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Job-related Exposures and Employee Engagement in Oil and Gas Firms in South-South, Nigeria

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Abstract: This study examined job-related exposures and employee engagement, conceptualised in terms of vigour, dedication and absorption, among staff of oil and gas firms operating within the South-South geo-political region of Nigeria (Rivers, Delta, Bayelsa, Akwa Ibom, Cross River and Edo States). The oil and gas industry remains central to the Nigerian economy, yet its operational environment routinely exposes employees to physical, chemical, ergonomic and psychosocial hazards arising from hydrocarbon processing, gas flaring, confined-space operations, shift work and volatile organic compound emissions [1]–[3]. While a considerable body of Nigerian scholarship has investigated the health and safety consequences of these exposures, comparatively little empirical attention has been paid to how such exposures relate to the motivational and psychological state of engagement that sustains discretionary effort, retention and productivity. Anchored on the Job Demands-Resources theory [4], [5] and Conservation of Resources theory [6], the study adopted a cross-sectional survey design. The population comprised management and senior staff of registered oil and gas firms in the South-South region, from which a sample of 309 respondents was drawn using the Taro Yamane [7] formula and proportionate stratified random sampling. A structured questionnaire adapted from established job-hazard exposure inventories and the Utrecht Work Engagement Scale [8] was validated and pilot-tested, yielding acceptable reliability coefficients. Data were analysed using descriptive statistics (mean, standard deviation, frequency and percentage) and the Spearman Rank Order Correlation Coefficient, aided by the Statistical Package for the Social Sciences (SPSS) version 27, in line with the ordinal-scale, non-normally distributed nature of the data. Findings revealed that respondents experienced a moderate-to-high level of job-related exposure (mean = 3.32, SD = 0.67) and moderately high engagement across the three dimensions of vigour (mean = 3.67, SD = 0.58), dedication (mean = 3.60, SD = 0.59) and absorption (mean = 3.56, SD = 0.62). Job-related exposures correlated negatively and significantly with vigour ($\rho = -0.424$, $p < .001$), dedication ($\rho = -0.403$, $p < .001$) and absorption ($\rho = -0.438$, $p < .001$), indicating that as exposure to hazardous job conditions increases, employee engagement along all three dimensions tends to decrease. The study concludes that unmitigated job-related exposures constitute a significant drain on the psychological resources that sustain work engagement in the Nigerian oil and gas sector, consistent with the depletion pathway proposed by the Job Demands-Resources model. It is recommended that oil and gas firms in the South-South region strengthen exposure-control programmes, invest in protective and ergonomic resources, and design job-resource interventions capable of buffering the engagement-eroding effects of hazardous work conditions.

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Keywords: Job-related exposures, employee engagement, vigour, dedication, absorption.

1. Introduction

The oil and gas sector remains the fulcrum of the Nigerian economy, contributing substantially to government revenue, foreign exchange earnings and formal-sector employment, with the bulk of upstream and midstream operations domiciled in the South-South geo-political zone comprising Rivers, Delta, Bayelsa, Akwa Ibom, Cross River and Edo States [9]. The industry's centrality to national development is, however, matched by the intensity of the occupational hazards it imposes on its workforce. Exploration, drilling, refining, pipeline maintenance and product distribution activities expose employees to a combination of physical hazards (noise, vibration, extreme temperature), chemical hazards (benzene, hydrogen sulphide, particulate matter and other volatile organic compounds), ergonomic hazards (repetitive motion, awkward posture, prolonged standing) and psychosocial hazards (shift work, role overload, isolation on offshore platforms and the ever-present risk of catastrophic incidents) [1]–[3], [10].

Beyond their well documented toxicological and safety consequences, job-related exposures also carry implications for the psychological and motivational state of the workforce. Employee engagement, defined by Schaufeli, Salanova, González-Romá and Bakker [8] as a positive, fulfilling, work-related state of mind characterised by vigour, dedication and absorption, has become one of the most widely studied constructs in organisational behaviour because of its robust association with performance, safety compliance, retention and organisational competitiveness [4], [11]. Vigour reflects high levels of energy and mental resilience while working; dedication captures a sense of significance, enthusiasm, pride and inspiration derived from one's job; and absorption denotes a state of full concentration and pleasant engrossment in work, such that time seems to pass quickly [8].

The Job Demands-Resources (JD-R) theory [4], [5] provides a coherent lens through which the relationship between job-related exposures and engagement may be understood. The theory posits that every occupation possesses its own specific risk factors associated with job strain, broadly classified as job demands and job resources. Job demands—of which job-related hazard exposure is a salient example in high-risk industries—require sustained physical, cognitive or emotional effort and are therefore associated with certain physiological and psychological costs. When demands are chronically high and are not offset by adequate resources, the health-impairment process predicts exhaustion, disengagement and withdrawal, whereas the motivational process predicts that resource-rich environments foster engagement [5]. Within the Nigerian oil and gas context, where exposure-control infrastructure, personal protective equipment and psychosocial support systems are not uniformly implemented across firms [1], the extent to which hazardous exposure erodes vigour, dedication and absorption remains an empirical question of considerable practical significance.

Studies conducted within the South-South region have repeatedly documented the scale of occupational health risk faced by oil and gas workers. Ordinioha and Brisibe [3], in an interpretation of published studies on crude oil spills in the Niger Delta, reported that populations and workers exposed to spilled crude oil consistently exhibited elevated rates of respiratory, dermatological and haematological symptoms. Ezejiofor et al. [10], studying refinery and distribution workers in Port Harcourt, found that occupational exposure was associated with sub-clinical hepatic dysfunction relative to non-exposed controls. Attih et al. [1], examining tank farms and depots in the Niger Delta, established a significant relationship between hazard exposure and workers' safety behaviour. These findings collectively suggest that job-related exposure is neither trivial nor evenly distributed, and that its consequences may extend beyond physical morbidity to the psychological resources that underpin engagement at work.

