Journal of Scientific Research and Reports

Volume 30, Issue 12, Page 659-669, 2024; Article no.JSRR.128219
ISSN: 2320-0227

The Effect of Demographic Factors on Employee Productivity and Safety Programmmes in Oil and Gas and Construction Industries in the Niger Delta Area, Nigeria

Lazarus Tsado Sala [a], Ify L. Nwaogazie [b*], Ugbong John Inyang [a], Nelson Eyenike [a] and Caleb O. Onofeghara [a]

[a] Centre for Occupational Health, Safety and Environment (COHSE), University of Port Harcourt, Choba, Port Harcourt, Rivers State, Nigeria.
[b] Department of Civil & Environmental Engineering, University of Port Harcourt, Choba, Port Harcourt, Rivers State, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/jsrr/2024/v30i122710

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/128219

Original Research Article

Received: 16/10/2024
Accepted: 18/12/2024
Published: 26/12/2024

**Corresponding author: E-mail: ifynwaogazie@yahoo.com;*

Cite as: *Sala, Lazarus Tsado, Ify L. Nwaogazie, Ugbong John Inyang, Nelson Eyenike, and Caleb O. Onofeghara. 2024. "The Effect of Demographic Factors on Employee Productivity and Safety Programmmes in Oil and Gas and Construction Industries in the Niger Delta Area, Nigeria". Journal of Scientific Research and Reports 30 (12):659-69. https://doi.org/10.9734/jsrr/2024/v30i122710.*

ABSTRACT

The aim of this study was to examine how demographic variables affect employee productivity in the selected Oil & Gas and Construction companies in the Niger Delta, Nigeria. Structured questionnaire was the research instrument administered to 390 employees by random sampling; while the selection of the Oil & Gas and construction companies was by purposive method. Demographic variables captured in the questionnaire included Gender, Age, Level of education, Marital status and Years of experience. The collated data were analyzed using Xlstat version 16 for descriptive statistics and reliability test using Cronbach alpha. Also, Z-test and Analysis of Variance were carried out to check for significant difference in the employee productivity across the demographic variables. Principal Component Analysis was further used to understand the relationship between the demographic variables and safety programs. The result from the study showed that female had slightly higher employee productivity than male employee. The overall productivity might be slightly geared toward cognitive diversity rather than physical work demand. The result further showed that there was no significant difference in the employee productivity with respect to gender. Similarly, the finding from the study showed that employee between the ages of 42 to 49 and workers with 17 - 24 years of working experience had the highest employee productivity. While workers between the ages of 18 to 25 and workers with experience above 25 years had the least employee productivity. No significant difference was found in the ages and working experience with respect to productivity. However, significant difference was observed in the marital status with respect to productivity. Single and divorced workers had significantly higher employee productivity than their counterpart. Given that workers above 50 years also showed high productivity, it is recommended that pairing employees above the age of 50 years and younger workers (below 25) will be beneficial in increasing the overall productivity in the company. However, the need for succession planning and knowledge transfer as they approach retirement should be carried out by the companies.

Keywords: Demographic variables; employee productivity; oil and gas; construction industries; Xlstat.

1. INTRODUCTION

Productivity is the ability to turn talents and ideas into tangible outputs, influenced by the relationship between inputs and results. High workplace safety standards reduce accidents and health issues, enhancing productivity. Productivity involves optimizing time, materials, and energy, requiring improvements in work systems and workforce proficiency. Safety is crucial, as healthier employees perform better, contributing to both the quality and quantity of output. Neglecting safety can harm health and productivity, underscoring the importance of the relationship between safety, health, and optimal performance (Mora et al., 2020).

In the context of the Niger Delta area of Nigeria, where industries are diverse and complex, it is essential to evaluate the effectiveness of the demographic factors that affects the employee's productivity. Organizations depend on a productive workforce, yet inadequate safety measures can hinder productivity as underscored by the European Employee Productivity Institute in 2019. Globalization, legal changes, and technological advancements have introduced new safety concerns in workplaces, as noted by Keraka (2020). Obrenovic et al. (2020) and Gupta et al. (2016) highlight that traditional safety programmes may not address these evolving hazards. While (Saleem et al. 2021) emphasize the need for comprehensive safety programmes, many organizations remain hesitant due to limited empirical evidence linking safety to productivity (Ndegwa et al., 2022; Mutegi et al., 2023).

