

Navigating Geopolitical Turbulence: A Qualitative Investigation of Supply Chain Resilience Strategies in the African Oil and Gas Sector

Pennel Tabi AGBORNKWAI¹

¹ Department of Supply Chain and Procurement Management, Swiss

International University

Email: p9tabi@yahoo.com

Abstract:

Resilience within the supply chains of African Oil & Gas (AOG) companies has been neglected by the literature, which has mostly covered supply chains in well-structured, mature environments. This research fills this research void through a qualitative analysis of how AOG firms can achieve resilience in a long-term period of geopolitical instability and disruption, such as the current Russia-Ukraine conflict as well as the increasing foreign participation (particularly China) in Africa's energy sector. Semi-structured interviews with senior supply chain managers, logistics directors, procurement officers and other stakeholders involved in the process in Western, Eastern, Central, Northern and Southern parts of Africa were conducted and analyzed through an inductive-deductive approach. Five major themes were identified: risk identification, supplier relationship management, visibility via technology, workforce preparation and external regulations – with real-time visibility as a common resilience-enabling factor. Regional differences have been observed: Western Africa paid more attention to supplier/route diversification, Eastern Africa stressed the need for digital coordination and environmental monitoring while Southern Africa considered sustainable technology and regional collaboration as key.

Keywords: supply chain resilience; qualitative research; African oil and gas; supply chain visibility; geopolitical risk; resilience strategies; thematic analysis

1. Introduction

1.1 Background and Rationale

Africa has a considerable proportion of proven oil and gas resources in the world, with production being centered in countries such as Libya, Nigeria, Algeria, Angola, Sudan, Egypt, Republic of Congo, Uganda, Gabon, and Equatorial Guinea. The oil and gas industry continues to be one of the key sources of growth in these nations, contributing greatly to GDP, budget revenues, and foreign exchange earnings. On the other hand, the African oil and gas (AOG) industry faces an array of unique vulnerabilities including persistent geopolitical tensions, infrastructure shortages, and economic instability.

Resilience within the supply chain – the ability to prepare for, withstand, adapt to, and recuperate from disruption – has emerged as a core concern for both practitioners and academics in light of the multiple shocks to the system experienced throughout recent years, ranging from the global COVID-19 pandemic to the war between Russia and Ukraine. However, the great bulk of the literature on resilience has been developed with respect to supply chains that operate within an environment of relative stability of the institutional and infrastructural conditions surrounding them. The unique dynamics that have formed around the AOG industry, in terms of its exposure to political instability, poorly-developed transport and energy infrastructure, currency instability, and the geopolitical machinations of the outside players, have been examined in much less detail.

1.2 Reasons for a Qualitative, Practitioner-Based Approach

A qualitative, practitioner-based research design was adopted for this study because the phenomenon of interest – how firms perceive, interpret, and respond to geopolitical and operational disruption – is fundamentally experiential and context-dependent. Quantitative measures of supply chain performance can indicate that disruption has occurred, but they are less well suited to explaining how practitioners recognise emerging risk, negotiate it with suppliers, communities and governments, and translate lessons learned into organisational practice. Semi-structured interviews with senior supply chain managers, logistics coordinators, and policy-facing stakeholders allow this tacit, practice-based knowledge to surface in a way

that structured survey instruments cannot readily capture. This approach is consistent with calls in the supply chain risk management literature for richer, practitioner-grounded accounts of resilience-building in emerging and high-risk markets.

1.3 Research Questions

- RQ1: What strategies do African oil and gas firms use to build supply chain resilience under conditions of geopolitical instability?
- RQ2: Which resilience-enabling factors — risk management, supplier relationships, technology, human capital, or external stakeholder engagement — are perceived by practitioners as most consequential?
- RQ3: How do resilience strategies vary across West, East, and Southern Africa, and what does this regional variation suggest about the contingent, context-specific nature of resilience-building?

1.4 Contribution and Structure of the Paper

This paper contributes rich, practitioner-based evidence to the theory of supply chain resilience in a sector that remains comparatively under-researched relative to its global economic significance. This paper is organized as follows. In section 2, the literature concerning supply chain resilience, technology-mediated visibility, and dynamic capabilities theory is reviewed and the particular research gap being addressed is identified. In section 3, the qualitative research methodological approach, which includes the sampling strategy, interview approach, and process of thematic analysis, is described. In section 4, the results of the study are presented along five themes. In section 5, the resilience approaches of West, East, and Southern Africa are compared. In section 6, the results are analyzed in light of the theoretical literature, while section 7 concludes the paper.

1.5 Peculiar Turbulences Across the Upstream, Midstream, and Downstream Value Chain

Beyond the generic categories of political, infrastructural, and economic risk discussed above, the turbulence facing AOG firms is not uniform along the value chain; the peculiar pressures confronting upstream, midstream, and downstream operations differ markedly in origin and consequence, and most African oil-producing economies experience some combination of the three simultaneously. This segment-specific framing is used later in the paper to contextualise why practitioners in different roles and sub-regions foreground different resilience strategies.

Upstream (exploration and production):

turbulence here is concentrated at the point where the state, the firm, and the host community intersect.

- Resource nationalism and periodic renegotiation of licensing terms, fiscal regimes, and local-content requirements, which unsettle long-horizon investment planning (Andreasson, 2015).
- Community relations and security exposure, including land and compensation disputes, pipeline vandalism, and disruption of field operations in producing regions.
- Dependence on foreign joint-venture partners and OPEC-linked production decisions, which tie exploration financing to a geopolitical risk premium set largely outside the continent (Wang, Su and Umar, 2021).
- Cost and schedule overruns on capital-intensive field development projects, compounded by the operating conditions distinctive to African basins (Rui et al., 2017).

Midstream (pipelines, storage, and transport):

turbulence here centres on the physical and regulatory connective tissue linking production to market.

- Ageing or incomplete pipeline, rail, and port infrastructure, which leaves firms reliant on costly road transport and redundant routing.
- Cross-border transit risk where pipelines and corridors pass through neighbouring states with differing levels of political stability and regulatory alignment.
- Product theft and illegal tapping ("bunkering") of pipelines, forcing shutdowns and diverting resources toward surveillance rather than throughput.
- Storage and port-handling constraints that generate congestion and demurrage costs, amplified by currency shortages that delay clearance of imported equipment and freight contracts.

Downstream (refining, distribution, and retail):

turbulence here is felt most directly by consumers and is closely bound up with domestic policy.

- Underutilised or ageing domestic refining capacity, which leaves several crude-producing economies paradoxically dependent on imported refined products.
- Fuel subsidy and price-control regimes subject to abrupt policy reversal, producing sudden shifts in margins and demand (Bala and Chin, 2018).
- Foreign-exchange scarcity that restricts the import of refined products and distribution equipment, a recurring theme in participant accounts of currency risk.
- Informal and cross-border parallel-market fuel distribution, together with strike- and scarcity-driven retail disruptions, which undermine planned distribution schedules.