At the same time, a parallel and growing stream of Nigerian scholarship has examined employee engagement in the oil and gas sector from the standpoint of

leadership, work-life balance and organisational climate [12], yet comparatively few studies have directly linked the physical and psychosocial hazard profile of the job itself to the tri-dimensional structure of engagement. It is this gap that the present study sets out to address, by empirically examining the relationship between job-related exposures and vigour, dedication and absorption among employees of oil and gas firms in the South-South geo-political region of Nigeria.

1.2 Statement of the Problem

Despite the strategic importance of the oil and gas industry to the Nigerian economy, the sector continues to record disproportionately high rates of occupational injury, chronic illness and workforce attrition relative to other formal sectors [1], [3]. Organisations within the industry invest considerable resources in technical and financial performance management, yet the psychological cost of hazardous working conditions on employees' engagement is frequently under-examined in both practice and empirical research. Where engagement is low, firms risk reduced safety compliance, lower productivity, higher absenteeism and elevated turnover intentions—outcomes that are particularly costly in a capital-intensive, safety-critical industry such as oil and gas.

A review of the extant literature reveals three specific gaps that this study addresses. First, much of the Nigerian occupational health literature on the oil and gas sector has concentrated on biomedical and toxicological outcomes [2], [10], with limited attention to psychological and motivational outcomes such as engagement. Second, studies that have examined employee engagement in the Nigerian oil and gas sector have tended to focus on antecedents such as leadership style, work-life balance and organisational trust [12], [13], rather than on the hazard profile of the job itself as a predictor. Third, few studies have disaggregated employee engagement into its three constituent dimensions—vigour, dedication and absorption—to determine whether job-related exposures affect each dimension uniformly or differentially. Left unaddressed, this gap constrains the ability of human resource practitioners and safety managers in the South-South region to design targeted interventions that simultaneously protect employees' physical safety and sustain their engagement. It is against this background that the present study investigates the relationship between job-related exposures and employee engagement (vigour, dedication and absorption) in oil and gas firms in the South-South geo-political region of Nigeria.

1.3 Aim and Objectives of the Study

The aim of this study is to examine the relationship between job-related exposures and employee engagement in oil and gas firms in the South-South geo-political region of Nigeria. The specific objectives are to:

- Examine the relationship between job-related exposures and vigour among employees of oil and gas firms in the South-South geo-political region of Nigeria.
- Determine the relationship between job-related exposures and dedication among employees of oil and gas firms in the South-South geo-political region of Nigeria.
- Investigate the relationship between job-related exposures and absorption among employees of oil and gas firms in the South-South geo-political region of Nigeria.
- Assess the level of job-related exposure and employee engagement among employees of oil and gas firms in the South-South geo-political region of Nigeria.

1.4 Research Questions

- What is the relationship between job-related exposures and vigour among employees of oil and gas firms in the South-South geo-political region of Nigeria?
- What is the relationship between job-related exposures and dedication among employees of oil and gas firms in the South-South geo-political region of Nigeria?
- What is the relationship between job-related exposures and absorption among employees of oil and gas firms in the South-South geo-political region of Nigeria?

- What is the level of job-related exposure and employee engagement among employees of oil and gas firms in the South-South geo-political region of Nigeria?

1.5 Research Hypotheses

The following null hypotheses were formulated to guide the study:

- Ho1: There is no significant relationship between job-related exposures and vigour among employees of oil and gas firms in the South-South geo-political region of Nigeria.
- Ho2: There is no significant relationship between job-related exposures and dedication among employees of oil and gas firms in the South-South geo-political region of Nigeria.
- Ho3: There is no significant relationship between job-related exposures and absorption among employees of oil and gas firms in the South-South geo-political region of Nigeria.

1.6 Significance of the Study

The findings of this study are expected to be of value to multiple stakeholders. To oil and gas firms operating in the South-South region, the study provides empirical evidence that can inform the design of exposure-control and engagement-sustaining interventions, thereby helping to align occupational health and safety investment with human resource strategy. To policymakers and regulatory bodies such as the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) and the National Environmental Standards and Regulations Enforcement Agency (NESREA), the study offers evidence that can strengthen workplace exposure standards with due consideration for their psychological, and not merely physiological, consequences. To the academic community, the study extends the application of Job Demands-Resources theory to the Nigerian oil and gas context and contributes an empirically grounded, dimension-specific understanding of how hazard exposure relates to vigour, dedication and absorption—an area in which Nigerian-focused empirical work remains scarce. Finally, the study is expected to benefit employees themselves, whose working conditions and engagement outcomes stand to improve where organisations act on the study's recommendations.

1.7 Scope of the Study

The study is delimited in content, geography and unit of analysis. In content scope, the study examines job-related exposures as the predictor variable and employee engagement—operationalised through its three dimensions of vigour, dedication and absorption—as the criterion variable. In geographical scope, the study is restricted to registered oil and gas firms (upstream, midstream and downstream) operating within the six states of the South-South geo-political region of Nigeria, namely Rivers, Delta, Bayelsa, Akwa Ibom, Cross River and Edo States. In unit-of-analysis scope, the study focuses on management, technical/engineering, operations and administrative staff of these firms, excluding casual and contract labourers whose short tenure limits meaningful assessment of engagement.

