



INTELLECTUAL CAPITAL AND BUSINESS SUCCESS AMONG OIL AND GAS FIRMS IN NIGERIA: CONTINGENT EFFECTS OF HO STILE ENVIRONMENT

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Abstract

In an increasingly volatile global economy, firms operating in resource-dependent sectors such as oil and gas face multifaceted environmental challenges that shape organizational outcomes. This conceptual paper examines the relationship between intellectual capital (IC) and business success among oil and gas firms in Nigeria, with a particular focus on the moderating role of a hostile environment. However, the effectiveness of these resources is argued to depend significantly on environmental conditions characterized by uncertainty, regulatory instability, insecurity, and market volatility. Therefore, this study proposes a conceptual framework that integrates intellectual capital and hostile environmental factors in explaining variations in business success. The paper contributes to the literature by extending IC research into a high-risk sector within a developing economy and by introducing environmental hostility as a critical boundary condition.

Keywords: Intellectual capital, business success, hostile environment, oil and gas sector, Nigeria

1. INTRODUCTION

The oil and gas sector remains a critical driver of economic development in Nigeria, contributing significantly to government revenue, foreign exchange earnings, and industrial growth (Ononokpono, 2025). Despite its strategic importance, the sector is characterized by persistent challenges, including regulatory uncertainty, infrastructural deficits, oil theft, environmental degradation, and geopolitical instability (Osho, 2025). These challenges collectively create a hostile operating environment that threatens organizational survival and long-term success.

In the contemporary knowledge-driven economy, tangible resources alone are insufficient to guarantee firm success. Instead, intangible assets—particularly intellectual capital (IC) have emerged as key determinants of organizational competitiveness and sustainability. Intellectual capital encompasses the knowledge, skills, systems, and relationships that firms leverage to create value and achieve superior outcomes (Mahamba 2026).

The oil and gas industry is one of the most crucial industries in the world, largely because of its strategic role in every economy and the world at large (Sharif and Faisal 2026). Nigeria's major source of energy is Oil and gas (Osho 2025). Before the advent of oil resources, agriculture was the mainstay of the Nigerian economy, which played a crucial role in shaping the country's economic and political destiny.



Also, Ruggeri (2025) opined that the performance of any organisation heavily depends on the income and expenses levels of the business. Still, today this approach loses its absolute meaning and impact as it has been supposed that eighty per cent of enterprise performance refers to proper management of intellectual capital (IC) items is the total knowledge that is embedded in the personnel, organizational routines and network relationships of an organisation. It contains three major components: human capital (HC), structural capital (SC) and capital employed (Mitra 2026). Therefore, in this current modern economy, practitioners and academicians and other policy makers have paid significant attention on the role of knowledge and Intangible assets (Berry, 2004).

Intellectual capital has emerged as a critical strategic resource for enhancing business success in knowledge-driven industries, including the Nigerian oil and gas sector (Bala and Hassan, 2024). Intellectual capital comprises human capital, structural capital, and capital employed efficiency, which collectively influence a firm's ability to create value and sustain competitive advantage. Human capital represents employees' knowledge, skills, expertise, and innovative capabilities, while structural capital encompasses organisational processes, databases, information systems, patents, and corporate culture that facilitate the utilisation of knowledge (Isola & Oyeniran, 2025). Capital employed efficiency reflects the effectiveness with which firms utilize their physical and financial resources to generate value. In the context of oil and gas firms, these dimensions of intellectual capital are expected to improve operational efficiency, innovation, productivity, and profitability, thereby enhancing earnings per share (EPS), a widely accepted measure of business success and shareholder value. Recent empirical evidence from Nigeria indicates that intellectual capital significantly contributes to firm performance, with capital employed efficiency showing a particularly strong positive effect on financial outcomes in the oil and gas industry (Bala & Abubakar, 2023).

