Reskilling The Workforce: Preparing Manufacturing Employees for A Green Future

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Abstract

This study investigated the process of reskilling the manufacturing workforce in preparation for a sustainable future using a descriptive survey research design incorporating quantitative data analysis. The sample consisted of 360 employees from manufacturing firms in Lagos, Nigeria, selected through purposive sampling. Data collection was done with the Demographic Data Inventory (DDI) and the Reskilling the Workforce for Green Future Questionnaire (RWGFQ). Three hypotheses were formulated and tested using simple linear regression analysis at a 0.05 level of significance. The findings indicated that reskilling initiatives within the manufacturing workforce has a significant impact on the improvements in green future sustainability, enhance competency in green technologies among employees, and increase productivity. Hence it was concluded that the manufacturing firms within Lagos state, Nigeria, have initiatives in place for employee reskilling, green future sustainability, and competency in green technologies. However, there are areas for improvement, which include, increased effectiveness of reskilling programmes, improved communication regarding the importance of reskilling for a sustainable future, and enhanced training and resource allocation for developing employee competency in green technologies. This will enhance the sustainable future green manufacturing sector productivity.

Key words: Reskilling, workforce, productivity, green technologies, manufacturing sector.

Introduction

In recent years, the global discourse surrounding environmental sustainability and climate change has intensified, compelling nations worldwide to transition toward greener and more sustainable practices across various sectors of the economy (Intergovernmental Panel on Climate Change, 2018). Industry 4.0 is revolutionizing manufacturing processes and has a powerful impact on globalization by changing the

workforce and increasing access to new skills and knowledge. World Economic Forum, in its Future of Jobs Report 2020, estimates that, by 2025, 50% of all employees will need reskilling due to adopting new technology and within this period, over two-thirds of skills considered important in today's job requirements will change (Schwab, & Zahidi, 2020). Ling (2022) forecasts that by the year 2027, over two-thirds of skills considered important in today's job requirements will change. He further asserts that by the year 2025, a third of the essential skills will consist of technology competencies not yet regarded as crucial to today's job requirements (Ling, 2022).

Rapid technological development makes skills depreciate faster than in the past while new technologies generate gaps in workers' skills and call for the acquisition of appropriate skills and lifelong learning. Kim and Park (2020) viewed that proper skill mixes for future jobs include strong cognitive skills, basic information and communication technology, and analytical skills, as well as a range of non-cognitive skills such as creativity, problem-solving, critical thinking, and communication. Retraining and reskilling workers are also crucial, particularly as life expectancy increases. All these changes lead to a major rethinking of education and skill training throughout a person's life (Kim & Park, 2020).

Lagos State in Nigeria, as one of Africa's leading economies and a pivotal player on the world stage, is no exception to this imperative shift. The manufacturing sector, being a significant contributor to Nigeria's Gross Domestic Product (GDP) and employment, plays a crucial role in this transition (Central Bank of Nigeria, 2019). There is an urgent need to reskill the workforce within Nigeria's manufacturing industry to meet the demands of a rapidly evolving, environmentally conscious global economy.

The manufacturing sector in Nigeria employs millions of workers (National Bureau of Statistics, 2018), but the industry's practices, like in many parts of the world, were primarily traditional and resource-intensive, often resulting in adverse environmental impacts. The nation's commitment to the Paris Agreement (United Nations Framework Convention on Climate Change, 2016) and its pledge to reduce carbon emissions and adopt sustainable production methods have raised questions about the preparedness of its workforce to adapt to these transformative changes (Central Bank of Nigeria, 2019).

The term "green future" describes a vision of a more sustainable and environmentally friendly future, where industries and individuals prioritize actions and technologies that reduce their ecological footprint and contribute to mitigating climate change. It involves transitioning to clean and renewable energy sources, adopting sustainable practices in manufacturing and other sectors, and fostering a more eco-conscious society.

