The implications of macroenvironmental forces and SMEs investment behaviour in the energy sector: the role of supply chain resilience

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ABSTRACT

Following a theory of strategic positioning perspective, this paper aims to explore the operating context in which dimensions of the macro-environment factors are likely to enhance Small and Medium Enterprise's (SMEs) intentions to invest in the Ghana’s downstream oil and gas sector. Specifically, macro environment model has been developed wherein an important exogenous context (supply chain resilience) variable has been considered and studied its moderating effect on the relationship between macro environment dimensions and intentions to invest. The study also, examined the conditional effect of micro environment dimensions on intention to invest at different levels of supply chain resilience. Using Partial Least Square method we analyze cross sectional data across Ghana's SMEs spectrum between the periods 2017–2018. Our indicative evidence suggests that political factors, economic factors, environmental factors and technological factors are related to SMEs intentions to invest in the downstream oil and gas. Moreover, the research findings revealed that supply chain resilience moderated the relationship between macro environment dimensions and intention to invest. The link between macro environment dimensions and intention to invest was strengthened via the interaction effect of supply chain resilience. These robust results are consistent with the theory of strategic positioning. Overall, our results are akin to policy makers agenda to create enabling macro environment to improve local businesses participation in the Ghanaian oil and gas value chain. Besides, the findings will assist SMEs owners and managers in their decisions to invest in the downstream oil and gas sector by strengthening investment capability at different levels of supply chain resilience.

1. Introduction

Unarguably, today’s complex business environment is saturated with micro and macro levels influences which imperatively require adequate research, policy and practical attention (Appiah et al., 2021). Macro-environment contains variables that are beyond the control of an organization, but which nevertheless must be analyzed in order to adapt business and investment strategies to the changing business environment (Johnson et al., 2008; Appiah et al., 2018, 2021). As asserted by Appiah et al. (2018) political, economic, social, technological, legal, environmental, demographic, ethical, and regulatory are considered the major forces of the macro environment. Available evidence (See; Itani et al., 2014; Litavniece and Znotin a, 2015) from the developed economies suggest that macro-environment forces have effects on investment intentions. Relatedly, Appiah et al. (2018) avowed that the macro-environmental forces exerted strong influence on indigenous companies' willingness to invest in the Ghanaian oil and gas sector. The purpose of macro environment analysis is to help organizations recognize major developments and their future impact. Having a good understanding of the environment in which oil and gas operate, and recognizing the forces that exert pressure on the environment, can help companies better improve sustainable investment issues. Studying the macro environment will help identify external forces that affect the design of supply chains and operations. There is a lack of research on investment intentions from a macro perspective (Halldorsson et al., 2009; Barkauskas et al., 2015; Appiah et al., 2018). Due to the importance of the oil and gas industry, there is a need to study the macro environment and identify external forces that affect sustainable investment. Sustainability issues can be effectively addressed with a good understanding of the oil and gas environment and the forces that encourage or hinder behavioural intentions to invest (Johnson et al., 2008; Appiah et al., 2021).

Identification of relevant criteria that influence the environment can be done by extracting factors and causal factors from other models that examine the business environment. Two models are used in this study: The
Porter's five forces model and the PESTEL model (political, economic, social, technological, environmental and legal factors) (Johnson et al., 2008; Appiah et al., 2021). Porter's five forces model is mainly used to develop competitive strategies. Porter's intention was to create a general model that would help organizations realize the impact of external scenarios on their overall performance (Porter, 1980). The application of this model can provide companies with useful information to evaluate the industry in which they operate and develop appropriate competitive strategies (Appiah et al., 2021). Competition is the basis of a company's success or failure. It determines the adequacy of a firm's actions, which can affect its productivity, creativity, and the products it produces (Haldorsson et al., 2009). Using Porter's model, the competitive environment in the oil and gas industry will be examined. The PESTEL model is a framework for evaluating the external environment in which a company operates and looking at that environment in isolation. This means that the industry environment can be studied and useful information can be extracted about the environment and the factors that affect the company (Johnson et al., 2008; Barkauskas et al., 2015; Waqas et al., 2015).