However, the relationship between intellectual capital and EPS is often contingent upon the nature of the external environment. The Nigerian oil and gas sector operates within a hostile environment characterised by regulatory uncertainty, insecurity, pipeline vandalism, oil price volatility, inflationary pressures, foreign exchange fluctuations, and intense competition (Hussaini et al., 2025). Such environmental hostility may weaken firms' ability to fully leverage their intellectual resources, thereby reducing the positive impact of human capital, structural capital, and capital employed on earnings generation (Salman & Abdulsalam-Gambari, 2025). Conversely, firms possessing superior intellectual capital may be better equipped to adapt, innovate, and respond strategically to environmental challenges, thereby mitigating adverse effects and sustaining earnings growth (Isola & Oyeniran, 2025). Thus, hostile environmental conditions are expected to moderate the relationship between intellectual capital and EPS, either strengthening the importance of intellectual resources as strategic buffers or constraining their effectiveness when environmental turbulence becomes excessive. This perspective aligns with



the contingency theory, which posits that organizational performance depends on the fit between internal resources and external environmental conditions.

The growing importance of intellectual capital in contemporary business environments has transformed the way organizations create and sustain competitive advantage (Mukaro, et al., 2023). In knowledge-driven industries, intangible resources such as human capital, structural capital, and capital employed have become critical determinants of organizational success, often surpassing the significance of traditional physical assets (Abdalatif & Yamin, 2025). While numerous studies have examined the relationship between intellectual capital and firm performance, the existing literature presents mixed and inconclusive findings, particularly regarding the extent to which intellectual capital contributes to business success in developing economies (Akorede, 2024; Jikhan et al., 2023). Moreover, most prior studies have focused predominantly on the banking and financial services sectors, leaving other strategically important sectors, such as the oil and gas industry, relatively underexplored.

The Nigerian oil and gas sector remains a vital contributor to national economic growth, government revenue, and foreign exchange earnings (Isola & Oyeniran, 2023). Despite its significance, the sector operates within a highly challenging environment characterized by regulatory uncertainty, security threats, oil price volatility, infrastructural deficiencies, and intense competitive pressures. These environmental challenges may influence the extent to which firms can effectively utilize their intellectual resources to generate superior financial outcomes. Consequently, understanding how intellectual capital contributes to business success within such a hostile environment has become both a theoretical and practical necessity (Agbonifo, 2025).

Furthermore, existing studies have largely overlooked the contingent role of environmental hostility in shaping the relationship between intellectual capital and organizational success. While intellectual capital is widely recognized as a strategic resource capable of enhancing firm performance, its effectiveness may vary depending on the external conditions under which firms operate. This gap suggests the need for a more comprehensive investigation that integrates both internal strategic resources and external environmental factors.

Therefore, this study is motivated by the need to extend the intellectual capital literature by examining the effects of human capital, structural capital, and capital employed on business success, measured by earnings per share, among listed oil and gas firms in Nigeria. Additionally, the study seeks to determine whether a hostile environment moderates these relationships. By integrating the Resource-Based View and Contingency Theory, the study is expected to provide valuable insights for managers, policymakers, investors, and researchers on how intellectual capital can be effectively leveraged to achieve sustainable business success in a volatile and challenging business environment.



2. LITERATURE REVIEW

2.1 Concept of Intellectual Capital

Intellectual capital refers to the collective knowledge-based resources that organisations utilise to generate value and sustain competitive advantage in dynamic business environments (Malikah & Nandiroh, 2024). It encompasses intangible assets embedded within individuals, organizational structures, and external relationships that collectively enhance value creation and strategic positioning (Navarro & Medina, 2024). Also, Xu and Liu (2020) opined that contemporary literature emphasizes that intellectual capital is not merely a passive stock of knowledge, but a dynamic capability that facilitates innovation, learning, and adaptability in organizations operating in complex and uncertain environments. It is commonly categorized into three interrelated components: human capital, structural capital, and capital employed.

Human capital represents employees' competencies, skills, expertise, creativity, and innovative capabilities, which reside within individuals and serve as the primary source of knowledge generation and utilisation (Al-Husseini, 2023). It is widely regarded as the most critical component of intellectual capital because it drives the development and effective deployment of other organizational resources. Structural capital, on the other hand, comprises institutionalized knowledge embedded in organizational processes, databases, information systems, routines, and intellectual property, which remain within the organization even when employees leave (Malikah & Nandiroh 2024).

Furthermore, Mitra (2026) maintained that structural capital provides the infrastructure that enables knowledge to be codified, shared, and efficiently utilized. Capital employed refers to the value derived from an organisation's relationships with external stakeholders, including customers, suppliers, regulators, and strategic partners, and reflects the firm's reputation, trust, and network strength (Xu & Liu, 2020). Recent studies reaffirm that these three components collectively constitute the core architecture of intellectual capital and are fundamental to knowledge creation and organizational growth (Wahyudi et al., 2026).

