

LOGISTICS RISK ASSESSMENT AND RESILIENCE OF OIL AND GAS SERVICING COMPANIES IN AKWA-IBOM STATE, NIGERIA

EBONG Caleb Akanimo

Department of Marketing, Faculty of Administration and Management
Rivers State University Nkpolu-Oroworukwo, Port Harcourt

IHUNWO Elvis C.

Department of Logistics and Supply Chain Management
Faculty of Administration and Management
Rivers State University Nkpolu-Oroworukwo, Port Harcourt

Abstract

This study examined the impact of logistics risk assessment on resilience of oil and gas servicing companies in Akwa-Ibom State, focusing on coping with change, adaptability and resilience ethos as proxies of resilience. The study adopted an explanatory research design. Its population comprised 16 oil and gas servicing companies. Considering the smallness of the population, all the companies were studied. 4 respondents from each of the 16 companies making a total of 64 (i.e. 4 x 16) respondents provided data through a 16 item questionnaire structured in Likert scale. However, only 58 respondents provided valid data which were used for the analysis. Simple regression analysis was used to test the null hypotheses formulated in the study, using the Statistical Package for Social Sciences (SPSS) version 22.0. Results of the analyses shows that logistics risk assessment has positive and significant impacts on coping with change, adaptability and resilience ethos of oil and gas servicing companies in Akwa-Ibom State. In view of these findings, the study concluded that logistics risk assessment significantly impacts resilience of oil and gas servicing companies in Akwa-Ibom State; and recommends that, oil and gas servicing companies in Akwa-Ibom State should continue to deploy logistics risk assessment initiatives to provide essential insights into potential hazards and their implications in order to improve their resilience capacity.

Keywords: Adaptability, coping with change, logistics risk assessment, resilience, resilience ethos,

Introduction

The oil and gas industry is the cornerstone of Nigeria's economy, contributing significantly to its Gross Domestic Product (GDP). However, companies operating in the sector face numerous challenges, including volatile market conditions, regulatory uncertainties, environmental risks, and operational hazards. These challenges necessitate the implementation of robust logistics risk assessment practices to enhance organizational resilience.

Risk assessment serves as a systematic approach to identifying, analyzing and mitigating potential threats to business operations (Aven, 2016). In the context of oil and gas servicing companies in Akwa Ibom State, effective logistics risk assessment is critical due to the region's susceptibility to environmental degradation, community unrest and infrastructure deficits (Udoh & Okon, 2020). By proactively managing risks, companies not only minimize operational disruptions but also enhance capacity to adapt to unexpected challenges, and foster long-term sustainability.

Drawing on contemporary theories of risk management and resilience, this study explored how structured logistics risk assessment processes contribute to coping with change, adaptability and resilience ethos. The implementation of effective logistics risk assessment significantly improve

operational safety of firms, especially where operational hazards are prevalent (Nwilo & Badejo, 2006).

By improving resilience through robust risk management practices, oil and gas servicing firms can achieve greater economic stability, even in the face of market volatility and geopolitical uncertainties (Fiksel, 2015). This stability can attract further investment and foster economic growth in the region. Thus, this study examined the impact of logistics risk assessment on resilience of oil and gas servicing firms in Akwa-Ibom State of Nigeria. The study sought to provide actionable insights for stakeholders in the oil and gas industry. The study is conceptualized in Fig. 1.

