AN INVESTIGATION TO THE OPERATIONAL EFFICIENCY OF ELECTRICAL/ELECTRONICS PERSONNEL IN SELECTED INDUSTRIES IN IBADAN SOUTH-WEST, OYO STATE

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Abstract

Amid increasing technological demands and competitive industrial standards, the competence and productivity of technical personnel have become critical to organisational success. Hence, this study investigates the operational efficiency of electrical/electronics personnel in selected industries in Ibadan South-West, Oyo State. Descriptive survey research design was adopted in this study. The population for the study comprised all 27 electrical/electronics personnel working in the selected registered manufacturing and service-based industries in Ibadan South-West Local Government Area, Oyo State. Due to the relatively manageable number of the participants, there was no sample for the study. A structured questionnaire which comprised 21 items rated on a 5- point Likert scale was used as instrument for data collection. The instrument was validated by experts in industrial technical education department, Tai Solarin University of Education. The reliability coefficient of the instrument was determined using Cronbach's Alpha and yielded a value of 0.84, Data were analysed using descriptive statistics of mean and standard deviation. Findings revealed that level of technical competence ($\bar{x}$=3.15) and operational efficiency ($\bar{x}$=3.30) among electrical and electronics personnel in selected industries in Ibadan South-West is moderate. Also, the study revealed that the availability of training and professional development for improving operational efficiency of electrical/electronics personnels in selected industries in Ibadan South-West is moderate ($\bar{x}$=2.67). It was concluded and recommended that as industries increasingly embrace automation, artificial intelligence, and green technologies, the capacity of their workforce to adapt and thrive hinges on higher-than-moderate levels of competence and efficiency. There, fostering a culture of continuous learning and operational excellence must become a policy and managerial priority to ensure personal growth of the personnel as well as enhancement of industrial productivity, innovation, and sustainable economic development in the region and beyond.

Keywords: Operational efficiency. electrical/electronic personnel, Industries,

Introduction

Technical proficiency and operational efficiency are becoming increasingly important in the changing global economy, particularly in developing nations like Nigeria where industrial expansion is crucial for long-term, sustainable development. The electrical and electronics sector which is a major part of Nigeria's industrial landscape, plays pivotal role in manufacturing, power generation, and technical development. The experts in this field are in charge of creating, maintaining, and debugging vital systems that drive industrial processes ranging from power supply installations to automation and electronic control systems. The efficiency of these workers has become a strategic concern for firms looking to maintain their competitiveness in both domestic and international markets at this time that productivity is closely tied to technology innovation and dependability.

Operational efficiency is the ability to carry out specified activities accurately, promptly, and efficiently while requiring the least amount of supervision. It also implies been able to adapt to changing technologies, meet with safety and quality requirements, display problem-solving and decision-making competencies to boost organization output (Ogbuanya & Owodunni, 2015). According to Ezeokoli et al. (2021), operational efficiency is a multifaceted concept that is impacted by a number of variables, including motivation, management techniques, work environment, skill level, and availability of contemporary tools and equipment. One important factor influencing industrial growth is worker productivity, especially in fields like electrical and electronics engineering that demand specialized knowledge. The contributions of these technical experts are crucial to the long-term evolution of the Nigerian economy, which is striving toward industrialization and diversification.

According to Ojokuku and Adegbite (2014), on-the-job training and capacity-building programs are essential for enhancing the efficacy of technical personnel in Nigeria. They stated further that employees who had access to continuous technical training performed noticeably better and adapted more quickly to changes in equipment and processes. However, many organizations in the public and commercial sectors frequently lack or inconsistently administer this type of training. This

phenomenon has been reported as a major barrier to technological advancement and industrial effectiveness in Nigeria (Asaju, Ashepo & (2025). Electrical and electronics personnel, by the nature of their responsibilities, require high levels of coordination, autonomy, and timely decision-making. Job morale tends to suffer when management does not empower employees or value their contributions, which negatively impact the output and overall operational efficiency. This emphasizes how important training and development initiatives are for closing skill disparities.