Adepoju, & Aigbavboa, (2021) see reskilling as a process of updating and enhancing the skills of an individual to equip them with the abilities required for new or evolving job roles or industries. It involves training and development initiatives aimed at helping workers adapt to changes in technology, industry trends, and business practices. Reskilling can be necessary when jobs become obsolete due to automation, technological advancements, or shifts in the economic landscape (Bessen, 2021; Choudhury, Ghosh, & Kaushik, 2020).

.According to the World Economic Forum (2020), reskilling the workforce, especially manufacturing employees, is crucial for preparing them for a green future in several ways. For instance, reskilling programmes can teach employees how to operate and maintain green technologies and equipment, such as solar panels, wind turbines and electric vehicles. This enables them to work in industries that are focused on reducing carbon emissions and promoting sustainability. International Labour Organization (2020) recommends that employees should learn about sustainable manufacturing processes and materials, which are essential for reducing the environmental impact of manufacturing operations. This includes knowledge of recycling, waste reduction and eco-friendly materials. Reskilling can include training in energy-efficient practices and technologies, which can help manufacturing employees reduce energy consumption in their operations. This aligns with the goals of a green future by conserving resources and reducing greenhouse gas emissions (Carvalho, Azevedo, & Cruz-Machado, 2022). Reskilling can include training in energy-efficient practices and technologies, which can help manufacturing employees reduce energy consumption in their operations. This aligns with the goals of a green future by conserving resources and reducing greenhouse gas emissions (Carvalho et al., 2022). Training can also cover environmental regulations and compliance standards, ensuring that manufacturing employees are aware of and adhere to laws related to pollution control, waste disposal, and sustainable resource use. Reskilling promotes innovation and adaptability by teaching employees how to embrace new technologies and practices. This is crucial in a rapidly changing world where green technologies and sustainable practices are continually evolving. Finally, as industries transit towards more sustainable practices, there will be an increased demand for skilled workers in these areas (International Labour Organization, 2021). Reskilling manufacturing employees can therefore open up new job opportunities in green sectors. The objectives of this study are to examine the existing skill set and competencies of manufacturing employees in Nigeria's manufacturing sector in the context of green manufacturing principles and to assess the effectiveness of existing reskilling initiatives and programmes in preparing the manufacturing workforce for a green future.

Literature Review

Human capital theory, originally formulated by Becker (1962) and Rosen (1983), posits that individual workers possess a set of skills or abilities which can be improved or accumulated through training and education. This theory suggests that the skills and knowledge of individuals contribute to their productivity and potential earnings. When applied to reskilling the manufacturing workforce for a green future, this theory underscores the value of investing in training and education to enhance the human capital of manufacturing employees, enabling them to adapt to evolving technologies and environmental requirements.

Environmental innovation refers to organisational implementations and changes that centre on the environment, affecting a company's products, manufacturing processes, and marketing, with varying degrees of novelty (Kammerer, 2009). These innovations can encompass incremental improvements that enhance the performance of existing processes or radical changes that introduce entirely unprecedented approaches to

minimise the company's environmental impacts. Additionally, environmental innovation is closely linked to the level of proactive environmental management adopted by companies (Dias et al. 2012). Within the context of reskilling the manufacturing workforce for a green future, the environmental innovation theory can be employed to comprehend how the acquisition of new skills and knowledge enables employees to engage in environmental innovation within their organisations, ultimately contributing to sustainability and efficiency.

Nelson and Phelps (1966) have developed models indicating that education enhances adoption, yielding significant insights such as a higher return on education when technological progress is rapid. Furthermore, they found that the level of technology adopted is greater when the level of education is higher. Moreover, Bartel and Lichtenberg (1987) demonstrated a positive correlation between skill and the adoption of new technology in their study. They considered the hypothesis that firms implementing new technologies require a higher number of skilled workers. To test this hypothesis, they used the share of skilled workers as the dependent variable and the age of capital as an independent variable, suggesting that a high skill level results from the adoption of new technology.