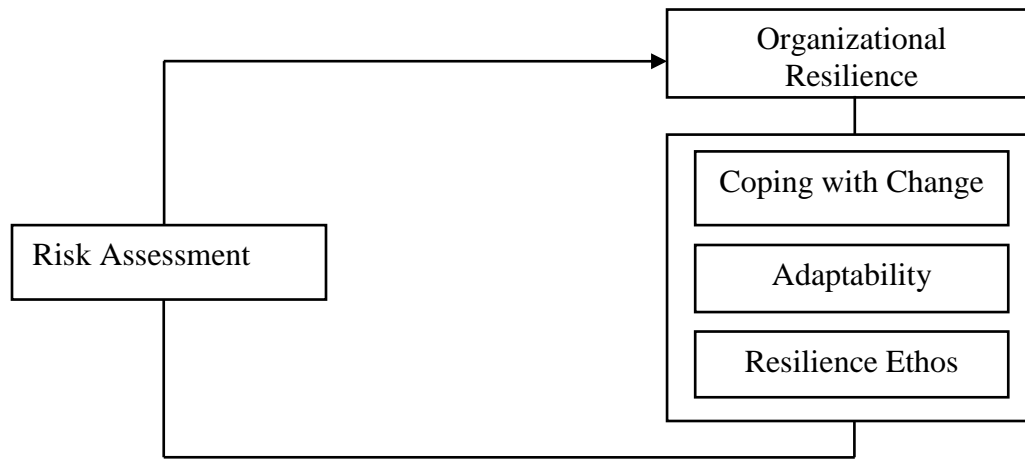


Fig. 1: Conceptual framework of impact of logistics risk assessment on resilience of oil and gas servicing companies in Akwa-Ibom State

Theoretical Foundation: Complex Adaptive Systems Theory

Complex adaptive systems theory (CAST) view organizations as complex adaptive systems that continuously interact with their environment, adapt to change, and self-organize in response to internal and external dynamics (Hollnagel et al., 2006). In the context of the oil and gas industry, CAST provides understanding of how risk management strategies enhance the ability of firms to adapt to changing market conditions. CAST emphasizes the importance of flexibility, diversity, redundancy, and learning to enhance resilience.

CAST is highly relevant to understanding how companies can build resilience through effective risk assessment. CAST provides a framework for addressing the complexity, unpredictability, and interconnectedness of risks companies face; and emphasize adaptability, decentralized decision-making, feedback loops, and ability to co-evolve with external systems. By applying CAST, companies can move beyond traditional, linear risk management approaches to create more flexible, adaptive systems capable of handling both anticipated and emergent risks. Thus, the CAST was considered appropriate for this study.

Concept of Logistics Risk Assessment

Logistics risk assessment is the systematic process of identifying, analyzing, and evaluating risks in a specific context or associated with logistics activity. It involves determining the likelihood of adverse events occurring and the potential impact of those events on logistics operations.

According to Aven and Zio (2014), logistics risk assessment provides a structured framework for understanding uncertainties and making informed decisions to mitigate potential threats.

Logistics risk assessment is a critical component of logistics risk management. Its goal is to understand the nature and magnitude of risks, in order guide decision-making on risk mitigation strategies. According to Aven and Zio (2014), risk identification involves recognizing potential hazards and threats that could impact the organization's logistics operations. This can be achieved through brainstorming, historical data analysis, and expert judgment. Once risks are identified, risk analysis quantifies the likelihood and impact of these risks using qualitative or quantitative methods.

By systematically identifying and addressing potential risks, organizations enhance safety, environmental protection and operational resilience. Despite its importance however, logistics risk assessment faces several challenges, including uncertainties in risk estimation, complexity of risk interdependencies, and need for accurate data. Aven and Zio (2014) suggest that advanced logistics risk assessment techniques and better integration of qualitative and quantitative approaches can address some of these challenges.

Organizational Resilience

Resilience is the capacity of a system to adapt, recover, and bounce back from adversity, disruptions or shocks while maintaining functionality and integrity (Hollnagel et al., 2006); or “a system's ability to continue to perform and meet its objectives in the face of challenges (Ateke & Nwulu, 2018). In organizational studies, resilience is conceptualized as the capacity of firm to learn from failures, anticipate risks and continuously improve processes and practices to enhance adaptive capabilities and sustainability (Hollnagel, 2010). Resilient firms have the capacity to absorb disturbances, withstand fluctuations and maintain essential functioning by exhibiting flexibility, robustness and adaptability (Hosseini & Barker, 2019).

Resilience is crucial to oil and gas industry, given complexity and dynamism of their operating environment. Resilience is essential for maintaining operational continuity in the face of disruptions. By building redundancy, flexibility and adaptive capacity into their operations, companies mitigate impact of disruptions, and ensure uninterrupted operations (Hosseini & Barker, 2019). Resilience also enable companies to quickly recover from setbacks, minimize downtime, meet demands of consumers, and contribute to security and economic stability.