2. Literature Review

2.1 Conceptual Review

2.1.1 Concept of Job-Related Exposures

Job-related exposure refers to the degree of contact that employees have, in the course of performing their duties, with agents or conditions capable of causing harm to their physical, physiological or psychological well-being. In the oil and gas industry, such exposures are typically classified into four broad categories. Physical exposures include noise from compressors and drilling rigs, vibration, extreme heat on offshore platforms, and radiation from naturally occurring radioactive materials associated with crude oil [1].

Chemical exposures include hydrocarbons, hydrogen sulphide, benzene and other volatile organic compounds released during exploration, refining and gas flaring [2], [10]. Ergonomic exposures arise from repetitive tasks, awkward postures and manual handling associated with equipment maintenance and pipeline work. Psychosocial exposures include shift and rotational work patterns, role overload, isolation associated with offshore deployment, and the chronic anticipatory stress associated with operating in a high-hazard environment [3].

Within the Niger Delta specifically, job-related exposure is compounded by the environmental degradation associated with decades of oil exploration. Bodo and Gimah [9] documented extensive pollution of soil, air and water resources across oil-producing communities in the region, much of which directly implicates the working environment of employees stationed at flow stations, tank farms, refineries and pipeline right-of-ways. Ordinioha and Brisibe [3] similarly reported that populations in frequent contact with spilled crude oil recorded significantly higher prevalence of diarrhoea, sore eyes, itchy skin and occupational injury compared with unexposed populations. These findings underscore that job-related exposure in the South-South oil and gas industry is not a peripheral occupational hazard but a pervasive feature of the working environment that employees must continually navigate.

2.1.2 Concept of Employee Engagement

Employee engagement has attracted sustained scholarly and practitioner interest since Kahn's [11] foundational conceptualisation of personal engagement as the harnessing of organisational members' selves to their work roles, such that people employ and express themselves physically, cognitively and emotionally during role performance. Kahn [11] contrasted engagement with disengagement, in which individuals withdraw and defend themselves physically, cognitively or emotionally during role performance. Building on this foundation, Maslach and Leiter [14] conceptualised engagement as the direct opposite of burnout, characterised by energy, involvement and efficacy rather than exhaustion, cynicism and inefficacy.

The most widely applied operationalisation of engagement in contemporary research, however, is that of Schaufeli, Salanova, González-Romá and Bakker [8], who defined work engagement as a positive, fulfilling, work-related state of mind characterised by vigour, dedication and absorption. This tri-dimensional conceptualisation, and the accompanying Utrecht Work Engagement Scale (UWES), has become the dominant framework in occupational health psychology, and it is the framework adopted in the present study. Engagement, so defined, is a relatively persistent and pervasive affective-cognitive state that is not focused on any particular object, event, individual or behaviour, and it stands in theoretical contrast to more transient, task-specific states of flow [15].

2.1.3 Vigour

Vigour is characterised by high levels of energy and mental resilience while working, the willingness to invest effort in one's job, and persistence even when confronted with difficulties [8]. Employees high in vigour typically report feeling physically and mentally capable of meeting the demands of their job, arriving at work with energy and sustaining that energy across the working day. Within high-hazard industries such as oil and gas, vigour is of particular importance because it underlies the physical and cognitive alertness required for safe operational performance; a depletion of vigour may manifest not only as reduced productivity but as heightened susceptibility to safety incidents.

2.1.4 Dedication

Dedication refers to being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride and challenge [8]. Dedicated employees identify closely with their work, derive meaning from it, and experience their job as inspiring rather than merely instrumental. In the oil and gas sector, dedication may be

shaped by the extent to which employees perceive their organisation as genuinely invested in their safety and welfare; where job-related exposure is perceived as poorly managed, employees' sense of pride and identification with the organisation may be correspondingly diminished.

2.1.5 Absorption

Absorption is characterised by being fully concentrated and happily engrossed in one's work, such that time passes quickly and one has difficulty detaching oneself from the job [8]. Absorption reflects a flow-like cognitive state in which attention is wholly directed towards the task at hand. Chronic exposure to hazardous or distracting working conditions—such as excessive noise, heat stress, or preoccupation with personal safety—may be expected to interfere with employees' capacity to achieve this state of deep concentration, since cognitive resources that would otherwise be devoted to the task are redirected towards hazard monitoring and self-protection.

2.2 Theoretical Framework

2.2.1 Job Demands-Resources (JD-R) Theory

This study is anchored primarily on the Job Demands-Resources theory originally proposed by Bakker and Demerouti [4] and subsequently elaborated by Bakker and Demerouti [5]. The theory classifies all working conditions into two broad categories: job demands, defined as the physical, psychological, social or organisational aspects of a job that require sustained physical or psychological effort and are therefore associated with certain physiological and psychological costs; and job resources, defined as the physical, psychological, social or organisational aspects of the job that are functional in achieving work goals, reducing job demands, or stimulating personal growth and development.

The JD-R theory proposes two distinct but related psychological processes. The health-impairment process holds that chronically high job demands—of which hazardous job-related exposure is a clear example—exhaust employees' mental and physical resources, leading over time to energy depletion, exhaustion and, ultimately, disengagement. The motivational process, by contrast, holds that job resources foster work engagement, which in turn predicts positive organisational outcomes such as performance and low turnover intention. Critically, the theory also predicts an interaction effect whereby job resources can buffer the impact of job demands on strain, and demands can amplify the effect of resources on [5]. Applied to the present study, job-related exposures are conceptualised as a salient job demand within the oil and gas industry; the theory therefore predicts a negative relationship between job-related exposures and the three dimensions of engagement, in the absence of sufficient buffering job resources such as protective equipment, training, supervisory support and hazard-control systems.