Taken together, these segment-specific turbulences help explain why the resilience strategies documented later in this paper cluster differently by sub-region: firms whose exposure is weighted toward the upstream segment gravitate toward security- and contract-oriented risk management, those most exposed midstream prioritise route and mode diversification, and those with significant downstream exposure place relatively greater emphasis on regulatory engagement and currency hedging.

2. Literature Review

2.1 Conceptualising Supply Chain Resilience

Resilience in a supply chain is often discussed on the basis of two main concepts: vulnerability, which refers to the level of exposure and susceptibility of the supply chain to being disrupted, and capability, which means the resources and competencies that the firm is able to use to resist and recover from this disruption. In this school of thought, flexible, redundant and robust supply chain is considered to be capable of resisting disruptions without becoming incapable of performing its function properly. The resilience model by Christopher and Peck explains resilience in terms of the capacity of a supply chain to resist disruption while at the same time maintaining its initial or even improved state of functionality. The qualities of a resilient supply chain, such as agility, adaptability, alignment and collaboration, have been identified in the literature and will be used as a conceptual guide for conducting thematic analysis in this study.

A parallel stream of resilience scholarship draws on resilience engineering, which treats resilience not as a fixed structural property but as an ongoing process of adjustment — a system's capacity to adjust its functioning before, during, and after disruption. This process-oriented framing is particularly relevant to the AOG sector, where disruption is rarely a single discrete event but rather a continuous condition that firms must manage adaptively over time.

2.2 Technology-Based Visibility in Supply Chains: Prior Studies and the Research Gap

A substantial body of work links supply chain visibility — typically operationalised through real-time tracking, data analytics, and digital communication platforms — to improved resilience outcomes. Visibility is theorised to work by compressing the time between the onset of disruption and its detection, thereby widening the window in which a firm can respond before losses compound. Communication quality and relational commitment between supply chain partners have similarly been shown to strengthen resilience through a social-exchange mechanism, in which trust and reciprocal information-sharing reduce the likelihood that disruption at one node cascades through the network (Yesim Can Saglam et al., 2022).

However, this literature has been developed overwhelmingly with reference to manufacturing, retail, and technology-sector supply chains operating in institutionally mature markets. The specific question of how visibility-enabling technologies are adopted, adapted, and valued by practitioners operating in the infrastructurally constrained and politically volatile environment of the AOG sector has received comparatively little direct empirical attention. This represents a meaningful gap that the present study is positioned to address.

2.3 Geopolitical Risk and the AOG Supply Chain

The AOG sector's exposure to geopolitical risk has intensified in recent years, driven in large part by the deepening economic presence of external powers, particularly China, and by the reverberations of the Russia-Ukraine conflict. Since the onset of the conflict, global oil prices have risen sharply, and African oil-importing economies have experienced material cost and inflationary pressure as a direct consequence (Umar et al., 2022; Kohnert, 2022). Global energy-market volatility induced by the conflict has, in turn, shaped investment, operational planning, and financial forecasting across the continent (Zhang et al., 2023).

On one hand, China's infrastructural investments in connection to the Belt and Road Initiative in Africa have also impacted the resource dependencies and the trading relations that AOG companies need to take into consideration, hence another geopolitical dimension in supply chains (Alden, 2017). Complex

interdependence theory, viewing international relations as both competitive and cooperative, is a good framework through which to view the impact that choices by OPEC countries or other major trading partners make on the decisions of AOG firms (Keohane, 2020). On the other hand, power politics theory provides explanations of how African oil-producing countries use the linkages that they have with major consuming countries to influence trade and investment.

2.4 Dynamic Capabilities and Resilience Building

The dynamic capabilities theory that refers to the ability of a firm to detect new threats and opportunities, act on them by reallocating resources and change its business model accordingly, is an additional perspective on theoretical foundations. Applied to the AOG context, dynamic capabilities theory suggests that the firms best positioned to withstand geopolitical shocks are not necessarily those with the most redundant infrastructure, but those with the organisational agility to reconfigure supplier relationships, redeploy technology, and reallocate personnel rapidly in response to a changing risk environment. Absorptive capacity — a firm's ability to recognise, assimilate, and apply new external information — has been shown to strengthen this capability, particularly when aligned with marketing and supply chain management functions (Ismail Gölgeci and Olli Kuivalainen, 2020).

2.5 Gaps in the Existing Research

Three gaps in the literature motivate this study. First, existing work on geopolitical risk and supply chain resilience tends to operate at a global or cross-regional level of analysis, which risks obscuring the nation-state and sub-regional specificity of the challenges facing AOG firms. Second, while the general relationship between technology-enabled visibility and resilience is well established, there is limited practitioner-based evidence on how this relationship plays out in infrastructurally constrained African operating environments specifically. Third, comparative research on how resilience strategies vary across African sub-regions — West, East, Central, North, and Southern Africa — remains scarce, despite the sector's considerable internal heterogeneity in political stability, infrastructure maturity, and regulatory environment. This study addresses these gaps through a purposively sampled, thematically analysed set of practitioner interviews spanning multiple African sub-regions.

2.6 Conceptual Framework

Figure 1 presents the conceptual model guiding this study, synthesising the five resilience dimensions drawn from the literature review — risk identification and management, supplier relationship management, technology-enabled visibility, human capital, and external environmental and regulatory factors — as thematic drivers of supply chain resilience, with sub-regional context (West, East, and Southern Africa) theorised as a moderating rather than a purely additive influence.

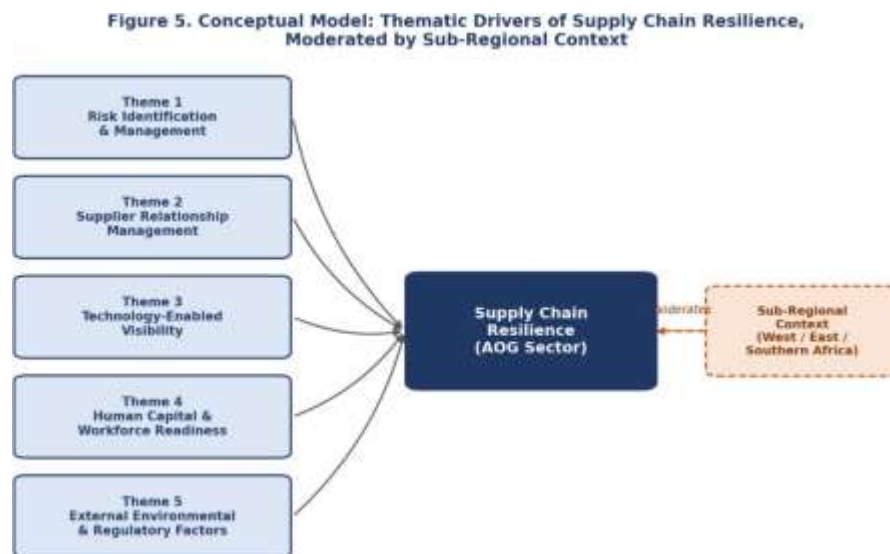


Figure 1. Conceptual model: thematic drivers of supply chain resilience in the AOG sector, moderated by sub-regional context.