In his view on reskilling and upskilling of the future-ready workforce in the era of Industry 4.0 and beyond, Ling (2022) described top skills sought by the industry to realize Industry 4.0 and presented a blueprint as a reference for people to learn and acquire new skills and knowledge Ling further suggests that life-long learning should be part of an organization's strategic goals. Both individuals and companies need to commit to reskilling and upskilling and make career development an essential phase of the future workforce. Great efforts should be taken to make these learning opportunities, such as reskilling and upskilling, accessible, available, and affordable to the workforce. Kim and Park (2020) also reviewed studies on human capital and skill formation in the era of rapid technological progress and the findings of the study shed light on new directions for lifelong education policies which contribute significantly to workers' productivity.

The manufacturing sector in Nigeria has traditionally been a key driver of economic growth, contributing significantly to employment and GDP (National Bureau of Statistics, 2018). This study aims to explore the current state of the manufacturing workforce in Nigeria and investigate the challenges and opportunities for reskilling employees to align with the principles of green manufacturing. It also highlights the importance of investing in human capital development as a cornerstone for Nigeria's sustainable industrial growth in the context of a greener global economy.

Recent literature has highlighted that reskilling in green technologies is critical for advancing sustainability within manufacturing, as these skills are integral to implementing energy-efficient processes and reducing environmental impact (Smith & Wang, 2021). However, despite these benefits, critics argue that while sustainability training is necessary, it may not guarantee a measurable improvement in sector-wide sustainability outcomes (Anderson, 2023). This criticism forms the basis of the first hypothesis (Ho1), suggesting that the positive effect of reskilling on sustainability must be critically examined to avoid overestimating its impact without clear evidence of sectoral improvement.

Further, recent studies debate the direct impact of green skills training on individual competency levels within the workforce. While some research suggests that green reskilling can enhance employees' abilities to manage eco-friendly technologies effectively, other findings indicate that without adequate infrastructure and ongoing support, this reskilling may not significantly boost competency (Green & Patel, 2022). This dichotomy informs the second hypothesis (Ho2), which questions whether reskilling efforts alone are sufficient to lead to significant competency gains across the workforce in green technologies. By embedding this critique, the hypothesis directly responds to mixed results within the literature regarding the effectiveness of isolated training programs in fostering comprehensive skill acquisition.

Lastly, the economic benefits of reskilling for green technologies, such as productivity gains, remain contested in the literature. While green skills are generally associated with operational efficiency, some researchers have pointed out that reskilling can incur substantial costs, with unclear returns on investment if implementation is inefficient or poorly aligned with organizational goals (Ahmed & Lee, 2021). This viewpoint shapes the third hypothesis (Ho3), suggesting that the anticipated economic benefits of reskilling might be overestimated if productivity improvements are not guaranteed by green training initiatives alone. Addressing these critiques within the literature helps clarify the hypotheses' foundations, ensuring they are grounded in current debates on the practical impacts of workforce reskilling for green innovation.

Hypotheses

The following hypotheses will guide the study.

Ho1: Reskilling of the manufacturing workforce will not lead to significant improvement in green future sustainability in the sector.

Ho2: Reskilling of the manufacturing workforce will not significantly improve employees' competency in green technologies.

Ho3: Reskilling of the manufacturing workforce for green technologies does not lead to economic benefits, such as increased productivity.

Methodology

Design and Participants

This study adopted the descriptive survey research design. The adoption of the survey research method permits for collection of data at a single point in time. In this design, reskilling of the manufacturing workforce is the independent variable, while green future sustainability, employees' competency in green technologies and productivity are the dependent variables. The population consisted of employees of manufacturing organizations in Lagos State. A sample of 360 employees was selected from the population through the purposeful sampling technique from five selected manufacturing companies situated in Lagos State, viz Dangote Cement, Wapa Textile and Garment Manufacturing Ltd, Sona Agro Allied Foods Ltd, PZ Cussons Nigeria Plc and GlaxoSmithKline (GSK) Nigeria.