Supply chain resilience is an important determinant in Small and Medium Enterprises (SMEs) investment decisions (Fiksel, 2015). Resilience is a multidimensional and interdisciplinary concept, and although supply chain resilience has been the subject of much research, there is still no consensus on a comprehensive definition or roadmap for achieving it. Supply chain resilience is essentially ".... Recognizing threats, assessing current risks, ..... subset of the system, including the ability to respond, self-regulate and prepare for future defensive actions' (Timothy et al., 2013, p. 6). Resilience can be interpreted here as the ability of the supply chain to complement traditional risk processes (Fiksel, 2015) and potentially offset the severity of supply chain vulnerabilities. Due to their limited resources and capabilities, SME leaders are forced to act sustainably in the face of supply chain risks and disruptions. SME managers therefore need to create an environment where the resilience of their supply chains is regularly assessed and clearly understood in terms of SME capabilities and resources, the effectiveness of their information systems and the availability of funds for SME needs. The study also shows that working with supply chain partners can impact not only the vulnerability of SMEs, but also the resilience of supply chain partners. Furthermore, focusing on continuous assessment of these four areas of SME supply chain resilience can provide SMEs with opportunities to continuously adapt and improve their operations and enhance their ability to withstand potential disruptions (Fiksel, 2015; Timothy et al., 2013). We argued that Porter's 5 forces as well as macro-environmental forces such as political, economic, social, technological, legal, environmental, demographic, ethical, and regulatory are part of the uncertainties that SMEs must consider throughout its supply chain when considering investment opportunities in the oil and gas sector. This paper aims to explore the operating context in which dimensions of the macro-environment factors are likely to enhance SMEs intentions to invest in the Ghana's downstream oil and gas sector. The theory of strategic positioning postulated that business activities are influenced by external environment, expectation and stakeholders (Johnson et al., 2008). Johnson et al. (2008) proposed the organizational strategic position theory and stipulated that the business environment is made up of macro-external factors, industry factors, competitors and markets. We limited our discussion on the strategic positioning theory to macro-environment factors. The macro business environment represents the broader environment that influences every aspect of the business (Johnson et al., 2008). According to the study of Itani, O’Connell and Mason (2014) as cited in Litavniece and Znotin a, 2015, the macro environment in which a firm operates affects its performance and the extent of effect boils down to the level at which the firm is dependent on the economy. The external business is mostly analyzed using the political situation in a country, the economic conditions, the socio-cultural factors, technological achievements and the legal framework. This theory had been used in the past to study related phenomena (Johnson et al., 2008; Snyman and Saayman, 2009; Menzies and Orr, 2010; Gondor and Nistor, 2012; Litavniece and Znotin a, 2015). Drawing from extant literature (Soderlund and Ohman, 2003; Clark-Murphy and Soutar, 2004) several factors affect SMEs investment intentions.

In addition to the theory of strategic position, the current study employed Porters' Five forces model as a complementary model. The paper deployed Michael Porters’ Five forces as a competitive tool to determine the suitability of the industry. Unarguably, the Porter 5 forces model has been reported as exerting strong influence on companies operating within a given industrial. In the oil and gas sector the model has been proven that a huge capital is required to enter the industry, lower supply bargaining power, lower Buyers bargaining power, limited substitutes and moderate competitive rivalry even in the downstream where the present study is focused (Appiah et al., 2021). Sequel to the above, the PESTLE model is employed in the current study to determine how the dimensions of the model such as political, economic, social, technological, legal, environmental, demographic, ethical, and regulatory impact on corporate investment intentions. Appiah et al. (2018) argued that the macro-environment has significant influence on investment decisions and a key determinant in business survival. This assertion has also been supported separately by other researchers in the past (See, Itani et al., 2014; Litavniece and Znotin a, 2015).

Appiah et al. (2018) stipulated that accessibility to market, external funding, credit facilities, perceived corruption and investment capital affect investment intentions. Appiah et al. (2018) argued that plans and expectations are the ideal measures of investment intentions. Soderlund and Ohman further asserted that the
expectations of investment project have a significant impact on the investor’s intentions to invest. Moreover, factors such as economic ability and company specific factors influence an investor’s intention (Appiah et al., 2018). Baker and Haslem (1973) identified three factors that influence investor’s intentions. These were quality management of the company, the company’s economic outlook and the future economic status of the industry. Clark-Murphy and Soutar (2004) posited that intention to conduct any investment activity was influenced by risk. Similarly, Nagy and Obenberger (1994) investigated whether economic and non-economic factors can influence investment intentions. The study showed that profit maximization is the investor’s main investment intention. Investors invest for a higher rate of return depending on the type of investment. The study showed that even though investors chose stocks, wealth maximization was very important to them.

Moreover, previous studies (Barber and Odean 2000; Benartzi 2001; Poteshman and Serbin 2003) showed the differences between institutional or professional investors and individual investors and found that institutional investors are well educated and have sufficient knowledge about risk management. However, retail investors have no such training and therefore behave rational and trade excessively (Barber and Odean, 2000; Kamesaka et al., 2002; Jackson, 2003). In addition, factors such as demographical factors were indicated as having influence on investor’s intention to invest (Olsen and Cox, 2001). Among these factors age was indicated as one factor that influences investor’s decision. Based on this Appiah et al. (2018) revealed that younger people take risk investment decision than the older people. Therefore, the intentions behind investments may differ, but estimates show that young people are more likely to invest in risky investments than older people. Christiansen et al. (2006) show that educated people invest most of their resources in investment projects, and intuitively it may be risky to invest in larger and riskier ventures, but due to their intelligence they still choose these investments because they have the courage to take more risk for higher returns. However, this has affected their willingness to invest in the stock and bond markets.

As illustrated in Figure 1 a new research framework is proposed based on theory of strategic positioning and extant literature. The new model hypothesizes that political situation in the country, the economic conditions, technological socio-cultural and environmental factors affect SMEs intentions to invest in Ghana’s downstream oil and gas which are strengthened by supply chain resilience.