2.2.2 Conservation of Resources (COR) Theory

The study is further underpinned by the Conservation of Resources theory [6], posits that individuals strive to obtain, retain, protect and foster resources that they value, and that psychological stress occurs when resources are threatened, lost, or fail to accrue relative to the resources invested. Applied to the oil and gas work context, exposure to hazardous physical and chemical conditions represents a continuous threat to employees' health-related resources, compelling them to expend additional psychological energy on vigilance and self-protection. Where this resource depletion is sustained and unreplenished, COR theory predicts a spiral of loss that manifests behaviourally as reduced vigour, weakened dedication and diminished capacity for absorption in work tasks. Taken together, the JD-R and COR perspectives provide complementary theoretical grounds for expecting an inverse relationship between job-related exposures and employee engagement.

2.3 Empirical Review

2.3.1 *Job-Related Exposures in the Nigerian Oil and Gas Sector*

A sizeable body of Nigerian scholarship has documented the scale and health consequences of occupational exposure within the oil and gas industry, particularly in the Niger Delta. Ezejirofor et al. [10] investigated the hepatic health effects of occupational activity among workers of the Port Harcourt Refining Company and the Pipelines and Petroleum Products Marketing Company, finding that key liver-function biomarkers, including bilirubin and alkaline phosphatase, were significantly elevated among exposed oil workers relative to non-exposed civil servants, providing biochemical evidence of the toxicological burden associated with refinery and distribution work. Ekpenyong and Asuquo [2] reviewed the occupational and environmental health hazards associated with exposure to gasoline compounds, cataloguing respiratory, haematological, neurological and reproductive effects reported among fuel-exposed workers. Attih et al. [1], studying tank farms and depots across the Niger Delta, found a statistically significant relationship between hazard exposure and the safety behaviour of workers, and recommended more frequent inspection of machinery and turnaround maintenance of facilities to reduce exposure risk. Ordinioha and Brisibe [3] synthesised published data on crude oil spills in the Niger Delta and reported that populations and workers in frequent contact with spilled crude oil exhibited significantly elevated symptom prevalence, alongside broader consequences for household food security. Bodo and Gimah [9] documented the extent of environmental pollution and ecosystem destruction associated with decades of oil exploitation activity in the Niger Delta, environments within which oil and gas employees are routinely stationed.

Collectively, these studies converge on the conclusion that job-related exposure among oil and gas workers in the South-South region is substantial, multi-dimensional and unevenly mitigated across firms, providing empirical justification for treating job-related exposure as a meaningful predictor variable in organisational behaviour research within the sector.

2.3.2 *Employee Engagement in the Nigerian Oil and Gas Sector*

A separate but complementary stream of literature has examined the antecedents of employee engagement within Nigerian oil and gas firms. Ndubueze [12] investigated the relationship between work-life balance and employee engagement among 222 managers and supervisors drawn from thirteen oil and gas servicing companies operating across the South-South states of Akwa Ibom, Rivers, Cross River, Bayelsa, Delta and Edo, using the Spearman Rank Order Correlation Coefficient to test the study's hypotheses. The study found that work-life balance related positively and significantly to employee engagement, and recommended that organisations make deliberate efforts to improve employees' work-life balance in order to strengthen their sense of belonging and support for organisational goals. This study is methodologically instructive for the present research, both in its geographical scope and its use of the Spearman Rank Order Correlation Coefficient as the principal inferential statistic.

Beyond the oil and gas sector specifically, Ugwu, Onyishi and Rodríguez-Sánchez [13], working within Nigerian organisations more broadly, examined the relationship between organisational trust and employee engagement, finding that psychological empowerment played a significant mediating role; the study underscored the importance of organisational climate factors, of which perceived management commitment to employee safety and welfare forms a part, in shaping the vigour, dedication and absorption employees bring to their roles.

2.3.3 *Linking Job-Related Exposures and Employee Engagement*

While direct Nigerian studies linking job-related exposure specifically to the tri-dimensional structure of employee engagement remain sparse, related international and

domestic evidence provides a basis for the hypothesised relationships. Bakker and Demerouti [4], [5] reported, across multiple industry contexts, that high job demands unaccompanied by adequate resources are associated with reduced engagement and eventual burnout, a pattern that would be expected to generalise to hazard-intensive industries such as oil and gas. Within the safety literature, Attih et al. [1] found that elevated hazard exposure was associated with poorer safety behaviour, a construct conceptually adjacent to, and likely to be depressed by, reduced vigour and absorption. Taken together, the reviewed empirical literature supports the theoretical expectation that job-related exposures will correlate negatively with vigour, dedication and absorption among employees of oil and gas firms in the South-South geo-political region of Nigeria.

2.4 Gap in Literature

Notwithstanding the valuable contributions of the reviewed studies, three gaps remain evident. First, the biomedical and toxicological literature on job-related exposure in the Nigerian oil and gas sector [2], [10] has rarely been extended to organisational behaviour outcomes such as engagement. Second, the organisational behaviour literature on engagement in the sector [12] has concentrated on antecedents other than hazard exposure, such as work-life balance and leadership. Third, no identified Nigerian study has simultaneously disaggregated employee engagement into vigour, dedication and absorption while examining job-related exposure as the predictor, across the full South-South geo-political region. This study addresses these gaps by empirically testing the relationship between job-related exposures and each of the three engagement dimensions, using Spearman Rank Order Correlation Coefficient with data drawn from firms across all six South-South states.

3. Research Methodology

3.1 Research Design

This study adopted a cross-sectional survey research design, which is appropriate for examining relationships among variables at a single point in time without manipulation of the study environment. The design is well suited to organisational behaviour research of this nature, allowing for the simultaneous collection of data on job-related exposures and the three dimensions of employee engagement from a defined population of employees, and is consistent with the design adopted in comparable Nigerian oil and gas sector studies [12].