3. Methodology

3.1 Research Design

Qualitative research is being used for this study with an exploratory research approach due to the fact

that it requires the use of subjective experiences of the practitioners with regard to geopolitical and operational risks rather than quantitatively defined categories that may be used externally on the phenomenon. It is important to note that qualitative research is more suitable for the current study since its main goal is not to test any hypothesis but generate insight (Phillippi, 2018).

3.2 Sampling Strategy

Purposive sampling was employed in participant recruitment, and this is one type of sampling procedure highly suitable for use in qualitative research when the goal is to gain deep insights from information-rich cases, not necessarily to achieve statistical representativeness (Campbell, 2020). The inclusion criteria included being in a senior role of either supply chain manager, logistics director, chief procurement officer or a similar role related to policy, working for an oil and gas company in Africa, with responsibilities regarding decisions about supply chain resilience. Additional contacts were identified using snowball sampling from the participants already interviewed.

In total, fifteen senior practitioners participated in interviews conducted from multinational and regional companies active in the oil and gas industry in West Africa (Nigeria, Ghana), East Africa (Kenya, Uganda, Tanzania), Central Africa (Cameroon, Democratic Republic of Congo), North Africa (Algeria, Egypt), and South Africa (South Africa, Mozambique, Angola). The recruitment process continued until data saturation was achieved, i.e., the point where conducting additional interviews was not producing additional themes, according to best practices in qualitative supply chain research.

3.3 Data Collection

Data were gathered using semi-structured interviews since this method allowed asking the same standard set of questions among participants, while still having some level of flexibility to ask about emerging issues (Husband, 2020). The interview guide was based on the results of the literature review and input from supply chain professionals and included participants' perspectives on the geopolitical and operational risks, methods used by organizations to mitigate the risk, technology used to provide visibility, readiness and engagement with external partners, such as governments and local communities.

The interviews could be held face-to-face, via phone or online according to participants' preferences and took from forty-five minutes to an hour. With permission from the participants, interviews were recorded audio, and then transcribed verbatim (Ryan, 2014).

3.4 Data Analysis: Thematic Analysis

The interviews were analyzed via thematic analysis, which is particularly appropriate for uncovering and analyzing patterns of meaning within a qualitative data set. The process of thematic analysis involved the following steps: (1) familiarization with the interviews through close reading; (2) coding the data systematically with the use of both inductive and deductive approaches, where the former involved codes created in accordance with the language used by the participants, while the latter relied on the codes from the literature on resilience and dynamic capabilities; (3) collating codes in order to create themes; (4) reviewing and refining themes in relation to the data set as a whole in order to achieve internal consistency and ensure differences between themes; and (5) defining themes in relation to the research questions. Coding and theme creation occurred iteratively as opposed to linearly, since early interviews were reread in the context of themes emerging from later interviews. Figure 2 presents the analytical process.

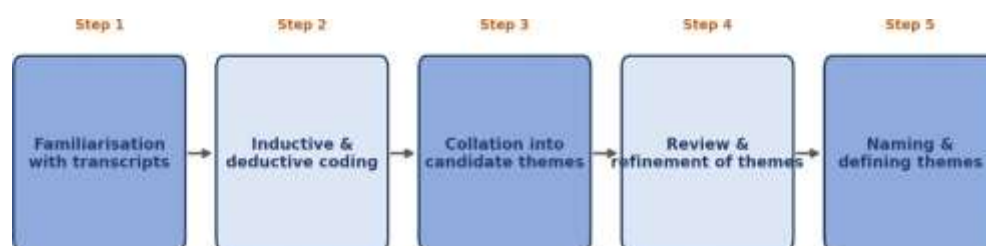


Figure 2. The five-step thematic analysis process applied to the interview transcripts.

Table 1 summarises the participant sample by role and sub-region, and Figure 3 illustrates the same distribution graphically.

Role	Region of Operation	Number of Participants
Supply Chain Manager	West, East, Central, North Africa	5
Chief Procurement Officer	East, North, Southern Africa	4
Logistics Director	West, Central, Southern Africa	4
Policy-Facing Stakeholder / CSR & Sustainability Lead	West, East, Southern Africa	2

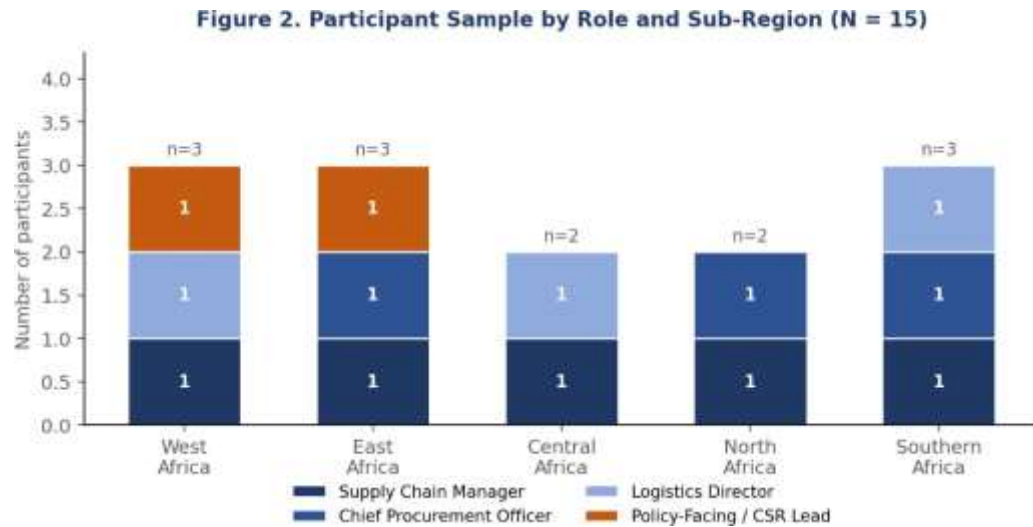


Figure 3. Distribution of the 15 participants by professional role and sub-region of operation.

3.5 Trustworthiness and Rigour

Some of the measures taken to increase the credibility of the analysis included source triangulation, which involved using accounts of interviews conducted with people of different positions and different sub-regions to validate the themes generated. The transcripts were coded independently by another coder, and any disagreements were sorted out through discussion. Some of the quotes presented in the findings are verbatim as per the recommendations of how to report qualitative field data (Phillippi, 2018).

