Comparative Study of Safety Awareness and Compliance Between Small and Medium Scale Enterprises in Akwa-Ibom State, Nigeria

ABSTRACT

The aim of this study is to conduct a comparative analysis of safety awareness and compliance between small and medium-scale enterprises (SMEs) in Akwa Ibom, Nigeria. The study utilized a structured questionnaire to collect data from 179 respondents, including workers from both small and medium-scale manufacturing companies. The mean scores were computed for the various safety awareness constructs to have the general safety level awareness for both small and medium-scale companies. Z-test was utilized to establish a significant difference in the safety awareness level between small and medium-scale workers. Principal Component Analysis was used to unravel structures or patterns in the safety awareness level among the workers. The findings revealed that medium-scale company workers generally exhibited significantly higher levels of safety awareness compared to their counterparts in small-scale companies. The principal component analysis (PCA) result highlighted the distinction between management-level and individual-level safety awareness factors, indicating the need for tailored interventions for small and medium-scale companies.

Keywords:Occupational Safety and Health (OSH), Safety Awareness, Safety Compliance, Small and Medium-Scale Enterprises (SMEs), Comparative Study.

1. INTRODUCTION

Small and medium-scale enterprises (SMEs) are the backbone of Nigeria's economy, contributing significantly to job creation, economic growth, and industrial development. However, despite their vital role, SMEs often grapple with challenges related to occupational safety and health (OSH) awareness and compliance. Occupational safety and health are a critical issue that impacts worker well-being, productivity and overall business performance. The World Health Organization, WHO [1] emphasizes that a safe and healthy working environment is a fundamental human right and a prerequisite for sustainable development. Unfortunately, many SMEs in Nigeria struggle with inadequate safety awareness, lack of compliance with safety protocols, and a high incidence of work-related accidents and hazards ~~(~~[2]~~,~~[3]~~)~~.According to theLindholm et al.[4], Nigeria has approximately 41.5 million SMEs, contributing nearly half of the total GDP and employing over 84% of the nation's workforce

[5]. However, this numerical prominence is overshadowed by the escalating challenge of work-related accidents and hazards faced by these enterprises [6].

The rate of work-related accidents in SMEs is usually associated with the size of the company. McVittie et al.[7] stated that as the company size increases injuryfrequencies tend to decrease. Jeong[8] reported that there were more fatal and non-fatal injury rates in smaller construction companies than in larger ones. Work-related injuries that occur especially in small-scale companies can improve safety awareness of the workers. However, the level of safety awareness in SMEs has a relationship with the company size. McVittie et al. [7]suggested that the awareness of occupational health and safety among workers tends to increase as the company's size increases.Most researchershave attributed awareness of safety issues to resource constraints. Walters[9] stated that SMEs have fewer resources, and the available resources are allocated for the operation of the business thereby overlooking the management of safety issues. This study looksat the safety awareness level in small and medium-scale companies operating in Akwa Ibom State and compares the differences in the level of awareness.

