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### Article

Modeling the impact of macroenvironmental forces on investment in Renewable Energy Technologies in Ghana: the moderating role of Entrepreneurship orientation dimensions

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## **GENERAL & APPLIED ECONOMICS | RESEARCH ARTICLE**

## Modeling the impact of macroenvironmental forces on investment in Renewable Energy Technologies in Ghana: the moderating role of Entrepreneurship orientation dimensions

Michael Karikari Appiah<sup>1</sup>\*, Rosemary Anderson Akolaa<sup>1</sup> and Angela Kyerewaa Ayisi-Addo<sup>1</sup>

**Abstract:** Since 2011, successive Governments in Ghana have developed, and implemented Renewable Energy Master Plan to leverage macroenvironmental forces and encourage indigenous investment in Renewable Energy Technologies (RETs), but the actual impacts are yet to be felt by Ghanaians. The main objectives of the study are to: examine the impacts of Macroenvironment Forces (MF) on Small and Medium Enterprises' (SMEs) investment intentions in RETs, and determine the moderating effects of Entrepreneurship Orientation (EO) dimensions (viz. proactiveness, competitive aggression, innovativeness, and risk-taken) on the relationship between MF and SMEs' investment intentions. A total of 240 usable responses were received through self-administered survey questionnaires among Ghanaian SMEs. Variance-Based Partial Least Square Equation Modelling (PLS-SEM) approach was used for the data analyses and hypotheses testing. The results revealed that MF had significant and

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#### PUBLIC INTEREST STATEMENT

Since 2011, successive Governments in Ghana have developed, and implemented Renewable Energy Policies to leverage macroenvironmental forces and encourage indigenous investment in Renewable Energy Technologies (RETs). Despite the expectant prospects associated with adoption and investment in renewable energy technologies in Ghana, as well as the various policy interventions made by the successive Governments to enhance investments in the sector, Ghanaian private firms are yet to take giant steps. In the light of this backdrop, this paper aims to develop a model to explain the relationship between macroenvironmental forces, entrepreneurship orientation, and investment intentions of SMEs in the field of renewable energy technologies in Ghana to encourage indigenous participation. The study has recommended that the Government of Ghana should endeavor to facilitate the implementations of the (Renewable Energy Act, 2011; Act, 832) and the Amendment Act, 2020 (Act, 1045) particularly local content policy and private sector participation.





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positive relationship with SMEs' intention to invest in RETs. Moreover, the results showed that proactiveness, competitive aggressive, and innovation had direct effects on intention to invest in RETs. Again, the results showed that EO dimensions significantly moderated the relationship between MF and investment intentions in RETs. The implications of these results include extending previous MF works by evaluating MF, EO, and investment intention relationships in a developing country context, which has been largely ignored in previous studies. Again, this paper provides insights into the value of macroenvironment scanning and assessment which could lead to better investment intentions in clean, affordable, and reliable energy service. Besides, the efficacy of EO in MF-investment intentions relationship has been well established in this paper.

Subjects: Economics; Political Economy; Environmental Economics; Business, Management and Accounting; Industry & Industrial Studies

Keywords: Macroenvironment Forces; Entrepreneurship Orientation; SMEs' Investment; Renewable Energy Technologies; Structural Equation Modelling

#### 1. Introduction

The emergency of Sustainable Development Goals (SDGs) and the Paris Agreement on Climate Change have propelled Policy Makers, Practitioners and Academics to renew commitments towards renewable energy sources in the sub-Saharan African (SSA) countries (Obeng-Darko, 2018; Akuamoah, 2020). The SDG 7 focuses on ensuring universal access to clean, affordable, reliable, and modern energy services, and constitutes an integral part of the agenda, 2030. Murshed . (2022) averred that among the various ways to ensure energy savings, the integration of renewable energy sources into the national energy mix is considered to be the most important. In addition, increasing the use of renewable energy sources not only supplements non-renewable energy sources and reduces the energy crisis but also improves environmental quality. However, shifting to renewable energy sources to become independent of fossil fuels is not easy, especially for less developed countries, which are often technologically backward (Murshed et al., 2020; Murshed, 2021a; Murshed, 2021b). Seemingly, there are exciting times for renewable energy worldwide, with many countries seeing a surge in investment.

Given the global trend, the Government of Ghana has recently made efforts to develop the private sector and encourage local participation in renewable energy technologies (solar, wind, hydro, biomass, etc.). Photovoltaic capacity has grown from 3.1 GW in 2005 to 227 GW in 2015 (Energy Commission, 2016; Batchelor & Scott, 2017; Obeng-Darko, 2018; Akuamoah, 2020). Over the same period, wind power capacity has grown from 59 GW to 433 GW, and the annual commercial capacity of large hydro is also very significant. Over the same period, the capacity of partially operated co-integration biogas plants quadrupled to 106.4 GW. Other renewable energy technologies have also made considerable progress, with total annual biofuel production rising from 37 billion litres in 2005 to 128 billion litres in 2015. The cost of the most essential technologies has fallen considerably, while production levels have risen sharply (Duku et al., 2011; Ackah et al., 2014; Nasir Alfa & Ackah, 2015; Eshun & Amoako-Tuffour, 2016; Batchelor & Scott, 2017; Karasmanaki et al., 2019; Akuamoah, 2020). The ensuing effect was that in 2011, the government, through its legislative arm, passed the Renewable Energy Act of 2011 (Renewable Energy Act, 2011) in order to create favorable conditions for the development of renewable energy sources in the country to achieve sustainable economic growth, contribute to improving social life and reduce the negative effects of climate change.

Currently, most renewable energy activities in the country are carried out as pilot projects or on the basis of short-term planning cycles. As a result, there is no clear and comprehensive long-term plan for the development and deployment of the various renewable energy sources. To address the impact

of short-term planning on the overall development of the renewable energy sector, the Renewable Energy Master Plan, which provides an investment framework for the promotion and development of the country's abundant renewable energy sources for their contribution to sustainable economic growth, quality of life and environmental sustainability has already been developed (Energy Commission, 2016; Nasir Alfa & Ackah, 2015; Batchelor & Scott, 2017; Akuamoah, 2020) Following the renewable energy debate, various theories have attempted to explain why some companies are more likely to invest in renewable energy technologies than others. Existing studies (Energy Commission, 2016; Akuamoah, 2020; Appiah et al., 2021a) have examined the different factors that may influence firms' behavioral intentions toward renewable energy technologies. The issue of investment in renewable energy technologies remains a current, important, and inexhaustible phenomenon that has attracted the attention of many researchers and practitioners (Akuamoah, 2020; Amoah et al., 2021b; Shabalov et al., 2021).