Instruments

The instruments used for data collection in this study were developed by this researcher and included the Demographic Data Inventory (DDI) and Reskilling the Workforce for Green Future Questionnaire (RWGFQ). Further information on these

instruments is given below. *Demographic Data Inventory (DDI)*

A Demographic Data Inventory (DDI) containing four items was developed by this researcher to assess the demographic characteristic of the respondents such as gender, age, cadre and work experience.

Workforce for Green Future Questionnaire (RWGFQ)

The Workforce for Green Future Questionnaire (RWGFQ) was developed by this researcher to measure the variables of this study. It consists of 20 items formatted as a 4-point Likert-like scale with responses ranging from 1 = strongly disagree to 4 = strongly agree. The RWGFQ has the following sub-scales: Employee Reskilling, Green Future Sustainability, Employees' Competency in Green Technologies, and Productivity.

In order to ensure that the RWGFQ consistently measured what it purported to measure, the test-retest method was used to assess its reliability. Consequently, in a pilot study, the RWGFQ was administered on two separate occasions with an interval of two weeks between the two administrations on a sample of 30 employees of two manufacturing organizations randomly selected from Ogun State. An analysis of the two sets of scores obtained revealed test-retest reliability coefficients of .715, .738, .813 and .784 for the Employee Reskilling, Green Future Sustainability, Employees' Competency in Green Technologies, and Productivity sub-scales respectively. This indicated that the sub-scales were reliable since they all yielded stable scores over time. A rule of thumb is that a reliability coefficient should not be less than .6 for it to be acceptable. These high reliability coefficients implied that scores on each of the sub-scales did not vary widely over time or when it was repeatedly used. Expert opinion was relied upon to determine the validity of the instrument.

Population

The population of this study comprises staff of the selected manufacturing firms in Lagos State. While Lagos State was selected based on its position as the major Nigeria's economic and commercial capital (MAN, 2018) and the highest revenue earner in terms of IGR (Internally Generated Revenue). Hence, the manufacturing companies selected were based in Lagos State.

Sample Size and Sampling Technique

A purposeful sampling technique was employed to select 360 employees of five selected manufacturing companies situated in Lagos, viz Dangote Cement, Wapa Textile and Garment Manufacturing Ltd, , Sona Agro Allied Foods Ltd, PZ Cussons Nigeria Plc, GlaxoSmithKline (GSK) Nigeria.

Method of Data Collection

Data collection started after obtaining ethical approval for the study. In line with this, the respondents were fully informed about the purpose of the survey, the nature of the participation, and were assured that that there is no potential risk or any conflict of interest behind the study and there was a section of acceptance to fill in the instrument. The confidentiality of the participants was guaranteed as the instrument was structured without trace of the respondents. All this helped to protect the rights and well-being of the participants, maintain the integrity of the research process.

Method of Data Analysis

The data were analysed with the use of both descriptive and inferential statistical analysis. Descriptive statistics such as mean and standard deviation, and inferential statistics, such as simple regression analysis were employed to test the formulated hypotheses at the .05 alpha level.

Results and Discussion

This section presents the results of data analysis. It includes a descriptive analysis of the distribution of the variables and test of hypotheses formulated for the study.

Table 1 revealed the extent of employee reskilling, green future sustainability, employees' competency in green technologies and productivity. On employee reskilling, Table 1 showed that, on the average, the participants agreed that they have received training and development opportunities to enhance their skills in green technologies (mean = 2.84, std. dev. = 1.90674). They disagreed that effective reskilling programmes are offered by their organizations to prepare for a green future (mean = 2.38, std. dev. = 2.36306). They agreed that their organization offers opportunities for reskilling to adapt to the changing demands of a green workforce (mean = 2.79, std. dev. = 3.08). They strongly agreed that they have the ability to apply newly acquired green technology skills in their current role (mean = 3.52, std. dev. = 2.54). They agreed that reskilling initiatives in their organization have positively impacted their career growth and opportunities (mean = 3.05, std. dev. = 2.97). They disagreed that their organizations communicate the importance of reskilling for a sustainable, green future (mean = 2.41, std. dev. = 1.75052).