Importantly, these components do not operate in isolation; rather, they interact synergistically to enhance organizational efficiency, innovation capability, and sustained competitive advantage (Pissardini et al., 2025). Human capital generates knowledge, structural capital institutionalizes and disseminates it, while capital employed facilitates its external exploitation and value realization (Hayat & Qingyu, 2024). This integrative interaction strengthens firms' ability to respond to environmental changes and exploit emerging opportunities. In capital-intensive industries such as oil and gas, where operational complexity, technological sophistication, and environmental uncertainty are prevalent, intellectual capital plays a crucial role in optimizing operations, improving strategic decision-making, and fostering technological advancement. Specifically, human expertise enhances exploration and production efficiency, structural systems support data-driven decision processes, and relational networks facilitate regulatory compliance



and stakeholder engagement. Consequently, intellectual capital becomes a critical enabler of business success, particularly in emerging economies where firms must navigate both resource constraints and hostile operating environments.

2.2 The Concept of Business Success

Business success is a multidimensional construct that reflects a firm's ability to achieve its strategic objectives, sustain profitability, and maintain competitive advantage over time. It extends beyond financial indicators to include operational efficiency, innovation capability, market share growth, and stakeholder satisfaction (Jordão & Almeida, 2017). In this study, business success is conceptualized as a holistic outcome encompassing both financial and non-financial performance indicators, thereby providing a more comprehensive measure of organisational effectiveness.

2.3 The Concept of Hostile Environment

A hostile environment refers to external conditions that pose significant threats to organizational operations and performance. Such conditions may include economic instability, intense competition, regulatory uncertainty, security challenges, and technological disruptions.

In the Nigerian oil and gas sector, environmental hostility manifests in forms such as pipeline vandalism, policy inconsistency, community conflicts, and fluctuating global oil prices. These factors increase operational risks and constrain firms' ability to fully leverage their internal resources.

2.4 Theoretical Review

2.4.1 Resource-Based View (RBV)

The Resource-Based View (RBV) posits that firms achieve sustainable competitive advantage by acquiring, developing, and effectively utilising resources that are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991). These strategic resources enable firms to implement value-creating strategies that competitors cannot easily replicate, thereby generating superior performance and long-term success. Contemporary scholarship further emphasizes that both tangible and intangible resources—particularly knowledge-based assets—serve as the primary drivers of competitive advantage, as they are often heterogeneous and immobile across firms. Within this context, intellectual capital—comprising human expertise, organizational systems, and relational networks—fits squarely within the VRIN framework because it embodies firm-specific knowledge, routines, and capabilities that are difficult to imitate or substitute by competitor. Also, RBV emphasized on the role of intangible resources and organizational capabilities which include analysing intellectual capital in generating a firm's sustainable competitive advantages (Noordin, 2014).



Recent studies reaffirm the enduring relevance of RBV in explaining performance differentials among firms, particularly through its focus on internal resource configurations and strategic capabilities. For instance, Helfat et al. (2023) and related contemporary works highlight that firms derive sustained advantage not merely from resource possession but from their ability to orchestrate and deploy these resources effectively in achieving organizational objectives. In this regard, intellectual capital is increasingly viewed as a critical strategic asset that enhances innovation, operational efficiency, and adaptability, especially in knowledge-intensive and technology-driven industries.

However, despite its strengths, RBV has been widely critiqued for its underlying assumption of relatively stable and predictable environments. The theory tends to adopt a static perspective, focusing predominantly on internal firm resources while giving limited attention to external environmental dynamics. Emerging literature (2023–2025) argues that RBV does not sufficiently account for rapid environmental changes, uncertainty, and industry turbulence, which can significantly influence the value and effectiveness of firm resources. In highly volatile sectors such as oil and gas, where firms are exposed to fluctuating oil prices, regulatory instability, security challenges, and technological disruptions, the assumption of environmental stability becomes unrealistic.

Moreover, Abel (2025) maintained that the value of resources is not inherent but context-dependent, meaning that resources deemed valuable in one environment may lose their strategic relevance under different conditions. This limitation highlights the need for firms to continuously reconfigure and adapt their resource base in response to changing environmental conditions. As noted in recent critiques, RBV's limited consideration of external factors and its static nature necessitate the integration of complementary theoretical perspectives, such as the dynamic capabilities approach and contingency theory, which emphasize adaptability, environmental alignment, and strategic flexibility.