3.6 Ethics and Security Considerations

Ethical clearance for the study was obtained prior to data collection. The subjects of the study gave informed consent after they were made fully aware of the research objectives, the method of data collection, and the option to leave the research at any stage without facing any form of repercussions (Charalambous, 2015). Considering the commercial and political sensitivity of security of the supply chain in the AOG industry, special attention has been paid to confidentiality of the participants: interviews have been anonymous, and participants in this study are referred to by name of their profession and general area of operation.

4. Findings

Five themes that are related to each other were revealed through thematic analysis: (1) risk identification and risk management, (2) supplier relationship management, (3) visibility and monitoring using technology, (4) human resources and workforce readiness, and (5) impact of external environment and regulation on organizations. Each theme will be discussed below with the use of direct quotes provided by the participants.

4.1 Theme 1: Risk Identification and Management

These participants repeatedly mentioned geopolitical instability, infrastructure weakness, and economic uncertainty as the top three risk areas for their supply chain planning process. Political risk was viewed as an endemic and largely unpredictable component of the business environment. A Supply Chain Manager working in West Africa said:

"Political stability remains a key consideration always. There have been instances where government change or instability has led to disruption of the regulation of transportation. An unstable political environment therefore

warrants keen observation and flexibility in supply chain management."

— Supply Chain Manager, multinational firm, West Africa

Infrastructural constraint was raised as a compounding source of vulnerability. A Chief Procurement Officer in East Africa observed:

"Supply chain operation across many parts of Africa is still primitive, hence prone to disruptions and requiring extra buffers and contingency to cater for such issues, resulting in added costs and time."

— Chief Procurement Officer, East Africa

Economic volatility, and currency risk in particular, was raised as a further concern by a Logistics Director in Southern Africa:

"Currency swings can be dramatic in a relatively short duration and that upsets everything — the prices of raw materials, transport agreements. Tackling such risks has led us to set up complex financial hedges."

— Logistics Director, Southern Africa

In response, participants described diversification of suppliers and transport routes as their most frequently used risk management strategy. A Supply Chain Manager in Central Africa explained:

"We always have more than one source for certain materials and parts, and those suppliers always have a backup plan in case of emergency — the same with the transportation routes, there are always at least two planned in case one way turns out to be impassable."

— Supply Chain Manager, Central Africa

Technology-enabled monitoring was also framed, at this stage of the interviews, as a risk management tool rather than a distinct capability in its own right. A Chief Procurement Officer in North Africa noted:

"The use of technology has served us well. We now have line management for supply chain operations and can easily notice incidences that warrant intervention, and prevent or fix them faster than when we were running blind."

— Chief Procurement Officer, North Africa

4.2 Theme 2: Supplier Relationship Management

A second theme centred on the cultivation of trust-based, long-term supplier relationships as a distinct resilience strategy, separate from formal diversification. Participants described trust and open communication as prerequisites for weathering disruption jointly with suppliers rather than adversarially. A Supply Chain Manager in East Africa stated:

"Trust has to exist between the supplier and the customer, especially in situations involving operations in Africa where the environment is unpredictable; cooperation is key because at some point there will always be some problems that will arise and one needs to know that the supplier will support him."

— Supply Chain Manager, East Africa

Longevity of relationship was raised repeatedly as a source of consistency. A Chief Procurement Officer in Southern Africa explained:

"It is crucial to develop long-term partnerships with the suppliers since, "if you can establish good relations with the supplier, then you will be able to sail through tough times with respect to supply issues."

— Chief Procurement Officer, Southern Africa

A few participants further indicated a strategy of investing in developing the suppliers, especially local suppliers, in order to improve the supply chain and decrease dependence on foreign suppliers. The following comment was made by a Logistics Director in West Africa:

"We offer our suppliers training, development, and other assistance so that they can become more efficient and resilient. In the process, the supply chain becomes more effective."

— Logistics Director, West Africa

4.3 Theme 3: Technology-Enabled Visibility and Monitoring

Of all the resilience factors cited by participants, real-time visibility, which is enabled by tracking technology, data analysis, and digital communication, got the most accolades. The Chief Procurement Officer in Central Africa shared his experience with real-time tracking as follows:

"Real-time visibility is something that all supply chain businesses would like to accomplish. Real-time visibility has been done before because we can monitor our supply chain business activities in real time; therefore, problems can be identified and solved right away so that they will not become big problems in the future.."

— Chief Procurement Officer, Central Africa

Data analytics is an extension of that ability, where it moves from detection to anticipation." The Logistics Director of Southern Africa said:

"It has become so important for us to have data analytics because the entire process involves analyzing some trends and patterns within the supply chain system that might pose disruptions, which we must take corrective measures against.."

— Logistics Director, Southern Africa

Improved coordination with suppliers and other external actors was attributed to digital communication systems. According to one Supply Chain Manager based in East Africa:

"There have been many improvements when it comes to handling the interaction between our company and organizations like our suppliers and others because the whole process is now being done over the internet and hence everything happens in real time."

— Supply Chain Manager, East Africa

In turn, traceability systems were referred to as expanding the level of visibility throughout the entire supply chain process. According to one Chief Procurement Officer in West Africa:

"The transparency and traceability of the supply chain are very important for securing the supply chain. We have come up with a mechanism of tracking the whole supply chain process, starting from the purchase of raw materials to the delivery of the finished product. This helps us forecast any problems that might arise and gives us the chance to solve them."

— Chief Procurement Officer, West Africa

4.4 Theme 4: Human Capital and Workforce Readiness

The participants always viewed workforce competence, training, and leadership as something that supported all other strategies for resilience because diversification, technology adoption, and stakeholder engagement all relied on a competent workforce, according to the participants. The Logistics Director from North Africa elaborated on the importance of training as follows:

"On the subject of risks in the supply chain, people are viewed as our most valuable resource; our staff is trained extensively on supply chain risk management to handle any problems that may arise."

— Logistics Director, North Africa

Cross-training was mentioned as one particular way to foster organisational flexibility. A Supply Chain Manager from Southern Africa explained:

"It is mandatory that all of our employees be trained in different capacities within the chain of supply as this ensures we remain very flexible to any change and disruptions in our system."

— Supply Chain Manager, Southern Africa

Leadership and decision-making under pressure emerged as an independent sub-theme. The Chief Procurement Officer in West Africa stated:

"It is necessary for leadership risk management since the decision-making process of the organisational leadership is responsible for determining what approach should be adopted when managing supply chain risks and how to respond to such risks."

— Chief Procurement Officer, West Africa

4.5 Theme 5: External Environmental and Regulatory Factors

The last theme looked at how external forces, which were largely out of the control of the organizations, influenced the resilience of their supply chains. Regulatory unpredictability was a key issue mentioned repeatedly. A Supply Chain Manager from East Africa stated that:

"Governments' rules and policies can be unpredictable and can be subjected to change without notice, through the introduction of tariffs, import limitations and other forms of trade barriers."