2.2. Political environmental factors

The political situations in a country have direct and indirect effect on the success of SMEs (Wanjiru, 2013). These political factors may be in the form of security controls, migration issues and other government subventions (Johnson et al., 2008). Political subventions such as duty modification, reduction of taxes, policies of labour and employees, contamination approaches, customer protection lows and others influence SMEs investment behaviour. Some policies are designed to promote the activities of SMEs these include are; government subventions, patent laws and others (Snyman and Saayman, 2009; Menzies and Orr, 2010; Gondor and Nistor, 2012). In Ghana, the following political forces have been adopted to promote SME activities; legislation, environmental protection, stable political system, increases in taxes, foreign trade agreement and among others. From the presentation above we hypothesize that:

H1. Favourable political factor has positive and significant effect on SME’s intentions to invest in the downstream oil and gas

2.3. Economic environmental factors

The economic environment hosts the economic climate that borders on labour, interest rates, per capita domestic product, trade rates, rate of economic development, inflation rate, unemployment rate and trade deficit or surplus (Gamble, 2014 as cited in Litavniece and Znotin a, 2015). The economic conditions in a country help business (SMEs) to make strategic decisions (Barkauskas et al., 2015; Waqas et al., 2015; Shafl et al., 2019). Appiah et al. (2018). There is therefore the need for SMEs to understand monetary indicators and use the information to make informed decisions and plan for the future. Changes in interest rate automatically affect SMEs decision on cost estimation hence the need to be sensitive to the economic environment. Thus, high level economic barriers negatively affect local production compared to international competitors. From the argument above we hypothesize that:

H2. Favourable economic factors has positive and significant effect on SME’s intentions to invest in the downstream oil and gas

2.4. Technological environmental factors

The technological environment takes into account scientific changes, which foster growth in a society (Gamble, 2014 as cited in Litavniece and Znotin a, 2015). In Ghana, SMEs are at disadvantage when it comes to the adoption of technology since it is expensive (Kayunala and Quartey, 2000). Technology has deprived SMEs in Ghana from competing with international organizations hence they are not able to satisfy their customers. There is the need to take decision on the adoption of technology to meet the emerging needs of customers. ICT plays a significant role in business competitiveness and innovation. According to the EU, IT equips

Figure 1. Research framework.
small businesses with the skill to apply high level of technological infrastructure. In Ghana, SMEs lack the physical infrastructure for communication to influence global competition (Dzisi et al., 2014). SMEs intending to participate in Ghana's oil and gas sector need to integrate technology into their operations to be competitive. From the ongoing we hypothesize that:

**H3.** Improved Technology factor has positive and significant effect on SMEs intentions to invest in the downstream oil and gas

### 2.5. Environmental factors

The legal environment includes labour laws, occupational health and safety policies, regulations, anti-trust laws and among others that protect the business environment through regulations. Business registration processes (incorporation and commencement) are lessened for SMEs (Pheng and Chuan, 2006; Genis-Gruber and Ocut, 2014; Gupta and Mirchandani, 2018). Aryeetey (1994) as cited in Kayanula and Quartey (2000) indicated that regulation in SME sector constitute only 1% of the entire laws of the country. Among these regulations are; screening of premises, collating and managing inventories, monitoring or registration of renewal applications and other documentations. We propose based on the above that:

**H4.** Favourable environmental factor has positive and significant effect on SMEs intentions to invest in the downstream oil and gas

### 2.6. Socio-cultural factors

Socio-cultural practices come in several forms typically these include; value system, models of life, human rights customs, beliefs and arts. Socio-cultural factors have effect on investment behaviours of businesses (Borgers et al., 2015; Mayala et al., 2017). Rihab and Lotfi (2011) reported that cultural perceptions are the major determinants of investment flows. Moreover, Mac-Dermott and Murnah (2015) asserted that cultural perceptions are very important in terms of international trade. Besides, the cultural aspect has a significant impact on firms' decision-making process. We hypothesize that:

**H5.** Favourable Socio-Cultural factor has positive and significant effect on SMEs intentions to invest in the downstream oil and gas

### 2.7. Supply chain resilience as a moderator

An organisation can take a number of preventive measures to reduce damage caused by known and observable failures (Ivanov et al., 2014). For example, an organisation can proactively examine the risk factors that threaten its information security and assess the vulnerability of its information security to the identified risk factors. Ponomarov and Holcomb (2009) and Christopher and Peck (2004) asserted that supply chain resilience is the ability of a supply chain to develop the preparedness, responsiveness and flexibility to manage the risk of failure and recover to baseline or better after a failure. Likewise, SCR is regarded as the resilience of the system to temporary failures (Son et al., 2014). This can help strengthen the SC's ability to respond to temporary disruptions and maintain its resilience (Pettit et al., 2010). To cope with unavoidable threats, an organisation should prepare buffer resources to increase the resilience to unavoidable events (Satuck et al., 2008; Vugrin et al., 2011). Liu et al. (2017) considered a model describing the relationship between supply chain resilience (SCR) and firm performance. The model results show that the direct positive impact of risk management culture on agility, integration and supply chain (re)design is significant, and that SCR performance contributes to firm performance. The results also show that risk management plays a key role in the positive impact of the three types of SCR (agility, integration and supply chain (re)design) on firm performance. In view of the above, there is the need to explore how supply chain resilience affect investment intention, secondly, as the moderator between macroenvironment and investment intention relationships. The study therefore hypothesizes as follows:

**H6.** Supply chain resilience has positive and significant effect on SME's intentions to invest in the downstream oil and gas

**H7a.** Supply chain resilience as a moderator has significant effect on SME's intentions to invest in the downstream oil and gas

**H7b.** Supply chain resilience as a moderator has significant effect on the relationship between economic factorsSME's intentions to invest in the downstream oil and gas