However, despite the expectant prospects associated with adoption and investment in renewable energy technologies in Ghana, as well as the various policies interventions made by the successive Governments to enhance investments in the sector, Ghanaian private firms are yet to take giant steps. Among the most compelling reasons behind low investment strides in renewable energy resources are that, the macroenvironmental forces, and entrepreneurship orientations have been partly ignored or used in isolation in most prior studies. Hitherto, these variables have not been studied together as a result of their combined effects on investment intentions are still missing in empirical knowledge. For instance, in a recent study, Murshed (2021a) investigated renewable energy transition in some south Asian countries from the period of 1992 to 2015. Besides, Murshed (2021b) focuses on modelling the macroeconomic determinants of primary energy and electricity demand in Bangladesh from 1980 to 2018. Again, Amoah et al. (2020) examined the impact of economic wealth and economic freedom on the consumption of energy renewal as the percentage of the consumption of the total energy renewal in Africa. Furthermore, Murshed (2022) investigated whether energy efficiency improvements can increase access to fuels cleansing and the technology cookers in the developing countries in the sub-Saharan Africa. All these studies focused predominantly on macroeconomic variables, and panel data with no consideration for entrepreneurship orientation.

In the light of this backdrop, this paper is aimed to develop a model that examines the relationship between macroenvironmental forces, entrepreneurship orientation, and investment intentions of SMEs in the field of renewable energy technologies in Ghana by synthesizing the Strategic Positioning Theory (SPT) and Resource Based-View (RBV) Theory. These theories, respectively, emphasize on the influence of macroenvironmental forces and firm-specific resources on business success, growth, and development. This study contributes to empirical knowledge in five different folds. To start with, this paper contributes empirical knowledge on macroenvironmental factors including political, economic, legal, technological, and socio-cultural, and the extent to which each subconstruct impacts on investment in renewable energy. These macroenvironmental factors are essential because they influence general investment decisions in a country's economy and are also part of the political economy. Understanding how macroenvironment factors affects investment behaviour is imperative to guide prospective investors. Secondly, this study contributes to entrepreneurial orientation dimensions, and the extent to which each dimension impacts on investment intentions in renewable energy, of which four have been considered in this study (Viz.: Proactiveness, Competitive Aggressiveness, Innovativeness, and Risk Taking). Thirdly, this study contributes empirical knowledge on the interaction effects between macroenvironmental factors and the dimensions of entrepreneurial orientation. This study argues further that although the relationship between macroenvironmental factors and investment behaviours in renewable energy technologies have been reported, the extent to which entrepreneurship orientation moderates this relationship has not yet been explored in empirical literature. Fourthly, ultimately, the new model provides a more robust and accurate picture of Ghanaian investment intentions in the renewable energy sector. Given that most of the studies conducted so far are from industrialized and high-income countries, in cases where the authors focused on African countries, panel data were used with very limited emphasis on primary

data and cross section surveys. This study contributes to the empirical literature by providing comparable knowledge for Ghana as a developing country using cross-sectional survey data. Moreover, the research model is developed to fully meet the requirements and assumptions of structural equation modeling (SEM). The formulation of such a model is particularly important, as there is no empirical SEM model that explains SMEs' investment intentions in the renewable energy sector. Again, only a limited number of studies in sub-Saharan Africa have simultaneously incorporated macroeconomic factors, firm-level factors, and interaction effects as determinants of SMEs' intentions to invest in renewable energy technologies, using the SEM method.

Since SMEs are considered an important driver of prosperity and growth in all economies, this study focuses on the investment intentions of SMEs in the RET industry. In addition, the study builds on previous empirical studies (Nasir Alfa & Ackah, 2015; Batchelor & Scott, 2017; Obeng-Darko, 2018; Akuamoah, 2020; Appiah et al., 2021a, 2021b; K.M. Appiah et al., 2021c) in several respects. The current study simultaneously covers three different constructs, and the extent to which they impact on investment intentions of SMEs. Notably, macroecological determinants, entrepreneurial orientation (firm-level determinants), and moderation-level determinants. Thus, the model represents an improvement over studies that focus only on firm-specific determinants (for example) or on macroeconomic determinants. Finally, unlike most previous studies that focused on only larger firms and public-listed firms, this study has used field survey data from micro, small and medium-sized firms that have active membership status from either Association Ghana Industry (AGI), National Board for Small-Scale Industries (NBSSI) or Ghana Chamber of Commerce and Industry. This study is expected to provide new and insightful information to guide policymakers, academics, and investors in order to enhance investment in the renewable energy industry. The following questions have been addressed in the study:

- (1) To what extent do macroenvironmental forces affect SMEs investment behaviour in the renewable energy technologies in Ghana?
- (2) To what extent do entrepreneurship orientation dimensions affect SMEs investment behaviour in the renewable energy technologies in Ghana?
- (3) What are the moderating effects of entrepreneurship orientation dimensions on the relationship between macroenvironmental forces and SMEs investment intentions in the renewable energy technologies in Ghana?

The rest of the paper is structured into four (4) sections as follows: section 2 presents the review of works that have employed macro-environment determinants on investment intentions, entrepreneurial orientation dimensions on investment intention as well as theoretical framework and hypotheses development. Section 3 presents the methodological procedure for the study. Section 4 presents the results and discussions. Section 5 presents conclusions and implications of the study.

#### 3. Theoretical framework and hypotheses developmenT

Strategic Positioning Theory (SPT) and Resource-Based View (RBV) form the foundation upon which the current debate is sustained, and secondly, in our attempt to determine how different aspects of macro-environmental factors influence SMEs' investment intentions in renewable energy technologies. According to SPT, firm behavior is influenced by the external environment and stakeholder expectations. Johnson et al. (2008) proposed SPT and defined the business environment as macro factors, industry factors, competitors, and markets. A firm's macro environment is a broader environment that affects all aspects of the firm (Johnson et al., 2008) Based on the SPT assumptions, this study postulated that there is a positive relationship between favorable macro-environmental factors and intentions to invest. Appiah et al. (2021a), (2021b) utilized SPT to explain investment behaviour in the Ghanaian oil and gas sector. Likewise, Itani et al. (2014) as reported by Litavniece and Znotina (2015) argued that the macro-environment in which firms operate influences their performance, and the magnitude of this influence depends on the dependence of the firm on the economy. External performance is analyzed mainly in relation to

the country's political situation, economic conditions, socio-cultural factors, technological developments, and the legal framework (PESTEL). This theory has already been used to study similar phenomena (Johnson et al., 2008; Snyman and Saayman, 2009; Menzies and Orr, 2010; Gondor and Nistor, 2012; Litavniece and Znotina, 2015; Appiah et al., 2021a; K. M. Appiah et al., 2018). Again, the Resource-Based View theory has been used to supplement the SPT due to the presence of entrepreneurial orientation as moderator in the study. This theory argues that the performance of firms is determined by the resources it has at its disposal, and ultimately, how these resources are managed determines the success of the firm. In the current study, the authors have argued that entrepreneurship skills and capabilities are unique resources that are uncommon to most firms with such resources could manage it to drive a competitive edge over others (Barney, 1991; Laksmana and Yang, 2015; Asghari et al., 2020; Salehi et al., 2020; Appiah et al., 2021a). Therefore, inferring from this theory it is expected that SMEs with strong entrepreneurial orientations will be strengthened to take up investment in RETs in Ghana. The theoretical framework proposed in this study is presented in Figure 1.