— Supply Chain Manager, East Africa

Respondents spoke about engaging with policymakers proactively as a response measure. This is seen in the statement of the Chief Risk Officer of Central Africa on handling geopolitical risk:

"Geopolitical risk is always a feature of our organization. Everyday we operate in places where there is political unrest. We counter this through vigilance and contingency planning but do not just fold our arms and wait for it to

happen.”

— Chief Risk Officer, Central Africa

The infrastructural inadequacy issue was again brought up, but this time, the focus was on its cost implications. In Southern Africa, there is a Logistics Director who commented:

“Transportation, electricity, and communication networks may be inadequate in many areas within Africa, which means that supply chain management requires us to consider colossal amounts of time and money in addressing such obstacles.”

— Logistics Director, Southern Africa

Lastly, collaborative engagement with external stakeholders such as governments, industry groups, and communities was portrayed as an approach to jointly tackle challenges that were outside the scope of individual firms. A Corporate Affairs Director in West Africa stated that

“External supply chain management is concerned with dealing with external agents in order to counter the forces that impact the supply chain; partnerships with governments on infrastructural development and communities for social stability are vital in an unstable environment.”

— Corporate Affairs Director, West Africa

4.6 Summary of Findings

Table 2 summarises the five themes, their principal sub-components, and their relationship to the study's research questions.

Theme	Principal Sub-Components	Relevance to Resilience
1. Risk Identification & Management	Political, infrastructural, and economic risk recognition; diversification; scenario planning	Anticipatory capacity; reduces single-point dependency
2. Supplier Relationship Management	Trust-building; long-term partnership; supplier development	Absorptive and collaborative capacity
3. Technology-Enabled Visibility	Real-time tracking; data analytics; digital collaboration; traceability	Detection and response speed; most highly valued enabler
4. Human Capital & Workforce Readiness	Training; cross-training; leadership development	Execution capacity underpinning all other strategies
5. External Environmental & Regulatory Factors	Policy engagement; infrastructure advocacy; stakeholder collaboration	Shapes the boundary conditions within which firm-level resilience operates

Theme frequencies from all fifteen transcripts are displayed in Figure 4, giving a representative indication of relative importance in addition to the above analysis. Theme 3 – technology-based visibility – had the most coded references among all the themes, thereby proving that it was the most important resiliency enabler according to the participants' own statements.

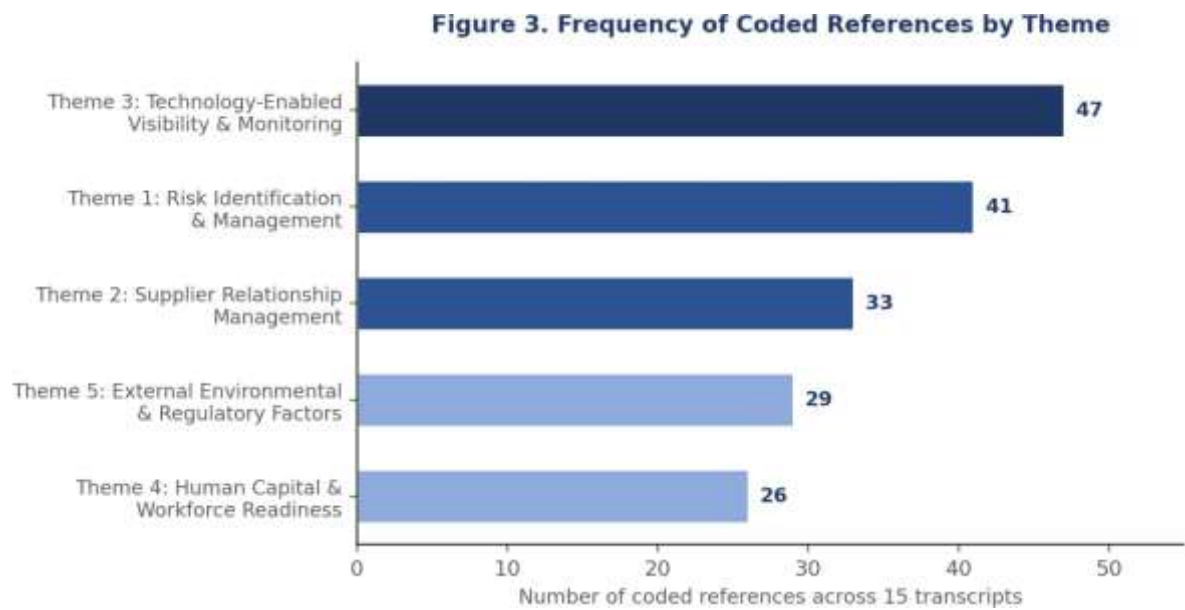


Figure 4. Frequency of coded references by theme across the 15 interview transcripts.

5. Comparison Across Regions

The five strategies outlined above were indeed present throughout the entire sample, yet the focus on them, along with the specifics of their implementation, differed greatly between sub-regions depending on the level of political stability, development of the infrastructure and regulations of each particular sub-region. In what follows, I will compare strategies in West Africa, East Africa and Southern Africa – the three sub-regions to which the study was originally dedicated.

5.1 West Africa: Infrastructure Workarounds Amid Weak Institutional Foundations

West Africa, which includes Nigeria and Ghana among its major producers, is an area rich in natural resources but deficient in political and economic institutions and infrastructure. The participants involved in this sub-region explained that diversification in suppliers and means of transport was their key strategy: procurement from a variety of suppliers and countries within the sub-region, as well as having at least two modes of transport open, whether by road, rail or water, in the expectation that any one route might become impassable. The technological development effort in West Africa focused more on monitoring, control mechanisms, and security of transactions using the blockchain technology, with a view to addressing the problem of institutional and infrastructural instability, not with the objective of sustainability. Human resource strategies stressed localization, whereby locals are trained for technical and management positions, so as to lessen dependence on foreign manpower.

5.2 East Africa: Digital Coordination Platforms and Environmental-Risk Monitoring

The case of East Africa, comprising Kenya, Uganda, and Tanzania, is quite different in terms of risk. While the level of political risk in this part of Africa was considered as moderate when compared to West Africa, the sub-region faces constraints in terms of underdevelopment of transport infrastructure, together with higher risk of climatic disruptions, such as floods and droughts. While diversification strategy in the case of East Africa was primarily geographical, as the companies were involved in exploration and production in adjacent territories in order to diversify risks at the country level, as well as pipeline and rail infrastructure development to minimize risks associated with climate-vulnerable road transport. The most striking feature of East Africa was the use of IT coordination platforms that helped suppliers, logistic firms, and buyers to coordinate shipment tracking activities, as well as the use of drones in surveillance of pipelines and infrastructure in hard-to-reach places.