The operating context of firms have become more challenging, and presents both threats and opportunities; cultivating a resilient culture therefore better positions a firm to prosper (Harcourt & Ateke, 2019). Companies that embrace resilience as a guiding principle, navigate uncertainty, manage risks, and thrive in volatile and competitive environments. Resilience is a multidimensional idea, and in this study, it is measured in terms of coping with change, adaptability and resilience ethos.

Coping with change

Coping with change refers to the psychological, behavioral and organizational strategies employed by individuals and entities to adapt to new circumstances, challenges, or disruptions. It involves the ability to effectively manage stress, uncertainty, and transitions while maintaining

functionality and well-being (Folkman & Moskowitz, 2004). It entails proactive adaptation, problem-solving, and seeking social support to effectively cope with the challenges posed by change (Bonanno, 2004).

Oil and gas servicing firms operate in a dynamic environment characterized by technological advancements, market fluctuations, regulatory changes, and geopolitical tensions. Coping with change is essential for companies in this sector to navigate uncertainty, seize opportunities, and ensure long-term success. Coping with change require companies to invest in research and development, adopt new technologies, and upgrade existing infrastructure to remain competitive (Huang & Barnett, 2020).

Adaptability

Adaptability is the ability of individuals, organizations, or systems to adjust, evolve, and thrive in response to changing circumstances, environments, or requirements. It involves flexibility and openness to change and innovation (Martin & Osberg, 2007). Adaptability can also be conceptualized as to learn from experience, acquire new skills and develop innovative solutions to challenges. It is a stems naturally, from a “customer first” mindset; and involves reforming business activities align with changing consumer preferences, geography or era in which the firm operates (Ateke & Nwulu, 2021).

Adaptability involve continuous improvement, and the ability to leverage opportunities in changing contexts (DeCarolis & Deeds, 1999). Adaptability is also understood as the capacity of organisms or systems to survive and thrive in dynamic or unpredictable environments by adjusting behaviors, structures, or strategies. It involves being responsive, agile, and proactive in anticipating and addressing changes (Cohen, 2014). These definitions highlight the multifaceted nature of adaptability and its relevance across individual, organizational, and ecological contexts.

Adaptability is increasingly recognized as a critical factor driving organizational growth and success in today's dynamic and competitive business environment. Adaptability fosters resilience and agility, and enable firms to respond effectively to change in their internal and external environment (Lengnick-Hall & Beck, 2005). By cultivating a culture of adaptability, companies can anticipate market trends, identify emerging opportunities, and pivot their strategies in a timely manner (Dobbs & Hamilton, 2007).

Resilience ethos

Resilience ethos can be defined as a mind-set within organizations that emphasize adaptability, perseverance, and problem-solving in the face of adversity. It involves fostering a shared belief in the importance of resilience, promoting a positive outlook, and encouraging individuals to bounce back from setbacks and challenges (Sutcliffe & Vogus, 2003).

Resilience ethos can also be understood as the values, norms, and beliefs that guide individual and collective behavior within organizations during times of uncertainty or adversity. It involves prioritizing resilience as a core organizational value, fostering trust, collaboration, and communication, and empowering employees to overcome challenges and achieve goals (Weick & Sutcliffe, 2007).

Resilience ethos is important to firms for several reasons. Firstly, it enhances agility and responsiveness, and enable firms to adapt quickly to changing market conditions (Lengnick-Hall & Beck, 2005). By fostering a culture of adaptability and innovation, resilience ethos empowers organizations to seize opportunities and mitigate risks, thereby enhancing their competitiveness and long-term viability.

Secondly, resilience ethos promotes employee engagement and well-being, as individuals feel supported, valued and empowered within a resilient organizational culture (Hopkins, 2009). This, in turn, foster high levels of employee satisfaction, retention and performance. Lastly, resilience ethos strengthens stakeholder trust and confidence in the organization, as external parties perceive it as being capable of weathering challenges and delivering on its commitments (Sutcliffe & Vogus, 2003). This enhances the organization's reputation, credibility, and resilience in the face of external pressures and uncertainties.