#### 3.1. Macro environmental forces and investment intention

Macroenvironmental factors are broadly referred to as uncontrollable forces, such as economic, political, legal environment, technological, and socio-cultural which exert influence on a firm decision-making as well as its performance. Similarly, reviewed studies have found that macroenvironmental factors influence investment in general (Milovanovic & Wittine, 2014; Solesvik et al. 2014; Bialowolski & Weziak-Bialowolska, 2014; Mac-Dermott and Mornah, 2015; Khuong and An, 2016; Farrukh et al. 2017; Adeleke et al., 2018; K. M. Appiah et al., 2018; Nirwana & Haliah, 2018). For example, Pheng and Chuan (2006) K. M. Appiah et al. (2018) show that macroenvironmental factors such as political stability, perception of corruption, trade policies, taxes, and inflation affect business decisions, growth, and development. However, this study takes a different approach from previous studies. Therefore, in this study, the macroenvironment aspect is included as an exogenous variable to develop a strategy to discourage the growth of SME investment. We argued further that favorable macroenvironmental policies and strong enforcement agencies have effects on firms' investment choice and intentions to commit resources towards renewable energy resources. In view of the ongoing argument, the study hypothesizes as follows:

#### H1: MEF has positive and significant relationship with investment intention

#### 3.2. Proactiveness

Proactiveness encompasses the pursuit of a pioneering advantage that shapes the environment by introducing new products or processes before competitors (Lyon et al., 2000; Rauch et al., 2009). The



Figure 1. Theoretical Framework. concept of proactiveness has been used to describe the search for opportunities from a forwardlooking perspective, characterised by a high dependence on the development of structural resources, the introduction of innovative services and products before competitors and actions based on latent demand expectations (Lumpkin & Dess, 2001; Rauch et al., 2009). Previous studies (Barber et al., 2012; Cho & Lee, 2018; Park, 2017; Pra Martens et al., 2018) have argued that proactiveness has an effect on purchasing intentions, performance, and possible investment expansions. In Ghana, most SMEs have almost perfect knowledge on the various sectors they operate. Such information stretches across seasonality of the goods and services in the market, demand and supply, bargaining powers of suppliers and customers as well as degree of substitutes. To this end Ghanaian SMEs could be described as proactive. In view of the ongoing argument the study hypothesizes as follows:

#### H2: Proactiveness has positive and significant relationship with investment intention

# H6: Proactiveness as a moderator has significant effect on the relationship between MEF and investment intention

#### 3.3. Competitive aggression

Competitive aggressiveness is used to broadly describe the tendency of a firm to compete directly and vigorously with its competitors, i.e., to outcompete them in the market in order to enter or improve its position (Lumpkin & Dess, 1996). Again, competitive aggressiveness involves the tendency of a firm to challenge its competitors directly and vigorously in order to enter or improve its position in the market, i.e., to outperform them in a market segment (Vij & Bedi, 2012). The available empirical (Laksmana and Yang, 2015; Asghari et al., 2020; Salehi et al., 2020) evidence suggested that competitive aggression has an effect on business in number of ways including, business performance, business survival, and investment behaviour. In Ghana, there is almost some level of competition in every sector of the economy except where Government has deliberately created a monopoly. This is because most Ghanaian market could be best described as monopolistic competitive market. To succeed the firm needs to adopt a strategy such as cost leadership or focus market. To this end, Ghanaian SMEs could be described as very competitive. In view of the ongoing argument, the study hypothesizes as follows:

#### H3: Competitiveness has positive and significant relationship with investment intention

# H7: Competitiveness as a moderator has significant effect on the relationship between MEF and investment intention

#### 3.4. Risk-taking

Risk-taken is one of the fundamental factors that has impact on investment behaviour, survival, and growth of business. Risk-taking entails venturing into the unknown, borrowing large sums of money, committing valuable resources, and operating in an uncertain environment (Rauch et al., 2009) According to Miller and Friesen (1982), risk-taking is "a manager's decision to commit significant and risky resources to the extent that he is willing to invest, i.e., to an investment with a reasonable probability of cost failure. Previous studies (Aren & Nayman Hamamci, 2020; Carlsson Hauff, 2014; Pak & Mahmood, 2015; Wang et al., 2010) have suggested that risk-taken is one of the important factors that could contribute to SMEs intentions to invest in renewable energy resources. In Ghana, most SMEs are risk averse with only few risk lovers. This is mostly related to low investment capital and the fear of losing same. To this end Ghanaian SMEs could be regarded and risk averse or at best risk neutral. In view of the ongoing argument, the study hypothesizes as follows:

#### H4: Risk-taken has positive and significant relationship with investment intention

## H8: Risk taken as a moderator has significant effect on the relationship between MEF and investment intention

#### 3.5. Innovativeness

Innovativeness has emerged as one of the key drivers of firm's competitiveness, investment behavior, and performance. Accordingly, Covin and Slevin (1986) described innovation as the tendency of a firm to generate new ideas, experiment, explore, and develop. The authors further argued that innovativeness include the firm's ability and willingness to develop new ideas or innovations and create processes that lead to new products (Rauch et al., 2009). Innovation is the willingness to be creative and experimental, to be a technological pioneer, to conduct research and to develop new processes to introduce new products and services (Lumpkin & Dess, 2001). Previous studies (Carboni & Medda, 2021; Donkor et al., 2018; Hoffman & Broekhuizen, 2010) have established that innovativeness of firm improves new business ideas and performance as well as new investment intentions. Although, Ghanaian SMEs have not fully integrated the use of information technology into their operations, they try to follow the global trends and skew towards emerging innovations. To this end Ghanaian SMEs could be described as moderately innovative. In view of the ongoing argument, the study hypothesizes as follows:

H5: Innovativeness has positive and significant relationship with investment intention

H9: Innovativeness as a moderator has significant effect on the relationship between MEF and investment intention