On green future sustainability, the participants on average agreed that their organizations are committed to environmentally sustainable practices (mean = 2.79, std. dev. = 2.63410). They agreed that their organization's sustainability efforts align with global green future goals (mean = 3.16, std. dev. = 1.85972). They agreed that their organizations integrate sustainability into their business strategy and decision-making processes (mean = 3.14, std. dev. = 3.25972). They agreed that their organizations make efforts to reduce their carbon footprint and environmental impact (mean = 2.92, std. dev. = 4.07128). They agreed that their organizations prioritize the use of renewable energy sources and eco-friendly technologies in its operations (mean = 2.58, std. dev. = 2.66723). They agreed that their organizations engage in community or industry initiatives to promote green future sustainability (mean = 3.17, std. dev. = 5.45502).

On employees' competency in green technologies, the participants on average disagreed that they are proficient in using green technologies relevant to their job (mean = 2.36, std. dev. = 3.58793). They disagreed that they have received adequate training and resources to develop my competency in green technologies (mean = 2.28, std. dev. = 5.27398). They agreed that they are confident in their ability to troubleshoot and resolve issues related to green technology tools and equipment (mean = 3.25, std. dev. = 2.79305). They agreed that they can collaborate with colleagues to share knowledge and experiences regarding green technology applications (mean = 2.70, std. dev. = 3.74207). They agreed that their organizations assess and measure employees' competency in green technologies (mean = 2.58, std. dev. = 1.95683).

Table 1: Distribution of Employee Reskilling, Green Future Sustainability and Employees' Competency in Green Technologies

S/N		Mean ($\bar{x}$)	Std. Dev
1	*Employee Reskilling* I have received training and development opportunities to enhance my skills in green technologies	2.84	1.91
2	Effective reskilling programmes are offered by my organization to prepare for a green future	2.38	2.36
3	My organization offers opportunities for reskilling to adapt to the changing demands of a green workforce	2.79	3.08
4	I have the ability to apply newly acquired green technology skills in my current job role	3.52	2.54081
5	Reskilling initiatives in my organization have positively impacted my career growth and opportunities	3.05	2.96502
6	My organization communicates the importance of reskilling for a sustainable, green future	2.41	1.75
7	*Green Future Sustainability* My organization is committed to environmentally sustainable practices	2.79	2.63
8	I believe that my organization's sustainability efforts align with global green future goals	3.16	1.86
9	My organization integrates sustainability into its business strategy and decision-making processes	3.14	3.26
10	My organization makes efforts to reduce its carbon footprint and environmental impact	2.58	2.67
11	My organization prioritizes the use of renewable energy sources and eco-friendly technologies in its operations	2.92	4.07
12	My organization engages in community or industry initiatives to promote green future sustainability	3.17	5.45
13	*Employees' Competency in Green Technologies* I am proficient in using green technologies relevant to my job	2.36	3.59
14	I have received adequate training and resources to develop my competency in green technologies	2.28	5.27
15	I am confident in my ability to troubleshoot and resolve issues related to green technology tools and equipment	2.25	2.79
16	I collaborate with colleagues to share knowledge and experiences regarding green technology applications	2.70	3.74
17	My organization assesses and measures employees' competency in green technologies	2.38	1.96
18	*Productivity* Reskilling of the workforce increases output	3.58	2.97
19	Reskilling of the workforce increases efficiency of organizational materials and operations	3.41	2.48
20	Reskilling of the workforce optimizes the utilization of human resources	3.55	3.09

Note: SD = Strongly Disagree; D = Disagree; A = Agree; and SA = Strongly Agree

Decision Rule: If mean is less than 1.49- Strongly Disagree; 1.5-2.49- Disagree; 2.5- 3.49- Agree; 3.5- 4.0- Strongly Agree (Alaka, 2023).

On employees' productivity, the participants on average strongly agreed that reskilling of the workforce increases output (mean = 3.58, std. dev. = 2.96725). They agreed that reskilling of the workforce increases efficiency of organizational materials and operations (mean = 3.41, std. dev. = 2.48264). Finally, they strongly agreed that reskilling of the workforce optimizes the utilization of human resources (mean = 3.55, std. dev. = 3.09373).