Logistics Risk Assessment and Organizational Resilience

In this section, the researcher examined a few empirical studies on impact of logistics risk assessment on resilience. Azadeh et al. (2017) evaluated resilience engineering factors in high-risk environments by fuzzy cognitive maps in a petrochemical plant in Iran. The study found that comprehensive risk assessments significantly enhance operational resilience by identifying critical risk factors and enabling proactive management strategies.

McManus et al. (2012) carried out a study on facilitated process for improving organizational resilience in New Zealand. The research demonstrated that organizations with thorough logistics risk assessment processes showed greater resilience, with improved recovery times and adaptive capacities. Similarly, Aven and Renn (2019) carried out a study on improving risk management: from risk analysis to resilience-based strategies in Norway. The study found that robust logistics risk assessment frameworks significantly contribute to organizational resilience by providing a clear understanding of potential risks and facilitating better preparedness.

Also, Hollnagel et al. (2018) conducted a study on resilience engineering in practice in various locations across Europe. The purpose of the study was to examine how logistics risk assessment impacts the resilience of complex socio-technical systems. The research indicated that adaptive logistics risk assessment practices, which allow for flexibility and responsiveness, significantly enhance the resilience of socio-technical systems.

In addition, Leveson et al. (2012) conducted a study to analyze the impact of logistics risk assessment on safety and resilience in complex engineering systems in the United States. The study found that risk assessments that consider system interactions and feedback loops are more effective in enhancing the resilience of complex engineering systems.

These above-mentioned studies collectively highlight the significant role of logistics risk assessment in enhancing resilience, emphasizing the need for comprehensive and adaptive logistics risk assessment methodologies to effectively manage potential threats and improve overall resilience. However, we formulated the following hypotheses to guide our data analyses:

H01: Logistics risk assessment does not significantly impact coping with change of oil and gas servicing companies in Akwa-Ibom State.

H02: Logistics risk assessment does not significantly impact adaptability of oil and gas servicing companies in Akwa-Ibom State.

H03: Logistics risk assessment does not significantly impact resilience ethos of oil and gas servicing companies in Akwa-Ibom State.

Methodology

This study is rooted in positivist philosophy; hence a quantitative methodology was employed to ascertain the impact of logistics risk assessment on resilience of oil and gas servicing companies in Akwa-Ibom State. The study adopted an explanatory research design. Its population comprised 16 oil and gas servicing companies in Akwa-Ibom State. Considering the smallness of the population, all the companies were studied. However, 4 respondents (health, safety and environment (HSE) officer, logistics manager, operations manager, project manager) from each of the 16 companies making a total of 64 (i.e. 4 x 16) respondents provided data through a 16 item questionnaire structured in Likert scale. However, only 58 respondents provided valid data used in the final analysis.

To determine the reliability of the research instrument, a Cronbach's Alpha reliability test was conducted, subject to a threshold of 0.70 set by Nunally (1978). Furthermore, the construct validity of the instrument was determined through Principal Component Analysis (PCA). (See table 1 for results of reliability and validity tests). Linear regression statistic was used to test the hypotheses formulated. The Statistical Package for Social Sciences (SPSS) version 22.0 aided the data analyses.

Table 1: Reliability and Validity Tests

S/N	Variables	Number of Items	Cronbach's Alpha Coefficients	Factor Loadings
1	Logistics Risk Assessment	4	0.938	0.871
2	Coping with Change	4	0.781	0.737
3	Adaptability	4	0.799	0.830
4	Resilience Ethos	4	0.709	0.717

Source: SPSS Output form field data

Results of the Cronbach's alpha analysis in Table 1 revealed that all the variables in the study produced high Cronbach's Alpha coefficients. This shows that, there is inter-item consistency among the variables in the study. Again, all the variables have high factor loadings greater than 0.4, indicating that the items and variables in the questionnaire measured what they were supposed to measure. Also, the loadings indicated no cross-loading, hence there is discriminant validity.

Data Analysis and Result

Table 2: Model Summary of impact of logistics risk assessment on coping with change

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.636 ^a	.404	.394	1.330

a. Predictors: (Constant), Risk Assessment

Source: Field Survey, 2024.

As shown in Table 2, logistics risk assessment has a strong and positive impact on coping with change. This is evident in the regression coefficient (R) of 0.636. The coefficient of determination (R Square) is 0.565. This means that approximately 60% of the changes in the criterion variable (coping with change) are attributable to the impact of the predictor variable (risk assessment), while the remaining 60% changes are due to the impact of external variables not included in the model.