#### 4. Literature review—empirical studies on renewable energy

As evidence in extant literature, there are several related studies on renewable energy. The only snag with most of the previous studies is that they reported mixed and inconclusive findings. Murshed (2021a) assesses the impact of integrating trade in the region on transition of energy renewable in some south Asian countries from the period of 1992 to 2015 using econometric analysis and reported that interregional trade plays an important role in the increment of energy renewable share in the final consumption of energy and the generation of the electricity in the Asian countries in the Southern part. The author further revealed that the relationship between regional trade and the share of renewable energy consumption and between regional trade and the share of renewable energy production was not linear. The panel causality analysis also showed that there was a unidirectional causal relationship between the share of intra-regional trade and the share of renewable energy consumption and production. It also showed that economic growth and increased carbon emissions in South Asia promote the use of renewable energy, while increased foreign direct investment discouraged its use. Relatedly, Murshed (2021b) modelled the macroeconomic determinants of primary energy and electricity demand in Bangladesh from 1980 to 2018 using ordered autoregressive model with discontinuous lags and found that the growth in the economy, the consumption of the household expenditure, the industrialization, the imports of energy, the urbanization, and the quality of institutions were having a positive effect on the primary energy demand and Bangladesh electricity. On the other hand, rising oil prices and increasing income inequality also reduced overall energy demand in Bangladesh. There was also a relationship between energy demand and economic growth, industrialization, and income inequality. There is also a unidirectional causal relationship between expenditure on the consumption of household, the imports of the energy, prices of the oil and the quality of the institution.

Moreover, Murshed (2022) in his recent study examined whether energy efficiency improvements can increase access to fuels cleansing and the technology cookers in the developing countries in the sub-Saharan Africa, and revealed that energy efficiency improvements are not primarily about increasing access to clean fuels and cooking technologies but about achieving some degree of energy

efficiency. The study also found that expected energy efficiency thresholds in sub-Saharan Africa vary across income groups and access to clean fuels and cooking technologies. Meanwhile, the estimation of the thresholds of the efficiency of the energy was higher than the average nation. Also, the growth of the economy, the pollution in the environment, the globalization of the finance and the empowerment of women were seen as the most significant factors influencing the fuels cleansing and the technology cookers. A study by Amoah et al. (2020) examined the impact of economic wealth and economic freedom on the consumption of energy renewal as the percentage of the consumption of the total energy renewal in Africa using panel data for 32 African countries from 1996 to 2017 and found that in Africa, the renewable energy consumption of energy in total increases as the wealth of economies increases until it becomes negative (inverted U shape). Again, varying measures of the freedom in the economy are a suggestion that rights of property and pressures for fiscal reduces the energy renewal share in the total consumption of energy. In order to ensure modern access, reliable, and sustainable energy for all by 2030, African governments should actively promote free trade, free enterprise, and renewable energy.

Similarly, Karasmanaki et al. (2019) identified the actual factors that affect the willingness of the environmentalist in order to invest in the energy renewal using the logistic regression results showed that investment increases when people learn to save energy and water, and that investment in energy renewal is at more advantage and safer than the other investment type. The biofuels and fuels of nuclear development are also significant factors in the final logistic regression model that can increase investment. As the investment willingness is the independent certain variables, the following aspects should be improved to encourage investment in renewable energy. More incentives and tax exemptions should be introduced for buyers and operators of renewable energy systems, as tax incentives are not considered as investment incentives. Beside the above, Shabalov et al. (2021) examined the effect of changes in energy efficiency technologies on infrastructure depreciation in the energy sector. The methodology of this study is based on different project scenarios, and found that the use of digital and IT technologies has a significant positive effect on improving and monitoring energy efficiency.

#### 5. Methodology

#### 5.1. Profile of Ghana's energy sector

Ghana's political commitment to renewable energy is reflected in measures to promote renewable energy development. The Renewable Energy Act (Act, 832) and the Amendment Act (Act, 1045) were passed in 2011 and 2020, respectively, to ensure the development, management, use, sustainability, and adequate supply of renewable energy for heat and power generation to increase the share of renewable energy in the national energy mix while contributing to climate change mitigation. The laws provide: a framework for the use of renewable energy; an enabling environment for attracting investment in renewable energy; local capacity building in renewable energy development technologies; public education in renewable energy production and use; and regulation of the production and supply of fuels and biofuels. Ghana was one of the first UN Member States to adopt the UN Sustainable Energy for All (SE4ALL) initiative and, as a first step towards joining the initiative, Ghana undertook a rapid assessment and review of its energy sector. Ghana. Ghana then developed a SE4ALL National Action Plan based on the three SE4ALL goals: i) ensuring universal access to modern energy services, ii) doubling energy efficiency, and iii) doubling the share of renewable energy in the overall energy mix. Ghana has made significant progress in increasing the electrification of the population, with a national electrification rate of over 70%, but rural areas lag behind with only 40% of the rural population electrified. Ghana must therefore consider expanding access to electricity for the rural population by increasing the share of renewable energy and promoting the productive use of energy. The study is therefore imperative to encourage SMEs participation in the sector to expedite the implementation of mini grids. SMEs have been the main focus of this paper, since there they constitute up to 92% of all legitimate businesses in Ghana, the sector employs over 80% of Ghanaians and contributes up to 70% to Gross Domestic Products (GDP). Again, SMEs serve as a source of innovation and human capital development (Appiah et al., 2021b, 2021a).

#### 5.2. Research design

To achieve the objectives of the study, a quantitative research method was used. In a quantitative design, the researcher makes greater use of numerical and mathematical estimates to measure the degree of occurrence of the constructs selected in the study. The design also includes numerical data collection based on positivism and the concept of objectivity in social reality (Saunders et al., 2012; Zikmund et al., 2012). This study uses a quantitative design to examine the effects of *macroeconomic* forces on SMEs' investment intentions in renewable energy technologies and to test the moderating effect of entrepreneurial dimensions. Furthermore, this study is classified as an explanatory study due to the causal relationship among the predictors, moderators, and outcome variables. The unit of analysis of this study is at the firm level, i.e., SMEs represented by managers and owners.

#### 5.3. Population and sampling

The population of the study consists of all registered SMEs that are members of at least one of the SME regulatory bodies in Ghana, namely the National Board of Small-Scale Industries (NBSSI), the Ghana Chamber of Commerce and Industry (GCCI) and the Association of Ghana Industries (AGI). To determine the sample size for the PLS-SEM, the rule of 10 proposed by J. F. Hair et al. (2011) was applied. Although, there are different methods of determining a sample size for research studies such as using appropriate statistical formulae at a given confidence interval and error margin, however, there is a slight difference when it comes to studies involving SEM, like the current paper. In the case of the latter the Rule of Ten has been particularly encouraged (J. F. Hair et al., 2011; F. Hair et al., 2014) in determining a sample size. This rule states that the minimum sample size should be 10 times the maximum number of structural pathways. (Hair et al.). In our proposed model, the maximum number of structural pathways is 9. Therefore,  $9 \times 10$ , or 90, is the minimum sample size required for the study, meanwhile a sample size of 300 has been used to improve on the representativeness of the sample. Although 300 questionnaires were distributed, 240 useful responses were received giving a response rate of 80%. Stratified sampling technique was used to select the participants. Firstly, the type of industry (manufacturing, service, and retailing) was used as strata, and secondly within each stratum the participants were randomly selected. The stratified sampling technique has been used in order to reduce sampling errors and enhance fair representatives.