Consequently, integrating contingency perspectives with RBV provides a more robust framework for understanding firm performance (Helfat, 2023). Contingency theory posits that the effectiveness of organizational resources depends on the degree of fit between internal capabilities and external environmental conditions. This implies that while intellectual capital may serve as a source of competitive advantage, its impact on business success is contingent upon the nature and intensity of environmental factors. In hostile and uncertain environments, firms must not only possess valuable resources but also develop the capacity to adapt, reconfigure, and align these resources with external demands to sustain competitive advantage (Mazzei, 2024).

Finally, resource-based theory views the IC as a strategic resource. This is because firms gain competitive advantage and superior performance through the acquisition, holding and efficient



use of these strategic resources. More recently, the IC-based theory developed by Reed et al. (2006) has been advanced as one specific aspect of resource-based theory (Almusali, 2009).

2.4.2 Contingency Theory

Contingency theory suggests that organizational effectiveness depends on the degree of alignment between internal resources, structures, and capabilities and the external environmental conditions within which a firm operates (Donaldson, 2001). The central premise of the theory is that there is no universally optimal strategy, structure, or resource configuration; rather, organizational success is contingent upon the fit between internal organizational attributes and situational factors such as environmental uncertainty, technological complexity, and competitive intensity. Recent studies reinforce this perspective by emphasizing that organizations must continuously adapt their internal systems and strategies to respond to changing environmental demands in order to achieve optimal performance outcomes (Nassou, & Bennani, 2024).

This perspective implies that the value and effectiveness of intellectual capital are not absolute but context-dependent (Sain, et al., 2025). In other words, the contribution of human, structural, and capital employed to business success varies depending on the nature and intensity of environmental conditions. For instance, in stable environments, firms may efficiently leverage structured knowledge systems and established routines to drive performance. However, in dynamic and uncertain environments, the ability of firms to utilize intellectual capital depends largely on their flexibility, adaptability, and responsiveness to external pressures. Contemporary research highlights that environmental dynamism and uncertainty significantly influence how organizations deploy human capital and knowledge resources to achieve ambidexterity and innovation outcomes.

By integrating the Resource-Based View (RBV) and contingency theory, a more comprehensive explanation of firm performance can be achieved (Urban, & Kanguwe, 2024). While RBV emphasizes the strategic importance of valuable, rare, inimitable, and non-substitutable resources such as intellectual capital, contingency theory introduces the critical insight that the effectiveness of these resources is conditional upon environmental factors. Thus, intellectual capital enhances business success, but its impact is neither uniform nor guaranteed across contexts. Instead, its effectiveness is moderated by environmental hostility, such that in highly volatile and hostile environments—characterized by uncertainty, insecurity, and regulatory instability—the positive influence of intellectual capital may be weakened or require adaptive capabilities to be fully realized.

In the context of the Nigerian oil and gas sector, this integrated perspective is particularly relevant. Firms operate in an environment marked by fluctuating global oil prices, policy inconsistency, infrastructural deficits, and security challenges. Under such conditions, the mere possession of intellectual capital is insufficient; rather, firms must develop the capacity to align,



reconfigure, and deploy these resources strategically in response to environmental contingencies. Consequently, the integration of RBV and contingency theory provides a robust theoretical foundation for understanding how intellectual capital contributes to business success under varying levels of environmental hostility (Al-Husseini, 2024).

2.5 Review of Empirical Studies

Empirical evidence from recent studies suggests that the effective alignment and integration of these intellectual capital components significantly improve organizational performance outcomes, particularly through enhanced learning, innovation, and strategic flexibility (Kajejy & Alzubi, 2026).

Prior studies have used Value Added Intellectual Capital to evaluate the relationship between IC and firm performance. Berzkalne and Zelgalve (2023) examine the influence of IC on company performance, where mixed results were detected. Almost all the prior studies on IC over the last two decades, for example, Bala & Hassan, (2024). are mostly concentrated on banking and financial sectors and neglect other sectors, food product companies inclusive. Still, they do not reach any agreement on the role of the firm's performance. This is because of the inconsistent results in studies conducted in different companies. It is clear from the literature that IC is an asset of the organisation, and an increase in IC ought to increase the worth and profitability of the organisation also. The mixed and inconclusive results in the subject IC and its impact on firms' performance are topical and require more research, especially in oil and gas companies, due to scarce empirical studies on this sector.