Employee productivity is essential for an organization's profitability and competitiveness, directly impacting efficiency, output, and job satisfaction (Tzenios, 2019). High productivity reflects a well-managed workforce, driving both financial success and employee fulfillment. Ergonomic workspace design, including appropriate seating, ventilation, and lighting, is crucial for reducing job stress and enhancing productivity (Zafir et al., 2022).

Productivity comprises three components: efficiency, effectiveness, and quality. Efficiency compares planned input use with actual implementation, while effectiveness measures the extent of targets met in terms of quantity and

timeliness. Quality assesseshow well consumer expectations are fulfilled. Employee productivity is vital as it directly influences profitability and competitiveness, enabling companies to produce more in less time. High productivity reflects effective management and leads to greater job satisfaction and engagement, fostering employee motivation and ongoing contributions to organizational success (Firman, 2022).

2. MATERIALS AND METHODS

Structured questionnaire was the main instrument used to obtain responses on the demographic effects on employee's productivity in selected Oil and Gas as well as Construction industries in Niger Delta Area. A total of 390 copies of the structured questionnaire was developed and administered for data collection among Indigenous and Multinational Oil and Gas as well as Indigenous and Multinational Construction companies across Niger Delta Area using Google Forms, an online survey tool. Sample size, 390 was determined using Equation (2.1),

$$N = \frac{Z^2 p(1-\alpha)}{T^2} \quad (2.1)$$

Where *N* = Sample size; Z = the abscissa of the normal curve that cuts off an area α at the tails, (1 – p) = the desired confidence level (i.e. 95%); T= Tolerance error (or the desired level of precision); and p = Estimated Proportion of an attribute that is present in the population without considering the finite population correction factor (fpc).

Most of the questions were structured using Likert scale (5-Strongly agrees, 4- agreed, 3-Disagree, 2-Strongly Disagree, 1-Undecided), in order to prevent ambiguity and the need for guessing in the analyses of the data. The respondents were assured of the confidentiality of their responses. Out of the 390 questionnaires distributed, 350 were successfully retrieved, representing a retrieval rate of 89.74%. The high retrieval rate is likely due to the ease of digital submission, which allowed respondents to complete and submit their questionnaires online without the need for physical retrieval. However, about 40 questionnaires were not returned, accounting for 10.25% of the total distributed questionnaires.

2.1 Instrument

This study was carried out as a cross-sectional study given that the data were collected within a specified time frame (Nwaogazie, 2024). Structured questionnaire was the research instrument administered to 390 employees by random sampling; while the selection of the oil companies as well as construction companies was by purposive sampling. Demographic variables captured in the questionnaire included Gender, Age, Level of education, Marital status and Years of experience. The administered questionnaire also includes information on the following: Management Commitment, Safety Participation, Safety Compliance, Safety Promotional Policies, Safety Training, Safety Knowledge, Employee Involvement/Participation and Employee Productivity.

2.2 Methods of Data Analysis

The collated data for this study were analyzed using Statistical Product and Service Solution (IBM SPSS version 26 and Xlstat version 16). Data were analyzed using descriptive statistics. The responses to the questionnaire from the respondents were subjected to a reliability test using Cronbach alpha. Z-test and Analysis of Variance were used to check for significant difference in the employee productivity across the demographic variables. Principal Component Analysis was further used to understand the relationship between the demographic variables and safety programs which was represented using a biplot.

3. RESULTS AND DISCUSSION

3.1 Reliability of the Instrument

The analysis revealed good internal consistency across employee productivity and safety programs measures, with Cronbach's alpha values ranging from 0.630 to 0.916 as shown in Table 1. Management commitment gave the highest reliability which Cronbach alpha 0.916 while safety participation gave the lowest reliability with Cronbach alpha of 0.63.