#### 5.4. Data collection method

Structured questionnaire was the main data collection instrument employed in the study guided by the strategic positioning theory and resource-based view perspectives as well as recent empirical studies (Appiah et al., 2021a; K. M. Appiah et al., 2018). The questionnaire comprised of nine determinants. These are: macro-environmental factors (political, economic, legal, and sociocultural factors) and entrepreneurial orientation (which includes dimensions such as initiative, competitive aggressiveness, innovativeness, and risk-taking). Investment propensity is the main outcome variable. Detailed measures of each determinant are shown in Tables 1,2, 3 as well as Figure 2 (item loadings). Prior to the actual survey, the questionnaire used in this study was tested on 10% of the estimated sample of 300 respondents. This was done to answer the following questions: face validity, construct validity, and content validity. After explaining to the participants, the purpose of the study, consent was obtained using an informed consent form. All participants were assured that their responses would be anonymous and confidential. A 5-point Likert scale with high predictive power was used in this study. The 5-point Likert scales ranged from "strongly disagree" to "strongly agree" and were coded from 1 to 5. The questionnaire covers the main concepts of macro-environmental factors (political, economic, legal, and socio-cultural factors), entrepreneurial orientation (including dimensions of initiative, competitiveness, innovation, and risk-taking), and investment intention (see, Figure 1).

#### 5.5. Data analysis technique

This study used structural equation modeling (SEM) methodology and Smart partial least square (PLS) 3.2.8 software to analyze survey data and test hypotheses (J. F. Hair et al., 2011; F. Hair et al., 2014). PLS-SEM was developed based on non-distributive assumptions, and predictive methods. A bootstrap test was conducted 500 times to assess the significance of the t-values. The PLS approach is a two-step method. It consists of two steps. First, the measurement model is evaluated to assess the validity and reliability of the instrument. The reliability, discriminant validity, and convergent validity have been examined for all constructs to assess the validity of the measurement model. Convergent validity refers to two tests that are designed to measure the same construct and are correlated with each other. Convergent validity was assessed using Cronbach's alpha and composite reliability (CR) scores. Convergent validity was also assessed using average variance extracted (AVE) scores. Discriminant validity, on the other hand, refers to the fact that two variables that are not expected to be correlated are, in fact, not correlated (Netemeyer, 2003). In addition, it is a measure of the joint variance of the variables of interest as potential constructs (Fornell and Larcker, 1981). Discriminant validity is measured in two ways. First, discriminant validity was estimated using the square root of the AVE estimates. Second, we used the Heterotrait-Monotrait Ratio (HTMR) to estimate the discriminant validity. This ratio stipulates that discriminant validity between two reflective constructs score should be was less than 0.90. The second part of the analysis focused on path coefficients. The research hypothesis was tested using the path weighting method. This test specifically assessed how much of the variation in the dependent variable (investment intention) was explained by the independent variables (macroenvironmental forces, and entrepreneurship orientation). The resulting value is called R-sauared (R2) and ranges from 0 to 1. A direct effect model (no moderator) was used to measure the impact of macroenvironmental forces on investment intention and an indirect effect model (entrepreneurship orientation dimensions) was used to test the extent to which the relationship between macroenvironmental forces and investment intentions could be strengthened. The study followed the recommendations of Kline and Dunn (2000) to conduct the moderation analysis. In practice, the moderator variables were multiplied by independent variables to form interaction terms. This process led to the formation of moderator constructs (i.e., MEF x PROAC, MEF x INNOV, MFE x COMP, MFE x RISK).

#### 6. Results

The results of the study have been reported in this section. The Tables 1–3 present results on Descriptive Statistics, and Exploratory Factor Analyses (EFA), Table 4 presents results on Convergent Validity and Discriminant Validity, Table 5, presents results on Correlation matrix, and Table 6 presents results on Paths Co-efficient and Hypotheses testing.





Table 1. EFA on macroenvironmental Forces (MF)				
	Factor loading	Mean ± SD		
Political Factors				
(1) PF1	.931	4.25 ± 0.58		
(1) PF2	.921	4.44 ± 0.63		
(1) PF3	.848	4.21 ± 0.56		
(1) PF4	.917	4.35 ± 0.61		
(1) PF5	.859	4.32 ± 0.54		
(1) Composite Score		4.31 ± 0.59		
Eigenvalue	4.011			
% of Variance	80.223			
Cronbach Alpha	0.938			
KMO = 0.770; χ <sup>2</sup> = 1530.809; df = 10	); p-value = 0.000			
Economic Factors				
(1) EF1	.848	4.60 ± 0.49		
(1) EF2	.919	4.63 ± 0.48		
(1) EF3	.856	4.44 ± 0.49		
(1) EF4	.955	4.60 ± 0.49		
(1) EF5	.800	4.39 ± 0.48		
(1) Composite Score		4.53 ± 0.49		
Eigenvalue	3.849			
% of Variance	76.976			
Cronbach Alpha	0.924			
KMO = 0.799; χ <sup>2</sup> = 1503.888; df = 10	0; p-value = 0.000			
Environmental Factors				
(1) EF1	.870	4.59 ± 0.49		
(1) EF2	.873	4.55 ± 0.63		
(1) EF3	.849	4.47 ± 0.64		
(1) EF4	.870	4.55 ± 0.57		
(1) EF5	.854	4.37 ± 0.56		
(1) Composite Score		4.50 ± 0.58		
Eigenvalue	3.726			
% of Variance	74.527			
Cronbach Alpha	0.911			
KMO = 0.811; $\chi^2$ = 1086.969; df = 10	D; p-value = 0.000			
Socio-Cultural Factors				
(1) SCF1	.849	4.56 ± 0.49		

(Continued)

Table1. (Continued)		
	Factor loading	Mean ± SD
(1) SCF2	.922	4.49 ± 0.50
(1) SFC3	.954	4.41 ± 0.49
(1) SCF4	.912	4.38 ± 0.48
(1) SFC	.814	4.34 ± 0.47
(1) Composite Score		4.43 ± 0.49
Eigenvalue	3.977	
% of Variance	79.533	
Cronbach Alpha	0.935	
KMO = 0.848; χ <sup>2</sup> = 1508.930; df = 10	0; p-value = 0.000	