**H7c.** Supply chain resilience as a moderator has significant effect on the relationship between technological factorsSME's intentions to invest in the downstream oil and gas

**H7d.** Supply chain resilience as a moderator has significant effect on the relationship between environmental factorsSME's intentions to invest in the downstream oil and gas

**H7e.** Supply chain resilience as a moderator has significant effect on the relationship between socio-cultural factorsSME's intentions to invest in the downstream oil and gas

### 2.8. Overview of Ghana’s oil and gas value chain

Ghana’s oil and gas industry is very complex in nature and transcends several areas of human lives including transportation, providing lubricants and other petrochemical products, energy, electricity and host of other products. Approximately 30 billion barrels of oil and gas products are consumed every year. Statistics and projections indicate that, the global consumption of oil is expected to increase by 53% as at 2035 (Gruenspecht, 2011). In continents like Asia and Europe, oil consumption account for 32% of all energies while 53% of oil consumption is recorded at the Middle East, 44% of oil consumption is recorded for the people of South-Central America and in North America, oil consumption was pegged around 40%. Ghana uses about 26% of oil and gas products to boost its energy consumption and over 70% of oil and gas products are used for commercial purposes (to feed industries and commercial vehicles) (Oil and Gas in Ghana-Overview, 2013). The data show that the oil and gas industry as a whole consists of a group of companies that work together to convert oil and gas resources into useful materials. The main players in Ghana's oil and gas industry are pipeline companies, industry associations, downstream companies, independent oil and gas producers, service companies and government agencies (Petro Strategies, Inc., 2012).

Ghana’s oil and gas industry as a whole consists of three sub-sectors: downstream, midstream and upstream. The upstream division is responsible for the production and manufacture of oil and gas products along the entire value chain. Administratively, the Ministry of Petroleum and Natural Gas has statutory powers to oversee all three sectors of the oil and gas industry. Ghana’s oil and gas industry currently has two major fields, Jubilee and Salt Basin. In the mining sector, the Ghana National Petroleum and Natural Gas Commission (GNPC) oversees all activities at this level on behalf of the Ministry of Petroleum and Natural Gas. The intermediate oil and gas sector includes the transportation of petroleum products, refining of crude oil and storage of petroleum products and gas. In addition, downstream activities refer to onshore activities responsible for refining, marketing and distribution of oil and gas products (Appiah et al., 2018). In Ghana, Tema Oil Refinery (TOR) is actively involved in gas production at Bonier in the Western Region. In particular, Bulk Oil Storage and Transportation (BOST) Limited is involved in storage of oil and gas products and distribution of gas products across the country. The National Petroleum and Natural Gas Authority (NPA) was established in 2005 by an Act of Parliament to oversee, regulate and monitor all oil and gas activities. It is at this level of the oil and gas supply chain that we expect SMEs to play a significant role, as the requirements for them are
lower than in the upstream and downstream segments of the supply chain. Generally, SMEs can engage in some of the following activities: distribution of oil and gas products to wholesalers and retailers, transportation of petroleum products, commercial contracting with industrial distribution of oil and gas products to wholesalers and retailers, trans-

3. Materials and methods

3.1. Research design

Quantitative research approach has been used in this study. This type of research approach involves measuring the degree of occurrence using numbers and estimations. This research approach has been used in the present because it fulfills the following: 1) collection of numerical data, 2) it conforms to the objectivity conception of social reality and 3) it is based on positivist’s epistemology (Fox and Bayat, 2007). In terms of research design, the explanatory design has been used. Due to the tendency of the selected design to determine causes and effects relationships i.e. the purpose of this study is to ascertain how each dimension of the macro-environment factors affect SMEs intentions to invest in the Ghana’s downstream oil and gas sector. Moreover, in terms of time, the cross-section survey has been used because data has been collected at a single time period i.e November 2017 to May 2018 unlike longitudinal which requires time series data. This period was considered because it marks two important events in the country (Ghana). first the banking sector clean up exercise was conducted within this period which reduced the number of commercial banks from 35 to 23. Secondly, the mid-term goal (5-years) of the local content policy (L. I 2024) for the Ghanaian oil and gas fell within this period. Both events have effects on SMEs investment intentions.

3.2. Population and sampling design

SMEs that are registered with the national board for small scale industries in Ghana have been used in this study. More precisely, SMEs within the service, retail and manufacturing industries have been used. Specifically, SMEs used in the study were adopted from National Board for Small Scale Industries (NBSSI-Ghana) which have been categorized in to three. Namely; manufacturing, retailing and service. These according to the Ghana Statistical Service can be small (employing less than 10 workers) or medium (employing more than 10 but fewer than 100). Hair et al. (2013) argued that the sample size for PLS SEM is determined by the rule of ten (10). This rule states that the sample size should be equal to the greater: a) 10 times the maximum number of formative metrics used to measure a single construct, or b) 10 times the maximum number of structural paths in the structural model for a given construct. Therefore, we have used option (b). We followed this guideline to select the respondents i.e the rule of ten has been used. This rule suggests that the minimum sample size must be ten (10) times higher to the total number of structural paths directed at the latent constructs. The present study has five paths i.e political, economic, socio-cultural, environmental and technological factors directed at the latent construct i.e., investment intentions. Following this rule 50 minimum cases are enough a sample size. Meanwhile 475 cases have been used in the present study. Stratified sampling technique has been used to select the cases i.e using the participant industry as strata we randomly selected the case. This sampling technique is robust i.e it reduces sampling error and ensures greater representatives.

