# CENTRALIZATION AND ORGANIZATIONAL SENSING AGILITY: THE MODERATING ROLE OF WORK MEANINGFULNESS IN NIGERIAN OIL AND GAS FIRMS

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## ABSTRACT

*The present research addresses the impact of centralization on organizational sensing agility and the moderating effect of meaningfulness of work in Nigerian oil and gas companies. Sensing agility-the ability to identify, interpret, and react to faint environmental signals-is an important dynamic capability to ensure survival and competitiveness in the highly dynamic setting with volatile crude oil prices, uncertainty in regulation and technological changes. Based on quantitative cross-sectional survey research, data were obtained from 411 middle and top-level managers from five firms operating in the upstream of oil and gas sector in South-South of Nigeria. PLS-SEM result indicate that centralization exerts a strong positive influence on organizational sensing agility. Work meaningfulness, however, was found to have no significant moderating influence on the relationship between centralization and sensing agility. It contradicts mainstream notions in agility literature-that decentralized structure is always beneficial-and concludes that centralized structures enhance sensing agility in high-risk, coordinated work environments because they allow information integration and enable strategic coherence. This study lends to both contingency theory and self-determination theory in that organizational-level effects of structural designs outweigh those of individual motivations.*

***Keywords:*** *Centralization; Organizational Sensing Agility; Work Meaningfulness; Organizational Structure; Oil and Gas; Nigeria*

## INTRODUCTION

The oil and gas sector is arguably the most important strategic sector of the Nigerian economy, contributing substantially to government revenue, foreign exchange, employment, etc. As much as it is important, the industry is operated in a volatile environment of fluctuating global oil price, uncertainties on the part of government policy, security threats, technological disruptions, and a changing energy landscape towards green energy (Akpobolokami, 2022).

These environmental factors necessitate the need for organizations to constantly scan the environment and react to changes. Consequently, sensing agility has been deemed a critical component for the maintenance of Organizational resilience and continued competitiveness (Gborogbosi & Amah, 2025). Organizational sensing agility relates to the ability of the firm to sense weak/ emerging signals in the environment and exploit them earlier than rivals (Gborogbosi & Chikwe, 2025; Malik et al., 2025).

It is considered as one of the dimensions of dynamic capabilities that allows the organization to anticipate shifts, recognize strategic opportunities, detect threats and

implement an early response for organizational adaptation and renewal (Bechtel et al., 2023; Gborogbosi & Onuoha, 2024). Organizations with better sensing capabilities are typically more able to adapt in an uncertain environment, and ultimately maintain a competitive advantage through improved decision quality (Hagen et al., 2024; Nguyen et al., 2024).

Literature suggests organizational sensing agility is influenced by both structural and psychological factors. Amongst the structural antecedents of organizational agility, centralization is the factor that has drawn the most attention from researchers. Centralization is the extent to which decision-making authority is dispersed at all organizational levels (Jong & Faerman, 2023; Stanikzai & Mittal, 2025).

Some studies see centralized structures as potential barriers to organizational sensing agility since they do not allow much leeway on the part of employees; but another stream of literature posit that centralized structure may indeed promote organizational effectiveness since they foster coordination, ensure strategic alignment and enhance integration of knowledge and resources across organization units (Nwonu & Ibedu, 2023; Sambamurthy et al., 2003). For a developing country such as Nigeria that operates in a complex environment with tremendous threats to safety, the control offered by centralized structure can contribute to sensing ability through controlled environmental scanning and quick response; however, evidence remains fragmented on the relationship between organizational sensing agility and centralization.

Work meaningfulness is a psychological factor that affects organizational processes. Defined as the significance employees find in their work, meaningful work is believed to correlate positively with job satisfaction and commitment to the firm (Steger et al., 2012; Daniel & Ahmed, 2023); consequently, employees are likely to be more engaged, proactively participate and show their commitment to the organizational goals (Kaur & Mittal, 2020; Kim, 2023). Meaningful work has also been suggested to support organizational sensing agility in that it is a driver of change participation and knowledge sharing amongst employees (Albrecht et al., 2023; Kubiak, 2022; Kurniawan, 2023). There is yet scant evidence on whether meaningful work moderates or strengthens the impact of structural factor such as centralization on organizational sensing agility.