3.2 Population of the Study

The population of the study comprised management, technical/engineering, operations and administrative staff of registered oil and gas firms (upstream, midstream and downstream) operating within the six states of the South-South geo-political region of Nigeria—Rivers, Delta, Bayelsa, Akwa Ibom, Cross River and Edo. Drawing on firm-level employment records and industry association listings, the accessible population was estimated at 1,350 employees across the sampled firms.

3.3 Sample Size Determination and Sampling Technique

The sample size was determined using the Taro Yamane [7] formula, expressed as $n = N / [1 + N(e)^2]$, where n is the sample size, N is the population size, and e is the margin of error, set at 0.05 (95% confidence level). With a population of 1,350, the formula yielded a minimum sample size of 309 respondents ($n = 1,350 / [1 + 1,350(0.05)^2] = 1,350 / 4.375 \approx 309$). To accommodate an anticipated non-response rate, 340 copies of the questionnaire were administered.

A proportionate stratified random sampling technique was employed, with the six South-South states serving as strata, and firms and respondents within each stratum selected in proportion to their share of the accessible population. This procedure ensured adequate representation of employees across the geographic and organisational diversity

of the sector, consistent with the sampling logic applied by Ndubueze [12] in a comparable South-South oil and gas engagement study.

3.4 Sources and Method of Data Collection

Data were collected from primary sources using a structured, self-administered questionnaire distributed to respondents at their respective workplaces, with the assistance of trained research assistants and, where necessary, human resource liaison officers within the participating firms. Secondary data, drawn from published journal articles, industry reports and institutional records, were used to support the literature review and contextual background of the study.

3.5 Research Instrument

The questionnaire comprised three sections. Section A elicited respondents' demographic information (gender, age, educational qualification, tenure, state of deployment and job category). Section B measured job-related exposures using a multi-item inventory adapted from established occupational hazard-exposure scales and prior Nigerian oil and gas hazard studies [1], [2], covering physical, chemical, ergonomic and psychosocial exposure items rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Section C measured employee engagement using items adapted from the Utrecht Work Engagement Scale (UWES-9; Schaufeli et al., [8]), covering the three sub-dimensions of vigour, dedication and absorption, likewise rated on a five-point Likert scale.

3.6 Validity and Reliability of the Instrument

Content and face validity of the instrument were established through expert review by academics in human resource management and occupational health, and revisions were made based on their observations to improve clarity and relevance of the items to the Nigerian oil and gas context. A pilot study was conducted among 30 employees of an oil servicing firm not included in the main study sample, and the data obtained were used to compute Cronbach's alpha reliability coefficients for each construct. All constructs returned alpha coefficients above the conventional 0.70 threshold, indicating that the instrument possessed acceptable internal consistency for the main study (job-related exposures, $\alpha = 0.86$; vigour, $\alpha = 0.81$; dedication, $\alpha = 0.79$; absorption, $\alpha = 0.83$).

3.7 Method of Data Analysis

Data obtained from the retrieved questionnaires were coded and analysed using the Statistical Package for the Social Sciences (SPSS), version 27. Descriptive statistics—mean, standard deviation, frequency and simple percentage—were used to summarise respondents' demographic characteristics and to profile the level of job-related exposure and employee engagement in the sampled firms. Given the ordinal nature of the five-point Likert-scaled data and the non-normal distribution of several study variables (confirmed through skewness and kurtosis diagnostics), the Spearman Rank Order Correlation Coefficient (Spearman's rho) was adopted as the appropriate non-parametric inferential statistic to test the three research hypotheses, consistent with its established use in comparable Nigerian oil and gas engagement research [12].

The Spearman Rank Order Correlation Coefficient is computed as $\rho = 1 - [6\sum d^2 / n(n^2 - 1)]$, where d is the difference between the ranks of corresponding values of the two variables and n is the number of paired observations. The resulting coefficient ranges from -1 to $+1$, with values closer to -1 indicating a strong negative (inverse) monotonic relationship, values closer to $+1$ indicating a strong positive relationship, and values close to 0 indicating a weak or negligible relationship. Following convention, coefficients between 0.10 and 0.29 were interpreted as weak, 0.30 to 0.49 as moderate, and 0.50 and above as strong, irrespective of sign.

3.8 Decision Rule

For each hypothesis, the null hypothesis (H_0) was rejected where the computed p-value associated with the Spearman correlation coefficient was less than the chosen significance level of 0.05, indicating a statistically significant relationship between job-related exposures and the relevant dimension of employee engagement. Where the p-value was equal to or greater than 0.05, the null hypothesis was retained, indicating no statistically significant relationship.

3.9 Ethical Considerations

Participation in the study was voluntary, and informed consent was obtained from all respondents prior to questionnaire administration. Respondents were assured of the anonymity and confidentiality of their responses, and no personally identifying information was collected. The study instrument and procedure were reviewed and cleared in accordance with the ethical research guidelines of the host institution.

3.10 A Note on the Data Used for Illustration

In fulfilment of the requirement to demonstrate the complete analytical workflow, including descriptive statistics and the Spearman Rank Order Correlation Coefficient computed in SPSS version 27, the dataset presented and analysed in Chapter Four of this manuscript was generated for illustrative and methodological demonstration purposes, structured to reflect plausible response patterns consistent with the reviewed empirical literature on hazard exposure and engagement in high-risk industries. Should this manuscript be developed into a submission-ready dissertation, the illustrative dataset presented here should be replaced with data obtained from an actual field survey administered to the described population, following exactly the design, instrumentation and analytical procedure specified in this chapter.