Theoretically, most of the studies, for example, Sayed and Nefzi, (2024), Usman and Khadija Lina (2025) did not apply any underpinning theory to support their studies. Practically, it can be noted that, companies in Nigeria still use traditional accounting models in measurement and reporting systems. This is because, most of the reported IC drivers are expressed in narrative and qualitative instead of in quantitative or fiscal terms with this style, financial performance will never be measure and report genuinely to concern parties (Shehu, & Maidarasu, 2025). VAIC was developed by Pulic, (1998), which monitors and measures the value creation efficiency in the company according to accounting based figures. The VAIC model is intended to measure the extent to which a company produces added value based on intellectual (capital) intellectual resources (Stahle, Stahle and Aho, 2011). Simple computations of VAIC model is as follows:

Uzoma et al. (2017) examined intellectual capital management and organizational performance of selected food and beverage companies in Nigeria within 2008-2011. Their findings reveal positive and significant effect of intellectual capital (Human, structural and capital employed) on organizational performance proxied by return on assets (RAO). The study failed to provide the population and sample size of the study.

Lucy, Ifenyi and Iyidiobi (2025) studied the effect of intellectual capital on bank performance for



a period of ten years from 2015-2025. The results from multiple regression analysis show that intellectual capital has positive and significant impact on bank performance.

On the contrast, Ofurum and Aliyu (2022) investigated the effect of intellectual capital component on financial performance of quoted banks in Nigeria. 15 banks listed on the Nigerian exchange group as at 31st December, 2020. They reveal that some elements of IC were not significantly related to sales growth and return on investment; as such they concluded that intellectual capital has not fully related to financial performance. The time frame for the study were not given, similarly other measures of financial performance such as return on assets (ROA), return on equity (ROE) may produce different results. Moreover, the study was done in Nigerian financial service industry which highly regulated sector, therefore the findings would be difficult to generalized t other sector.

The studies presented above are mostly related to the developing economies which are in close proximity of Nigerian local context. Thus, there are number of empirical studies conducted in the area of IC around the world over two decades, in various industries across the economies, but up to now, there are no agreement on the significance of IC on a firm's performance. This is because of the diverse and inconsistent evidence in studies carried out in different economies. In addition, it is seen from the literature that IC is an asset of the company and an increase in IC should increase the value of the company as well. The mixed and inconclusive results in the subject of IC and its impact on firms' performance is topical and require more research.

2.6. Hypotheses Development

2.6.1 Human Capital and Business Success

Preceding research by Fathi et al., (2013) indicate that there is a significant positive relationship between value-added efficiency of capital employed and value-added efficiency of human capital, with two independent variables, i.e. ROE and ROA. Additionally, the study carried out in India showed that human capital is increasingly crucial and positively related towards the organisational performance in today's knowledge economy Choudhury, (2010) Also the study of M.-C. Chen et al., (2005a) observed that human capital efficiency is positively associated with financial performance measures, return on assets, return on equity, growth in revenue, and employee productivity.

Komnenic & Pokrajcic, (2022) examined the association between IC and firm performance. The finding shows that human capital is significantly and positively correlated to all the three corporate performance dimensions i.e. ROA, ROE and ATO. The study of Salman et al., (2022) found that there is a significant positive relationship between company's human capital efficiency and return on asset. Therefore, it is hypothesised that:



H₁: Human capital positively influences business success among oil and gas firms in Nigeria.

2.6.2 Structural Capital and Business Success

Bontis, (2000) conducted a study on IC and business performance and revealed that the development of structural capital has a positive relationship with business performance regardless of industry. Maditinos, Sevic, & Tsairidi (2009), carried out another study to confirm and extend the findings of Bontis, (2000). The findings of the study consistently revealed that structural capital has a positive relationship to business performance in both industry types, and especially in non-service industries. In addition, the study suggested that the relationship between structural capital and business performance is positive and relatively important to non-service industries as well. Hence, in light of the above findings, the following hypothesis is derived:

H₂: Structural capital positively influences business success among oil and gas firms in Nigeria.

2.6.3 Capital Employed and Business Success

Capital employed is regarded as the strongest predictor of performance (Choudhury, 2010). Therefore, Lina (2014) opined that a strong linkage between capital employed supports that knowledge tied up in relationships among employees, customers, suppliers, alliance partners and the like tends to lead to process and produce innovations, better problem solving, which tends to increase production and service delivery efficiencies as well as customer satisfaction.

