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Entrepreneurial Alertness in Dynamic Environments: Mediating Pathways to Entrepreneurial Orientation and Performance

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Entrepreneurial orientation (EO) is critical for firms navigating dynamic environments, yet the mechanisms driving its development remain underexplored. This study examines the role of entrepreneurial alertness (EA) as a mediator linking environmental dynamism to EO and firm performance. We argue that whilst information acquisition reduces uncertainty, excessive focus on gathering information without adequate processing can lead to inefficiencies and missed opportunities. This imbalance may hinder the development of EO and adversely affect firm performance. Using data from 209 small and medium enterprises in Ghana, collected across multiple informants in two waves, our findings provide empirical support for the proposed model. The study contributes to the EO literature by demonstrating the relationship between information acquisition and processing in fostering EO and performance. It also cautions against the risks of overemphasizing one dimension at the expense of the other in dynamic environments. Additionally, we extend the conceptualization of EA by demonstrating that its dimensions operate through flexible, non-linear pathways, enabling entrepreneurs to adapt their information-processing strategies to the demands of dynamic environments.

Introduction

'Perhaps that you're searching far too much? That in all that searching, you don't have the time for finding?' – Siddhartha[1]

The concept of entrepreneurial orientation (EO), defined as 'sustained pattern(s) of entrepreneurial behavior' within an organization (Covin and Wales, 2019, p. 3), has garnered significant scholarly attention due to its pivotal role in enhancing firm performance (Cowden and Tang, 2021; Lumpkin and Dess, 1996; Rauch *et al.*, 2009). EO encompasses dimensions such as innovativeness, proactiveness and risk-taking, which collectively shape a firm's strategic posture and capacity to navigate uncertain environments. Extensive research has been conducted to explore the individual, organizational and contextual factors that influence EO (Clark *et al.*, 2023; Eshima and Anderson, 2017; Miller, Le Breton-Miller and Lester, 2011; Wiklund and Shepherd, 2003). Among these, the role of external factors such as environmental dynamism has been emphasized as a key driver of EO (Rosenbusch, Rauch and Bausch, 2013; Ruiz-Ortega *et al.*, 2013; van Doorn, Heyden and Volberda, 2017). This body of research suggests that environmental dynamism facilitates EO by compelling firms to engage in entrepreneurial actions to manage the uncertainty inherent in dynamic environments and to succeed within them.

However, despite these advancements, two critical gaps remain. First, whilst prior research highlights the importance of environmental dynamism in fostering EO, the underlying mechanisms through which entrepreneurs translate dynamic environmental conditions

[1]Book by Hermann Hesse (2001).

into entrepreneurial behaviours remain inadequately understood (McMullen, Brownell and Adams, 2021; Wales *et al.*, 2021). Specifically, there is limited knowledge of how entrepreneurs' cognitive and behavioural processes mediate the relationship between environmental dynamism and EO. This gap hinders a deeper understanding of how firms navigate the uncertainty inherent in dynamic contexts and foster EO effectively.

Uncertainty, whilst creating new opportunities, also leads to gaps in the information required to discern cause-and-effect relationships. These gaps, in turn, affect how firms allocate resources to generate value (Orrensalo, Brush and Nikou, 2024). Elevated uncertainty levels may deter entrepreneurial actions and hinder the adoption of an entrepreneurial strategic orientation in such settings (McKelvie, Haynie and Gustavsson, 2011; Townsend *et al.*, 2018). Entrepreneurs play a crucial role in acquiring and processing information to successfully navigate these uncertainties (Davidsson, Recker and von Briel, 2020; Fiet, 2007; Frese and Gielnik, 2014). These activities are vital for entrepreneurs to formulate and validate hypotheses about market opportunities (Camuffo *et al.*, 2020), thereby playing a critical role in how they manage and allocate organizational resources (Miller and Le Breton-Miller, 2011; Patel and Fiet, 2009). Indeed, Ferreira *et al.* (2015) argue that EO is deeply influenced by individual-level decision-making, cognition and information-processing capabilities. Similarly, the literature on entrepreneurs' information-seeking behaviour highlights that entrepreneurs' awareness of their knowledge gaps propels them to gather and process information to meet their objectives (Orrensalo, Brush and Nikou, 2024). Likewise, Sleptsov and Anand (2008) emphasize in their conceptual work the critical need to balance information-gathering and processing capabilities when navigating dynamic environments. They argue that whilst firms with strong information-gathering capabilities can identify opportunities, these efforts are futile without complementary information-processing capabilities to act on them.