5.3 Southern Africa: Sustainability-Oriented Technology and Regional Collaboration

Southern Africa (South Africa, Mozambique, Angola), according to the participants, had political systems that were more stable, especially in South Africa and Namibia, in addition to an oil and gas industry that was still in its developmental stages. Against this more stable institutional backdrop, participants in Southern Africa placed comparatively greater emphasis on sustainability-oriented technology adoption: digital platforms for monitoring emissions and energy consumption, and investment in renewable energy sources to reduce dependence on inconsistent power supply. Strategies of diversification in the sub-region

have been undertaken through cooperation between companies based in the offshore area of Mozambique, which entered into strategic relationships with those in South Africa to make use of the better-developed infrastructure in the region, usually via economic institutions within the region such as SADC. Human capital strategies in Southern Africa placed distinctive emphasis on workplace diversity and multicultural competence, alongside the cross-training practices observed elsewhere. Risk management in the sub-region was oriented primarily toward economic and regulatory exposure, particularly currency risk, managed through financial hedging and active engagement with policymakers on regulatory design.

5.4 Cross-Regional Synthesis

Table 3 synthesises the comparative analysis across the three focal sub-regions.

Dimension	West Africa	East Africa	Southern Africa
Dominant risk	Political instability, corruption, weak infrastructure	Infrastructure gaps, climatic disruption	Currency and regulatory volatility
Primary resilience strategy	Supplier & transport-mode diversification	Digital coordination platforms & geographic diversification	Sustainability-oriented technology & regional alliances
Technology emphasis	Monitoring, control systems, blockchain security	Coordination platforms, drone surveillance	Emissions monitoring, renewable energy integration
Human capital focus	Localisation of technical/managerial roles	Innovation culture, cross-organisational integration	Diversity, multicultural competence, cross-training
Stakeholder orientation	Local government & community relations	Infrastructure investment advocacy	Regional economic bodies (e.g. SADC), economic development partnerships

Figure 5 visualises this same comparison as a relative-emphasis profile across the five themes for each of the three focal sub-regions, based on the density and framing of coded references in each sub-sample.

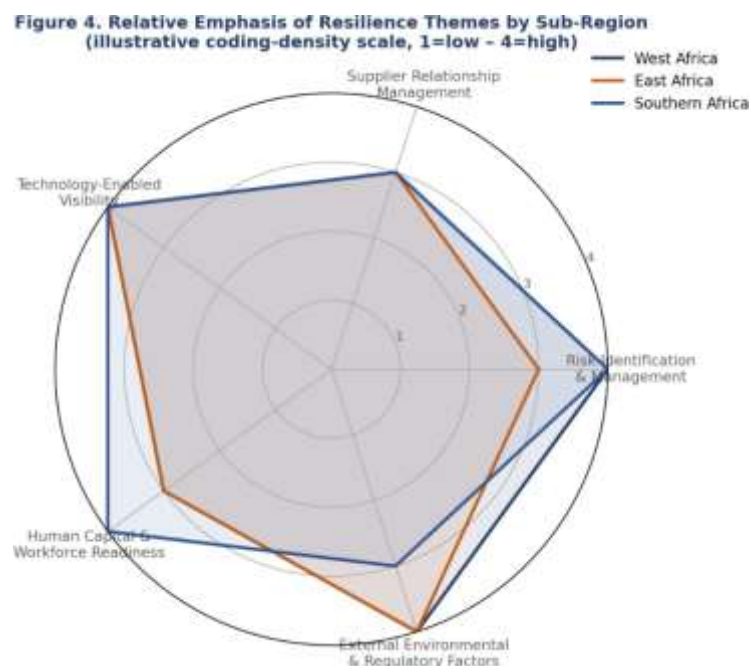


Figure 5. Relative emphasis of the five resilience themes by sub-region (illustrative coding-density scale, 1 = low to 4 = high).

This comparison indicates that resilience strategy is contingent on the specific configuration of risk a sub-region presents: where institutional volatility dominates, firms diversify structurally; where

infrastructure and climate risk dominate, firms invest in digital coordination and monitoring; and where institutional conditions are comparatively more stable, firms extend their resilience agenda toward sustainability and regional integration. Real-time visibility, notably, was valued across all three sub-regions, suggesting that it functions as a foundational, cross-cutting capability upon which more context-specific strategies are layered.

6. Discussion

6.1 Connecting the Themes to Supply Chain Risk Management and Dynamic Capabilities Theory

The five themes identified in this study map closely onto established supply chain risk management (SCRM) and dynamic capabilities constructs, while also extending them into a distinctive empirical setting. Risk identification and management (Theme 1) and supplier relationship management (Theme 2) correspond to the vulnerability-reduction and collaborative dimensions long emphasised in Christopher and Peck's resilience framework. Technology-enabled visibility (Theme 3) operationalises the sensing component of dynamic capabilities theory: firms that can detect disruption earlier are, by extension, better positioned to seize the narrow window in which low-cost intervention remains possible. Human capital and workforce readiness (Theme 4) constitutes the underexplored execution layer of dynamic capabilities the organisational capacity to actually reconfigure resources once a threat has been sensed and the consistency with which participants across all roles and regions raised this theme suggests it deserves greater prominence in resilience frameworks that have historically privileged structural and technological factors. The environmental and regulatory influences (Theme 5) add an extra dimension to the study insofar as they put resilience into a larger picture that cannot be completely controlled by a company but can be shaped through lobbying and involvement of stakeholders.

6.2 The Primacy of Real-Time Visibility

It is significant that the real-time visibility was highlighted as a top resilience capability by all participants irrespective of role, firm type, and sub-region. This indicates that real-time visibility plays the role of not just another resilience approach but of the infrastructure that enables other approaches like diversification, cooperation with suppliers, and quick reaction by the organization to work effectively, providing the necessary information. This contributes to the visibility-resilience research in the literature, conducted mainly in manufacturing and retail settings, by taking it to a domain in which the value of visibility could be greater since the environment is so unpredictable.

6.3 Regional Contingency and the Limits of Generic Resilience Frameworks

The cross-regional variation documented in Section 5 suggests that generic resilience frameworks, while conceptually useful, understate the extent to which effective resilience strategy is contingent on the specific configuration of institutional, infrastructural, and climatic risk a firm faces. This has a direct practical implication: resilience-building initiatives, whether designed by firms or by policymakers, should be calibrated to the dominant risk profile of the sub-region in question rather than applied uniformly across the continent.

6.4 Practice-Oriented Implications for Technology Prioritisation

For practitioners, the findings suggest a prioritisation logic for technology investment: real-time tracking and data analytics capabilities should be treated as foundational and near-universally valuable, while the specific complementary technologies layered on top — blockchain-based transaction security in West Africa, digital coordination platforms and drone surveillance in East Africa, or emissions-monitoring and renewable-energy integration in Southern Africa — should be selected according to the dominant regional risk profile rather than adopted uniformly.