3.2 Assessment of the Demographic Variables for Productivity

The demographic analysis of respondents, as presented in the Fig. 1 offers crucial insights into the characteristics of the workforce in the selected oil and gas and construction industries in the Niger Delta area. These demographic variables, including gender, age, marital status, educational background, and years of work experience play a significant role in shaping

Table 1. Cronbach alpha for the constructs

Groups	Constructs	Cronbach Alpha	Standardized Cronbach alpha	Internal consistency
Safety Programmes	Management Commitment	0.916	0.920	Good
	Safety Participation	0.630	0.741	Good
	Safety Compliance	0.862	0.861	Good
	Safety Promotional Policies	0.848	0.850	Good
	Safety Training	0.895	0.898	Good
	Safety Knowledge	0.867	0.877	Good
	Employee involvement/participation	0.849	0.850	Good
Productivity	Employee Productivity	0.785	0.787	Good

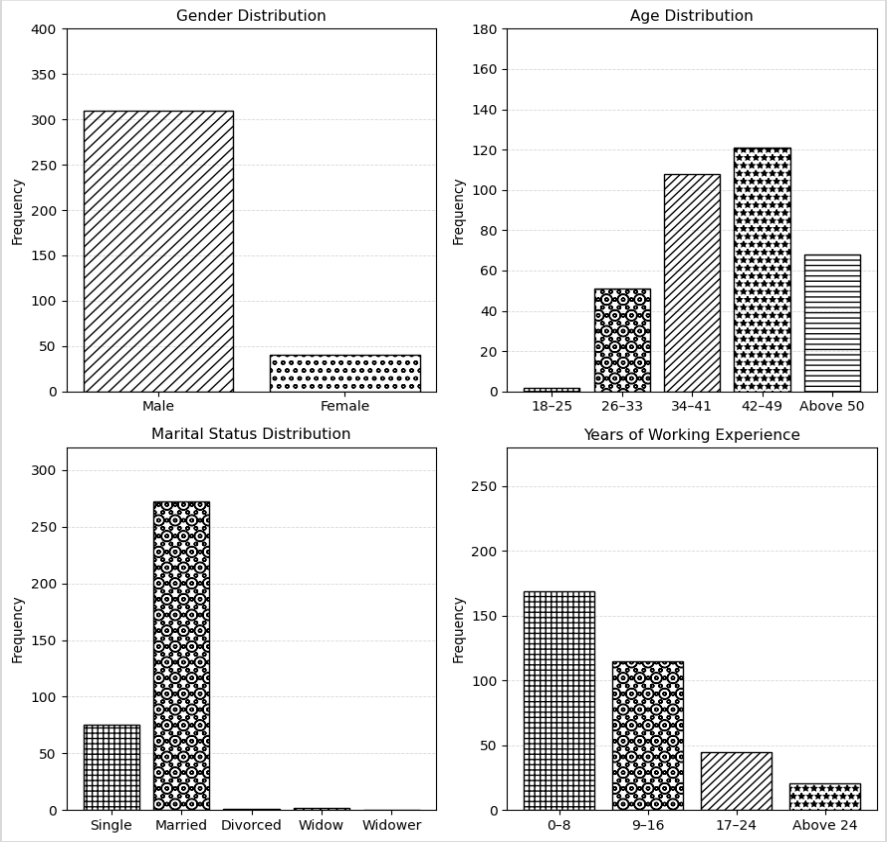

Fig. 1. Demographic variable distribution

employee productivity. This study evaluates how these variables influence productivity within the context of these industries, considering the implications of the observed trends.

3.2.1 Gender distribution and employee productivity

The workforce is male-dominated, with 88.6% male and 11.4% female respondents as shown in Fig. 1, reflecting the traditional gender imbalance in the oil and gas and construction industries, as noted by (Maduka & Okafor 2014). This disparity may be linked to the physical demands and perceived risks of these roles, which have historically attracted more men. While a male-dominated workforce may enhance productivity in physically demanding tasks, it is crucial to acknowledge that cognitive diversity and varied problem-solving approaches are also important for overall productivity.

The result of the employee productivity against the gender as shown in Fig. 2 showed that female gender had a slightly higher employee productivity than the male workers. In terms of significant differences, the result from the Z-test as presented in Table 2 did not provide sufficient

evidence that there was a significant difference in the employee productivity between the genders (Z-Observed = -0.745, p-value=0.451). The result obtained from the employee productivity against gender might be attributed to the fact that the overall productivity might be slightly geared toward cognitive diversity rather than physical work demand.