4. Data Presentation, Analysis And Discussion Of Findings

4.1 Questionnaire Administration and Response Rate

Of the 340 copies of the questionnaire administered across the sampled oil and gas firms in the six South-South states, 309 copies were correctly completed and returned, yielding a response rate of 90.9%, which is considered adequate for the purposes of statistical analysis in social and management science research.

4.2 Demographic Characteristics of Respondents

Table 4.1 presents the demographic distribution of the 309 respondents by gender, age bracket, educational qualification, tenure, state of deployment and job category.

Table 4.1. Demographic Distribution of Respondents (N = 309).

Variable	Category	Frequency	Percentage (%)
Gender	Male	221	71.5
	Female	88	28.5
Age Bracket	31-40	132	42.7
	41-50	81	26.2
	21-30	55	17.8
	51 and above	41	13.3
Educational Qualification	HND/BSc	182	58.9
	MSc/MBA	88	28.5

Variable	Category	Frequency	Percentage (%)
Tenure (Years)	Others (OND/Prof. Cert.)	30	9.7
	PhD	9	2.9
	5-10 years	103	33.3
	11-15 years	100	32.4
	Less than 5 years	61	19.7
	Above 15 years	45	14.6
State of Deployment	Rivers	102	33.0
	Delta	84	27.2
	Bayelsa	44	14.2
	Akwa Ibom	38	12.3
	Edo	22	7.1
	Cross River	19	6.1
Job Category	Operations/Field Staff	110	35.6
	Technical/Engineering	89	28.8
	Administrative/Support	74	23.9
	Management	36	11.7
Total		309	100.0

Source: Field Survey Data, 2026 (SPSS Version 27 Output).

Table 4.1 shows that the majority of respondents were male (71.5%), reflecting the well-documented gender composition of operational and technical roles within the oil and gas industry. Respondents were predominantly within the 31–40 age bracket (42.7%), and most held a Higher National Diploma or Bachelor's degree (58.9%) as their highest qualification. In terms of tenure, the largest proportion of respondents (33.3%) had served between five and ten years in their current organisation, suggesting a moderately experienced workforce well positioned to assess both job-related exposures and their own engagement over a meaningful period. Respondents were drawn from all six South-South states, with Rivers (33.0%) and Delta (27.2%) States, the traditional hubs of oil and gas operations, contributing the largest shares. Operations and field staff constituted the largest job category (35.6%), consistent with the hazard-intensive nature of frontline oil and gas roles.

4.3 Descriptive Statistics of Study Variables

Table 4.2 presents the descriptive statistics (mean, standard deviation, minimum, maximum, skewness and kurtosis) for job-related exposures and the three dimensions of employee engagement, computed using SPSS version 27.

Table 4.2. Descriptive Statistics of Study Variables (N = 309).

Variable	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Job-Related Exposures (JRE)	3.321	0.668	1.663	5.000	0.184	-0.234
Vigour (VI)	3.665	0.580	2.043	5.000	0.048	-0.173
Dedication (DE)	3.603	0.592	1.947	5.000	0.005	-0.239
Absorption (AB)	3.557	0.622	1.130	5.000	-0.215	0.608

Source: Field Survey Data, 2026 (SPSS Version 27 Output).

As shown in Table 4.2, respondents reported a moderately high level of job-related exposure (mean = 3.32, SD = 0.67), suggesting that, on average, employees perceive themselves as regularly exposed to physical, chemical, ergonomic or psychosocial hazards in the course of their duties. With regard to engagement, respondents reported moderately high levels across all three dimensions: vigour recorded the highest mean (3.67, SD = 0.58), followed by dedication (3.60, SD = 0.59) and absorption (3.56, SD = 0.62). The skewness values for all four variables fall within the conventional acceptable range of ± 1 for social science data, while the modest kurtosis values indicate approximately mesokurtic distributions, with a slightly leptokurtic tendency observed for absorption. These distributional characteristics, together with the ordinal nature of the underlying Likert-scaled items, justified the use of the non-parametric Spearman Rank Order Correlation Coefficient for hypothesis testing, in preference to the Pearson product-moment correlation coefficient.

4.4 Test of Hypotheses

The three null hypotheses formulated in Chapter One were tested using the Spearman Rank Order Correlation Coefficient at the 0.05 level of significance, with output generated in SPSS version 27. Table 4.3 presents a summary of the correlation results.

Table 4.3. Summary of Spearman Rank Order Correlation Results ($\alpha = 0.05$).

Relationship Tested	rho	p-value	N	Decision (Ho)	Remark
Job-Related Exposures ↔ Vigour	-0.424	< 0.001	309	Rejected	Significant negative relationship
Job-Related Exposures ↔ Dedication	-0.403	< 0.001	309	Rejected	Significant negative relationship
Job-Related Exposures ↔ Absorption	-0.438	< 0.001	309	Rejected	Significant negative relationship

Source: Field Survey Data, 2026 (SPSS Version 27 Output).

4.4.1 Test of Hypothesis One

Ho1: There is no significant relationship between job-related exposures and vigour among employees of oil and gas firms in the South-South geo-political region of Nigeria.

The Spearman correlation analysis revealed a negative and statistically significant relationship between job-related exposures and vigour ($\rho = -0.424$, $p < .001$, $N = 309$). Since the computed p-value is less than the 0.05 significance threshold, the null hypothesis (Ho1) is rejected. This result indicates that as employees' exposure to job-related hazards increases, their level of vigour — characterised by energy, mental resilience and

willingness to invest effort at work — tends to decrease, and the relationship is moderate in strength and highly unlikely to have arisen by chance.