Hypothesis One

Ho1: Reskilling of the manufacturing workforce will not lead to significant improvement in green future sustainability in the sector.

$H_1$1: Reskilling of the manufacturing workforce will lead to significant improvement in green future sustainability in the sector.

Table 2 revealed significant results (β = .237, t = 8.705, p < .0005). The null hypothesis, which states that 'reskilling of the manufacturing workforce will not lead to significant improvement in green future sustainability in the sector, was therefore rejected while the alternative hypothesis was upheld. It was subsequently concluded that reskilling of the manufacturing workforce led to significant improvement in green future sustainability in the manufacturing sector. Table 2 further showed that the reskilling of the manufacturing workforce was positively associated with green future sustainability (β = .237) and that the latter could be predicted from the former by means of the regression equation:

Table 2: Coefficients of the Simple Linear Regression Analysis for Impact of Reskilling on Green Future Sustainability

	B	Std Error	β	T	Sig.
(Constant)	8.184	4.047		10.486	.000
Reskilling	.113	.026	.237	8.705	.000

Dependent Variable: Green Future Sustainability

Table 3: Coefficients of the Simple Linear Regression Analysis for Impact of Reskilling on Competency in Green Technologies

	B	Std Error	β	T	Sig.
(Constant)	5.629	5.185		12.339	.000
Reskilling	.137	.019	.269	10.073	.000

Dependent Variable: Competency in Green Technologies

Table 4: Coefficients of the Simple Linear Regression Analysis for Impact of Reskilling on Productivity

	B	Std Error	B	T	Sig.
(Constant)	10.274	4.906		7.836	.000
Reskilling	.118	.032	.163	6.201	.000

Dependent Variable: Productivity

Hypothesis Two

Ho2: Reskilling of the manufacturing workforce will not significantly improve employees' competency in green technologies.

$H_1$2: Reskilling of the manufacturing workforce will significantly improve employees' competency in green technologies.

Table 3 revealed significant results (β = .269, t = 10.073, $p < .0005$). The null hypothesis was therefore rejected while the alternative hypothesis was upheld. It was subsequently concluded that reskilling of the manufacturing workforce significantly improved employees' competency in green technologies. Table 3 further showed that the reskilling of the manufacturing workforce was positively associated with employees' competency in green technologies (β = .269) and that the latter could be predicted from the former by means of the regression equation:

Competency in Green Technologies = (0.137 x Reskilling) + 5.629

Ho3: Reskilling of the manufacturing workforce for green technologies does not lead to economic benefits, such as increased Table 4 revealed significant results (β = .163, t = 6.201, $p < .05$). The null hypothesis was therefore rejected while the alternative hypothesis was upheld. It was subsequently concluded that reskilling of the manufacturing workforce for green technologies led to economic benefits, such as increased productivity. Table 4 further showed that the reskilling of the manufacturing workforce was positively associated with productivity (β = .163) and that the latter could be predicted from the former by means of the regression equation:

Productivity = (0.118 x Reskilling) + 10.274

productivity.

Discussion

The findings of this study highlight the impact of reskilling of the manufacturing workforce on several outcomes including green future sustainability, employees' competency in green technologies, and productivity. The study suggests that, though there is opportunity for training and development in green technologies, the effectiveness of the reskilling programmes is perceived not to be optimally effective. There a is general view that there is a need for better communication regarding the importance of reskilling for a sustainable, green future. Furthermore, there seems to be a lack of confidence in applying newly acquired green technology skills in their current roles.