3.3. Measurement instruments

Self-administered structured questionnaires have been used to collect the cross-sectional data. All the items have been newly developed based on extant literature review. The sources of the items, the number of items and type of measurement scales have been illustrated in Table 1.

3.4. Data collection instrument

The questionnaires have been pre-tested before the actual survey 10% (48) of the 475-sample size. The pretest has been done to establish that the following conditions are met; content validity, face validity and construct validity. Likewise, the objectives of the study were explained after voluntarily accepted to participate in the study. Those who declined were thanked and never conducted. Seven-point Likert scale has been used been used in this study due to strong predictive power like compare with other options. The 7-pint Likert scale ranged from Strongly Agree to strongly disagree and were coded 7 to 1. We also covered some profile of SMEs in the study i.e business type, industry type, legal status of business and number of employees.

3.5. Ethical considerations

Before conducting the interviews, we obtained verbal and written consent from the respondents (SMEs). At this stage we informed them of the purpose of the study and that their participation was voluntary. They were also assured that nothing would happen to them if they refused to participate in the study and that their social status and position in society would not be affected. They were assured confidentiality so that their identity and the content of their responses would not be known to anyone. In order to ensure the confidentiality promised to the respondents, all identifying information were removed. This study was conducted with the ethical approval of the Ethics Review Committee of the University of Environment and Sustainable Development, Somanya, Ghana.

3.6. Analytical tool for structural model

The partial least squares (PLS) method was used to analyze the data and test the path hypotheses using SmartPLS 3.2.8 software (Ringle et al., 2015). This method is most popular when the main objective of the study is to explain the variance of the target construct. Since the determinants of investment intention of SMEs are non-distributive, exploratory and predictive (Ringle et al., 2005; Chin, 2010). A two-stage analytical PLS-SEM approach is used, i.e., a measurement estimation model (external) and a structural model (internal) (Hair et al., 2011, p. 144; Chin, 2010). We assessed the significance of the t-values with 250 resampled tests (Chin, 2010). A path weighting system was used to test the hypotheses of this study. This test determines the amount of variance in the dependent variable explained by the independent variable. This value is usually referred to as R squared (R²), which ranges from 0 to 1. The bootstrap method with 250 samples was used to assess the statistical significance of the path estimates (t-values). To test the hypotheses of this study, a direct effects model (without a moderator) and then an interaction model (with a moderator)

| Construct | Items | Measurement Scale | Source of the items |
|-----------|-------|-------------------|---------------------|
| Political Factors | 5 | Likert-type Scale | Casas et al. (2011), Johnson et al. (2006) |
| Economic Factors | 7 | Likert-type Scale | Casas et al. (2011), Johnson et al. (2006) |
| Socio-cultural Factors | 5 | Likert-type Scale | Casas et al. (2011), Johnson et al. (2008) |
| Environment Factors | 4 | Likert-type Scale | Casas et al. (2011), Johnson et al. (2008) |
| Investment Intensions | 6 | Likert-type Scale | Soderlund and Ohman (2003), Islamoglu et al. (2015); Li (2013) Doctor et al. (1991) |
| Supply Chain Resilience | 6 | Likert-type Scale | Branuschield and Suresh (2009), Tomlin (2006), Duclos et al. (2005) |
was tested to determine whether the addition of a moderator would improve the explanatory power of the model. Moderating effects were tested using SEM as recommended by Kline and Dunn. In this approach, each component of the macroenvironment forces intensity component was crossed multiplied with SCR. This process resulted in moderator construct (i.e., PF × SCR, EF × SCR, TF × SCR, TF × SCR, SCF × SCR).

4. Results and discussions

4.1. Respondent's profile

As showed in Table 2, the results showed that slightly above half (54.7 percent) of the SMEs operated as sole proprietorship, slightly below one quarters of the SMEs operated as partnerships (14.7 percent), 14.1 percent operated as company limited by guaranteed, the remaining 16 percent operated as company limited by shares. With regards to industry type, slightly below half of the SMEs (48.8 percent) were retailers, 14.1 percent were manufacturers and the remaining 37.1 percent were service providers. These results implied that retailers dominate the SMEs scene in Ghana. A whopping majority (96 percent) of the SMEs have duly registered their business activities to secure a legal status. Concerning the size of the SMEs, the result showed that 44 percent were small sized businesses, 27 percent were micro sized business, 24.2 percent were medium sized businesses, the remaining 4.2 percent were relatively large companies. These results implied that majority of the Ghanaian SMEs were micro and small which is consistent with similar reports from previous studies (Appiah et al., 2018, 2021).

4.2. Exploratory factor analysis (EFA)

We first checked the data by measuring the reliability and validity of the model. Secondly, the structural model was performed for path analysis and hypotheses testing. Prior to the main PLS-SEM analysis the exploratory factor Analysis was performed. The data has shown strong correlation, sampling adequacy and suitability for EFA. As indicated in Table 3 the Kaiser – Meyer-Okin (KMO) values were greater than 0.60 (KMO≥0.6) and Bartlett’s Tests of Sphericity Chi-square tests values were significant i.e., p < 0.05.