2. METHODS

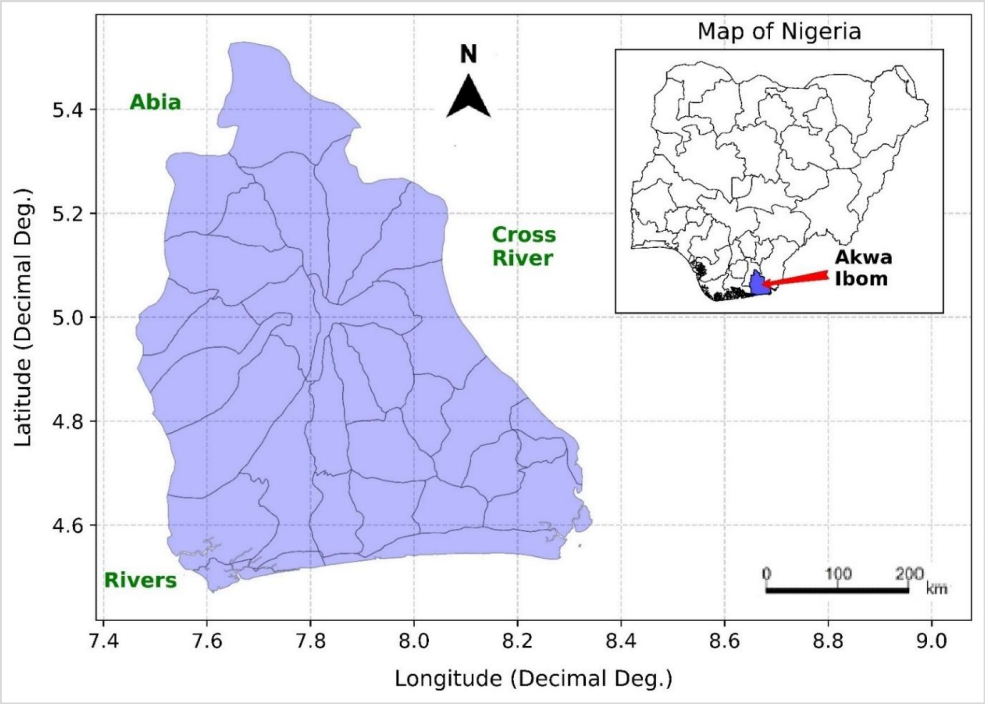
2.1 Participants

The participants in this comparative study were workers from small and medium-scale enterprises (SMEs) engaged in manufacturing activities in Nigeria. The study targeted various SMEs, including bakeries, sachet and bottled water companies, carpentry workshops, toilet roll producers, soap manufacturers, filling stations, auto mechanic workshops, tailoring workshops, welding workshops, and small processing units. Both local and foreign-owned SMEs were included to capture a comprehensive perspective on occupational health and safety practices. The selection criteria for participating enterprises were based on staff strength, with a preference for companies employing more than 10 workers. This criterion

ensured that the selected SMEs had a substantial workforce and established operational procedures, allowing for a meaningful assessment of safety awareness and compliance.

The study participants encompassed various roles within the SMEs, including human resource personnel, line/production supervisors, and frontline workers. By involving employees from different levels and functions, the research aimed to gather diverse perspectives and experiences related to occupational safety and health practices within SMEs. The study employed a combination of purposive non-probability sampling and cluster sampling techniques. Purposive sampling was used to select SME companies (see Figure 1), that aligned with the research objectives and criteria, leveraging the researcher's judgment and expertise in the field. This approach ensured that the study focused on SMEs with relevant manufacturing activities and potential occupational health and safety concerns. To ensure a comprehensive examination, the study targeted both local and foreign firms engaged in manufacturing activities. This inclusive approach allowed for the exploration of potential differences in safety awareness and compliance practices between locally owned and foreign-owned SMEs operating in Nigeria~~([10]; [11]&[~~12]).

The data collection process involved distributing questionnaires through the companies' hierarchies or secretariats, using sealed and re-sealable envelopes. This method ensured confidentiality and provided companies with the option to opt out of the study if desired. Feedback mechanisms were established to address any incomplete or incorrect questionnaire submissions, enhancing the reliability and validity of the collected data. Notably, safety personnel were excluded from the respondent pool to mitigate potential biases and obtain a more objective understanding of safety practices directly from the workers within the SMEs.



Fig~~ure~~ 1.: Map of the study Area

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2.2 Instrument

This study utilized a structured questionnaire, the Occupational Safety and Compliance of SMEs Questionnaire (OSCSMEQ), as a primary instrument for data collection. The questionnaire employed a standardized and formal approach, incorporating a 5-point Likert scale. Respondents were required to express their views on safety awareness and incidents within the workplace, rating items on a scale from 1 to 5 (1 = strongly disagree, 5 = strongly agree). Each cluster within the questionnaire allowed for a minimum possible score of 10 and a maximum possible score of 50. The OSCSMEQ comprised seven sections, each addressing specific aspects related to occupational safety within SMEs:

Section A (Demographics of the Respondents): Capturing basic demographic information of the participants.