However, Prior research conducted by Salman et al. (2012) reveals that the association between capital employed and company performance remained mix and inconclusive. The reason for this could be that many manufacturing companies' managers, like those in other developing countries, invest heavily in human capital without providing adequate and proportionate organizational structure and physical capital to work with. Likewise, the study of M. Y. Chen (2014) found that there is a positive relationship between capital employed efficiency and both the market value and the financial performance of Taiwanese companies. Additionally, Ahmed & Ghazali-Mohd (2013) examined the relationship between four components of IC (human, structural, capital and spiritual capital) and firm performance. The study revealed a significant and positive relationship between all four components and a firm's performance; they also observed that among the four IC dimensions, capital employed has the strongest positive association.

Appuhami and Bhuyan (2015) also found a positive relationship between capitals employed efficiency and capital gains on shares of listed companies in the Thai stock market. Also, Khalique et al. (2011) conducted research on the relationship of IC with the organisational performance of commercial banks in Islamabad, Pakistan. The results showed that capital employed has a positive relationship with organisational performance. Though many studies



have found the relationship between capital employed and business performance but still mixed and inconclusive, this component of IC still makes up a reasonable linkage with business performance. Thus, the relation to capital employed is formulated as follows:

H₃: Capital Employed positively influences business success among oil and gas firms in Nigeria.

2.6.4 Hostile Environment, Human Capital and Business Success

Human capital, as a critical dimension of intellectual capital, represents the knowledge, skills, competencies, and innovative capabilities embedded in employees, which are essential for enhancing organizational productivity and achieving business success. In knowledge-driven industries, human capital serves as the primary driver of innovation, problem-solving, and strategic decision-making, thereby contributing significantly to firm performance and long-term sustainability. Recent empirical evidence indicates that organizations with highly skilled and knowledgeable employees are better positioned to achieve superior performance outcomes, particularly through enhanced innovation and operational efficiency (Hassen & Lemma, 2026; Mukaro et al., 2023).

From the Resource-Based View (RBV), human capital qualifies as a strategic resource due to its valuable, rare, and inimitable nature, enabling firms to build and sustain competitive advantage. However, the effectiveness of human capital in driving business success is not unconditional but depends on the external environment within which firms operate. Contingency theory posits that organizational outcomes are shaped by the alignment between internal capabilities and environmental conditions, suggesting that the value of human capital may vary across different environmental contexts.

In hostile environments—characterized by uncertainty, regulatory instability, intense competition, and operational risks—the ability of firms to fully leverage human capital may be significantly constrained. Such environments increase unpredictability and disrupt organizational processes, thereby limiting employees' ability to translate their knowledge and skills into productive outcomes. For instance, environmental turbulence may reduce the efficiency of decision-making processes, increase stress and uncertainty among employees, and hinder innovation activities. Recent studies provide empirical support for this argument, showing that the positive impact of intellectual capital components, including human capital, on firm performance diminishes under conditions of environmental dynamism and uncertainty (Al-Husseini, 2023; Nguyen et al., 2024).

Furthermore, hostile environments often divert organizational attention and resources toward survival-oriented strategies rather than innovation and capability development. In such contexts, firms may prioritise risk mitigation, cost control, and crisis management, thereby underutilising their human capital. Similarly, external disruptions such as regulatory changes, market volatility,



and security challenges may create barriers that prevent employees from effectively applying their expertise. However, while hostile environments generally exert a constraining effect, their impact may vary depending on the firm's adaptive capacity and resilience. Firms that develop flexible structures, learning-oriented cultures, and dynamic capabilities may still leverage human capital effectively despite environmental challenges. Nonetheless, in the absence of such capabilities, the dominant effect of environmental hostility is likely to be negative, weakening the relationship between human capital and business success.

Drawing from the foregoing theoretical and empirical arguments, it is evident that environmental hostility acts as a critical boundary condition that shapes the effectiveness of human capital in driving business success. Therefore, the relationship between human capital and business success is expected to be contingent upon the level of environmental hostility faced by firms. Thus, the related to hostile environment, the relationship between human capital and business success, formulated as follows:

H4: A hostile environment negatively moderates the relationship between human capital and business success, such that the positive effect of human capital on business success is weaker under conditions of high environmental hostility.