4.3. Convergent validity and discriminant validity (measurement tool)

The first step of PLS-SEM is to assess the model’s measurement (convergent validity and discriminant validity). The relationships between constructs and items are represented by the measurement model. There are three main criteria to consider when evaluating the measurement model. These include: indicator reliability (factor loadings), internal consistency reliability (composite reliability), construct validity (mean extracted variance), and discriminant validity. Convergent validity was measured by composite reliability (CR) and Average Extracted Variance (AVE), and discriminant validity was measured by the square root of AVE. As shown in Tables 3 and 4, the total factor loadings were greater than 0.7, the total constructs under CR were greater than 0.7, and the AVE values were greater than 0.5. Thus, all acceptable recommended minimum values were exceeded, indicating internal consistency, indicator reliability, and CR. Fornell and Larker’s (1981) criteria were used to assess discriminant validity. According to this methodology, the square root of the AVE of each construct should have a higher correlation than within the other constructs. As shown in Table 4, the square roots of the AVEs were higher than their correlation with the internal constructs. Therefore, the Fornell and Larker test was used to determine discriminant validity. Based on the acceptable validity and reliability of the model measurement, analysis was performed to evaluate the structural model and test the hypotheses.

4.4. Construct reliability

The Cronbach’s Alpha has been performed as a supplementary to the CR to assess the internal consistency reliability of the measurement model. As a useful rule of thumb, a construct with Cronbach’s Alpha value of 0.7 (α ≥ 0.7) shows acceptable internal consistency reliability (Hair et al., 2011). As depicted in Table 5 Cronbach’s Alpha values for constructs were greater than 0.7, establishing satisfactory internal consistency reliability.

4.5. Effects of macroenvironmental forces and supply chain resilience on investment intentions

Table 6 presents the structural model results for the main model and the interaction (moderation) model. The empirical results show that five of the six direct hypotheses were significant. The predictive power of the model was 57.7% whiles the predictive power of the interaction model was 61.9%. Thus, there is empirical evidence explaining the relationship between macro-environmental factors and investment decisions in the oil and gas value chain in Ghana. H1 argues that political factors are positively related to SMEs’ intention to invest in the oil and gas sectors, which is consistent with (β = 0.193, p-value < 0.000, t-statistic = 8.06); H2 argues that economic factors are positively related to SMEs’ intention to invest in the oil and gas sectors, which is consistent with (β = 0.248, p-value < 0.000, t-statistic = 9.06). H3 suggests that technological factors are positively related to SMEs’ intention to invest in downstream oil and gas industry, which is also confirmed by (β = 0.323, p-value < 0.000, t-statistic = 7.06); H4 environmental factors are positively related to SMEs’ intention to invest in downstream oil and gas industry, which is also confirmed by (β = 0.097, p-value < 0.020, t-statistic = 2.33). However, we do not have enough evidence to confirm the socio-cultural factors and investment intention of SMEs in Ghana. We therefore reject H5. Meanwhile, all the interaction models were significant which implied that H7 (a–e) were supported.

5. Discussions

Inducing from the strategic the theory of positioning has been used in this study to identify the impact of external environment, expectation and influence of stakeholders on business. In this study we have disaggregated the macro environment factors into political, economic, socio-cultural, environmental and technological factors. We argue herein that macro environment factors facilitate SMEs intentions to invest in the downstream oil and gas. Our indicative evidence suggests that 4 out of the 5 hypotheses have been confirmed.
5.1. Effect of political factors on SME’s intentions to invest in the downstream oil and gas

H1 proposed that Political factors positively related to SME’s intentions to invest in the downstream oil and gas which was confirmed. The political situations in a country have direct and indirect effect on the success of SMEs (Wanjiru, 2013). These political factors may be in the form of political subventions such as duty modification, reduction of taxes, policies of labour and employees, contamination approaches, customer protection laws among others influence the activities of SMEs. We argue that political forces such as legislation, environmental protection, stable political system,

Table 3. Exploratory factor analysis (EFA).

| Construct          | Mean | Std. D | Skewness | Kurtosis | Loading | Eigenvalue |
|--------------------|------|--------|----------|----------|---------|------------|
| **Political Factors** |      |        |          |          |         |            |
| PF1                | 5.52 | 0.81   | -1.23    | -0.33    | 0.970   | 4.53 (90.59) |
| PF2                | 5.60 | 0.70   | -1.44    | -0.54    | 0.955   |            |
| PF3                | 5.66 | 0.69   | -1.73    | 1.31     | 0.960   |            |
| PF4                | 5.47 | 0.79   | -1.06    | -0.58    | 0.945   |            |
| PF5                | 5.52 | 0.79   | -1.23    | -0.29    | 0.928   |            |

KMO = 0.840, X² = 3653.885, df = 10, p-value = 0.000

| **Economic Factors** |      |        |          |          |         |            |
| EF1                | 5.34 | 0.69   | -0.54    | -0.76    | 0.847   | 4.49 (64.09) |
| EF2                | 5.25 | 0.78   | -0.47    | -1.21    | 0.957   |            |
| EF3                | 5.19 | 0.74   | -0.32    | -1.13    | 0.933   |            |
| EF4                | 5.39 | 0.71   | -0.72    | -0.74    | 0.720   |            |
| EF5                | 5.45 | 0.72   | -0.91    | -0.53    | 0.930   |            |
| EF6                | 5.45 | 0.72   | -0.91    | -0.53    | 0.701   |            |
| EF7                | 5.75 | 0.58   | -1.86    | 2.93     | 0.894   |            |