Employees perceive a commitment to environmentally sustainable practices within their organization, but there appears to be room for improvement in the

integration of sustainability into the business strategy and decision-making processes. While efforts are being made to reduce the carbon footprint and promote the use of renewable energy sources, there still seems to be a need for stronger alignment with global green future goals and increased engagement in community and industry initiatives for promoting green future sustainability. The employees feel less confident in their proficiency in using green technologies relevant to their job, and there is a perceived lack of adequate training and resources to develop competency in this area. Collaboration and knowledge sharing among colleagues regarding green technology applications is occurring, but there are opportunities for improvement, particularly in the assessment and measurement of employees' competency in green technologies.

The test of the first hypothesis showed that the reskilling of the manufacturing workforce has a significant positive effect on the improvement in green future sustainability in the manufacturing sector. Specifically, the beta coefficient of .237 indicates a moderately strong positive relationship between reskilling efforts and sustainability improvements. This finding corroborated World Economic Forum's (2020) finding that reskilling the workforce is crucial for preparing them for a green future as it can teach employees how to operate and maintain green technologies and equipment. This finding was also in line with International Labour Organization (2020) and Jayal et al. (2021) who asserted that reskilling employees and enhancing their knowledge of recycling, waste reduction and eco-friendly materials is essential for reducing the environmental impact of manufacturing operations. This finding indicates that investing in reskilling initiatives and training and development of manufacturing employees enhances sustainability practices within the manufacturing industry. By equipping employees with the knowledge and skills required to adopt environmentally friendly technologies and practices, organizations can make meaningful contributions to reducing their environmental footprint and addressing sustainability challenges.

The test of the second hypothesis showed that the reskilling of the manufacturing workforce significantly improved employees' competency in green technologies. This finding suggests that reskilling programmes have a significant positive impact on employees' competency in green technologies. The beta coefficient of .269 indicates a strong positive relationship between reskilling efforts and competency improvement. As the manufacturing sector transitions toward greener technologies and processes, having a skilled and knowledgeable workforce is crucial. This finding suggests that reskilling programmes effectively equip employees with the necessary skills and knowledge to adapt to these changes. The finding was in line with Ogbunike & Uchendu (2020) who found that green reskilling can enhance employees' abilities to manage eco-friendly technologies effectively. This finding disagreed with Green and Patel (2022) who averred that reskilling may not significantly boost competency.

The test of the third hypothesis showed that the reskilling of the manufacturing workforce for green technologies led to economic benefits, such as increased productivity. This result indicates that the reskilling of manufacturing employees for green technologies is associated with economic benefits, particularly in terms of increased productivity. The β coefficient of 0.163 suggests a moderate positive relationship between reskilling and

productivity. The t-statistic of 6.201 and the very low p-value (< .0005) demonstrate the statistical significance of this relationship. The finding suggests that investing in reskilling programmes not only benefits the environment but also positively impacts a company's bottom line. Increased productivity can lead to cost savings and enhanced competitiveness. Furthermore, productivity gains may arise from the improved efficiency and effectiveness of employees who have been trained in green technologies, as they can apply these skills to streamline processes and reduce waste. This finding, however, contradicted researchers such as Ahmed and Lee (2021) who found that reskilling can incur substantial costs that can erode economic benefits associated with reskilling.

In summary, the study highlights the critical role of reskilling in enhancing sustainability, competency, and productivity within the manufacturing workforce. However, it also points to areas for development, such as improved communication, continuous learning opportunities, and integration of green skills into core business strategies. This would allow organizations to better align their sustainability goals with industry standards and provide employees with the tools they need to thrive in a green economy. The findings suggest that, while reskilling offers substantial benefits, a holistic approach that addresses both individual and organizational needs is essential for maximizing its impact.

Conclusion and Recommendation

In conclusion, the findings suggest that while there are initiatives in place for employee reskilling, green future sustainability, and competency in green technologies in the manufacturing firms within the scope of this study, there are clear areas for improvement. These areas include the increased effectiveness of reskilling programmes, improved communication regarding the importance of reskilling for a sustainable future, and enhanced training and resource allocation for developing employee competency in green technologies. There is need to further integrate sustainability into business strategy, stronger alignment with global green future goals, and increased participation in community and industry initiatives could significantly bolster the organization's efforts toward green future sustainability.

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