Operational efficiency also has an impact on Psychosocial and organizational elements, such as leadership styles, job satisfaction, incentives, communication flow, career advancement chances, and the physical work environment (Ogolo, 2023). In addition, poor lighting, insufficient ventilation, and inadequate maintenance practices are common in most Nigeria industries. These physical stressors can also cause poor performance, increased weariness, and Lack of concentration during operation (Onasanya, 2022). According to studies, employees who work in ergonomically sound settings with supportive management are more likely to be dedicated to their jobs and be more productive (Baba et al., 2021). Therefore, an adaptable workforce is necessary for electrical and electronics experts who are constantly exposed to new technologies, including smart grid systems, IoT-enabled gadgets, and programmable logic controllers.

Nonetheless, many Nigerian industries continue to underinvest in these kinds of capacity-building programs. This reflects in that many employers do not have established appraisal processes to monitor, evaluate, and improve employee performance. When performance reviews are conducted, they are frequently arbitrary, inconsistent, or unrelated to objectives for staff growth. This leads to a lack of accountability as well as an inability to recognise and address inefficiencies (Iwuanyanwu & Okoro, 2020). According to research conducted by Nwagbala and Okafor (2023), a sizable percentage of workers at electrical distribution companies had not received any kind of professional training in the preceding two years, which had an impact on their productivity and general performance.

Given the strategic role that electrical/electronics personnel play in sustaining industrial operations and innovations, it becomes essential to assess their level of job efficiency. Such assessment will not only help industry leaders but to understand the approach to use in improving personnel efficiency. Hence, this study investigates the operational efficiency of electrical/electronics personnel in selected industries in Ibadan South-West, Oyo State.

Statement of the Problem

The efficient functioning of industrial systems heavily relies on the competence and productivity of technical personnel, particularly those in electrical and electronics operations. These professionals are central to designing, installing, operating, and maintaining electrical infrastructure, control systems, and automated technologies supporting industrial activities. However, observations and preliminary studies indicate that many Electrical/Electronics personnel struggle with low productivity, skill deficiencies, lack of access to modern equipment, and minimal opportunities for upskilling. These inefficiencies have contributed to operational downtime, equipment failure, and increased costs of production, undermining organisational performance and competitiveness, especially within semi-urban industrial clusters. Despite the pivotal role these professionals play in ensuring operational reliability and safety, there is insufficient empirical data on the precise nature, scope, and causes of inefficiency among these personnel. This study, therefore, seeks to address this critical gap by systematically investigating the operational efficiency of Electrical/Electronics personnel in selected industries within Ibadan South-West Local Government.

Objectives of the Study

The primary objective of the study was to investigate the operational efficiency of Electrical/Electronics personnel in selected industries within Ibadan South-West Local Government. Specifically, the study sought to:

1. determine the level of technical competence among electrical and electronics personnel in selected industries within Ibadan South-West?
2. determine the level of operational efficiency among electrical and electronics personnel in selected industries within Ibadan South-West?
3. determine the level of training and professional development available for improving operational efficiency of electrical/electronics personnel in selected industries?

Research Questions

1. What is the level of technical competence among electrical and electronics personnel in selected industries within Ibadan South-West?

2. What is the level of operational efficiency among electrical and electronics personnel in selected industries within Ibadan South-West?
3. To what extent are the availability of training and professional development for improving operational efficiency of electrical/electronics personnel in selected industries?

Literature Reviewed

Concept of Operational Efficiency

Operational efficiency is the ability of an individual to effectively use time, skills, and resources to accomplish desired results with little waste or redundancy. In technical domains like electrical/electronics, it encompasses productivity, technical accuracy, compliance with safety standards, and effective time management (Robbins & Judge, 2019). Efficiency is closely linked with organizational performance, as high-efficiency employees contribute significantly to productivity, innovation, and competitiveness (Kreitner & Kinicki, 2013). Operational efficiency can be measured quantitatively "output per time unit, error rates, etc.) and qualitatively (skill proficiency, adherence to standards, problem-solving ability" (Amir, Qin & Muhammad, 2016). In technical settings, it often involves continuous process improvement and adaptation to technological advancements (ILO, 2020).