Studies have extensively explored OU, dynamic capabilities, structural factors, employee motivation in isolation (Bechtel et al., 2023; Gagné et al., 2022; Nguyen et al., 2024; Stanikzai & Mittal, 2025; Steger et al., 2012); however, there is a conspicuous gap in research combining structural and psychological antecedents for explaining OSA. Furthermore, this void appears to be amplified in a Nigerian context and in an extractive industry where few studies exist on how the centralized nature of most firms influences sensing agility and to what extent work meaningfulness affects this relationship. It is therefore proposed to analyze the impact of centralization on organizational sensing agility, and whether this effect is moderated by work meaningfulness, among upstream firms in the oil and gas industry in South-South Nigeria. By integration of the two theoretical approaches to organizational sensing agility, the study aims at providing valuable input to the organizational sensing agility literature and to the Nigerian oil and gas industry.

## LITERATURE REVIEW

### Organizational Sensing Agility

Organizational sensing agility-defined as the ability of an organization to detect, understand and act on weak, faint signals about a changing environment earlier than its rivals-moves beyond ordinary environmental scanning; it encompasses the sensing of, and acting on emerging changes in markets, technologies, and regulations (Malik et al., 2025; Mohammed & Daniel, 2024). The concept of sensing-the first step in the dynamic capabilities framework-involves detecting opportunities and threats, and enabling a firm to reconfigure resources in response to turbulent environments (Bechtel et al., 2023; Gborogbosi & Onuoha, 2024). In environments where information is ambiguous, incomplete, or rapidly changing, sensing agility is necessary to enhance an organization's ability to anticipate future developments, cope proactively with disruption, and maintain a competitive advantage (Hagen et al., 2024; Nguyen et al., 2024). However, sensing agility becomes more complex in uncertain and

institutionally unstable environments such as emerging countries (like Nigeria), with infrastructure deficits and regulatory vagueness; here firms will need to interpret both explicit and implicit environmental signals, including the effects of the political climate, and pressure from the community.

**Centralization**

Centralization refers to the extent to which authority for decision making is distributed throughout an organization's hierarchy (Jong & Faerman, 2023; Stanikzai & Mittal, 2025). Centralization represents the highest levels in the hierarchy make strategic and tactical decisions and have restricted discretionary decision-making power. Within the traditional organization theory context, centralization is considered to have a negative influence on an organization's adaptability and responsiveness because lower-level agents are constrained from local decision-making (Lee & Xia, 2010; Daniel & Ahmed, 2023).However, contrasting with this view, research suggests that in capital intensive, complex and high-risk situations centralization could foster improved coordination, greater clarity, consistency of decision, and facilitate the integration of environmental information for senior-level coherent strategizing. The centralized structure could thus be a support mechanism in complex high-risk and high capital outlay industries. Given the complex, volatile, high-risk and high capital investment nature of the Nigerian oil and gas industry; centralization could be viewed less as a constraint, and more as a mechanism for effective decision-making and integration in an uncertain environment.

**Work Meaningfulness**

Work meaningfulness represents a core psychological condition under which employees perceive that their work is important, valuable and a contribution to the bigger picture (Steger et al., 2012; Daniel & Ahmed, 2023). Work meaningfulness has been linked to high motivation, job involvement and extra-role behavior, such as organizational commitment and increased discretionary efforts (Kaur & Mittal, 2020; Kim, 2023). In the workplace, meaningful work has also been shown to enable a variety of proactive behaviors, such as sharing knowledge, involvement in change processes, and problem solving, which can be used to support organizational sensing agility (Albrecht et al., 2023; Kubiak, 2022). The influence of work meaningfulness may be compromised by a high centralized structure as a consequence of the limited levels of autonomy and voice associated with this form of organization (Kaur & Mittal, 2020; Daniel & Ahmed, 2023).

**Integrative Perspective**

To capture fully how organizations enact sensing agility it seems necessary to bring together structural and psychological variables. While centralization may represent the manner in which an organization accesses and integrates environmental information as well as the efficiency with which it can make decisions; work meaningfulness relates to the degree of engagement and receptivity employees possess in perceiving the signals and threats that signal environmental changes. Together these constructs could have a joint impact on organizational responsiveness: Centralization could improve sensing agility by enhancing the efficiency and effectiveness of information integration at the top strategic level of the organization; work meaningfulness could spur employees at lower levels to be attentive, proactive and more likely to share perceived environmental information that may be useful for sensing. This interaction however, seems to remain relatively underdeveloped and unexamined.