Table 3: ANOVA^a of impact of logistics risk assessment on coping with change

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	67.178	1	67.178	37.982	.000 ^b
	Residual	99.046	56	1.769		
	Total	166.224	57			

a. Dependent Variable: Coping with Change

b. Predictors: (Constant), Risk Assessment

Source: Field Survey, 2024.

As shown in Table 3, logistics risk assessment significantly predicts coping with change. This is indicated by the probability value of 0.000, which is less than the critical value of 0.05. Statistically, logistics risk assessment significantly predicts coping with change at $F(1, 56) = 37.982$, $p = 0.000 < 0.05$, $R^2 = 0.404$. The results also showed that the regression model is a good fit for the data.

Table 4: Coefficients^a of impact of logistics risk assessment on coping with change

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14.681	.633		23.195	.000
	Risk Assessment	.237	.038	.636	6.163	.000

a. Dependent Variable: Coping with Change

Source: Field Survey, 2024.

As shown in the regression model in Table 4, the unstandardized coefficients indicate how much the dependent variable varies with the independent variable. As shown in the Table, before the introduction of the predictor variable - risk assessment, coping with change stood at 14.681, but at the introduction of the predictor variable, there is an additional unit. Specifically, as shown in the table, the intercept B_0 is 14.681, which is the predicted value of coping with change without the contributions of the predictor variable. That is, when logistics risk assessment is equal to zero, coping with change is 14.681. However, the slope B_1 is 0.237, indicating that 1% increase in logistics risk assessment will bring about approximately 0.24% increase in coping with change of oil and gas servicing companies in Akwa-Ibom State. Therefore, the researcher rejects the null hypothesis which states that '*logistics risk assessment does not significantly impact coping with change of oil and gas servicing companies in Akwa-Ibom State*'.

Table 5: Model Summary of impact of logistics risk assessment on adaptability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.748 ^a	.560	.552	2.272

a. Predictors: (Constant), Risk Assessment

Source: Field Survey, 2024.

As shown in Table 5, logistics risk assessment has a strong and positive impact on adaptability. This is evident in the regression coefficient (R) of 0.748. Furthermore, the coefficient of determination (R Square) is 0.560. This means that approximately 56% of the changes in the criterion variable (adaptability) are attributable to the impact of the predictor variable (risk assessment), while the remaining 44% changes are due to the impact of external variables not included in the model.

Table 6: ANOVA^a of impact of logistics risk assessment on adaptability

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	367.592	1	367.592	71.184	.000 ^b
	Residual	289.184	56	5.164		
	Total	656.776	57			

a. Dependent Variable: Adaptability

b. Predictors: (Constant), Risk Assessment

Source: Field Survey, 2024.

As shown in Table 6, logistics risk assessment significantly predicts adaptability of oil and gas servicing companies in Akwa-Ibom State. This is indicated by the probability value of 0.000, which is less than the critical value of 0.05. Statistically, logistics risk assessment significantly predicts adaptability at $F(1, 56) = 71.184$, $p = 0.000 < 0.05$, $R^2 = 0.560$. The results also showed that the regression model is a good fit for the data.

Table 7: Coefficients^a of impact of logistics risk assessment on adaptability

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	7.901	1.082		7.305	.000
	Risk Assessment	.554	.066	.748	8.437	.000

a. Dependent Variable: Adaptability

Source: Field Survey, 2024.

As shown in the regression model in Table 7, the unstandardized coefficients indicate how much the dependent variable varies with the independent variable. As shown in the Table, before the introduction of the predictor variable (risk assessment), adaptability stood at 7.901, but at the introduction of the predictor variable, there is an additional unit. Specifically, as shown in the table, the intercept B_0 is 7.901, which is the predicted value of adaptability without the contributions of the predictor variable. That is, when logistics risk assessment is equal to zero, adaptability is 7.901. However, the slope B_1 is 0.554, indicating that 1% increase in logistics risk assessment will bring about approximately 0.55% increase in adaptability of oil and gas servicing companies in Akwa-Ibom State. Therefore, the researcher rejects the null hypothesis

which states that '*logistics risk assessment does not significantly impact adaptability of oil and gas servicing companies in Akwa-Ibom State*'.