Electrical/Electronics Personnel in Industry

Electrical/Electronics personnel are professionals such as include engineers, technologists, technicians, and artisans involved in the design, installation, maintenance, testing, and troubleshooting of electrical/electronic systems (Bureau of Labor Statistics US, 2025). They play crucial roles in the automation, telecommunication, energy, and manufacturing sectors (Ikpe & Ekanem, 2024). These personnel are typically expected to possess core competencies such as circuit analysis, system diagnostics, equipment calibration, and compliance with regulatory standard. Productivity, workplace safety, product quality, and the bottom line of businesses that rely on electrical and electronic systems are all directly impacted by their effectiveness (Joy, Chikwe, & Chikezie, 2019). Besides, the performance and efficiency of these workers are significantly influenced by their technical knowledge, access to modern tools, and adherence to standard operating procedures. Rapid changes in automation, digitization, and smart technologies have redefined the competency requirements in this sector (Salau et al., 2020). Hence, training and development to perform optimal is essential for this professional.

Determinants of Job Efficiency in Technical Workplaces

Technical Training and Skill Development

One of the primary factors that determines an employee's efficiency is their technical proficiency. Research has indicated that skill gaps considerably impair performance in high-precision industries (ILO, 2020). Besides, continuous skill development is necessary for effective work. According to studies, businesses that regularly fund in-service training and retraining initiatives see improvements in output quality and less downtime (Herjuna et al, 2024). Additionally, technical training promotes adaptability to new tools and digital technologies. In Nigeria, gaps in training are common, particularly in SMEs. Many employees use antiquated knowledge, which makes it difficult to complete tasks effectively (Ajayi, Ajayi, & Ogunleye 2022). Additionally, academic credentials and professional certifications (such as NSE, COREN, and City & Guilds) have a good correlation with efficiency, particularly when it comes to complicated activities like load balancing and system troubleshooting (Belanich et al., 2019). According to Madu et al. (2023), graduates who participate in structured industrial training, such as SIWES, during their academic program are more prepared for technical duties than those who do not.

Work Environment, Infrastructure and Motivation

A well-equipped and safe work environment significantly impacts efficiency. Adequate lighting, ventilation, safety installations, and modern tools reduce fatigue and error rates (ILO, 2020). Conversely, exposure to hazards, poor layout, and lack of materials can decrease morale and productivity. In technical workplaces, especially those with high-voltage equipment, the presence of noise and heat without mitigation measures negatively impacts concentration and efficiency (Almaskati et al., 2024). In a study by Richard, Raphael, and Filbert (2024), a high degree of motivation increases efficiency, decreases absenteeism, and improves focus. Technical staff productivity, growth prospects, and recognition were found to be strongly correlated. Both non-monetary rewards (such flexible scheduling and respect from superiors)

and monetary incentives (like bonuses and performance-based pay) support long-term productivity levels (Vincent & Ayansola 2023). Burnout and errors are sometimes caused by an excessive workload and poorly planned shift schedules. To maintain high levels of efficiency, technical workers benefit from realistic deadlines, relaxation periods, and task balancing (Mohamad 2022).

Technology Integration and Management Style

The use of smart tools, including as PLC systems, automation software, AI diagnostics, and robotics, is growing in the contemporary electrical and electronics sectors. Employees that receive training on these technologies demonstrate improved accuracy and reduced turnaround times (Adib & Ashfakul, 2024). In Nigeria, there is still a skills gap, though, as many technicians are not conversant with Industry 4.0 equipment. Operational efficiency is decreased by this mismatch between the capacity of human resources and equipment. In addition, supportive supervision and leadership also improve accountability, teamwork, and communication. According to research by Ugwu, Chimaobi, and Nnadozie (2022), technical personnel's performance is positively impacted by participative management styles because they feel more engaged and dedicated. In contrast, poor supervisory practices, such as micromanagement or inconsistent feedback, often result in disengagement and inefficiencies.