KMO = 0.751, X² = 3239.320, df = 21, p-value = 0.000

| **Socio-cultural Factors** |      |        |          |          |         |            |
| SF1                | 5.86 | 0.61   | -1.58    | 3.52     | 0.866   | 3.59 (71.71) |
| SF2                | 5.87 | 0.60   | -1.68    | 4.02     | 0.840   |            |
| SF3                | 5.96 | 0.40   | -0.48    | 4.08     | 0.803   |            |
| SF5                | 5.85 | 0.36   | -2.11    | 2.91     | 0.792   |            |
| SF6                | 5.91 | 0.29   | -3.16    | 9.11     | 0.927   |            |

KMO = 0.817, X² = 1659.100, df = 10, p-value = 0.000

| **Environment Factors** |      |        |          |          |         |            |
| EF1                | 6.20 | 0.54   | -0.70    | 4.66     | 0.847   | 2.93 (73.29) |
| EF2                | 6.04 | 0.48   | -0.36    | 4.56     | 0.815   |            |
| EF3                | 6.12 | 0.53   | -0.31    | 3.08     | 0.864   |            |
| EF4                | 6.11 | 0.52   | -0.31    | 3.41     | 0.897   |            |

KMO = 0.791, X² = 2971.252, df = 6, p-value = 0.000

| **Supply Chain Resilience** |      |        |          |          |         |            |
| SCR1               | 4.34 | 0.60   | -0.44    | -0.55    | 0.937   | 5.12 (85.45) |
| SCR2               | 4.32 | 0.59   | -0.57    | -1.32    | 0.964   |            |
| SCR3               | 4.44 | 0.61   | -0.22    | -1.23    | 0.899   |            |
| SCR4               | 4.30 | 0.58   | -0.32    | -0.75    | 0.925   |            |
| SCR5               | 4.38 | 0.60   | -0.93    | -0.33    | 0.907   |            |
| SCR6               | 4.32 | 0.58   | -0.51    | -0.53    | 0.903   |            |

KMO = 0.833, X² = 2861.269, df = 15, p-value = 0.000

| **Investment Decisions** |      |        |          |          |         |            |
| ID1                | 6.80 | 0.40   | -1.51    | 0.27     | 0.802   | 4.37 (72.79) |
| ID2                | 6.74 | 0.44   | -1.08    | -0.84    | 0.795   |            |
| ID3                | 6.73 | 0.57   | -1.98    | 2.78     | 0.897   |            |
| ID4                | 6.66 | 0.61   | -1.63    | 1.47     | 0.854   |            |
| ID5                | 6.86 | 0.34   | -2.12    | 2.51     | 0.957   |            |
| ID6                | 6.80 | 0.40   | -1.51    | 0.27     | 0.802   |            |

KMO = 0.841, X² = 2449.750, df = 15, p-value = 0.000

Table 4. Discriminant validity and convergent validity.

| Construct          | CR   | AVE  | EF   | ID   | CF   | PF   | EF   | SF   | SCR  |
|--------------------|------|------|------|------|------|------|------|------|------|
| Economic Factor    | 0.896| 0.570| 0.755|      |      |      |      |      |      |
| Investment Decision| 0.922| 0.672| 0.782| 0.820|      |      |      |      |      |
| Cultural Factor    | 0.926| 0.815|      | -0.010| 0.007| 0.903|      |      |      |
| Political Factor   | 0.970| 0.872| 0.515| 0.544| 0.010| 0.934|      |      |      |
| Environment Factor | 0.925| 0.825| 0.292| 0.320| 0.007| 0.153| 0.908|      |      |
| Social Factor      | 0.902| 0.650| 0.541| 0.531| 0.002| 0.014| 0.315| 0.816|      |
| SC Resilience      | 0.965| 0.852| 0.454| 0.453| 0.234| 0.234| 0.423| 0.334| 0.931|

Note: Square Root of Average Variance Extraction (AVE) shown on diagonal in italic; CR = Composite Reliability.
increases in taxes, foreign trade agreement impact on SMEs investment intentions.

5.2. Effect of economic factors on SME’s intentions to invest in the downstream oil and gas

In addition, H2 is confirmed, and hence economic factors are positively related to the intention of SMEs to invest in downstream oil and gas sector. The economic environment carries economic conditions bordering on labor force, interest rate, GDP per capita, level of trade, rate of economic development, inflation rate, unemployment rate and trade deficit or surplus (Gamble, 2014 cited in Litavniece and Znotină, 2015). The economic situation in the country helps enterprises (SMEs) to make strategic decisions. Therefore, SMEs need to understand monetary indicators and use this information to make informed decisions for the future. We argue that favorable economic factors contribute to SMEs' investment intentions, and similarly, unfavorable economic conditions can inhibit SMEs' investment behavior.