Section B (Awareness of Job Safety): Focused on general knowledge of safety measures on the job, consciousness of workplace activities, awareness of risk factors, and measures to avert dangers.

Section C (Awareness of Coworkers' Safety): Addressed knowledge of safety rules, concern for coworkers' safety, and promotion of a safe work environment for social well-being.

Section D (Awareness of Supervisor Safety): Explored activities and behaviours displayed by supervisors that reflected safety awareness, such as praising safe work behaviours and rewarding safety practices.

Section E (Awareness of Management Safety Practices): Examined practices like providing safety training programs, supplying safe equipment, maintaining clean work areas, and promptly investigating safety problems.

Section F (Satisfaction with Safety Programs): Explored employees' feelings of happiness or fulfilment with safety practices and procedures within their work environment.

Section G (Compliance with Safety Behaviours): Assessed adherence to safety rules and regulations, encompassing wearing safety equipment, following safety procedures, and reporting safety issues to supervisors.

2.3 Data Aanalysis and Pprocedures

The study employed descriptive statistics using XLSTAT for assessing occupational safety awareness levels. Pearson correlation analysis in IBM SPSS Statistics explored relationships between safety components. Regression analysis, also in IBM SPSS Statistics, delved into the predictive capacity of safety awareness on compliance. This multifaceted approach ensured a comprehensive understanding of occupational safety within SMEs.

3. RESULTS

3.1 Demographic

A total of 179 respondents participated in the survey. The demographic distribution from the questionnaire showed that 97 respondents who took part in the survey worked forsmall-scale companies while 82 respondents worked for medium-scale companies. Majority of the respondents who took part in the survey in both the small and medium-scale companies were male. For the small-scale company,74 respondents were male while for the medium-scale company, 58 respondents were females. For the age distribution, both the scale and medium-scalecompanies had a young workforce. The age distribution showed that 45 respondents in the small-scale companies were below the age of 30 while for the medium-scale companies, 35 respondents were below the age of 30. Most of the respondents in the small and medium-scale companies just had 0 to 5 years of working experience.

3.2 Level of Occupational Safety Awareness in Akwa Ibom

The general perception of safety awareness in both the small and medium-scale companies was ascertainedwith the mean response of the respondents and the result is presented in Table 1. Each of the constructedmeasures showed good reliability as the Cronbach alpha ranged from 0.711 to 0.882. The result from Table 1 revealed that more of the respondents in the medium-scale companies were aware of the various forms of safety associated with their jobs than the respondents in the small-scale companies. Although the general awareness of job safety for both small and medium scale workers was still relatively low. The mean scores of co-worker awareness for both small and medium-scale company workers were 1.69 and 1.76 respectively. The result showed that medium-scale company workers had a better understanding of co-worker safety awareness than small-scale company workers. Medium-scaleworkers showed that they had a better understanding of concern for co-worker safety at the workplace. The mean scores of supervisor safety awareness for small and medium-scale

companies were 1.95 and 1.97 respectively. The result showed that there was not so much difference in the awareness level between small and medium-scalecompany workers for that construct. The result indicated that both small and medium-scalecompany workers viewed that their supervisors displayed similar behaviour when it came to safety. The general view of workers in SMEs to management commitment, to safety was generally low. The mean score for management commitment to safety for small and medium companies was 1.92 and 1.94 respectively, which indicated slightly more disagreement in management commitment to safety among the small-scale company workers. For satisfaction with the safety program, both the small and medium-scale workers had similar views. Most workers in SMEs were generally not satisfied with the safety program at their companies. The mean scores for compliance to safety behaviour between the small and medium-scale company workers were 1.57 and 1.81 respectively. The result indicated that medium-scale workers had better compliance with safety behaviour such as wearing Personal Protective Equipment than small-scale company workers. But it should be noted that even the medium scale company workers had better compliance behaviour; although, the compliance behaviour of medium scale workers was still generally poor.