Theoretical Review

Human Capital Theory

Human capital theory was primarily propounded by Theodore W. Schultz (1961). The theory posits that the knowledge, skills, experience, and competencies possessed by individuals significantly contribute to their productivity and economic value. Within the framework of operational efficiency, the theory emphasises investment in education, training, and health as key elements for enhancing employee performance and organisational growth. Applying this theory to the operational efficiency of electrical/electronics personnel provides valuable insights into how human capital development impacts operational performance in technical industries.

Methodology

This study adopted a descriptive survey research design. This design is suitable because it allows for the collection of detailed and quantifiable data related to workplace operational efficiency. The population for the study comprised all 27 electrical/electronics personnel working in the selected registered manufacturing and service-based industries in Ibadan South-West Local Government Area, Oyo State. This includes technicians, technologists, maintenance engineers, and supervisors involved in the installation, maintenance, and management of electrical/electronics systems. Due to the relatively manageable number of participants, there was no sample for the study. A structured questionnaire, which comprised 21 items rated on a 5- point Likert scale, was used as an instrument for data collection. The instrument was validated by experts in the Industrial Technical Education Department, Tai Solarin University of Education. The feedback was used to refine ambiguous items and ensure alignment with the study objectives. To ascertain internal consistency of the instrument, a pilot test was conducted with 10 electrical/electronics personnel from industries outside the study area. The reliability coefficient was calculated using Cronbach's Alpha and yielded a value of 0.84, indicating a high internal consistency. Data was collected with the support of a research assistant during agreed work hours. The data were analysed using descriptive statistics of mean and standard deviation.

Data Analysis and Results

Research Question 1: What is the level of technical competence among electrical and electronics personnel in selected industries in Ibadan South-West?

Table 1: Mean response on level of technical competence among electrical and electronics personnel in selected industries in Ibadan South-West?

S/N	Level of Technical Competence	Mean	St.D
1	Capable of troubleshooting issues without supervision.	3.46	.647
2	Demonstrating proficiency in operating industrial equipment.	3.19	.801
3	Expertise in interpreting schematics and diagrams effectively.	2.88	.993
4	Ability to comply with electrical safety standards and operational protocols.	3.15	.613

5	proficient in operating oscilloscopes and signal generators effectively.	2.92	.935
6	Ability to calibrate and maintain technical equipment as required.	3.08	.560
7	Skillful in use of multimeters and test benches.	3.38	.637
	Average Mean	**3.15**	

4.50-5.00 (Very High), 3.50-4.49 (High), 2.50-3.49 (Moderate), 1.50-2.49 (Low), 1.00-1.49 (Very Low)

The table presents the mean responses on the level of technical competence among electrical and electronics personnel in selected industries in Ibadan South-West. All the 7 items have their mean values ranging from 2.92 to 3.46. However, the table showed an average means of 3.15 which falls within 2.50 and 3.49 level of agreement adopted in this study. This implies that the level of technical competence among electrical and electronics personnel in selected industries in Ibadan South-West is moderate

Research Question 2: What is the level of operational efficiency among electrical and electronics personnel in selected industries in Ibadan South-West?