Table 8: Model Summary of impact of logistics risk assessment on resilience ethos

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.504 ^a	.254	.241	1.383
a. Predictors: (Constant), Risk Assessment				

Source: Field Survey, 2024.

Table 8 shows that logistics risk assessment has moderate positive impact on resilience ethos. This is evident in the regression coefficient (R) of 0.504. Furthermore, the coefficient of determination (R Square) is 0.254. This means that approximately 24% of the changes in the criterion variable (resilience ethos) are attributable to the impact of the predictor variable (risk assessment), while the remaining 75% changes are due to the impact of external variables not included in the model.

Table 9: ANOVA^a of impact of logistics risk assessment on resilience ethos

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.461	1	36.461	19.072	.000 ^b
	Residual	107.056	56	1.912		
	Total	143.517	57			

a. Dependent Variable: Resilience Ethos

b. Predictors: (Constant), Risk Assessment

Source: Field Survey, 2024.

As shown in Table 9, logistics risk assessment significantly predicts resilience ethos of oil and gas servicing companies in Akwa-Ibom State. This is indicated by the probability value of 0.000, which is less than the critical value of 0.05. Statistically, logistics risk assessment significantly predicts resilience ethos at $F(1, 56) = 19.072$, $p = 0.000 < 0.05$, $R^2 = 0.254$. The results also showed that the regression model is a good fit for the data.

Table 10: Coefficients^a of impact of logistics risk assessment on resilience ethos

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	16.031	.658		24.360	.000
	Risk Assessment	.174	.040	.504	4.367	.000

a. Dependent Variable: Resilience Ethos

Source: Field Survey, 2024.

As shown in Table 10, the unstandardized coefficients indicate how much resilience ethos varies with risk assessment. As shown in the Table, before the introduction of risk assessment, resilience ethos stood at 16.031, but at the introduction of risk assessment, an additional unit was observed. Specifically, the intercept B_0 is 16.031, which is the predicted value of resilience ethos without the contributions of risk assessment. That is, when logistics risk assessment is zero, resilience ethos is 16.031. However, the slope B_1 is 0.174, indicating that 1% increase in logistics

risk assessment will bring about approximately 0.17% increase in resilience ethos of oil and gas servicing companies in Akwa-Ibom State. Therefore, the researcher rejects the null hypothesis which states that '*logistics risk assessment does not significantly impact resilience ethos of oil and gas servicing companies in Akwa-Ibom State*'.

Discussion of Findings

The simple regression analysis that was conducted to determine the impact of logistics risk assessment does not significantly impact resilience ethos of oil and gas servicing companies in Akwa-Ibom State indicated that, logistics risk assessment has a strong, positive and significant impact on coping with change; a strong, positive and significant impact on adaptability; and a moderate, positive and significant impact on resilience ethos.

Findings of this study are in line with findings of previous studies examined. For instance, the results aligned with the findings of Azadeh et al. (2017) that comprehensive risk assessments significantly enhance operational resilience by identifying critical risk factors and enabling proactive management strategies; and that organizations with thorough logistics risk assessment processes showed greater resilience, with improved recovery times and adaptive capacities (McManus et al., 2012).

The finding also corroborates that view that robust logistics risk assessment frameworks significantly contribute to organizational resilience by providing a clear understanding of potential risks and facilitating better preparedness (Aven & Renn, 2019); and that that adaptive logistics risk assessment practices, which allow for flexibility and responsiveness, significantly enhance the resilience of socio-technical systems (Hollnagel et al., 2018). In addition, our finding support the report that risk assessments that consider system interactions and feedback loops are more effective in enhancing the resilience of complex engineering systems (Leveson et al., 2012).

Conclusion and Recommendations

In view of the findings of this study and the large extent to which its findings support the findings of most previous studies examined, this study concludes that logistics risk assessment has a positive, significant impact on resilience of oil and gas servicing companies in Akwa-Ibom State. Therefore, this study recommends that, oil and gas servicing companies in Akwa-Ibom State should continue to deploy logistics risk assessment initiatives to provide essential insights into potential hazards and their implications in order to improve their resilience capacity.