**Empirical Gap**

The extant research on organizational agility and related concepts has largely investigated the structural, psychological, and capability-based constructs independently (Gborogbosi & Chikwe, 2025; Gborogbosi & Onuoha, 2024). There is limited research that has combined the roles of an organization's structure (centralization) and an employee's psychological state (work meaningfulness) in determining how it is able to implement sensing agility. This fragmentation restricts the ability to comprehensively understand how an organization reacts to turbulence in its environment. Furthermore, a few empirical studies have investigated organizational behavior in extractive industries in developing economies due to the complexity of operations and their strategic importance; this is even more limited for the Nigerian oil and gas sector

where very little is known about how centralized structure might lead to sensing agility, and whether work meaningfulness might influence this effect.

## THEORETICAL FRAMEWORK

### Contingency Theory

Contingency theory maintains that there is no one best way to organize; organizational effectiveness is influenced by how well organizational structures align with the characteristics of the environment (Northouse, 2007). For example, neither centralized nor decentralized organizational structures will invariably perform better than the other, because context dependent factors such as environmental complexity, technology, and size dictate the optimality of each structure. In the volatile, complex regulatory, and risk driven oil and gas industry, centralized structures are better than decentralized structures as information processing speeds up, consolidation of information becomes more coherent, and the response to stimuli can be coordinated for maximum efficiency. In less variable environments, decentralized structures can do a better job, and so a company's level of sensing agility will depend on its chosen structure.

### Self-Determination Theory

SDT defines motivation on the basis of three innate psychological needs; namely autonomy, competence and relatedness (Gagné et al., 2022). When these three needs are met, individuals tend to be intrinsically motivated, engaged and prone to proactively develop behaviors that are characteristic of highly effective organizational sensing, making SDT highly applicable in studies that relate motivation to an organization's response to its environment (McAnally & Hagger, 2024). Within the context of this study, work meaningfulness reflects the employees' subjective sense of work as significant, important, and consistent with their personal values and society (Steger et al., 2012) and so increases intrinsic motivation, participation in learning and scanning activities and adaptive behaviors (Gborogbosi & Chikwe, 2025). However, the application of this theory shows that a low level of autonomy imposed by a highly centralized structure may reduce the behavioral outcomes associated with work meaningfulness.