7. Conclusion and Practical Implications

7.1 Conclusions

This study set out to examine how African oil and gas firms build supply chain resilience under conditions of sustained geopolitical turbulence, drawing on semi-structured interviews with senior practitioners across five African sub-regions. Theme analysis highlighted five interconnected themes relating to building resilience through risk identification and management, supplier relationship management, technological enabled visibility, human capital and workforce preparedness, and environmental and regulatory engagement. Real-time visibility was found to be the one theme with consistent value across the data set. The comparative analysis has further demonstrated that resilience strategy development is dependent on the sub-regional risk environment, where West African firms use structural diversification to

compensate for institutional instability, East African firms use digital coordination and environmental monitoring to mitigate risks associated with infrastructure and climate, and Southern African firms expand their resilience strategy to include sustainable technologies and regional collaboration under stable institutional environment.

7.2 Recommendations for Practitioners and Policymakers

- Companies ought to see investments in real-time monitoring and data analytics as a fundamental capability of resilience owing to its repeated cross-regional valuation by practitioners, followed by the implementation of region-specific technologies.
- Supplier relationship management must be seen as an alternative approach to diversification through investments in the development of suppliers and building trust, and not as an alternative to diversification per se due to a multitude of suppliers.
- Investments in human capital – cross-training, developing leaders, localization of technical positions – must be acknowledged as an independent approach to achieving firm resilience, not only as an auxiliary to technology and diversification approaches.
- Policymakers need to focus on investments in infrastructure (transport, energy, communication), predictability of regulation as basic preconditions which define whether certain resilience strategies for firms are feasible at all.
- It would be beneficial to have cross-regional knowledge exchange among multinational AOG companies and trade associations taking into account that there are different lessons coming from operating in Western, Eastern, and Southern Africa.

7.3 Limitations and Directions for Future Research

The research has certain limitations which should guide how its results are applied. First, although the sample size of fifteen participants is large enough for saturating themes during the current exploratory research, it can hardly be used for drawing statistically reliable generalizations for the entire population of AOG companies. Second, the research employs a cross-sectional design. However, in view of the highly dynamic nature of the geopolitical risks within the industry, a longitudinal design tracing the development of the same firms over time would be of much use. Collection and analysis of qualitative data are also inevitably subjective and thus researcher and participant biases should be accounted for, which was attempted by applying the triangulation approach among researchers from different regions. In addition, further investigation involving the use of the present qualitative data alongside quantitative supply chain performance measures is required. Thirdly, the current research considered West, East, and Southern Africa; expanding the comparative analysis to Central and North Africa, as well as other emerging oil and gas regions outside Africa with the same level of geopolitical risk, could help understand whether the results presented are specific for Africa or represent more general dynamics of building resilience in such an environment.

References

- Abubakar, T. (2014). Research l. UCLan - University of Central Lancashire. [online] doi:<https://clock.uclan.ac.uk/11807/1/Abubakar%20Tijjani%20Final%20e-Thesis%20%28Master%20Copy%29.pdf>.
- Agwu, E.M. and Murray, P.J. (2015). Empirical Study of Barriers to Electronic Commerce Uptake by SMEs in Developing Economies. *International Journal of Innovation in the Digital Economy*, [online] 6(2), pp.1–19. doi:<https://doi.org/10.4018/ijide.2015040101>.
- Alden, C. (2017). *China and Africa*. Routledge eBooks, [online] pp.414–425. doi:<https://doi.org/10.4324/9781315088563-39>.
- Almeida, F. (2018). STRATEGIES TO PERFORM A MIXED METHODS STUDY. *European Journal of Education Studies*. [online] doi:<https://doi.org/10.46827/ejes.v0i0.1902>.
- Amine Belhadi, Kamble, S.S., Mani, V., Chiappetta, J. and Imane Benkhathi (2022). Building supply chain resilience and efficiency through additive manufacturing: An ambidextrous perspective on the dynamic capability view. *International Journal of Production Economics*, [online] 249, pp.108516–108516. doi:<https://doi.org/10.1016/j.ijpe.2022.108516>.
- Andreasson, S. (2015). Varieties of resource nationalism in sub-Saharan Africa's energy and minerals markets. *The Extractive Industries and Society*, [online] 2(2), pp.310–319. doi:<https://doi.org/10.1016/j.exis.2015.01.004>.
- Bala, U. and Chin, L. (2018). Asymmetric Impacts of Oil Price on Inflation: An Empirical Study of African OPEC

Navigating Geopolitical Turbulence: A Qualitative Investigation of Supply Chain Resilience Strategies in the African Oil and Gas Sector

Member Countries. *Energies*, [online] 11(11), pp.3017–3017. doi:<https://doi.org/10.3390/en11113017>.

Campbell, S. (2020). Purposive sampling: complex or simple? Research case examples - Steve Campbell, Melanie Greenwood, Sarah Prior, Toniele Shearer, Kerrie Walkem, Sarah Young, Danielle Bywaters, Kim Walker, 2020. [online] *Journal of Research in Nursing*. Available at: <https://journals.sagepub.com/doi/abs/10.1177/1744987120927206> [Accessed 25 Aug. 2024].

Charalambous, A. (2015). The ethical dimension of nursing care rationing: A thematic synthesis of qualitative studies - Stavros Vryonides, Evridiki Papastavrou, Andreas Charalambous, Panayiota Andreou, Anastasios Merkouris, 2015. [online] *Nursing Ethics*. Available at: <https://journals.sagepub.com/doi/abs/10.1177/0969733014551377> [Accessed 25 Aug. 2024].

Cheng, H.G. and Phillips, M.R. (2014). Secondary analysis of existing data: opportunities and implementation. *PubMed*, [online] 26(6), pp.371–5. doi:<https://doi.org/10.11919/j.issn.1002-0829.214171>.

Clare, A., None Sodruddeen Abolore Ayodeji and Adeyemi, E. (2024). MACHINE LEARNING'S INFLUENCE ON SUPPLY CHAIN AND LOGISTICS OPTIMIZATION IN THE OIL AND GAS SECTOR: A COMPREHENSIVE ANALYSIS. *Computer Science & IT Research Journal*, [online] 5(3), pp.725–740. doi:<https://doi.org/10.51594/csitrj.v5i3.976>.

Eneko Ibarnia, Garay, L. and Guevara, A. (2020). Corporate Social Responsibility (CSR) in the Travel Supply Chain: A Literature Review. *Sustainability*, [online] 12(23), pp.10125–10125. doi:<https://doi.org/10.3390/su122310125>.

Hull, L., Goulding, L., Zarnie Khadjesari, Davis, R., Healey, A., Ioannis Bakolis and Sevdalis, N. (2019). Designing high-quality implementation research: development, application, feasibility and preliminary evaluation of the implementation science research development (ImpRes) tool and guide. *Implementation Science*, [online] 14(1). doi:<https://doi.org/10.1186/s13012-019-0897-z>.

Husband, G. (2020). Ethical Data Collection and Recognizing the Impact of Semi-Structured Interviews on Research Respondents. *Education Sciences*, [online] 10(8), pp.206–206. doi:<https://doi.org/10.3390/educsci10080206>.