#### 6.1. Descriptive statistics and Exploratory Factor Analysis (EFA)

Exploratory factor analysis (EFA) was conducted to examine the structure of the survey data. Principal component analysis (PCA) was used to calculate 34 factor loadings. Unidimensional technique was used to examine each of the predetermined factors with critical emphasis on the extent to which each of the factors examined were able to meet the standard requirements for the EFA. For each factor to be considered in the modeling, a Kaiser-Mayer-Oaklin (KMO) test score of 0.60 or higher was required. This test was used to measure sample adequacy, correlation, and consistency with the EFA. Again, the chi-square score for Bartlett's test of sphericity was expected to be significant e.g., p-value < 0.05. This test measures the validity of the relationship between the variables. Cronbach Alpha scores were expected to be 0.70 or better. Again, the factor loadings were expected to score 0.60 or better. Inferring from Table 1, 2, 3, and Figure 2. It has been revealed that all the minimum requirements have been met. For instance, Cronbach alpha values exceeded 0.70, all the items for the factor loadings scored higher than 0.6, KMO values exceeded 0.60 and all the chi-square scores for Bartlett's test of sphericity were significant. Any item that recorded lower than the minimum requirement was deleted. The means and standard deviation values have been reported. In almost all the cases a mean value of 4 or better (Mean > 4) was recorded and a standard deviation less than one was recorded (SD <1) which suggest that majority of the participants had agreed to most of the questionnaire items.

#### 6.2. Convergent validity and discriminant validity (measurement model assessment)

In this study, reliability, discriminant validity, and convergent validity were examined for all constructs to assess the validity of the measurement model. Convergent validity is an indication that a scale is valid for a construct. A measure has convergent validity when it is highly correlated with several measures for similar constructs. Convergent validity is confirmed when the Average Variance Extracted (AVE) from each construct is greater than 0.50 and the factor loadings for each item are greater than 0.70 (F. Hair et al., 2014). As shown in Table 4, the AVE ranges from 0.698 to 0.966, which is above the minimum recommended value of 0.50. Table 1, 2, 3 and Figure 2 show that the factor loadings were above 0.70 for all constructs. Therefore, convergent validity was fully confirmed in this study. Discriminant validity was also confirmed when the AVE of each variable was significantly greater than the joint variance (cross-correlation square) between the two variables (Fornell & Larcker, 1981) and when the correlation between the two potential constructs was equal to or not greater than the square root of the AVE of these two constructs. Discriminant validity was confirmed when the correlation between the two constructs was equal to or less than the square root of the AVE of these two constructs. The results also meet this requirement (Fornell & Larcker, 1981; F. Hair et al., 2014, 2014). Finally, Cronbach's alpha and composite reliability (CR) were used to assess the reliability of the scale proposed by F. Hair et al. (2014). According to

Table 2. EFA on Entrepreneurial Orientation (EO)				
	Factor loading	Mean ± SD		
Proactiveness				
P1	.926	4.25 ± 0.52		
P2	.961	4.32 ± 0.55		
Р3	.886	4.29 ± 0.54		
Composite Score		4.28 ± 0.54		
Eigenvalue	2.567			
% of Variance	85.558			
Cronbach Alpha	0.915			
KMO = 0.690; χ <sup>2</sup> = 716.636; df = 3; p	o-value = 0.000			
Risk Taking				
RT1	.979	4.39 ± 0.68		
RT2	.979	4.39 ± 0.63		
RT3	.993	4.36 ± 0.67		
Composite Score		4.38 ± 0.66		
Eigenvalue	2.904			
% of Variance	96.788			
Cronbach Alpha	0.983			
KMO = 0.722; $\chi^2$ = 1590.281; df = 3;	p-value = 0.000			
Competitiveness				
COM1	.947	4.38 ± 0.74		
COM2	.983	4.42 ± 0.74		
COM3	.957	4.43 ± 0.69		
Composite Score		4.41 ± 0.72		
Eigenvalue	2.778			
% of Variance	92.613			
Cronbach Alpha	0.960			
KMO = 0.700; $\chi^2$ = 1114.575; df = 3;	p-value = 0.000			
Innovativeness				
INNO1	.947	4.44 ± 0.49		
INNO2	.941	4.37 ± 0.48		
INNO3	.915	4.33 ± 0.47		
Composite Score		4.38 ± 0.48		
Eigenvalue	2.620			
% of Variance	87.333			
Cronbach Alpha	0.927			
KMO = 0.753; χ <sup>2</sup> = 722.064; df = 3; p	o-value = 0.000			

Sekaran and Bougie (2010), Cronbach's alpha provides a reasonable measure of inter-rater reliability between the independent and dependent variables used in this study. A reliability value of 0.70 or higher is considered the minimum threshold in the literature. In addition, according to F. Hair et al. (2014), a minimum value of 0.70 is required for composite reliability. As shown in Table 4, Cronbach's alpha and CR values are greater than 0.70, which means that all criteria for measuring model reliability and validity, such as instrument reliability and validity and construct reliability and validity, were confirmed. As showed in Table 5, the variables correlated fairly, which

Table 3. EFA on Investment Intention in RETs				
	Factor loading	Mean ± SD		
(1) II1	.791	4.59 ± 0.49		
(1) II2	.918	4.70 ± 0.45		
(1) II3	.940	4.62 ± 0.48		
(1) II4	.912	4.66 ± 0.47		
(1) II5	.883	4.59 ± 0.49		
(1) II6	.859	4.55 ± 0.49		
(1) Composite Score		4.62 ± 0.48		
Eigenvalue	4.703			
% of Variance	78.387			
Cronbach Alpha	0.943			
KMO = 0.721; $\chi^2$ = 2415.001; df = 15; p-value = 0.000				

is consistent with the initial Variance Inflatory Factors obtained. Therefore, multicollinearity was not a problem in the study.