Table 1. Descriptive statistic of level of Occupational Safety Awareness in Akwa Ibom

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Health and Safety Awareness Construct	Statistic	Small Scale Companies	Medium Scale Companies
Job Safety Awareness (JSA)	mean	1.37	1.69
	std	0.29	0.19
Coworkers Safety Awareness (CWSA)	mean	1.69	1.76
	std	0.29	0.12
Supervisor Safety Awareness (SSA)	mean	1.95	1.97
	std	0.10	0.12
Management Safety Awareness (MSA)	mean	1.92	1.94
	std	0.15	0.20
Satisfaction with Safety Program (SSP)	mean	1.95	1.96
	std	0.10	0.17
Compliance with Safety Behaviour (CSB)	mean	1.57	1.81
	std	0.11	0.18

Likert rating: 1=Strongly Disagree, 2= Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

3.3 Relationship between Safety Awareness Constructs for Ssmall and MmediumSscale Ceompany

The relationship between the safety-awareness constructs for small and medium-scale companies is shown in Figure 3. The heat map in Figure 2 clearly shows the relationship between the safety awareness construct for small and medium-scale companies is different.

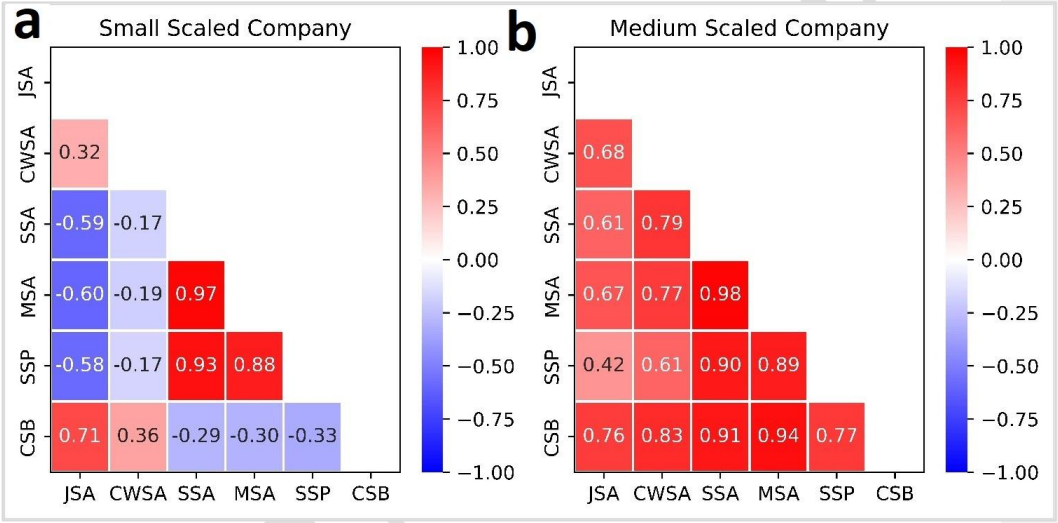

Fig.ure2.:Heat mapshowing the relationship in Occupational Safety Awareness Constructs for small and medium-sized companies.

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3.4 Principal Component Analysis

The suitability of the dataset for Principal Component Analysis (PCA) was assessed using Bartlett's sphericity test. The results presented in Table 1 indicated that the chi-square observed value (1158.815) compared to the critical value (24.996) was higher, suggesting that the dataset is suitable for PCA. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was found to be 0.700, further confirming the appropriateness of the dataset for PCA. The result from the PCA showed that two principal components explained most of the variation in the original dataset as presented in Table 3. The result from Table 3 showed that the first two principal components explained 84.18% of the