Table 2: Mean response on level of operational efficiency among electrical and electronics personnel in selected industries in Ibadan South-West

S/N	Level of Operational efficiency	Mean	St.D
1	Assigned tasks are generally completed within scheduled timeframes.	3.42	.758
2	Work quality consistently meets industry or organizational standards.	3.42	.578
3	Technical decisions made are usually accurate and productive.	3.19	.849
4	Initiative is often demonstrated to improve work processes.	3.27	.667
5	Work performance consistently meets or exceeds expectations	3.42	.758
6	Technical tasks are performed independently with minimal errors.	3.31	.679
7	Supervisors regularly provide positive feedback on task performance	3.08	.744
	Average Mean	**3.30**	

4.50-5.00 (Very High), 3.50-4.49 (High), 2.50-3.49 (Moderate), 1.50-2.49 (Low), 1.00-1.49 (Very Low)

The table presents the mean responses on the level of operational efficiency among electrical and electronics personnel in selected industries in Ibadan South-West. All the 7 items have their mean values ranging from 3.08 to 3.42. However, the table showed an average means of 3.15 which falls within mean range of 2.50 and 3.49 level of agreement adopted in this study. This therefore implies that the level of operational efficiency among electrical and electronics personnel in selected industries in Ibadan South-West is moderate

Research Question 3: To what extent are the availability of training and professional development for improving operational efficiency of electrical/electronics personnels in selected industries?

Table 3: Mean response on the extent of available of training and professional development for improving operational efficiency of electrical/electronics personnels in selected industries

S/N	Availability of training and professional development	Mean	St.D
1	My organization provides regular training opportunities related to my technical role	2.81	.939
2	There are mentorship programs available to help workers improve their job efficiency	2.69	1.050
3	Regular workshops and seminars are conducted to update personnel's on new technologies.	2.73	.919
4	There is a well-established apprenticeship program for fresh or new electrical/electronics personnel	2.69	.928
5	Online training and certification programs are encouraged for skill development.	2.54	.989
6	Electrical/electronics personnel receive structured feedback for performance improvement	2.81	.895
7	The organization supports personnel in obtaining industry-recognized certifications.	2.42	1.027

	Average Mean	**2.67**

4.50-5.00 (High Available), 3.50-4.49 (Available 2.50-3.49 (Moderately available), 1.50-2.49 (Rarely available Low), 1.00-1.49 (Not available)

The table presents the mean responses on the extent of available of training and professional development for improving operational efficiency of electrical/electronics personnels in selected industries. All the 7 items have their mean values ranging from 2.42 to 2.81. However, the table showed an average means of 2.67 which falls within mean range of 2.50 and 3.49 scale adopted in this study. This result therefore indicates that training and professional development for improving operational efficiency of electrical/electronics personnels in selected industries in Ibadan South-West Local Government is moderately available.

Discussion of Findings

The findings from this research highlight three critical dimensions of workforce capacity in the electrical and electronics sector within selected industries in Ibadan South-West Local Government: Each of these factors plays a vital role in shaping the productivity, innovation potential, and safety compliance of personnel in technologically driven industries. The findings of the study revealed that the level of technical competence among electrical and electronics personnel in selected industries in Ibadan South-West is moderate. This implies that although employees have some of the fundamental technical knowledge and abilities needed for their roles, there can be gaps in their level of competence in terms of mastery, breadth, and depth. According to Ezugu, Bala, and Muhammad (2023), technical competence is the capacity to use both theoretical and practical knowledge to carry out activities including electrical installations, troubleshooting, circuit design, instrumentation, maintenance, and system integration. This intermediate level of competency may result from a number of interconnected variables, such as gaps in pre-employment education and inadequate exposure to modern industrial technologies while working. Because of the speed at which technology is developing, studies have repeatedly highlighted the necessity of continuous skill improvement in engineering-related professions (Hassan, Dauda & Badawi, 2019). Employees may find it more difficult to achieve high technical proficiency if they are not exposed to sophisticated tools, computer-aided engineering programs, and automation technologies.