Second, although existing research emphasizes the diverse activities entrepreneurs undertake to form beliefs and create value in dynamic contexts, limited attention has been given to the sequencing and integration of these activities (Zellweger and Zenger, 2023). This oversight constrains our understanding of how entrepreneurs transition from acquiring information to generating actionable insights, particularly under uncertainty (Sleptsov and Anand, 2008). Addressing this gap is important for advancing our knowledge of the cognitive and behavioural processes that underpin entrepreneurial decision-making in dynamic environments.

Entrepreneurial alertness (EA), with its dual dimensions of information acquisition and processing, provides a nuanced lens for understanding the mechanisms that translate environmental uncertainty into actionable entrepreneurial behaviours. Through its components of scanning and search, association and connection, judgment and evaluation (Tang, Kacmar and Busenitz, 2012, 2021), EA bridges the critical gap between environmental changes and engaging in entrepreneurial action, thereby serving as a vital mechanism for navigating and capitalizing on dynamic market conditions. This aligns with prior arguments suggesting that organizations require 'maintenance processes' to sustain their functionality amidst external change (Berger and Luckmann, 1966). We extend this reasoning by proposing that EA functions as a critical maintenance process for EO in dynamic environments. Specifically, EA acts as a mediating mechanism that enables firms to adapt to environmental dynamism and sustain EO by systematically managing information flows. This involves scanning and searching for relevant data, followed by integrating this information through association and judgment, thereby bridging the gap between environmental uncertainty and entrepreneurial action. Whilst traditionally conceptualized as a three-stage sequential process, our study suggests that EA can operate flexibly, with scanning and searching followed by either association or judgment, depending on situational demands. This adaptive capability positions EA as a dynamic stabilizer, enabling firms to maintain EO under conditions of flux, and aligns with Davidsson's (2015) argument that two parallel processes – external enablers and new venture ideas – influence entrepreneurial actions.

This study addresses the research gaps discussed above by leveraging insights from the literature on entrepreneurial agency, cognition and information-seeking (Chaston and Sadler-Smith, 2012; Fiet, 2007; McMullen, Brownell and Adams, 2021; McMullen, Wood and Palich, 2014; Sleptsov and Anand, 2008). This integrative approach provides a robust foundation and enables us to seamlessly bridge concepts from multiple domains and levels to develop our theoretical framework. We test our framework using multiple-informant data collected in two waves: from entrepreneurs and senior managers in the first wave, and finance managers in the second wave, across 209 small and medium enterprises (SMEs) in Ghana. Despite being recognized as one of the most stable countries in Sub-Saharan Africa (Spillan and King, 2017), Ghana continues to grapple with underdeveloped market institutions and regulatory challenges (Acquaah, 2007; Adomako *et al.*, 2018; Obeng, Robson and Haugh, 2014). Coupled with robust economic growth driven by vigorous entrepreneurial activity in recent years, these factors make Ghana an ideal context for investigating how entrepreneurs adapt and thrive in dynamic environments.

Our study makes significant contributions to the EO and EA literatures by addressing critical gaps and advancing theoretical understanding. First, we examine the pivotal role of information acquisition and processing in shaping EO within dynamic environments, responding to calls for deeper insights into how such environments either facilitate or impede EO (Covin and Wales, 2019; Wales, Gupta and Mousa, 2013). By positioning EA as a mediating construct, we illuminate the cognitive and behavioural processes that link environmental dynamism to EO, thereby contributing to the broader understanding of entrepreneurial cognition and behaviour (McMullen, Brownell and Adams, 2021; Wales *et al.*, 2021). Building on this, we contribute to the EO literature by empirically demonstrating how EA mediates the relationship between environmental dynamism and EO through distinct pathways – scanning and search followed by association and connection, or judgment and evaluation. This differentiation enhances understanding of EA as a mechanism for translating environmental dynamism into strategic entrepreneurial behaviours, offering nuanced insights into how firms navigate dynamic contexts to sustain EO. Additionally, we extend the conceptualization of EA by relaxing the assumption of sequentiality traditionally associated with its dimensions (Tang, Kacmar and Busenitz, 2012). Our findings show that EA operates through flexible, non-linear pathways, allowing entrepreneurs to tailor their information-processing strategies to the demands of dynamic environments. Specifically, entrepreneurs can adapt their approach based on their needs, utilizing association and connection processes for creative recombination and pattern recognition, or employing judgment and evaluation processes to assess the feasibility and make timely decisions. This adaptability broadens the theoretical boundaries of EA, offering a nuanced understanding of its role in fostering EO. Finally, by contextualizing our study in Ghana, we provide insights into entrepreneurial behaviour in resource-constrained and dynamic settings, with implications that extend to other SMEs in developing economies.