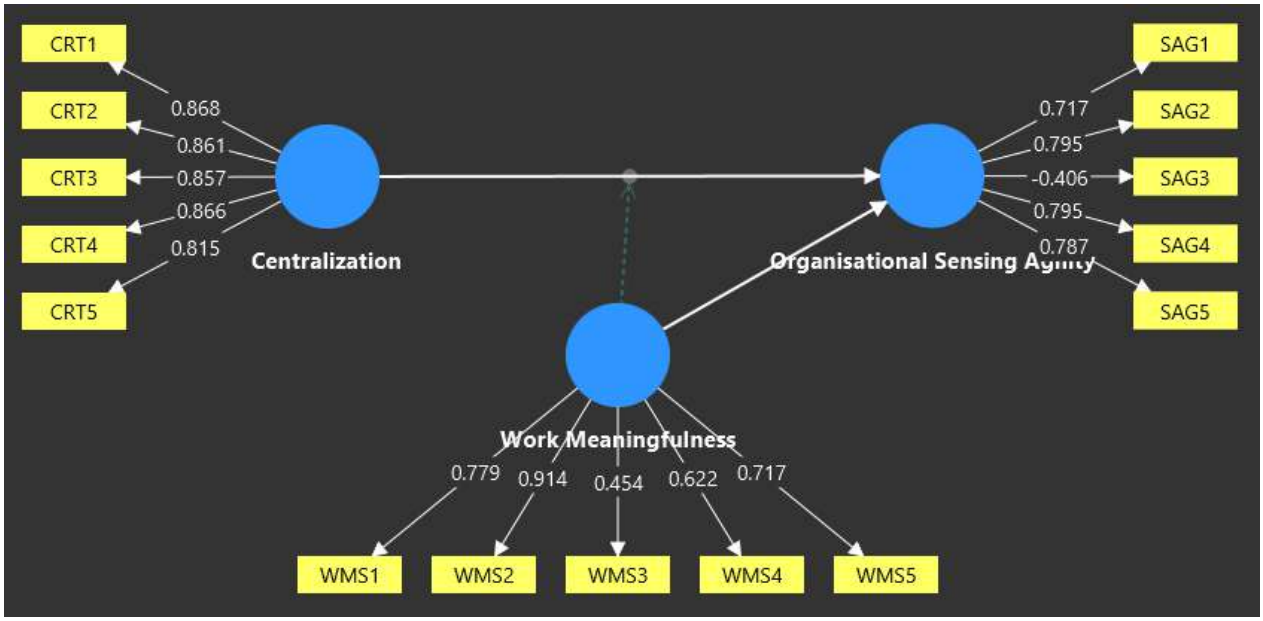
### Combined Model

Drawing upon contingent theory and self-determination theory to frame our hypotheses, this study argues that both structural (centralization) and psychological (work meaningfulness) dimensions contribute to organizational sensing agility. Structurally, centralization can be expected to have effects on the pace of communication, coordination, decision making, etc; whereas psychological dynamics can influence employee motivation, attentiveness and willing participation in sensing activities. This study draws on the interaction between these two theories to predict that while centralization has potential benefits for the efficiency of organizational sensing due to higher coordination, the role of work meaningfulness will be moderated by the amount of freedom allowed within a centralized system.

### Conceptual Model Initial Measurement Model

The integrated conceptual framework guiding this study is presented below. Figure 1: Conceptual Model of Centralization, Work Meaningfulness, and Organizational Sensing Agility (Author’s construct based on Gagné et al., 2022; Northouse, 2007; Steger et al., 2012).

**Figure 1:** Measurement Model (Outer Loadings)




The model illustrates the direct relationship between centralization and organizational sensing agility, as well as the moderating role of work meaningfulness on this relationship. The interaction term captures the extent to which psychological conditions influence the structural effect of centralization on sensing capability.

## HYPOTHESES DEVELOPMENT

Based on the logic of contingency theory and self-determination theory, this paper hypothesize that centralization is positively related to organizational sensing agility through enhanced coordination and decision integration. However, because the existing literature provided mixed results concerning the impacts of centralized structure on the firm's adaptability in dynamic environment, the null hypothesis is developed as below.

*H01: There is no significant relationship between centralization and organizational sensing agility.*

Additionally, even though work meaningfulness could predict employee involvement and pro-activity, it is uncertain if work meaningfulness could further amplify the structural impacts of centralization on organizational sensing agility. This is because centralization can potentially restrict individual freedom and autonomy. Therefore, the null hypothesis is stated as follows.

*H02: There is no significant moderating effect of work meaningfulness on the relationship between centralization and organizational sensing agility.*

## METHODOLOGY

### Research Design

This study utilized a quantitative cross-sectional survey design in examining the impact of centralization on organizational sensing agility and moderating effect of meaningfulness of work on organizational sensing agility in Nigerian oil and gas industry. The design is relevant as it allows for the explanation of relationships between latent variables assessed simultaneously at a given time point particularly for organizations behavior and management disciplines when perceptions have to be gathered (Ghanad, 2023).

### Population and Sample

The respondents' populations consisted of middle and upper level managers of five companies within the oil and gas industry operating in South South Nigeria. These management levels were chosen as they are most likely involved in the process of coordinating decisions, scan the environment and make decision on strategy respond relevant to the sensing agility. Following the sample size determination criterion stated by Krejcie and Morgan (1970) and creating a systematic

sampling frame from the sample, 423 questionnaires were distributed and 411 responses were returned and used for the analysis giving a very good usable response rate.

**Data Collection Process**

The data collection was done through structured questionnaires delivered physically to the respondents as well as online due to differences in organizations' readiness to welcome researches in their organizations. It was a voluntary exercise where the confidentiality of response was assured to the respondents.

**Measures**

All latent constructs were measured by a multi-item likert type scale adapted from a variety of studies. Centralization was defined as the concentration of decision-making authority at higher organizational levels (Stanikzai & Mittal, 2025). Sensing agility refers to the ability to discover, interpret and respond to the faint organizational environmental signals (Malik et al., 2025). Meaningfulness of work means the extent to which an individual feels his or her work is meaningful and significant (Steger et al., 2012).