5.3. Effect of technological factor on SME's intentions to invest in the downstream oil and gas

Our evidence suggests that H3 is supportive. Technological factors are positively related to SMEs' intention to invest in downstream oil and gas sector. The technological environment accounts for changes in science that promote social development (Gamble, 2014 cited in Litavniece and Znotină, 2015). In Ghana, SMEs are at a disadvantage in the gas sector. The technological environment accounts for changes in science that promote social development (Gamble, 2014 cited in Litavniece and Znotină, 2015). The economic situation in the country helps enterprises (SMEs) to make strategic decisions. Therefore, SMEs need to understand monetary indicators and use this information to make informed decisions for the future. We argue that favorable economic factors contribute to SMEs' investment intentions, and similarly, unfavorable economic conditions can inhibit SMEs' investment behavior.

5.4. Effect of environmental factors on SME’s intentions to invest in the downstream oil and gas

There is verifiable evidence that environmental factors are positively related to SMEs’ intention to invest in downstream oil and gas sector, which confirms H4. Thus, legal environmental factors such as labor laws, health and safety policies, regulations, antitrust laws, and other factors that protect the business environment through legal means (Johnson et al., 2008). Aryeettey (1994) in Kayanula and Quartey (2000) noted that regulations controlling the SME sector represent only 1% of all national laws. Among these regulations are: inspecting premises, compiling and maintaining inventories, controlling or recording renewal applications and other documents. We believe that government and other stakeholder decisions to create an SME-friendly environment, such as the Local Content Policy (L. 1 2024), are most likely to support SME participation in the gas sector.

5.5. Effect of supply chain resilience as a moderator

The results of the study support H6. Supply chain resilience has positive and significant effect on SMEs’ intentions to invest in the downstream oil and gas which is empirically supported. Ponomarov and Holcomb (2009) and Christopher and Peck (2004) argued that supply chain resilience is the ability of a supply chain to develop the preparedness, responsiveness and flexibility to manage the risk of failure and recover to baseline or better after a failure. It can be inferred from the results that SMEs with strong supply chain resilience will certainly consider investment potentials in the downstream oil and gas value chain. Moreover, the H7 was supported. The research findings revealed that supply chain resilience moderated the relationship between macroenvironment dimensions and intention to invest. The link between macroenvironment dimensions and intention to invest was strengthened via the interaction effect of supply chain resilience. Chowdhury et al. (2019) investigated the conditional impact of supply chain resilience on supply chain performance under different levels of supply chain relationship practices and network complexity and reported that there was relationship between SCRE and SCP. Besides, Liu et al. (2017) considered a model describing the relationship between supply chain resilience and firm performance. The model results showed that there were direct positive and significant impacts of risk management culture on agility,
integration and supply chain (re)design, and that SCR performance contributes to firm performance. The results also showed that risk management plays a key role in the positive impact of the three types of SCR (agility, integration and supply chain (re)design) on firm performance. It is recommended that management focus on the role of risk management in determining the useful value of SCR. Aheysekara et al. (2019) found that supply chain risk management culture positively influenced SCR performance in terms of restructuring, flexibility and collaboration. Flexibility had the greatest impact on organizational performance and competitive advantage. Alfarsi et al. (2019) investigated how supply chain resilience affects corporate reputation. The results showed the processes by which SCR affects the maintenance and enhancement of corporate reputation. The mechanisms underlying these relationships were identified in supply chain networks.

6. Conclusions and implications

This paper duly followed the theory of strategic positioning to analyze the influence of macro-environmental dimensions on SMEs intentions to invest in the Ghana’s downstream oil and gas sector. Secondly, the paper has examined the moderating effect of supply chain resilience on the relationship between macroenvironment dimensions and intentions to invest, and finally to examine the effect of supply chain resilience on investment intentions. The results have shown that macro-environment dimensions including political factors, economic factors, environmental factors and technological factors were significantly related to SMEs intentions to invest in the downstream oil and gas which were consistent with previous studies (Johnson et al., 2008; Appiah et al., 2018, 2021). Moreover, the results have shown that supply chain resilience significantly moderated the relationship between macroenvironmental dimensions and intention to invest. The results have further revealed that supply chain resilience significantly influence SMEs investment intentions. The link between macroenvironmental dimensions and intention to invest was strengthened via the interaction effect of supply chain resilience which was again consistent with Liu et al. (2017), Alfarsi et al. (2019) and Aheysekara et al. (2019). Overall, our results are akin to policy makers agenda to create enabling macro environment to improve local businesses participation in the Ghanaian oil and gas value chain. Besides, the findings will assist SMEs owners and managers in their decisions to invest in the downstream oil and gas sector by strengthening investment capability at different levels of Supply chain resilience. In addition, the findings will have implications for policy makers, investors and researchers to create a supportive macro-environment for greater participation of local firms in Ghana’s oil and gas value chain. Given the limitations of this study, we recommend further research to assess the full impact of the business environment, i.e., macro-environment, industry forces and resource competitive strategies on SMEs’ investment intentions. Moreover, further studies should consider a comparative study between SMEs and large corporations regarding willingness to invest in the downstream oil and gas sector.

Declarations

Author contribution statement
Michael Karikari Appiah: Conceived and designed the analysis; Analyzed and interpreted the data; Wrote the paper.
Daniella Delali Sedegah: Contributed analysis tools or data; Wrote the paper.
Rosemary Anderson Akolaa: Analyzed and interpreted the data; Wrote the paper.

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