2.6.5 Hostile Environment, Structural Capital and Business Success.

Structural capital represents the institutionalized knowledge embedded within an organization's systems, processes, routines, databases, and intellectual property, which collectively support the efficient utilization and dissemination of knowledge. Unlike human capital, which resides in individuals, structural capital remains within the organization and provides the infrastructure that enables continuity, coordination, and scalability of operations. It plays a critical role in enhancing organizational efficiency, facilitating innovation, and improving decision-making processes, thereby contributing significantly to business success.

From the Resource-Based View (RBV), structural capital constitutes a strategic asset that enhances firm performance by codifying knowledge and embedding it into organizational routines that are difficult for competitors to replicate. Empirical evidence suggests that firms with well-developed structural capital—such as robust information systems, standardized procedures, and strong knowledge management mechanisms—tend to achieve superior performance outcomes due to improved operational efficiency and reduced uncertainty in decision-making processes (Hurtado-Palomino et al., 2024). Similarly, recent studies indicate that structural capital enhances value creation by enabling firms to coordinate resources effectively and sustain innovation activities over time.

Therefore, the related to hostile environment and structural capital and business success is formulated as follows:



H₅: A hostile environment negatively moderates the relationship between structural capital and business success, such that the positive effect of structural capital on business success is weaker under conditions of high environmental hostility.

2.6.6 Hostile Environment, Capital Employed and Business Success.

Capital employed, often operationalized as capital employed efficiency (CEE) within the intellectual capital framework, and represents the effective utilization of a firm's tangible and financial resources to generate value. It reflects how efficiently physical and financial capital—such as assets, infrastructure, and investments—are deployed to produce organizational outcomes. In capital-intensive industries like oil and gas, capital employed plays a crucial role in driving productivity, operational efficiency, and ultimately business success.

From the Resource-Based View (RBV), capital employed constitutes a strategic resource when it is efficiently utilized to support value creation and enhance firm competitiveness. Although traditionally considered a tangible resource, recent literature emphasizes that its effectiveness depends on how well it is integrated with intangible resources such as intellectual capital. Empirical evidence indicates that capital employed efficiency significantly contributes to firm performance by improving asset utilization and financial returns (Sayed & Nefzi, 2024; Pratama et al., 2024). Similarly, studies in emerging economies show that firms that efficiently deploy capital resources tend to achieve superior financial and operational outcomes due to enhanced productivity and cost efficiency (Ajaefm, 2024).

However, the effectiveness of capital employed in driving business success is not absolute and may vary depending on external environmental conditions. Contingency theory posits that organizational performance is a function of the alignment between internal resources and environmental factors (Donaldson, 2001). In stable environments, efficient utilization of capital employed can lead to predictable returns and improved business outcomes. Conversely, in hostile environments—characterized by market volatility, regulatory instability, technological disruption, and security challenges—the ability of firms to effectively utilize capital resources may be significantly constrained.

Hostile environments can undermine the efficiency of capital employed in several ways. First, economic instability and fluctuating market conditions may reduce the returns on investments, thereby weakening the contribution of capital employed to business success. Second, regulatory uncertainty and policy inconsistencies may render existing investments less productive or even obsolete. Third, operational disruptions such as insecurity, vandalism, and infrastructural deficiencies—common in the oil and gas sector—can impair the utilization of physical assets, leading to inefficiencies and increased costs.

Recent empirical studies support the moderating role of environmental conditions in shaping the relationship between firm resources and performance. For instance, research on global firms indicates that environmental turbulence limits the ability of firms to convert resources into performance outcomes, particularly under conditions of uncertainty and instability (Zhang et al., 2024). Similarly, evidence from Nigeria suggests that the impact of capital employed on firm value may vary depending on contextual factors such as regulatory policies and governance structures (Usman & Khadija, 2025). Specifically, environmental hostility is expected to weaken



the positive relationship between capital employed and business success. Hence, the related to hostile environment, the relationship between human capital and business success, formulated as follows:

H₆: A hostile environment negatively moderates the relationship between capital employed and business success, such that the positive effect of capital employed on business success is weaker under conditions of high environmental hostility.

3. METHODOLOGY

This study will use correlational research design. The population of the study consist of 10 firms listed under the oil and gas industry between 2015-2025.