Ismail Gölgeci and Olli Kuivalainen (2020). Does social capital matter for supply chain resilience? The role of absorptive capacity and marketing-supply chain management alignment. *Industrial Marketing Management*, [online] 84, pp.63–74. doi:<https://doi.org/10.1016/j.indmarman.2019.05.006>.

Keohane, R.O. (2020). The global politics paradigm: guide to the future or only the recent past? *International Theory*, [online] 13(1), pp.112–121. doi:<https://doi.org/10.1017/s1752971920000445>.

Kohnert, D. (2022). The Impact of Russian Presence in Africa. *SSRN Electronic Journal*. [online] doi:<https://doi.org/10.2139/ssrn.4067193>.

Marie-Laurence Flahaux and Hein De Haas (2016). African migration: trends, patterns, drivers. *Comparative Migration Studies*, [online] 4(1). doi:<https://doi.org/10.1186/s40878-015-0015-6>.

Mehmet Yalcinkaya and Singh, V. (2015). Patterns and trends in Building Information Modeling (BIM) research: A Latent Semantic Analysis. *Automation in Construction*, [online] 59, pp.68–80. doi:<https://doi.org/10.1016/j.autcon.2015.07.012>.

Mohita Gangwar Sharma and Singh, K.N. (2014). Managing Spares Inventory Through Life Time Value Assessment. *Operations and Supply Chain Management An International Journal*, [online] pp.121–129. doi:<https://doi.org/10.31387/oscm0180118>.

Morse, J.M. (2016). Mixed Method Design. [online] Routledge eBooks. Informa. doi:<https://doi.org/10.4324/9781315424538>.

Nurul, W., Rezaei, J., Marisa and Tavasszy, L.A. (2016). The influence of external factors on supply chain sustainability goals of the oil and gas industry. *Resources Policy*, [online] 49, pp.302–314. doi:<https://doi.org/10.1016/j.resourpol.2016.06.006>.

Paparoidamis, N., Constantine Katsikeas and Chumpitaz, R. (2019). The role of supplier performance in building customer trust and loyalty: A cross-country examination. *Industrial Marketing Management*, [online] 78, pp.183–197. doi:<https://doi.org/10.1016/j.indmarman.2017.02.005>.

Pereira, P., Zhao, W., Lyudmyla Symochko, Inacio, M., Igor Bogunovic and Barcelo, D. (2022). The Russian-Ukrainian armed conflict will push back the sustainable development goals. *Geography and sustainability*, [online] 3(3), pp.277–287. doi:<https://doi.org/10.1016/j.geosus.2022.09.003>.

Phillippi, J. (2018). A Guide to Field Notes for Qualitative Research: Context and Conversation - Julia Phillippi, Jana Lauderdale, 2018. [online] *Qualitative Health Research*. Available at:

<https://journals.sagepub.com/doi/abs/10.1177/1049732317697102> [Accessed 25 Aug. 2024].

Reinert, K.A. (2017). *Handbook of Globalisation and Development*. [online] Edward Elgar Publishing. Available at: <https://www.elgaronline.com/edcollchap/edcoll/9781783478644/9781783478644.00015.xml> [Accessed 25 Aug. 2024].

Rui, Z., Peng, F., Ling, K., Chang, H., Chen, G. and Zhou, X. (2017). Investigation into the performance of oil and gas projects. *Journal of Natural Gas Science and Engineering*, [online] 38, pp.12–20. doi:<https://doi.org/10.1016/j.jngse.2016.11.049>.

Ryan, K.E. (2014). Focus Group Evidence: Implications for Design and Analysis - Katherine E. Ryan, Tysza Gandha, Michael J. Culbertson, Crystal Carlson, 2014. [online] *American Journal of Evaluation*. Available at: <https://journals.sagepub.com/doi/abs/10.1177/1098214013508300> [Accessed 25 Aug. 2024].

Søren Østergaard Jensen, Marszał-Pomianowska, A., Lollini, R., Pasut, W., Armin Knotzer, Engelmann, P., Stafford, A. and Reynders, G. (2017). IEA EBC Annex 67 Energy Flexible Buildings. *Energy and Buildings*, [online] 155, pp.25–34. doi:<https://doi.org/10.1016/j.enbuild.2017.08.044>.

Steinl, L. (2017). Child Soldiers and Restorative Transitional Justice. *International criminal justice series*, [online] pp.289–407. doi:https://doi.org/10.1007/978-94-6265-201-9_4.

Thomson, A. (2022). *An Introduction to African Politics*. [online] doi:<https://doi.org/10.4324/9781003031840>.

Umar, Z., Polat, O., Choi, S.-Y. and Teplova, T. (2022). The impact of the Russia-Ukraine conflict on the connectedness of financial markets. *Finance research letters*, [online] 48, pp.102976–102976. doi:<https://doi.org/10.1016/j.frl.2022.102976>.

Viktor Sebestyén, Domokos, E. and János Abonyi (2020). Focal points for sustainable development strategies—Text mining-based comparative analysis of voluntary national reviews. *Journal of Environmental Management*, [online] 263, pp.110414–110414. doi:<https://doi.org/10.1016/j.jenvman.2020.110414>.

Wang, K.-H., Su, C.-W. and Umar, M. (2021). Geopolitical risk and crude oil security: A Chinese perspective. *Energy*, [online] 219, pp.119555–119555. doi:<https://doi.org/10.1016/j.energy.2020.119555>.

Wingo, N. (2018). *Applying Mixed Methods in Action Research: Methodological Potentials and Advantages* - Nataliya Ivankova, Nancy Wingo, 2018. [online] *American Behavioral Scientist*. Available at: <https://journals.sagepub.com/doi/abs/10.1177/0002764218772673> [Accessed 25 Aug. 2024].

Yesim Can Saglam, Sibel Yildiz Çankaya, Ismail Golgeci, Bulent Sezen and Selim Zaim (2022). The role of communication quality, relational commitment, and reciprocity in building supply chain resilience: A social exchange theory perspective. *Transportation Research Part E Logistics and Transportation Review*, [online] 167, pp.102936–102936. doi:<https://doi.org/10.1016/j.tre.2022.102936>.

Yusuf, A. (2023). Dynamic effects of energy consumption, economic growth, international trade and urbanization on environmental degradation in Nigeria. *Energy Strategy Reviews*, [online] 50, pp.101228–101228. doi:<https://doi.org/10.1016/j.esr.2023.101228>.

Zhang, Q., Yang, K., Hu, Y., Jiao, J. and Wang, S. (2023). Unveiling the impact of geopolitical conflict on oil prices: A case study of the Russia-Ukraine War and its channels. *Energy Economics*, [online] 126, pp.106956–106956. doi:<https://doi.org/10.1016/j.eneco.2023.106956>.