3.2.2 Age distribution and employee productivity

The workforce is predominantly aged between 34 and 49, with the largest groups in the 42-49 (34.6%) and 34-41 (30.9%) age ranges.

The result from Fig. 3 showed that employee between the ages of 42 to 49 had the highest productivity followed by those between the ages of 34 to 42. It was observed that employees below the age of 25 had the lowest productivity. Matured workforce age-wise are often associated with higher productivity due to greater experience and familiarity with industry standards. Older employees bring valuable knowledge, efficiency, and strong work ethics, contributing to overall productivity. Workers above the age of 50 also showed high productivity, however the need for succession planning and knowledge transfer as they approach retirement should be carried out by the companies. Implementing mentorship programs by pairing employees above the age of 50 years and younger workers (below 25) will be beneficial in increasing the overall productivity in the company. The result for the ANOVA as presented in Table 3 did not provide sufficient evidence stating that there was a significant difference in the employee productivity against the age distribution, however differences were observed in the employee productivity across the age group as shown in Fig. 3.

3.2.3 Marital status and employee productivity

Fig. 3 shows how employee productivity is distributed according to marital status. It was observed that divorced workers had the highest productivity and widow had the lowest productivity. The result from the ANOVA as presented in Table 4 provide sufficient evidence in stating that there was significant difference in the employee productivity in relation to marital status (F-value (3,346) =7.28, p-value<0.0001). The Tukey multiple comparison test as presented in Table 5 showed that divorced and single workers had significantly higher productivity than employees who were widow. The result from the study highlights that marital status significantly influences productivity, which was also supported by (Mallika 2010). The result from the findings revealed that without spouses (single and divorced) showed to be more focus than their counterpart (married or widow). The extra burden of actively looking after the need of a spouse and family can serve as a distraction resulting in low productivity.

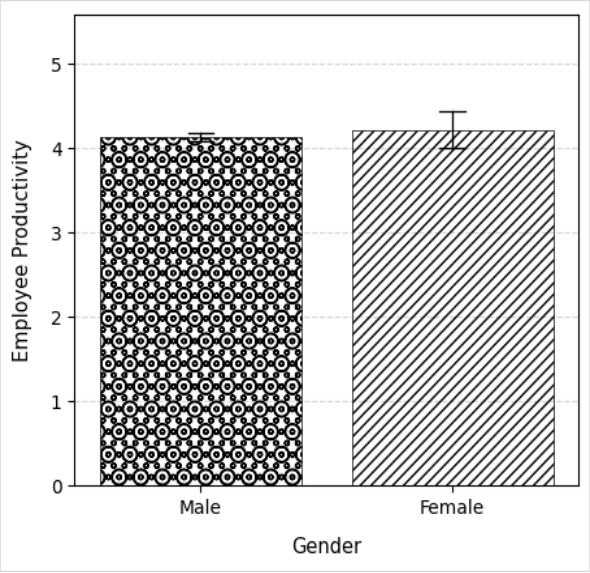

Fig. 2. Gender distribution and Employee productivity

Table 2. Z-test showing significant difference between employee productivity and gender

Difference	**-0.086**
z (Observed value)	-0.754
|z| (Critical value)	1.960
p-value (Two-tailed)	0.451
Alpha	0.05

Table 3. Analysis of Variance for employee productivity and age distribution

Source	**DF**	**Sum of squares**	**Mean squares**	**F**	**Pr > F**
Model	4	0.493	0.123	0.408	0.803
Error	345	104.158	0.302		
Corrected Total	349	104.652			

Computed against model Y=Mean(Y)