**Data Analysis Technique**

The data analysis was conducted using a Partial Least Squares Structural Equation Modelling (PLS-SEM) carried out using SmartPLS. PLS-SEM was chosen due to its capabilities of a predictive oriented modeling approach and the examination of complex moderating effects. Following Hair et al. (2014) measurement and structural models are estimated in two stages, reliability and validity of the measurement model are checked then the structural model is tested using bootstrapping.

## RESULTS

**Demographic Profile**

The demographic characteristics of respondents are presented in Table 1. The sample was predominantly male (63.0%), reflecting the gender distribution typical of technical and managerial roles in the oil and gas industry.

**Table 1.** Demographic Analysis

| Demographic Variable | Category | Frequency | Percent (%) | Valid Percent (%) | Cumulative Percent (%) |
|---|---|---|---|---|---|
| Gender | Male | 259 | 63.0 | 63.0 | 63.0 |
| | Female | 152 | 37.0 | 37.0 | 100.0 |
| Age | 20–29 years | 23 | 5.7 | 5.7 | 5.7 |
| | 30–39 years | 81 | 19.7 | 19.7 | 25.4 |
| | 40–49 years | 167 | 40.6 | 40.6 | 66.0 |
| | 50 years and above | 140 | 34.0 | 34.0 | 100.0 |
| Marital Status | Single | 77 | 18.7 | 18.7 | 18.7 |
| | Married | 299 | 72.8 | 72.8 | 91.5 |
| | Divorced | 34 | 8.5 | 8.5 | 100.0 |
| Educational Qualification | Diploma | 53 | 12.9 | 12.9 | 12.9 |
| | B.Sc./HND | 102 | 24.8 | 24.8 | 37.7 |
| | Masters | 177 | 43.1 | 43.1 | 80.8 |

| Demographic Variable | Category | Frequency | Percent (%) | Valid Percent (%) | Cumulative Percent (%) |
|---|---|---|---|---|---|
| | Ph.D. | 79 | 19.2 | 19.2 | 100.0 |
| Number of Years in the Organization | Less than 2 years | 31 | 7.5 | 7.5 | 7.5 |
| | 2–5 years | 87 | 21.2 | 21.2 | 28.7 |
| | 6–10 years | 214 | 52.1 | 52.1 | 80.8 |
| | Above 10 years | 79 | 19.2 | 19.2 | 100.0 |

Most respondents were within the 40–49 years age category (40.6%), followed by those aged 50 years and above (34.0%), indicating a relatively experienced workforce. In terms of educational qualification, a majority possessed postgraduate degrees (62.3% combined Master's and Ph.D.), suggesting a highly skilled managerial population. Organizational tenure was also substantial, with 52.1% of respondents having 6–10 years of experience, indicating strong familiarity with organizational systems and decision structures.

**Measurement Model Assessment**

The measurement model was evaluated using indicator reliability, internal consistency, convergent validity, and discriminant validity. As presented in Table 2, most indicator loadings exceeded the acceptable threshold of 0.70, consistent with established PLS-SEM requirements (Hair et al., 2014). However, a few indicators with weaker loadings were retained after model purification based on theoretical relevance and construct validity considerations.

**Table 2.** Measurement Model Results

| Constructs | Indicators | Loadings (β) | Indicator Reliability ($\beta^2$) | AVE | Composite Reliability (ρc) | Cronbach's Alpha (α) |
|---|---|---|---|---|---|---|
| Centralization | CTR1 | 0.868 | 0.753 | 0.728 | 0.931 | 0.907 |
| | CTR2 | 0.861 | 0.741 | | | |
| | CTR3 | 0.857 | 0.734 | | | |
| | CTR4 | 0.866 | 0.750 | | | |
| | CTR5 | 0.815 | 0.664 | | | |
| Organizational Sensing Agility | SAG1 | 0.717 | 0.514 | 0.512 | 0.740 | 0.530 |
| | SAG2 | 0.795 | 0.632 | | | |
| | SAG3 | -0.406 | 0.165 | | | |
| | SAG4 | 0.795 | 0.632 | | | |
| | SAG5 | 0.787 | 0.619 | | | |

| Constructs | Indicators | Loadings (β) | Indicator Reliability (β²) | AVE | Composite Reliability (ρc) | Cronbach's Alpha (α) |
|---|---|---|---|---|---|---|
| Work Meaningfulness | WMS1 | 0.779 | 0.607 | 0.510 | 0.320 | 0.752 |
| | WMS2 | 0.914 | 0.835 | | | |
| | WMS3 | 0.454 | 0.206 | | | |
| | WMS4 | 0.622 | 0.387 | | | |
| | WMS5 | 0.717 | 0.517 | | | |

Composite reliability values for all constructs exceeded the recommended threshold of 0.70, indicating strong internal consistency. Similarly, Average Variance Extracted (AVE) values were above 0.50, confirming convergent validity. Table 3 further confirms that Cronbach's alpha values for all constructs ranged between 0.775 and 0.907, indicating satisfactory reliability.