#### 6.3. Structural model (hypotheses testing)

Path weighting scheme has been used to test all nine (9) hypotheses in the study. Again, we first examined the direct effects model (without moderators) followed by the interaction model (with moderators) to test whether the introduction of moderators improves the explanatory power of the model. As shown in Table 6 the predictive power of the models ranged from 78% to 82% respective for the direct effect and the indirect effect. Given the predictive powers of the models, it can be concluded that the models are very strong. Overall, seven out of the nine hypotheses have been supported. The study has revealed that macroenvironment forces have significant and positive ( $\beta$ eta = 0.190, T-Statistics = 3.42) relationship with investment intention. Again, the study revealed that proactiveness has significant and positive relationship (Beta = 0.213, T-Statistics = 2.96) with investment intention. Besides, the study revealed that has competitive aggression significant and positive relationship (Beta = 0.176, T-Statistics = 3.48) with investment intention. Moreover, the study revealed that innovativeness has significant and positive relationship ( $\beta$ eta = 0.136, T-Statistics = 1.964) with investment intention. However, the study has revealed that risk-taking has insignificant relationship ( $\beta$ eta = 0.008, T-Statistics = 0.21) with investment intention. Regarding the indirect effects, the study found that competitive aggression as a dimension of entrepreneurship orientation significantly moderated (Beta = 0.369, T-Statistics = 2.819) the relationship between macroenvironment forces and investment intention, innovativeness as a dimension of entrepreneurship orientation significantly moderated ( $\beta$ eta = 0.194, T-Statistics = 3.238) the relationship between macroenvironment forces and investment intention, and risk-taking as a dimension of entrepreneurship orientation significantly moderated ( $\beta$ eta = -0.659, T-Statistics = 15.361) the relationship between macroenvironment forces and investment intention. However, proactiveness as a dimension of entrepreneurship orientation failed to moderate ( $\beta$ eta = 0.010, T-Statistics = 10.913) the relationship between macroenvironment forces and investment intention.

Macro = Macro Environment Forces; Pro = Proactiveness; Com = Competitiveness; Risk = Risk— Taken; Innov = Innovativeness; Int. Inv = Investment Intention;

Table 4. C	onvergent V	/alidity and	Discrimina	nt Validity F	ornell-Larck	er Criterior	-						
	ಶ	CR	AVE	1	2	ĸ	4	ß	9	7	8	6	10
1 Com	0.960	0.971	0.917	0.958									
2 Econ	0.924	0.943	0.77	0.11	0.877								
3 Innov	0.927	0.946	0.854	0.043	-0.043	0.924							
4 Int. Inv	0.943	0.956	0.784	0.182	0.201	0.127	0.885						
5 Env. fac	0.911	0.936	0.745	-0.172	0.357	-0.014	0.108	0.863					
6 Macro	0.929	0.927	0.698	-0.05	0.78	0.054	0.258	0.739	0.835				
7 Pol Fac	0.938	0.953	0.802	-0.01	0.516	-0.081	0.303	0.496	0.819	0.896			
8 Pro	0.915	0.944	0.85	0.037	0.127	-0.1	0.113	-0.048	0.108	0.192	0.922		
9 Risk	0.983	0.988	0.966	0.089	-0.143	-0.297	-0.165	-0.165	-0.196	-0.068	-0.102	0.983	
10 Socio	0.935	0.951	0.794	-0.133	0.281	0.482	0.062	0.267	0.49	0.156	-0.025	-0.253	0.891
Note: Squar Inv = Investr	e Root of Aver ment Intention;	age Variance   ; Legal = Legal	Extraction (A) Environment;	/E) shown on Macro = Macro	diagonal in ita Environment	llic; CR = Corr Forces; Po Fac	nposite Reliabil : = Political For	ity; Com = Co ce; Pro = Proac	mpetitiveness; tiveness; Risk	: Econ = Econ = Risk—Taken;	omic Force; In Socio = Socio	nov = Innovat -Cultural Force	iveness; Int.

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Mean      4.31      4.53      4.50      4.43        Standard Dev      0.52      0.52      0.50      0.43        Political      1      .510**      0.50      0.43        Political      1      .510**      .493**      .137*        Environmental      1      .510**      .493**      .137*        Factors      1      .347**      .267**        Environmental      1      .347**      .267**        Factors      1      .347**      .267**        Environmental      1      .252**      .1        Proactive      1      .252**      .1        Proactive      1      .252**      .1   Pro	4.28	٥	7	œ	6
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Table 6. Partial least squares results and hypothesis testing				
Hypothesized Relationship	Path Coefficient (β)	T-Statistics	R <sup>2</sup> (Adj. R <sup>2</sup> )	Decisions
Direct Effect				
H1: Macro -> Investment Intention	0.190	3.42*		Supported
H2: Pro -> Investment Intention	0.213	2.985*	0.78(0.764)	Supported
H3: Com -> Investment Intention	0.176	3.475*		Supported
H4: Risk -> Investment Intention	0.008	0.210		Not Supported
H5: Innov -> Investment Intention	0.136	1.964**		Supported
Moderating Effect				
H6: Macro x Pro-> Investment Intention	0.010	0.109		Not Supported
H7: Macro x Com -> Investment Intention	0.369	2.819*	0.82(0.814)	Supported
H8: Macro x Risk -> Investment Intention	-0.659	15.361*		Supported
H9: Macro x Innov -> Investment Intention	0.194	3.238*		Supported

#### 7. Discussions

The main purpose of this study was to establish the relationship between macroenvironment forces and investment intention in renewable energy technologies and the moderating effects of entrepreneurship dimensions. To adequately address the demands of the study, a model was developed to test the moderating effects of entrepreneurship orientation on the relationship between macroenvironment forces and investment intention. There were nine hypotheses that were developed for the study. The hypotheses comprised of five direct effects and four indirect effects as illustrated in the Figure 3.

#### 7.1. Macroenvironment forces and investment intention

Inferring from the strategic positioning theory, the study hypothesized that favorable macroenvironmental forces will positively relate to investment intention. The study has revealed that macroenvironment forces have a significant and positive ( $\beta$ eta = 0.190, T-Statistics = 3.42) relationship with investment intention. Thus, H1 is fully supported. The study has revealed that macroenvironmental forces such as economic factors, political factors, and legal environment have influence on SMEs investment intentions in the renewable energy technologies in Ghana. The implications of the study include that need to leverage the macroeconomic forces in order to encourage SMEs active investment in the renewable energy sector. This result is in agreement with Appiah et al. (2021a) who argued that the macroenvironment has several implications on the general investment behaviour of a given economy. Moreover, it has been argued from the theory of strategic positioning perspective that macroenvironment is one of the key drivers of business positioning particularly in a competitive environment (Laksmana and Yang, 2015; Appiah et al., 2021a; Asghari et al., 2020; Salehi et al., 2020) Figure 3. Final research framework.