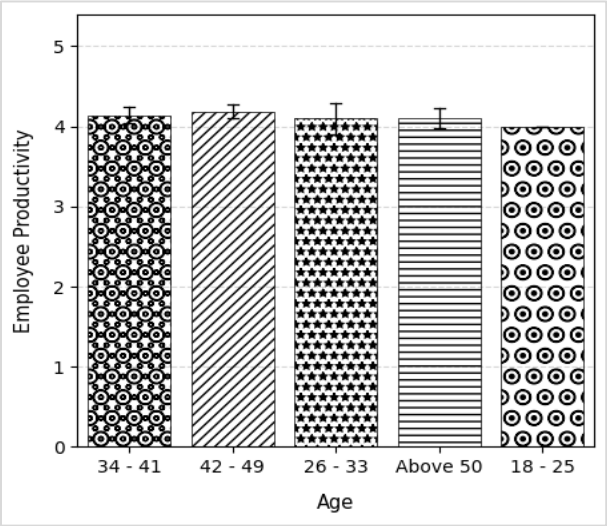

Fig. 3. Age distribution and employee productivity

Fig. 4. Marital distribution and employee productivity

Table 4. Analysis of Variance for employee productivity and marital status distribution

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	3	6.216	2.072	7.283	< 0.0001
Error	346	98.435	0.284		
Corrected Total	349	104.652			

Computed against model Y=Mean(Y)

Table 5. Tukey Multiple comparison test showing where the difference in employee productivity lies in relation to marital status

Category	LS means	Standard error	Lower bound (95%)	Upper bound (95%)	Groups	
Divorced	5.000	0.533	3.951	6.049	A	
Single	4.339	0.062	4.218	4.460	A	
Married	4.088	0.032	4.024	4.151	A	B
Widow	3.200	0.377	2.458	3.942		B

3.2.4 Years of work experience and productivity

The distribution of employee worker experience showed that 48.3% of respondents have 0-8 years of experience, and 32.9% have 9-16 years, indicating a mix of relatively new and moderately experienced workers as presented in Fig. 1. Fig. 5 shows the employees productivity as against years of working experience. The result from the figure showed that employees with 17 to 24 years of working experience had the highest employee productivity followed by those with 9 to 16 years of working experience. The result also showed that worker with above 25 years of working experience had the lowest productivity. The cross tabulation of age of employee and year of working experience in this study showed that the worker ages 42 to 49 coincide with workers with 17 to 24 years of working experiences. The finding revealed some sort of curvilinear relationship. The relationship showed that a steady increase in employee productivity at worker ages 18 to 25 and years of working experience 0 to 8 years which then peak at worker age of 42 to 49 years and that of working experience of 17 to 24 years and both curves begins to decline accordingly. The result for the ANOVA presented in Table 6 do not provide sufficient evidence in stating that there was significant difference between the employee productivity and years of working experience. However, workers with 17 to 24 years of working experience tend to have higher employee productivity but it is not significant from others.

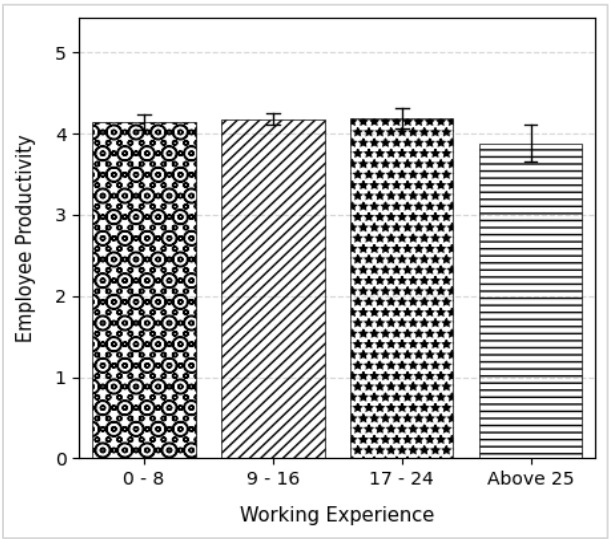

Fig. 5. Year of working experience and employee productivity

Table 6. Analysis of Variance for employee productivity and years of working experience distribution

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	3	1.696	0.565	1.900	0.129
Error	346	102.956	0.298		
Corrected Total	349	104.652			

Computed against model Y=Mean(Y)