variations in the original dataset. The first factor (F1) explained 52.531% of the variance before Varimax rotation and 49.313% after rotation. The second factor (F2) accounted for 31.647% of the variance before rotation and 34.865% after rotation. The selection of the principal components was based on Eigenvalues and the proportion of variance retained by each component. Principal components with eigenvalues greater than 1 were retained. Three of the safety awareness factors loaded strongly on each of the principal components. For principal component 1, it can be observed that management safety awareness, supervisor safety awareness, and satisfaction with the safety program are related to the management side of safety awareness and can only be improved by management as shown in Figure 3. The second principal components, job safety awareness, coworkersafety awareness, and compliance with safety behaviour are all related to awareness of safety on an individual level. The level of safety for the constructs that are loaded on second principal components can be improved by the workers. The relationshipbetween small scale and medium-scale companies and the safety awareness constructs can be visualized on the biplot presented in Figure 3. It can be observed that the medium-scale companies were closer to the principal component 2, indicating that their workers had a higher level of awareness about job safety, and coworkers' safety and had higher compliance with safety behaviour than small-scale workers. There was no clear distinction as to whether small or medium-scale companies were closer to principal component 1, thoughmedium-scale companies were slightly closer to PC1.

Z-test of significancewas used to establish if the difference in the level of awareness in small and medium-scale companies were significantly different and the result is presented in Table 4. The result showed that there was a significant difference in the level of safety awareness regarding job safety, coworker safety and worker compliance with safety behaviour between small and medium-scale workers. The z-test provided sufficient evidence to state that medium-scale workers had significantly higher levels of awareness than small-scale workers on safety on an individual safety awareness level. For the level of awareness on management commitment and supervisor safety awareness between small and medium-scale workers were similar, as the z-test did not provide sufficient evidence to state that the awareness level differs.

Table 2. Bartlett's sphericity and KMO test

Chi-square (Observed value)	1158.815
Chi-square (Critical value)	24.996
DF	15
p-value	< 0.0001
alpha	0.05
KMO	0.700

Table 3. Eigen values and Proportion of Eigenvalue retained

Principal Components	Eigenvalue	Before Varimax Rotation		After Varimax Rotation	
		Variability (%)	Cumulative %	Variability (%)	Cumulative %
F1	3.152	52.531	52.531	49.313	49.313
F2	1.899	31.647	84.178	34.865	84.178

Table 4. Z-test showing significant difference in safety awareness in small and medium scaled companies

Safety Awareness Construct	P-value from z-test
Job Safety Awareness	**< 0.0001**
Coworkers Safety Awareness	**0.014**
Supervisor Safety Awareness	0.225
Management Safety Awareness	0.391
Satisfaction with Safety Program	0.737
Compliance with Safety Behaviour	**< 0.0001**

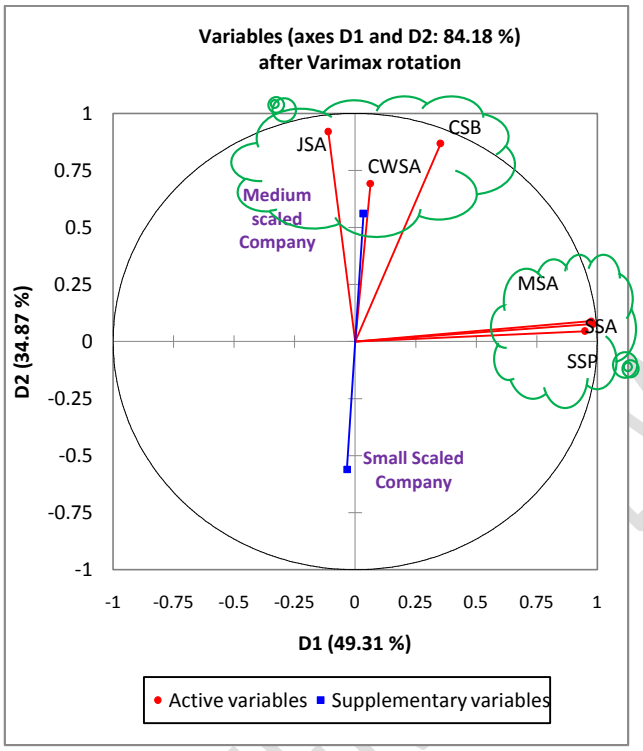

**Fig.~~ure~~3.~~:~~Biplot showing the relationship between the Occupational Safety Awareness construct and small and medium-sized companies.~~-~~