References

- Ateke, B. W., & Nwulu, C. S. (2018). Employee competency development and organisational resilience of deposit money banks. *International Journal of Social Sciences and Management Research*, 4(3), 31-44.
- Ateke, B. W., & Nwulu, C. S. (2021). Dynamic marketing capabilities and adaptability of hospitality firms in Rivers State. *Nigerian Journal of Management Sciences*, 22(1), 165-189.

- Aven, T. (2016). Logistics risk assessment and risk management: Review of recent advances on their foundation. *European Journal of Operational Research*, 253(1), 1-13.
- Aven, T., & Renn, O. (2019). Improving risk management: From risk analysis to resilience-based strategies. *Safety Science*, 120, 197-205.
- Aven, T., & Zio, E. (2014). Foundational issues in logistics risk assessment and risk management. *Risk Analysis*, 34(7), 1164-1172.
- Azadeh, A., Keramati, A., & Shirali, G. A. (2017). Evaluation of resilience engineering factors in high-risk environments by fuzzy cognitive maps: A petrochemical plant. *Safety Science*, 93, 102-114.
- Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist*, 59(1), 20-28.
- Cohen, M. J. (2014). Does the concept of resilience contribute to understanding and managing freshwater ecosystems alongside other disturbances? *Current Opinion in Environmental Sustainability*, 5(1), 26-31.
- DeCarolis, D. M., & Deeds, D. L. (1999). The impact of stocks and flows of organizational knowledge on firm performance: An empirical investigation of the biotechnology industry. *Strategic Management Journal*, 20(10), 953-968.
- Dobbs, M., & Hamilton, R. T. (2007). Small business growth: Recent evidence and new directions. *International Journal of Entrepreneurial Behavior & Research*, 13(5), 296-322.
- Fiksel, J. (2015). *Resilient by design: Creating businesses that adapt and flourish in a changing world*. Island Press.
- Folkman, S., & Moskowitz, J. T. (2004). Coping: Pitfalls and promise. *Annual Review of Psychology*, 55(1), 745-774.
- Harcourt, H., & Ateke, B. W. (2018). Customer-contact employee empowerment and resilience of quick service restaurants. *European Journal of Human Resource Management Studies*, 1(2), 1-17.
- Hollnagel, E., Paries, J., Woods, D. D., & Wreathall, J. (2018). *Resilience engineering in practice: A guidebook*. Ashgate Publishing.
- Hollnagel, E., Woods, D. D., & Leveson, N. (2006). *Resilience engineering: Concepts and precepts*. Ashgate Publishing, Ltd.
- Hopkins, A. (2009). *The seven pillars of safety: Making workplaces safer*. Energy Institute.
- Hosseini, S., & Barker, K. (2019). Resilience in the oil and gas industry: A systematic review of the literature. *Journal of Resilience Engineering*, 12(2), 110-125.
- Leveson, N., Dulac, N., Marais, K., & Carroll, J. (2012). Moving beyond normal accidents and high reliability organizations: A systems approach to safety in complex systems. *Organization Studies*, 30(2-3), 227-249.
- McManus, S., Seville, E., Vargo, J., & Brunsdon, D. (2012). Facilitated process for improving organizational resilience. *Natural Hazards Review*, 13(1), 61-70.
- Nunnally, J. C. (1978). *Psychometric Theory*. New York: McGraw-Hill.
- Nwilo, P. C., & Badejo, O. T. (2006). Impacts and management of oil spill pollution along the Nigerian coastal areas. *Administering Marine Spaces: International Issues*, 119-133.
- Sutcliffe, K. M., & Vogus, T. J. (2003). Organizing for resilience. In K. S. Cameron, J. E. Dutton, & R. E. Quinn (Eds.), *Positive organizational scholarship: Foundations of a new discipline* (94-110). Berrett-Koehler Publishers.

- Udoh, A., & Okon, E. (2020). Environmental risks and business resilience in Nigeria's oil and gas sector. *Journal of Business and Environmental Studies*, 45(3), 123-135.
- Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the unexpected: Resilient performance in an age of uncertainty*. John Wiley & Sons.