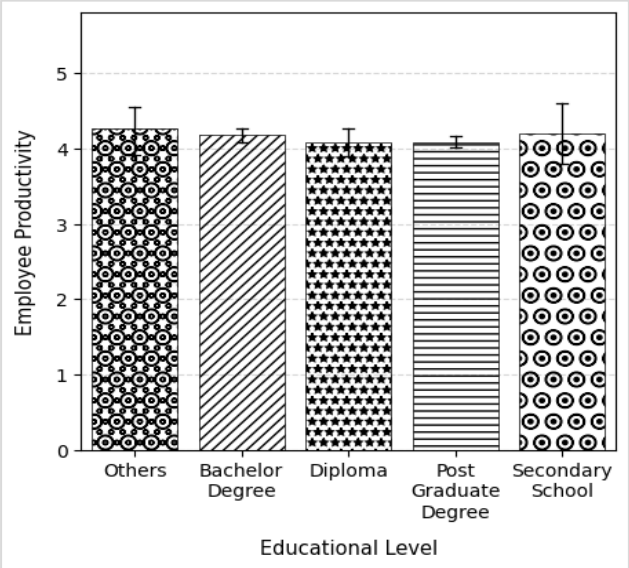

Fig. 6. Educational qualification and employee productivity

Table 7. Analysis of Variance for employee productivity and educational qualification

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	4	0.949	0.237	0.790	0.533
Error	345	103.702	0.301		
Corrected Total	349	104.652			

Computed against model Y=Mean(Y)

3.2.5 Educational qualification and employee productivity

The educational qualification of respondents indicates a highly educated workforce, with 47.4% holding a Bachelor's degree and 38.9% possessing a Postgraduate degree as shown in Fig. 1. The relationship between the employee productivity against the education qualification is presented in Fig. 6. The result from the figure showed that as per Others the respondents tend to represent those with professional certifications or specialized training and had the highest employee productivity. The result from the ANOVA as presented in Table 7 does not provide sufficient evidence in stating there was significant difference in the employee productivity with respect to the educational qualification.

This high level of education is expected to positively impact productivity, aligning with (Ng & Feldman 2009) who found that education is positively related to task performance. Higher education equips employees with critical thinking, problem-solving skills, and industry-specific knowledge, which are essential for high productivity, particularly in the technical fields of oil and gas and construction. The lower percentages of respondents with Diplomas (8.3%) and Secondary School certificates (1.4%) suggest that advanced education is prevalent. However, employees with these lower levels of formal education can also bring valuable practical skills and hands-on experience to their roles. To maximize productivity, organizations should ensure these employees have access to continuous learning and professional

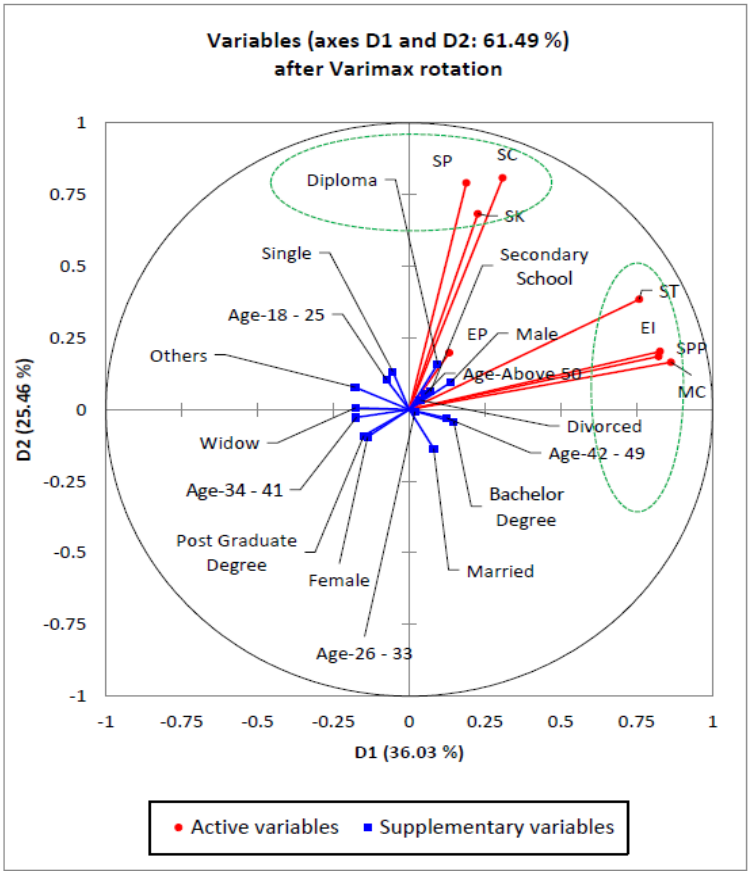

Fig. 7. PCA Biplot showing the interaction between the safety program factors and demographic variables