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4. DISCUSSION

4.1 Relationship between Safety Awareness Constructs for Ssmall and Mmedium Sscale Ccompany

For medium-scale companies, the relationship as shown in the heat map in Figure 2b indicated that the safety awareness constructs had a positive relationship with each other. The heat map for medium-scale companies showed that there was a positive relationship between respondents' job awareness level and their compliance with safety behaviour. Workers in medium-scale companies who had higher levels of job safety awareness also had higher levels of compliance with safety behaviour. The relationship between other safety awareness constructs and compliance with safety behaviour was also positive which indicates that the awareness level increases for other safety constructs so does the compliance with safety behaviour. For small-scale companies, the relationship between the level of safety awareness with compliance with safety behaviour showed a mixed relationship. The relationship between job safety awareness and compliance with safety behaviour was positive like what was observed for medium-scale companies. Also, a positive relationship was observed between coworker safety awareness and compliance with safety behaviour. The relationship indicates the higher workers have concerns about coworker's safety the higher the compliance

with safety behaviours they exhibit and vice versa. The relationship between supervisor safety awareness and compliance with safety behaviour was negative in small-scale companies. The results indicate that the higher workers' awareness of supervisor safety, the lower their level of compliance with safety behaviour. The relationship was contrary to what was observed in workers in medium-scale companies. Similarly, the relationship between management safety awareness and workers' compliance with safety behaviour was also negative. The result indicates the higher the worker's awareness of management commitment to safety the lower their compliance with safety behaviour

4.2 Safety Awareness Levels Among Workers in Small and Medium-Scale Companies

The findings of the study regarding safety awareness levels among workers in small and medium-scale companies are important for understanding workplace safety dynamics. The study reveals that medium-scale company workers generally exhibit higher levels of safety awareness compared to their counterparts in small-scale companies. This observation aligns with broader trends observed in organizational research, where larger enterprises tend to have more established safety cultures due to greater resources and organizational capacity.Champoux & Brun [13]identified firm size as a key factor influencing OHS practices in SMEs, with smaller businesses facing greater constraints.Kheni et al. [14] on Ghanaian construction SMEs reported that there was an overall low level of OHS awareness and complianceparticularly among smaller firms.Furthermore, the study emphasizes the crucial role of management in shaping safety perceptions and practices within organisations. The findings suggest that workers in both small and medium-scale companies perceive a relatively low level of management commitment to safety, indicating a potential area for improvement in leadership engagement with safety initiatives. Kheni et al. [15] found that OHS management practices like documentation, hazard identification, safety training and use of consultants were lacking in many of the SMEs. Most SMEs are solely focused on surviving and management pays little attention to adequate safety practices.

4.3 Principal Component Analysis onFfactors Iinfluencing Ssafety Aawareness

The results of the Principal Component Analysis (PCA) provide valuable insights into the underlying factors influencing safety awareness within the sampled companies. By identifying distinct components related to management and individual-level factors, tailored solutions that be directed toward SMEs. Small-scale companies require more individual-level intervention toward safety awareness than medium-scale companies. SMEs require contextspecific OHS support recognizing their resource constraints and work cultures[13, 15,] [16]~~& [13]~~.

The findings of the study have important implications for intervention and policy development aimed at enhancing workplace safety in small and medium-scale companies. Strategies aimed at improving management commitment, supervisory practices, and worker engagement with safety protocols can contribute to fostering a culture of safety and well-being in the workplace.

5. CONCLUSION

The findings of this comparative study on safety awareness and compliance in small and medium-scale enterprises (SMEs) in Akwa Ibom, Nigeria, provide valuable insights for policymakers, industry stakeholders and workplace safety practitioners. The study highlights the need for targeted interventions to address the safety challenges in smaller enterprises, as medium-scale company workers exhibited higher levels of safety awareness compared to their counterparts in small-scale companies.

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