**Table 3.** Reliability and Validity Statistics

| Constructs | Cronbach's Alpha | Composite Reliability | AVE |
|---|---|---|---|
| Centralization | 0.907 | 0.931 | 0.729 |
| Organisational Sensing Agility | 0.782 | 0.859 | 0.604 |
| Work Meaningfulness | 0.775 | 0.853 | 0.596 |

Discriminant validity was assessed using the Fornell-Larcker criterion and HTMT ratios. As shown in Table 4, the square roots of AVE for each construct were higher than their inter-construct correlations, confirming adequate discriminant validity.

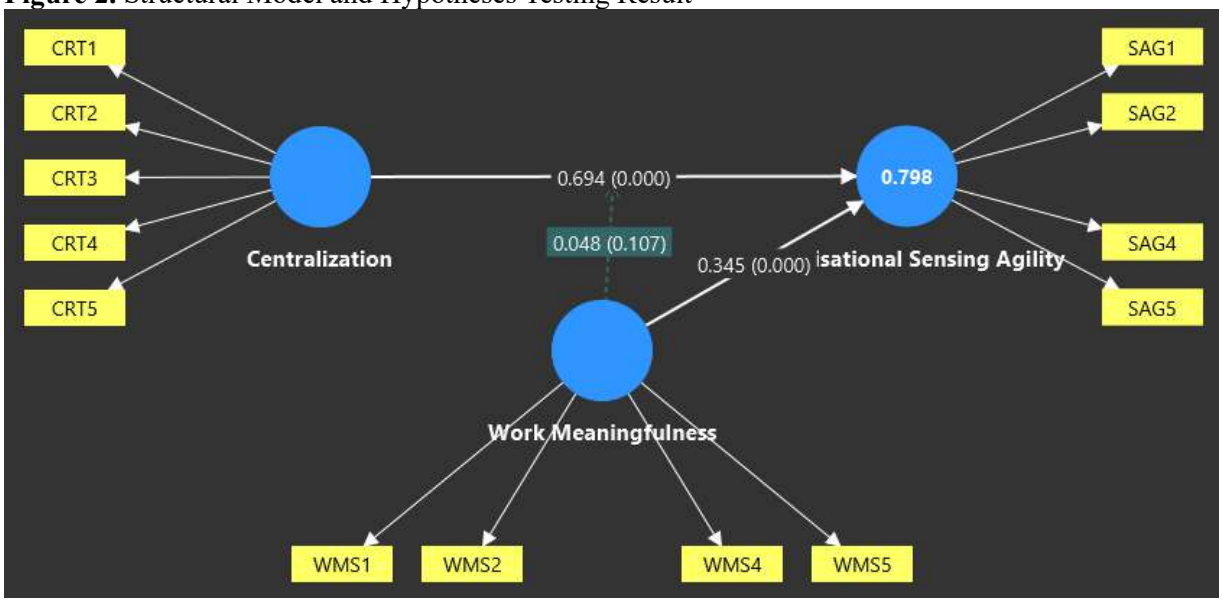
**Table 4.** Discriminant Validity (Fornell-Larcker/HTMT)

| Constructs | Centralization | Organisational Sensing Agility | Work Meaningfulness |
|---|---|---|---|
| Centralization | 0.854 | | |
| Organisational Sensing Agility | 0.743 | 0.777 | |
| Work Meaningfulness | 0.663 | 0.737 | 0.772 |

**Structural Model Results**

The structural relationships among the constructs were examined using PLS-SEM bootstrapping procedures. The overall structural model illustrating the hypothesized relationships and the estimated path coefficients is presented in Figure 2.

**Figure 2.** Structural Model and Hypotheses Testing Result




The structural model was assessed using bootstrapping with 5,000 resamples. The results are presented in Table 5. Centralization had a strong and statistically significant positive effect on organizational sensing agility (β = 0.694, t = 9.683, p < .001). This indicates that higher levels of centralized decision-making are associated with stronger sensing capability within the sampled firms.