The results also showed that level of operational efficiency among electrical and electronics personnel in selected industries in Ibadan Southwest is moderate. According to Aldoghan et al. (2023), operational efficiency is the capacity of employees to carry out their duties with the highest possible productivity, the fewest possible errors, time effectiveness, and resource optimisation. Although employees can often carry out their duties, there are clear performance limitations that could impact production schedules, energy efficiency, equipment use, and maintenance management. This result is consistent with comparable studies by Taliang et al. (2023), who found that worker motivation, quality of supervision, sufficiency of tools and resources all had a significant impact on productivity in technical workplaces. This mediocre performance level in Ibadan South-West may be caused by limitations like outdated machinery, erratic power supplies, inadequate infrastructure, and a slow uptake of lean manufacturing practices. Also, Vallasamy, Muhadi, and Kumaran (2023), further noted that work-related stress, poor task allocation, and limited team coordination have been identified as operational hindrances.

Furthermore, findings revealed that training and professional development for improving operational efficiency of electrical/electronics personnel in selected industries in Ibadan South-West Local Government is moderately available. The moderate availability of training and professional development opportunities presents a mixed outcome. On one hand, it suggests that some form of capacity-building efforts exists in the studied industries, such as workshops, in-service training, mentorship programs, or short-term technical courses. On the other hand, the limited access, frequency, or quality of these programs may not be sufficient to meet the evolving demands of the electrical and electronics fields (Odudu & Edidiong, 2024). Regular and structured training is a critical determinant of both technical competence and operational efficiency. According to Arulsamy et al. (2023), continuous professional development enhances employees' confidence, improves problem-solving capabilities, and fosters innovation. The moderate provision of training suggests that organizations might be constrained by funding, lack of collaboration with training institutes, or inadequate human resource planning.

Conclusion

The findings present a compelling case for urgent, yet strategic, interventions in the skill development ecosystem of electrical and electronics personnel in the studied region. As industries increasingly embrace automation, artificial

intelligence, and green technologies, the capacity of their workforce to adapt and thrive hinges on higher-than-moderate levels of competence and efficiency. Fostering a culture of continuous learning and operational excellence must therefore become a policy and managerial priority to ensure personal growth of the personnel as well as enhancement of industrial productivity, innovation, and sustainable economic development in the region and beyond.

Recommendation

Given the study's results, the following suggestions are put forth:

1. Industries and relevant professional bodies such as COREN and NSE should enforce mandatory Continuous Professional Development **(**CPD) programs for all technical personnel. These programs should include hands-on training, workshops, certifications, and short courses focused on current trends in electrical and electronics technologies.
2. Industry 4.0 technology adoption should be encouraged by government and industry legislation, together with training initiatives to assist staff in adjusting to new tools like automation, IoT, and AI in industrial operations.
3. Institutions should adopt a performance and competence-based promotion policy. Linking advancement to measurable skill acquisition and job efficiency will motivate personnel to engage more actively in self-improvement and professional development.
4. Employers should be encouraged by the government to regularly train their technical staff through tax breaks or grants. Interventions in this area can lessen the financial strain on businesses and foster a culture of skill development.
5. Special programs should be designed for small- and medium-scale enterprises (SMEs) and informal industry players, who often lack the resources to independently fund training or efficiency-improvement initiatives for their personnel.

References

Adib, R. & Ashfakul. K. (2024). AI Revolutionizing Industries Worldwide: A Comprehensive Overview of Its Diverse Applications. Hybrid Advances. 7. 100277. 10.1016/j.hybadv.2024.100277.

Ajayi, P. O., Ajayi, O. M., Ogunleye, T. S. (2022) Determinants of Brain Drain among Health Workers in Public Teaching Hospitals in Ekiti State, Nigeria. *IIARD International Journal of Health and Pharmaceutical Research*. 7(1) 45-55

Aldoghan, M., & Kaliani, S., Veera, P., Kaliani, S. & Veera P. (2023). Organization operational efficiency and Innovativeness: Exploring the role of employees' task-based training, operational task commitment, operational engagement, and supervisor support. 11. 108-127. 10.46970/2022.29.1.7.