Theoretical background and hypotheses

Linking environment to entrepreneurial behaviour

Environmental dynamism, defined as the rate of change and unpredictability in an environment (Miller and Friesen, 1983), creates conditions that compel motivated entrepreneurs to initiate and expand their ventures (Baron and Tang, 2011; Wiklund and Shepherd, 2005). In dynamic markets, characterized by rapidly shifting consumer demands, technological advancements and evolving regulations, existing products and services can quickly become obsolete. Firms must, therefore, demonstrate agility and foresight to foster entrepreneurial behaviours that sustain competitiveness (Adomako *et al.*, 2022; McMullen, Brownell and Adams, 2021).

EO has emerged as a key construct in dynamic environments due to its association with firm performance and adaptability (Cowden and Tang, 2021; Rauch *et al.*, 2009). EO encompasses three interrelated dimensions: innovativeness, which drives the pursuit of creative and novel solutions to market challenges; proactiveness, reflecting the firm's initiative to target emerging opportunities ahead of competitors; and risk-taking, which involves making bold investments under conditions of uncertainty (Lumpkin and Dess, 1996; Wiklund and Shepherd, 2003, 2005). Accordingly, research shows that innovativeness is critical for modifying products and services to meet rapidly evolving consumer demands (Zhou and Wu, 2010). Proactiveness enables firms to anticipate obsolescence, positioning them to capitalize on emerging trends before competitors (Zahra, 1996). Risk-taking becomes indispensable as firms undertake ventures with uncertain outcomes (Li and Ahlstrom, 2020). However, whilst these attributes are vital for navigating dynamism, existing research often neglects the cognitive and behavioural processes through which entrepreneurs operationalize EO.

Research has identified a range of antecedents influencing EO, including individual-level personality traits such as positive affect (Bernoster, Mukerjee and Thurik, 2020) and organizational-level factors like absorptive capacity, which moderates the EO–innovation relationship (Patel *et al.*, 2015). Furthermore, internal configurations of CEO motivations, traits and tenure have been shown to shape EO, as have external factors, including supply chain dynamics and co-ethnic networks (Pittino, Visintin and Lauto, 2017; Wang and Altinay, 2012). These findings highlight the complex interplay of internal and external influences on EO, yet they offer limited insight into the mechanisms that sustain EO amidst environmental flux. Research also suggests that 'the alertness of the individual entrepreneur is an antecedent of the entrepreneurial orientation of the firm' (Chaston and Sadler-Smith, 2012, p. 416). Accordingly, the manifestation of EO in dynamic contexts may depend on mechanisms such as EA, which integrates cognitive and behavioural processes to systematically manage environmental information (Tang, Kacmar and Busenitz, 2012). The literature underscores the importance of balancing epistemic curiosity with pragmatic action in these settings (Sergeeva, Bhardwaj and Dimov, 2022). However, the role of EA in mediating the relationship between environmental dynamism and EO remains insufficiently explored. Whilst prior research has advanced our understanding of EO's antecedents and outcomes, further investigation is needed to clarify how firms adapt their strategies, foster innovation and maintain proactiveness under conditions of flux.

Entrepreneurial alertness: The missing link in understanding entrepreneurial orientation in dynamic environments

EA pertains to the processes through which entrepreneurs become cognisant of new changes within their environments (Kirzner, 1973; Tang, Kacmar and Busenitz, 2012, 2021). By its nature, EA is shaped by external shifts, such as market, regulatory and technological changes (Baron and Tang, 2011, Gaglio and Winter, 2017). Despite its critical role in shaping the entrepreneurial process, research has not sufficiently examined how EA mediates the relationship between environmental dynamism and EO, particularly in resource-constrained and ambiguous contexts such as those found in developing economies (Adomako *et al.*, 2018; Wu, Eesley and Eisenhardt, 2020). This gap limits our ability to explain how firms leverage EA to sustain EO amidst uncertainty.

EA is conceptualized as a formative construct encompassing three distinct dimensions: scanning and search; association and connection; and judgment and evaluation (Tang, Kacmar and Busenitz, 2012, 2021). Scanning and search involve actively seeking information to understand environmental changes, association and connection enable pattern recognition and creative synthesis, while judgment and evaluation involve assessing how new information aligns with existing knowledge to inform entrepreneurial actions (Baron and Ensley, 2006; Gielnik *et al.*, 2014). These dimensions reflect the duality of information acquisition and processing that is central to understanding how EA influences entrepreneurial behaviours and strategic orientation in dynamic environments. However, existing literature often assumes a sequential progression between these dimensions, leaving alternative pathways underexplored and underemphasizing entrepreneurs' agency (Heinemann, Mussel and Schäpers, 2022; McMullen, Brownell and Adams, 2021).