development opportunities, which can help them enhance their skills and contribute effectively. The "Others" category (4.0%), likely representing professional certifications or specialized training, underscores the importance of ongoing education and skill development. Investing in training programs for all employees, regardless of their educational background, helps maintain a competitive and productive workforce. This approach is supported by (Bhatti & Qureshi 2007), who highlighted the impact of education on job satisfaction and recognition. Overall, a commitment to continuous learning and development is essential for optimizing productivity and ensuring employees remain effective in a dynamic industry landscape (Okoro et al. 2024, Ehiaguina et al. 2024, Sala et al. 2024, Sala et al. 2024).

3.3 Principal Component Analysis Showing Relationship Demographic Variables and Safety Program

The principal component analysis (PCA) was applied to assess the relationship between safety program constructs and demographic variables. The analysis is presented in Fig. 7, focusing on understanding the underlying patterns within the dataset.The biplot provides a visual representation of the relationship between the safety program constructs and demographic variables. The safety programmes are represented with the red vector line while the supplementary variables (demographic variables) are represented with the blue vector line. From the biplot, it was observed that safety training (ST), employee involvement (EI), management commitment (MC), and safety knowledge (SK) had stronger relationships with male oil and gas workers indicated by the blue male vector line positioned closer to the red vector lines (ST, EI, MC, and SK). The result showed that male oil and gas workers had higher scores on those safety programme constructs indicating that they engage more in safety training than the female workers. The male oil and gas workers believed also that management was more committed to safety in their companies than their female counterparts. Male workers reported that they were more involved in safety decision-making

concerning their work than female workers. Workers above the age of 42 stated that management was more committed to safety, and they were more involved in safety decision-making than other age demographic groups. Also, workers with bachelor's degree and married workers had higher scores concerning the four safety programme constructs indicating a positive interaction with the safety programme variables. This finding suggests that educational attainment and marital status may influence workers' perceptions and engagement with safety programs.

4. CONCLUSION

Based on the findings of this study, the following conclusions are drawn. The result from the study showed that female had slightly higher employee productivity than male employee. The overall productivity might be slightly geared toward cognitive diversity rather than physical work demand. The result further showed that there was no significant difference in the employee productivity with respect to gender. Similarly, the finding from the study showed that employee between the ages of 42 to 49 and workers with 17 -24 years of working experience had the highest employee productivity. While workers between the ages 18 to 25 and workers with experience above 25 years had the least employee productivity. No significant difference was found in the ages and working experience with respect to productivity. However, significant difference was observed in the marital status with respect to productivity. Single and divorced workers had significantly higher employee productivity than their counterpart.

5. RECOMMENDATION

Workers above the age of 50 also showed high productivity, however the need for succession planning and knowledge transfer as they approach retirement should be carried out by the companies. Implementing mentorship programs by pairing employees above the age of 50 years and younger workers (below 25) will be beneficial in increasing the overall productivity in the company.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Bhatti, K. K., & Qureshi, T. M. (2007). Impact of employee participation on job satisfaction, employee commitment, and employee productivity. *International Review of Business Research Papers,* 3(2), 54–68.

Ehiaguina, E., et al. (2024). Safety Culture Assessment in Petroleum Industry: Cross-Sectional Survey of Workers' Safety Performance in the Niger Delta Region, Nigeria. *Springer Nature - International Journal of Occupational Safety and Health Management*. [Online] Available at link.springer.com

Firman, A. (2020). Implementation of Occupational Safety and Health (K3) for Increasing Employee Productivity. *Journal Economic Resources*, *5*(2), 365-376.