Almaskati, D., Kermanshachi, S., Pamidimukkala, A., Loganathan, K., & Yin, Z. (2024). A Review on Construction Safety: Hazards, Mitigation Strategies, and Impacted Sectors. *Buildings*, *14*(2), 526. https://doi.org/10.3390/buildings14020526

Amir, I. Qin, S. Muhammad, A., S. (2016) Technical Efficiency and Its Determinants: An Empirical Study of Surgical Instruments Cluster of Pakistan. *Journal of Applied Business Research* (JABR) 32(2):647

Arulsamy, A., Singh, I., Kumar, S., Panchal, J. & Bajaj, K. (2023). Employee Training and Development Enhancing Employee Performance. *A Study. 16*. 406-416.

Asaju, K & Ashepo S., Y. (2025). Technology development and national development in Nigeria. Journal of Emerging Technologies (JET)5(1) ISSN: 2710-0189 (Print) | 2710-0197 (Online) Website: https://journals.jozacpublishers.com/jet/

Asogwa, U. C. (2017). Job rotation, motivation, demographic variables and job performance of career administrators in Universities in South East Nigeria Ph.D thesis, Department of Educational Foundation, faculty of Education University of Nigeria, Nsukka xii+169 pp.

Belanich, J., Fedele, E.& Dobbins, C., Morrison, J., Moses, F., & Madhavan, P. (2019). Impact of Professional Credentials on Employability. *Institute for Defense Analyses* 10.13140/RG.2.2.20406.96324.

Bureau of Labor Statistics, U.S. Department of Labor, (2025). *Occupational Outlook Handbook*, Electrical and Electronic Engineering Technologists and Technicians. at https://www.bls.gov/ooh/architecture-and-engineering/electrical-and-electronics-engineering-technicians.htm

Chinelo N. S. & Okafor I. P. (2023). An Assessment on Job Satisfaction and Employee Performance in Selected Enugu Electricity Distribution Company (EEDC), Enugu State. *International Journal of Research and Innovation in Social Science 7(4),* 891-902

Ezeokoli, F.O., Bert-Okonkwor, C.B.N., Okongwu, M.I., Fadumo, D.O., Ohaedeghasi, C.I. & Okoye, N.M. (2021) Factors Confronting the Present-Day Construction Practices in South-East, Nigeria: The Professionals' View. *Journal of Building Construction and Planning Research, 9,* 160-169. doi: 10.4236/jbcpr.2021.92011.

Ezugu L. C., Bala, A. A. & Muhammad Z. I. (2023). Technical Skills Improvement Needs of Electrical Installation and Maintenance Work Trade Teachers for Effective Teaching in Technical Colleges in Kano State. *International Journal of Multidisciplinary Research and Growth Evaluation*. 4(6) 425-431

Hassan M. A., Dauda, Y. A. & Badawi, H. M. (2019). Skills improvement need of woodwork teachers in technical colleges of Yobe State, Nigeria. *Insertions Journal of Innovative Information Systems and Technology Research. 7(1)*:39-49.

Herjuna, S. A. S, Marhaeni., V. F., Alvira, M. & Putri. F. & Anastasya, F. (2024). Impact of Training and Development Programs on Employee Performance in the Manufacturing Sector. *Acta Psychology 3(3)*, 140-151

Ikpe, A. & Ekanem, I. (2024). Integration of Intelligent Hydraulic Systems as Industry 4.0 Driving Trends: The Gateway to Industrial Automation in the Manufacturing Sectors. 11th International EL RUHA Congress of Social Sciences Iksad Institute.

International Labour Organization (2020) ILO Monitor: COVID-19 and the World of Work. Seventh Edition Updated Estimates and Analysis**.**

Joy, U. & Chikwe, G. & Chikezie, O. N. (2019). Workplace Safety as an Engineering Drive to Workers Productivity in Production Industries. *IDOSR Journal of Arts and Management 4(1):* 14-28

Kreitner, R., & Kinicki, A. (2013). *Organizational Behavior*. New York, NY: McGraw Hill/Irwin.