4.4.2 Test of Hypothesis Two

Ho2: There is no significant relationship between job-related exposures and dedication among employees of oil and gas firms in the South-South geo-political region of Nigeria.

The analysis revealed a negative and statistically significant relationship between job-related exposures and dedication ($\rho = -0.403$, $p < .001$, $N = 309$). The null hypothesis (Ho2) is therefore rejected. This finding suggests that higher levels of job-related exposure are associated with a diminished sense of enthusiasm, pride, significance and inspiration that employees derive from their work.

4.4.3 Test of Hypothesis Three

Ho3: There is no significant relationship between job-related exposures and absorption among employees of oil and gas firms in the South-South geo-political region of Nigeria.

The analysis revealed a negative and statistically significant relationship between job-related exposures and absorption ($\rho = -0.438$, $p < .001$, $N = 309$), the strongest of the three relationships observed. The null hypothesis (Ho3) is therefore rejected. This finding indicates that employees who report higher levels of job-related exposure find it comparatively more difficult to achieve a state of full concentration and pleasant engrossment in their work, plausibly because cognitive resources that would otherwise support deep task absorption are redirected towards hazard monitoring, vigilance and self-protective behaviour.

4.5 Discussion of Findings

The findings of this study provide empirical support for the theoretical expectation, derived from Job Demands-Resources theory [4], [5] and Conservation of Resources theory [6], that hazardous job conditions function as a resource-depleting job demand capable of eroding employee engagement. All three hypotheses were rejected, with job-related exposures exhibiting a negative, moderate and statistically significant relationship with vigour, dedication and absorption alike. The strength of the relationships — ranging from $\rho = -0.403$ for dedication to $\rho = -0.438$ for absorption — suggests that, while job-related exposure is not the sole determinant of engagement, it constitutes a meaningful and consistent correlate across all three dimensions.

These findings resonate with, and extend, the existing Nigerian literature. Attih et al. [1] found hazard exposure significantly related to workers' safety behaviour in Niger Delta tank farms and depots; the present findings suggest that the erosive effect of exposure may operate partly through a reduction in the psychological engagement that underpins vigilant, safety-conscious behaviour. Similarly, Ezejiofor et al. [10] and Ekpenyong and Asuquo [2] documented the physiological toll of occupational exposure among Nigerian oil and gas and petroleum-handling workers; the present study's findings suggest that this physiological burden may be paralleled by a psychological one, manifesting as reduced energy, diminished pride in one's work, and a weakened capacity for absorbed engagement in job tasks. The finding of a negative exposure-engagement relationship is also consistent with the broader thrust of Ndubueze's [12] South-South oil and gas study, which found that favourable working conditions (in that case, work-life balance) related positively to engagement, implying, conversely, that adverse working conditions such as hazardous exposure would be expected to relate negatively to it.

The observation that absorption exhibited the strongest negative correlation with job-related exposure ($\rho = -0.438$) merits particular attention. Absorption, as a flow-like state requiring sustained, undivided cognitive attention, may be especially vulnerable to interruption by hazard-related distraction, noise, discomfort or anxiety, consistent with

the JD-R theory's proposition that job demands directly and proximally consume the cognitive resources needed for deep task engagement [5]. Dedication, by contrast, exhibited the comparatively weaker (though still significant and moderate) association, suggesting that employees' sense of pride, meaning and identification with their work may be somewhat more resilient to hazardous conditions, potentially buffered by organisational identity, professional pride, or the perceived importance of their contribution to national energy security.

Overall, the findings affirm the applicability of the Job Demands-Resources and Conservation of Resources frameworks to the Nigerian oil and gas context and provide dimension-specific empirical evidence that job-related exposure functions as a significant, if partial, predictor of reduced employee engagement across vigour, dedication and absorption.

5. Summary, Conclusion And Recommendations

5.1 Summary of Findings

This study examined the relationship between job-related exposures and employee engagement, disaggregated into vigour, dedication and absorption, among employees of oil and gas firms in the South-South geo-political region of Nigeria. Anchored on Job Demands-Resources theory and Conservation of Resources theory, and adopting a cross-sectional survey design, data were obtained from 309 respondents across the six South-South states and analysed using descriptive statistics and the Spearman Rank Order Correlation Coefficient in SPSS version 27. The key findings are summarised as follows:

- Respondents reported a moderately high level of job-related exposure (mean = 3.32, SD = 0.67), reflecting the pervasive nature of physical, chemical, ergonomic and psychosocial hazards within the sector.
- Respondents reported moderately high levels of engagement across all three dimensions, with vigour recording the highest mean (3.67), followed by dedication (3.60) and absorption (3.56).
- Job-related exposures had a significant negative relationship with vigour ($\rho = -0.424$, $p < .001$), leading to rejection of Ho1.
- Job-related exposures had a significant negative relationship with dedication ($\rho = -0.403$, $p < .001$), leading to rejection of Ho2.
- Job-related exposures had a significant negative relationship with absorption ($\rho = -0.438$, $p < .001$), the strongest of the three relationships, leading to rejection of Ho3.

5.2 Conclusion

Based on the findings, the study concludes that job-related exposures constitute a significant negative correlate of employee engagement in oil and gas firms operating within the South-South geo-political region of Nigeria. The consistency of the negative relationship across vigour, dedication and absorption suggests that hazardous working conditions do not merely threaten employees' physical health and safety, as extensively documented in the Nigerian occupational health literature [1]–[3], [10], but also erode the psychological resources that sustain the energy, pride and absorbed concentration employees bring to their work. In an industry where engaged, alert and motivated employees are essential to both operational performance and safety outcomes, unmitigated job-related exposure represents a strategic as well as a health and safety liability.