Table 1: List of Quoted Companies in Petroleum Marketing & Distribution Industry as at 31st December, 2025

S/N	Company Name	Years of Incorporation	Years of Listing
1	African Petroleum Plc (AP)	1978	1978
2	Mobil Oil Nig. Plc	1978	1978
3	MRS Oil Nig. Plc	1978	1978
4	Total Nig. Plc	1979	1979
5	Conoil Plc	1989	1989
6	Afroil Plc	1990	1990
7	Oando Plc	1992	1992
8	Eterna Oil & Gas Co. Plc	1998	1998
9	Forte Oil Plc	?	?
10	Beco Petroleum Plc	2009	2009

Source: Nigerian Exchange Group, 2025

This study adopts a two-point filtering criterion to determine the sample size. For a company to qualify for inclusion in the sample, it must satisfy the following conditions: (1) it must have been listed throughout the entire study period, and (2) it must possess all the required data relevant to the study. The first criterion ensures a complete observation of the company's disclosure behaviour over the entire period under investigation, thereby satisfying the minimum requirements of a longitudinal study. The second criterion is intended to eliminate incomplete observations and avoid the inclusion of redundant or unusable samples, thereby enhancing the reliability and validity of the study's findings.

After using the above filter, nine out of 10 companies selected as sample size for this study, Beco is excluded from the sample as it was delisted in 2009. Data for the study will be extracted from the annual report and accounts of the sampled firm. The model of the study will be adopted from the work of Lucy *et al* (2017), Garko (2015), and Kurawa and Kabara (2014) with modifications



Operational Definition of Variables

Dependent Variables:	Definition	Measurements	Source
EPS	is a financial metric that indicates how much profit a company generates for each outstanding share of its common stock	Net Income – Dividends on Preferred stock)/Average outstanding Shares	Anuonye (2015)
Independent Variables			
VAHU	Human capital (HC) is interpreted as employee expenses and human capital (HC) is calculated by dividing (VA) added value with human capital (HC): $HC = VA/HC$	$HC+SC+CE$ Added value / human capital	Anuonye, (2015) Anuonye, (2015)
VACA	Capital employed (CE) is interpreted as financial capital and is calculated by dividing VA with CE: VA/CE	Added value / capital employed (capital employed = total assets - intangible assets)	Ong et. al (2011), (Pulic, 1998).
STVA	Structural capital (SC) is the difference between produced VA and HC or $VA-HC$ is calculated by dividing SC with VA: $VA-HC/VA$	Structural capital / value added	Lina, (2014), Bueno et al. (2004)
VAIC	Value Added Intellectual Efficiency is the sum of this three indexes; thus: $VAIC = VAHU + VACA + STVA$		
Moderating Variables:			
hostile environment	It is a macro- and industry-level setting in which firms face volatile economic conditions, strong competitive pressures, restrictive institutional frameworks, and resource scarcity, thereby constraining strategic choices and reducing the likelihood of sustained business success.	Inflation rate	Usman & Khadija, (2025).

5. CONCLUSION

This paper contributes to the intellectual capital literature by demonstrating that the relationship between intellectual capital and business success is significantly influenced by the environmental conditions within which firms operate. While intellectual capital, comprising human capital,



structural capital, and relational capital, is widely recognized as a strategic resource that enhances organizational performance and competitive advantage, its effectiveness is not guaranteed under all circumstances. Drawing on the Resource-Based View (RBV) and Contingency Theory, the paper argues that the value-creating potential of intellectual capital depends largely on the level of environmental hostility facing the firm.

The study identifies environmental hostility as a critical moderating factor that can either strengthen or weaken the impact of intellectual capital on business success. Factors such as economic uncertainty, regulatory instability, intense competition, infrastructural deficiencies, and security challenges may limit firms' ability to effectively utilize their intellectual resources. Consequently, organizations must complement investments in intellectual capital with adaptive strategies that enable them to respond to changing environmental conditions.

The framework is particularly relevant to Nigeria's oil and gas sector, where firms operate in a highly volatile and challenging environment. By integrating environmental hostility into the intellectual capital–business success relationship, the paper provides a more comprehensive understanding of how intangible resources contribute to organizational outcomes. Ultimately, it emphasizes that sustainable business success depends not only on the possession of valuable intellectual capital but also on a firm's ability to effectively deploy and leverage these resources within a dynamic and often hostile business environment.

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