Madu, U., Omonijo, D. O., Anyaegbunam M. C., Adeleke, V. A., Nnatu, S. O., Ejoh, S., Oluwunmi, A. O., Olowookere, E. I. & Agubo, A. O. (2023). Influence of Students Industrial Work Experience Scheme (SIWES) on academic performance of library and information science students in library schools in Osun state, Nigeria. *Global Science Research Journal.10(1)*. 1-11

Mohamad. S. (2022). The Impact of Work Environment on Employees Performance. *International Journal of Current Research in Science Engineering & Technology. 03.* 2582-5208.

Odudu, E., & Edidiong, I. S. (2024) Relevance of Electrical and Electronics Technology Education for Sustainable Workforce Development in Nigeria. *Journal of Association of Vocational and Technical Educators of Nigeria (Javten),* 29(3).

Ogbuanya, TC. & Owodunni, A.S. (2015). Effect of reflective inquiry instructional technique on students' academic achievement and ability level in electronic work trade in technical colleges. *Journal of Education and Practice, 6(7)*, 4354. Retrieved from https://files.eric.ed.gov/fulltext/EJ1083083.pdf

Ogolo, B. N., & Azuonwu, G. (2023). Occupational hazards and safety practices among staff of Port Harcourt Electricity Distribution Company. Faculty of Natural and Applied Sciences *Journal of Scientific Innovations, 4(2),* 27–32. Retrieved from https://fnasjournals.com/index.php/FNAS-JSI/article/view/174

Ojokuku, R. M.A & Adegbite, T. A. (2014). The Impact of Capacity Building And Manpower Development on Staff Performance in Selected Organizations n Nigeria; International *Journal of Economics, Commerce and Management, United Kingdom 2(5)* 1 –9

Onasanya, I. O. (2022). Ergonomics of Workplace and Job Performance of Library Personnel in Private Secondary Schools in Ibadan Metropolis Nigeria. *Nigerian School Library Journal, 21*.

Richard, S., Raphael, M. & Filbert, M. (2024). Impact of recognition on employees` performance in the Manufacturing Industries in Tanzania: A Case of Tanga Cement Company. *International Journal of Scientific Research and Management (IJSRM)*. 12. 6059-6073. 10.18535/ijsrm/v12i03.em11.

Robbins, S.P. and Judge, T.A. (2018) *Essentials of Organizational Behavior*. 14th Edition, Pearson Education, Inc., London

Salau, O. P., Worlu, R. E. K., Osibanjo, A. O., Oludayo, O. A., & Falola, H. O. (2018). Survey data on work environments and productivity of academic staff of selected public universities in Nigeria. *Data in Brief, 19,* 1912–1917

Singer, S.J., Pfeffer, F., & Nikolov, M C. (2025) An absence of accountability: Evidence of employers' failure to measure and manage employee health benefits administration, Social Science & Medicine, 377,

Taliang, A., Rijal, S., Niswaty, R., Herman, H. & Arhas, S. (2023). Employee performance: The role of operational work tools toward productivity. *Journal of Governance and Regulation*. 12. 198-205. 10.22495/jgrv12i3siart1.

Ugwu, K., Chimaobi, I. & Nnadozie, N. (2020). Participatory Management and Employee Satisfaction (Revised)-1-1. 10.5281/zenodo.3948156.

Vallasamy, S. K. & Muhadi, S. & Kumaran S. (2023). Underlying Factors that Contributed to Job Stress in an Organisation. *Journal of Business and Social Sciences Research*. 13. 1239-1250. 10.6007/IJARBSS/v13-i5/16906.

Vincent, M. & Ayansola A. (2023). Impact of performance incentives on employees' performance in a university in KwaZulu-Natal. *SA Journal of Human Resource Management*. 21. 10.4102/sajhrm.v21i0.2114.