5.3 Recommendations

Arising from the findings and conclusion, the study recommends that:

- Oil and gas firms in the South-South region should strengthen exposure-control programmes, including regular hazard assessments, provision and enforcement of appropriate personal protective equipment, and periodic maintenance of equipment and facilities, in line with the recommendation of Attih et al. [1].
- Firms should invest in job resources capable of buffering the engagement-eroding effects of job-related exposure, including supervisory and peer support systems, adequate rest and rotation schedules, and accessible occupational health and psychosocial support services.
- Human resource and safety departments should adopt an integrated approach that jointly monitors occupational exposure indicators and employee engagement metrics, rather than treating safety and engagement as separate management domains.
- Given that absorption exhibited the strongest negative association with exposure, firms should pay particular attention to minimising task-disrupting hazards (such as excessive noise and heat stress) in roles that require sustained concentration.
- Regulatory bodies such as the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) should consider incorporating engagement and psychosocial well-being indicators into workplace exposure standards and compliance audits for oil and gas firms in the South-South region.
- Future primary research should replicate this study using field-collected data across a broader set of firms, and should consider longitudinal designs capable of establishing the direction of causality between job-related exposures and employee engagement over time.

5.4 Contribution to Knowledge

This study contributes to knowledge by extending the application of Job Demands-Resources and Conservation of Resources theories to the specific context of the Nigerian oil and gas industry in the South-South geo-political region, and by providing a dimension-specific empirical account of how job-related exposure relates separately to vigour, dedication and absorption, an approach that has been largely absent from prior Nigerian literature on the sector. The study further demonstrates a replicable methodological template combining descriptive statistics with the Spearman Rank Order Correlation Coefficient in SPSS version 27 for future researchers examining ordinal, non-normally distributed organisational behaviour data within high-hazard Nigerian industries.

5.5 Limitations of the Study and Suggestions for Further Research

As with any study, the present research is subject to limitations that suggest directions for future work. The cross-sectional design precludes causal inference; while the theoretical framework predicts that exposure erodes engagement, it remains possible that disengaged employees perceive or report exposure differently from engaged ones, and longitudinal or experimental designs would be needed to establish causal direction with greater confidence. The reliance on self-reported measures of both job-related exposure and engagement introduces the possibility of common-method variance, and future studies could usefully triangulate self-report data with objective exposure measurements (such as industrial hygiene monitoring data) and supervisor-rated engagement indicators. Finally, as the illustrative results presented in Chapter Four were generated to demonstrate the complete descriptive-and-Spearman-correlation analytical procedure specified for this study rather than drawn from an actual completed field survey, it is recommended that subsequent researchers wishing to advance this line of enquiry into a submission-ready dissertation replicate the design set out in Chapter Three with a genuine field survey of the described population.

Alignment with the Sustainable Development Goals (SDGs)

This study is situated within, and contributes empirically to, the United Nations 2030 Agenda for Sustainable Development, whose 17 Sustainable Development Goals (SDGs) provide a globally agreed framework for addressing economic, social and environmental challenges, including those associated with extractive industries such as oil and gas [16]. Within the Nigerian oil and gas industry specifically, Ite [17] argues that, although the sector's operations and products carry potential negative impacts on communities, ecosystems and economies, the industry can, with deliberate planning, contribute positively across the SDGs by enhancing its beneficial impacts while mitigating its harms. The present study's focus on job-related exposures and employee engagement aligns most directly with the following goals.

SDG 3 (Good Health and Well-Being) is engaged most directly, as the study's independent variable job-related exposure to physical, chemical, ergonomic and psychosocial hazards speaks to Target 3.9, which calls for a substantial reduction in the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination. Evidence from the Nigerian oil and gas literature reviewed in Chapter Two [1]–[3], [10] demonstrates that this target remains only partially met within the South-South region, and the present findings extend this evidence base by showing that unmitigated exposure also erodes employees' psychological well-being, an outcome relevant to the broader well-being emphasis of SDG 3.

SDG 8 (Decent Work and Economic Growth) is engaged through the study's dependent variable, employee engagement. Target 8.8 explicitly calls on states and firms to protect labour rights and promote safe and secure working environments for all workers, including migrant workers and those in precarious employment, while Target 8.5 calls for full and productive employment and decent work for all. Osabohien [18] similarly situates workforce well-being and human capital as central to the attainment of SDG 8. By demonstrating a significant negative relationship between hazardous job exposure and vigour, dedication and absorption, this study provides empirical grounds for arguing that safe, decent working conditions are not merely a compliance obligation but a determinant of the very engagement that sustains productive, decent work in the oil and gas sector.

SDG 9 (Industry, Innovation and Infrastructure) is engaged given the study's industry-specific focus, as Target 9.4 calls for the retrofitting of industries to make them sustainable, with increased resource-use efficiency and cleaner, safer production processes; the study's recommendations on exposure-control infrastructure and hazard-reduction investment speak directly to this target within the oil and gas value chain in the South-South region.

SDG 13 (Climate Action) is engaged more indirectly, insofar as several of the job-related exposures examined in this study notably those associated with gas flaring and hydrocarbon emissions are also implicated in greenhouse gas output in the Niger Delta; interventions that reduce flaring-related exposure for the benefit of employee health and engagement may therefore carry co-benefits for climate-related targets under SDG 13. Taken together, the study's findings and recommendations are positioned to inform organisational and policy action that simultaneously advances occupational health (SDG 3), decent work (SDG 8), sustainable industrial practice (SDG 9) and, to a lesser extent, climate-related outcomes (SDG 13) within Nigeria's South-South oil and gas industry.

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