**Table 5.** Results of Hypotheses Testing

| Path | Original Sample (O) | STDEV | T Statistics | P Values |
|---|---|---|---|---|
| Centralization -> Organizational Sensing Agility | 0.694 | 0.072 | 9.683 | 0.000 |
| Work Meaningfulness × Centralization -> Organizational Sensing Agility | 0.048 | 0.030 | 1.611 | 0.107 |

In contrast, the moderating effect of work meaningfulness on the relationship between centralization and organizational sensing agility was positive but not statistically significant (β = 0.048, t = 1.611, p = .107). This suggests that while work meaningfulness contributes independently to employee motivation, it does not significantly alter the structural effect of centralization on sensing agility in the studied context.

Overall, the model demonstrates that organizational sensing agility in Nigerian oil and gas firms is primarily shaped by structural governance mechanisms rather than psychological moderation effects.

## DISCUSSION

**Centralization and Organizational Sensing Agility**

The results show that centralization has a strong and statistically significant positive influence on organizational sensing agility. This challenges the prevailing belief within the literature of the importance of decentralization to ensure better response time and responsiveness (Lee & Xia, 2010; Sambamurthy et al., 2003). This is in a Nigerian upstream oil and gas context, where centralization appears to have increased sensing agility, by helping improve coordination, lessen the fragmentation of information and allowing environmental information to be quickly synthesized and interpreted to make strategies.

This is in line with contingency theory, which holds that organizational structure is effective under specific environments (Northouse, 2007). Since oil and gas is a risk-prone and turbulent environment, centralization has served as a structural variable that limits confusion and ensures rapid coordinated responses to weak environmental signals. This is in line with previous research on organizational contexts which found that centralized structures facilitate knowledge integration and alignment of decision-making within complex project-oriented settings (Kan et al., 2025).

**Meaningfulness of the Job and Non-Significant Moderating Role of work meaningfulness**

Work meaningfulness failed to have a significant moderating influence on the relationship between centralization and organizational sensing agility, though it was in the predicted direction. This suggests that though employees find their jobs meaningful and involving, such a psychological state did not make it influence how the structure of centralized decision-making affects the organization's capacity for sensing.

This is contrary to what we would have predicted from the self-determination theory, where meaningfulness increases the level ofintrinsicmotivation and proactiveness (Gagné et al., 2022; Steger et al., 2012). We argue here that this finding is driven by the lack of control over decision-making that exists in highly centralized structures which prevents an increase in intrinsic motivation translating to an organization's sensing agility. This conforms to the proposition that structural control can override the effects of individual psychological empowerment within hierarchical organizations (McAnally & Hagger, 2024).

**Theoretical Implications**

Our research contributes to contingency theory by showing that under high volatility and risk, the structure can influence sensing agility in opposite directions as established by existing literature; centralizing helps rather than harms the sensing capability. This work also extends self-determination theory by establishing that work meaningfulness is not enough to influence organization level sensing agility if there is a lack of central control over decision making.

Taken together, the study shows that in the context of extractive industries sensing agility is largely driven by structure, with psychology only playing a minimal role when the governance structure is highly centralized.

**CONCLUSION AND MANAGERIAL IMPLICATIONS**

This study explored the influence of centralization on organizational sensing agility and the moderating role of work meaningfulness within Nigerian upstream oil and gas companies. The research found that centralization leads to significant increases in sensing agility while work meaningfulness had no significant moderating role. The findings indicate that while a central decision-making structure has proved effective in this risk-prone environment at helping the organization sense the environment and respond to it quickly.

From a theoretical perspective, this study complements contingency theory (Northouse, 2007) by confirming that at high levels of ambiguity and operational risk a centralized structure improves rather than impairs sensing ability. This study also expands self-determination theory (Gagné et al., 2022) by suggesting that meaning of the job may not affect sensing agility when decision-making authority is highly concentrated.

From a managerial perspective, oil and gas firms should focus on maintaining central control over strategic decision making while focusing efforts and resources on the technological systems that can enhance scanning of environmental trends and coordination (Gborogbosi & Amah, 2025). Work meaningfulness should be treated as a supportive initiative, but not as a driver of sensing agility.

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