.000
	N	114	114
Job design	Pearson correlation	0.809**	1.000
	Sig. (2-tailed)	0.000	
	N	114	114

Note: **. Correlation is significant at the 0.01 level (2-tailed). $df = 112$

Hypothesis Three:

Inclusiveness in an automated work environment has no significant effect on employee motivation and productivity assessment.

The study analysis reveals a significant relationship between inclusiveness and employee motivation in Table 4. The computed p -value of 0.000 is lower than the 0.005 significance level. The correlation index r is 0.871 with df of 112. This indicates that inclusiveness in the automated workplace is directly related to employee performance in the automated manufacturing environment in Nigeria.

5. Discussion

The discussion of findings is grounded in theoretical propositions and practices within the automated manufacturing industry.

This study delves into the motivating factors influencing employee productivity in automated work environments. A significant focus is placed on addressing the ICT skill gap in Nigeria, emphasizing the need for a comprehensive approach that includes

Table 4
Correlation

		Employee motivation	Inclusiveness
Employee motivation	Pearson correlation	1.000	0.871**
	Sig. (2-tailed)		0.000
	N	114	114
Inclusiveness	Pearson correlation	0.871**	1.000
	Sig. (2-tailed)	0.000	
	N	114	114

Note: **. Correlation is significant at the 0.01 level (2-tailed). $df = 112$.

education and the gradual acquisition of essential technological skills to ensure optimal performance. To align with the realities of the Fourth Industrial Revolution, Vroom's [74] theory of valence, instrumentality, and expectancy suggests that management should empower employees with the necessary capabilities to effectively exert effort on tasks [23]. This empowerment can be achieved through (i) career development training/retraining, (ii) competitive compensation plans [33], and (iii) supportive organizational policies.

Moreover, management must be cautious not to expect human workers to match the speed of machines such as robots or AI [21, 57]. It is essential to correlate employee responsibilities with value addition, taking into account GDP per worker. Despite some shortcomings, Vroom's [74] theory provides valuable insights into human behavior, guiding the application of various parameters to influence behavior positively toward increased productivity in automated workplaces. Hence, this study acknowledges that productivity could be increased in an automated work environment through intrinsic or extrinsic motivation, rather than equating humans (employees) to work as much as automated machines.

The unique nature of industrial practices in automated workplaces means that there is often a misconception tying productivity expectations to machine speed. Therefore, organizations must invest in employee empowerment and capacity building through training and retraining, ensuring that workers acquire essential automation skills for specific tasks. This investment can help prevent issues such as depression, frustration, stress, and burnout that employees may encounter when lacking the necessary skill sets in an automated environment [25]. Additionally, fostering employee engagement is crucial in mitigating resistance to change, especially as organizations adapt to the realities of a 4th Industrial Revolution workplace [2]. The retail service sector, too, can benefit from these practices to enhance customer satisfaction [68]. Furthermore, firms should comply with international labor regulations that govern operations in automated spaces. It is also vital that employees are not penalized for errors stemming from inadequate skills if management has not provided necessary training and empowerment [2].

The Fourth Industrial Revolution necessitates foundational requirements for seamless automation processes. Governments and regulatory authorities must enhance the industrialization policy framework that guides automation, particularly regarding procurement and the development of infrastructural facilities like energy, telecommunications, and ICT. These expansions could become the framework for a practical shift from manual production to automated processes. Additionally, there should be an emphasis

on capacity building for information system resources and enabling infrastructures; for instance, facilitating the transition from 4G to 5G networks is critical toward guaranteeing effective and speedy network connectivity, since automation relies on speedy network infrastructure. This will further drive industrialization and contribute to national economic development.

Furthermore, automated workplaces should strive to create inclusive environments that accommodate individuals with disabilities by integrating inclusiveness into automated environments' infrastructural designs, human capital management, workflow processes, and compensation planning. Such initiatives can support the achievement of the UNSDGs agenda for 2030, particularly SDG 8 (decent work and economic growth) and SDG 9 (industry, innovation, and infrastructure).

Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Data Availability Statement

The data that support the findings of this study are not openly available but can be provided upon request on a case-by-case basis.

Author Contribution Statement

Idongesit Oto Eshiett: Conceptualization, Methodology, Validation, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration. **Oto Eyamba Eshiett:** Software, Validation, Formal analysis, Resources, Data curation, Writing – original draft, Visualization.

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