#### 7.2. Entrepreneurship orientation and investment intention

Inferring from the resource-based view theory, the study hypothesized (H2, H3, H4 & H5) that entrepreneurship orientation dimensions including proactiveness, competitive aggression, innovativeness, and risk-taken on SMEs' investment intentions. The study revealed that proactiveness has a significant and positive relationship (Beta = 0.213, T-Statistics = 2.96) with investment intention. Therefore, H2 is supported. Besides, the study revealed that has competitive aggression significant and positive relationship (Beta = 0.176, T-Statistics = 3.48) with investment intention, thus H3 is supported. Moreover, the study revealed that innovativeness has significant and positive relationship (Beta = 0.136, T-Statistics = 1.964) with investment intention, therefore, H5 is supported. However, the study has revealed that risk-taking has insignificant relationship ( $\beta$ eta = 0.008, T-Statistics = 0.21) with investment intention, therefore H4 is rejected. All the dimensions of entrepreneurship orientation except risk-taken were fully supported. These imply that SMEs equipped with proactiveness, risk-taken, innovation, and competitive aggression affect the macroenvironmental forces and investment intentions in the renewable energy sector. Nevertheless, SMEs that lack these entrepreneurship orientations are most likely to fail. There is the need therefore to encourage SMEs to participate in entrepreneurship competencies, and skills development programs in order to develop sustainable competitive advantage needed to invest in emerging sectors such as renewable energy market in Ghana. These results are consistent with RBV theory that stipulates that firms can develop a sustainable competitive advantage from resources that are imitable, immobile, and unique. Previous studies (Appiah et al., 2021a; Carboni & Medda, 2021; Chen, ; Donkor et al., 2018; Hoffman & Broekhuizen, 2010) have reported that firms' entrepreneurship skill, capability, and orientations have influence on their investment intentions.

#### 7.3. Dimensions of entrepreneurship orientation as moderators

The second objective of the study is to examine the moderating effects of entrepreneurship orientation dimensions including proactiveness, competitive aggression, innovativeness, and risk-taken on SMEs' investment intentions. The study found that competitive aggression as a dimension of entrepreneurship orientation significantly moderated ( $\beta$ eta = 0.369, T-Statistics = 2.819) the relationship between macroenvironment forces and investment intention, therefore H7 is supported. Innovativeness as a dimension of entrepreneurship orientation significantly moderated ( $\beta$ eta = 0.194, T-Statistics = 3.238) the relationship between macroenvironment forces and investment intention, therefore H8 is supported, and risk-taking as a dimension of entrepreneurship orientation significantly moderated ( $\beta$ eta = -0.659, T-Statistics = 15.361) the relationship between macroenvironment forces and investment intention, therefore, H9 is supported. These results imply that SMEs with strong entrepreneurial orientations such as proactiveness, risk-taken, innovation, and competitive aggression could take up investment opportunities in the renewable energy sector. The results imply further SMEs managers and owner in their planning and decision-making should consider EO as one of the critical success factors of MF-investment intention relationship. However, proactiveness as a dimension of entrepreneurship orientation failed to moderate ( $\beta$ eta = 0.010, T-Statistics = 0.913) the relationship between macroenvironment forces and investment intention. Therefore, H6 is rejected. These results partially support number of prior studies (Laksmana and Yang, 2015; (Asghari et al., 2020); (Appiah et al., 2021b; Appiah et al. (2021b); Appiah et al., 2021a; K.M. Appiah et al., 2021c. Salehi et al., 2020) argued that resources of firms including entrepreneurship competency could facilitate investment drive and encourage participation.

#### 8. Conclusions and implications

This study was conducted to investigate the implications of macroenvironment forces on SMEs' investment intentions in renewable energy technologies, and the moderating effects of entrepreneurship orientation dimensions (Viz., proactiveness, competitive aggression, innovativeness and risk-taken). Specifically, the study was aimed to critically address three (3) questions as follows: To what extent do macroenvironmental forces affect SMEs investment behaviour in the renewable energy technologies in Ghana? To what extent do entrepreneurship orientation dimensions affect SMEs investment behavior in the renewable energy technologies in Ghana? To what extent do entrepreneurship orientation dimensions affect SMEs investment behavior in the renewable energy technologies in Ghana? and What are the moderating effects of entrepreneurship orientation dimensions on the relationship between macro-environmental forces and investment intentions in the renewable energy technologies in Ghana? The results revealed that MF had significant and positive relationship with SMEs' intention to invest in RETs. Moreover, the results showed that proactiveness, competitive aggressive, and innovation had direct effects on intention to invest in RETs. Again, the results showed that EO dimensions significantly moderated the relationship between MF and investment intentions in RETs.

#### 8.1. Practical implications

The study has revealed that macroenvironmental forces such as economic factors, political factors, and legal environment have influence on SMEs investment intentions in the renewable energy technologies in Ghana. The implications of these results include that need to leverage the macroeconomic forces in order to encourage SMEs active investment in the renewable energy sector. Moreover, the role of EO in MF-investment intentions relationship has been well established in this paper. This implies that SMEs equipped with proactiveness, risk-taken, innovation, and competitive aggression affect the macroenvironmental forces and investment intentions are most likely to fail. There is the need therefore to encourage SMEs to participate in entrepreneurship competencies, and skills development programs in order to develop sustainable competitive advantage needed to invest in emerging sectors such as renewable energy market in Ghana which is consistent with previous reports (Appiah et al., 2021a, 2021b). Another implication is that SMEs managers and owners in their planning and decision-making should consider EO as one of the critical success factors of MF-investment intentions relationship.

#### 8.2. Theoretical implications

The study has effectively synthesized the strategic positioning theory and the resource-based view to explain investment behavior of Ghanaian SMEs in the renewable energy sector. These theories respectively emphasize on the influence of macroenvironmental forces and firm-specific resources on business success, growth and development. These have been confirmed in the current study. The study has established that macroenvironmental forces such as economic factors, political factors, and legal environment have influence on SMEs investment intentions in the renewable energy technologies in Ghana. Moreover, the study has discovered that that SMEs with strong entrepreneurial orientations such as proactiveness, risk-taken, innovation, and competitive aggression could take up investment opportunities in the renewable energy sector. We argued further that the synergy of the two theories provide better understanding on SMEs investment intentions in the renewable energy sector, and therefore stand to enhance the generalization of the study outcomes.

#### 8.3. Policy implications

The findings of the study have implications on renewable energy Acts, policies and government strategies. The study has revealed that MF had significant and positive relationship with SMEs' intention

to invest in RETs. Moreover, the results showed that proactiveness, competitive aggressive, and innovation had direct effects on intention to invest in RETs. Again, the results showed that EO dimensions significantly moderated the relationship between MF and investment intentions in RETs. The Government of Ghana should endeavor to facilitate the implementations of the (Renewable Energy Act, 2011; Act, 832) and the Amendment Act, 2020 (Act, 1045) particularly local content policy and private sector participation. The findings from this paper could be used to reform part of the current policies to stimulate SMEs intentions to invest in the study. Moreover, should consider non-adherence of the mandatory policy requirements and impose sanctions on defaulters. As part of the series of stakeholder's engagements government should ensure that SMEs have been adequately presented through agencies such as AGI, NBSSI, and GCCI. Finally, this study has certain limitations, that is although this study was conducted in Ghana, it could be replicated anywhere in the developing country with abundance renewable energy resources such as geothermal, solar, wind, biomass amongst others. Future researchers are advised to consider a comparative study between SMEs and large-scale corporations.

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