Gupta, A. K., Diallo, K., Zurn, P., & Dal Poz, M. R. (2016). Assessing human resources for health: What can be learned from labour force surveys? *Human Resources for Health*, *1*(1), 5. Available: https://doi.org/10.1186/1478- 4491-1-5

Keraka, C. N. (2020*).* Safety Management System and Employee Performance in Textile Manufacturing Companies in Selected Counties in Kenya *(Doctoral dissertation, JKUAT-COHRED).*

Maduka, C. E., & Okafor, O. (2014). Effect of motivation on employee productivity: A study of manufacturing companies in Nnewi. *International Journal of Managerial Studies and Research (IJMSR), 2*(7), 137-147. Available: https://www.arcjournals.org

Mallika, N. (2010). Job satisfaction and demographic variables – is there any link?" *Perspectives of Innovations, Economics and Business, PIEB 3*, 108-111. Available: https://www.ceeol.com/search/article-detail?id=246585

Mora, Z., Suharyanto, A., & Yahya, M. (2020). Effect of Work Safety and Work Healthy Towards Employee's Productivity in PT. Sisirau Aceh Tamiang. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)*, 3(2), 753-760.

Mutegi, T. M., Joshua, P. M., & Kinyua, J. M. (2023). Workplace Safety and Employee Productivity of Manufacturing Firms in Kenya. *Cogent Business & Management*, 10(2), 2215569. Available: https://doi.org/10.1080/23311975.2023.2215569

Ndegwa, P. W., Guyo, W., Orwa, G., & Murigi, E. M. (2022). Legal Framework as a Determinant of Implementation of Occupational Health and Safety Programmes in the Manufacturing Sector in Kenya. *International Journal of Human Resource Studies*, *4* (4), 21. Available: https://doi.org/10.5296/ijhrs.v4i4.6500

Ng, T. W. H., & Feldman, D. C. (2009). How broadly does education contribute to job performance? *Personnel Psychology, 62*(1), 89–134. Available:https://doi.org/10.1111/j.1744-6570.2008.01130.x

Nwaogazie, I. L. (2024). Understanding Research Methods, Report Writing and Presentation with Selected Case Studies. De-Adroit Innovation, Enugu, Nigeria. ISBN: 978-8137-51-2 p. 214.

Obrenovic, B., Du, J., Godinic, D., Tsoy, D., Khan, M. A. S., & Jakhongirov, I. (2020). Sustaining enterprise operations and productivity during the COVID-19 pandemic: "Enterprise Effectiveness and Sustainability Model". *Sustainability*, *12*(15), 5981. Available: https://doi.org/10.3390/ su12155981

Okoro, N. U., Ugwo, C. E., & Onodugo, I. J. (2024). Assessment of Work-Life Balance and Employee Job Satisfaction in Oil and Gas Firms in the Niger Delta Region of Nigeria. *International Journal of Multidisciplinary Research and Development*, [Online] Available at allmultidisciplinaryjournal.com

Sala, L. T., Nwaogazie, I. L., & Ugbebor, J. N. (2024). A Comparative Analysis of Safety Programs and Employee Productivity in Oil and Gas Versus Construction Industries in the Niger Delta Region. *Asian Journal of Advanced Research and Reports*, [Online] Available at journalajarr.com.

Sala, L. T., Nwaogazie, I. L., & Ugbebor, J. N. (2024). Assessment of Safety Programmes on Employee Productivity in the Oil and Gas Industry in the Niger Delta Area, Nigeria. *Current Journal of Applied Science and Technology*, [Online] Available at journalcjast.com.

Saleem, F., Malik, M. I., & Malik, M. K. (2021). Toxic Leadership and safety performance: Does Organizational Commitment act as Stress Moderator? Cogent Business & Management, 8(1), 1960246. Available: https://doi.org/10.1080/ 23311975.2021.1960246.

Tzenios, N. (2019). The Impact of Health Literacy on Employee Productivity: An Empirical Investigation. *Article of Public Health and Medical Research, 21-33* Charisma University, Grace Bay, Turks and Caicos Islands.

Zafir, K. M. M., Md S. S., & Ariff, A. M. (2022). Ergonomics Workstation Environment Toward Organisational Competitiveness *International Journal of Public Health Science* (IJPHS) 11(1), 157~169 ISSN: 2252 8806. DOI: 10.11591/ijphs.v11i1.20680

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/128219