In highly dynamic environments marked by inherent uncertainty, EA serves as a mechanism to balance the epistemic and pragmatic aspects of entrepreneurial activity. Examining how entrepreneurs sequence and integrate the dimensions of EA may offer critical insights into this balance (Sergeeva, Bhardwaj and Dimov, 2022). Sleptsov and Anand (2008) emphasize the importance of dynamic adaptability in linking information acquisition to action, identifying information processing as a vital link between scanning and search activities and entrepreneurial decision-making. Whilst proactive information acquisition is essential for understanding environmental dynamism, an excessive focus on acquisition without integration through association or judgment may lead to information overload, impeding rapid decision-making and EO development (Tang, Kacmar and Busenitz, 2012). Conversely, integrating information enables entrepreneurs to adapt their cognitive strategies to the demands of dynamic environments (Fiet, 2007; Yuan, Xue and He, 2021). This dual process of information acquisition and processing enables firms to sustain EO under conditions of uncertainty, avoiding the pitfalls of decision paralysis and ensuring timely strategic action (Frese, 2009; Frese and Gielnik, 2023). This capability is particularly vital in developing economies like Ghana, where institutional voids and regulatory unpredictability exacerbate ambiguity (Adomako *et al.*, 2018; Istipliler, Bort and Woywode, 2023). Entrepreneurs with high EA are better equipped to navigate these challenges by fostering innovation and developing adaptive strategies to sustain EO in complex environments (Beliaeva *et al.*, 2020; Guerrero, Liñán and Cáceres-Carrasco, 2021). Such adaptive capabilities are critical for SMEs, which often operate with significant resource constraints (Drnevich and West, 2023).

This study addresses gaps in the literature by examining how EA mediates the relationship between environmental dynamism and EO, whilst considering alternative information-processing pathways. By focusing on the interplay between EA dimensions and entrepreneurial behaviours, the framework provides a nuanced understanding of how firms sustain EO under dynamic conditions and offers deeper insights into how entrepreneurial behaviours are initiated and maintained.

Information acquisition complemented by information processing

Dynamic environments are characterized by high uncertainty and frequent changes, which compel entrepreneurs to engage in extensive information-seeking activities to identify emerging opportunities and sustain their performance. The scanning and search dimension of EA enables entrepreneurs to systematically gather environmental information, enhancing their ability to anticipate and respond to changes (Tang, Kacmar and Busenitz, 2012). By acquiring insights into market trends, technological advancements and consumer preferences, entrepreneurs gain critical inputs necessary to navigate environmental dynamism effectively (Frese and Gielnik, 2023). However, information acquisition alone is insufficient for entrepreneurial success. Without the ability to process and integrate new information, entrepreneurs risk being overwhelmed by the sheer volume of data, which can impede their ability to act decisively (Fiet, 2007; Zellweger and Zenger, 2023). This challenge is particularly acute in dynamic contexts, where decision-making must be timely to capitalize on fleeting opportunities (McMullen, Brownell and Adams, 2021).

Sleptsov and Anand (2008) emphasize that information acquisition must be complemented by processing to transition from data collection to action. Building

on this foundation, we argue that the association and connection dimension of EA enables entrepreneurs to integrate and synthesize disparate pieces of information, facilitating pattern recognition and creative recombination (Baron and Ensley, 2006; Tang, Kacmar and Busenitz, 2012). Under certain conditions, such as when environmental signals are ambiguous or involve seemingly unrelated elements, association and connection processes play a pivotal role. By uncovering hidden relationships and generating novel solutions, this dimension allows entrepreneurs to derive actionable insights that would otherwise remain obscured (Bedford, Bisbe and Sweeney, 2022; Heinemann, Mussel and Schäpers, 2022). These capabilities are particularly critical in dynamic environments, where traditional decision-making frameworks may fail to account for the complex interplay of variables.

In contexts where environmental changes require adaptive creativity rather than feasibility assessment, association and connection alone may suffice for decision-making. For instance, when entrepreneurs face scenarios that demand immediate innovation or unconventional solutions, the association and connection dimension enables them to move swiftly from problem identification to action without necessarily engaging in the judgment and evaluation dimension (Baron and Ensley, 2006). This distinction underscores the unique cognitive role of association and connection in fostering EO, particularly in dynamic markets where adaptability and creative problem-solving are essential. Furthermore, the interplay between the scanning and search and association and connection dimensions of EA ensures that entrepreneurs are not merely reactive but strategically positioned to leverage environmental signals into proactive, innovative and risk-taking behaviours (Wiklund and Shepherd, 2003). By synthesizing information into coherent patterns, entrepreneurs can maintain EO and sustain firm performance, even in dynamic contexts (Frese, 2009). Furthermore, integrating new ideas with existing knowledge facilitates hypothesis generation and empirical testing, reducing uncertainty and fostering confidence in decision-making (Camuffo *et al.*, 2020). These processes enhance the conviction necessary for bold entrepreneurial actions, further strengthening EO and its positive impact on firm performance (Anderson and Galinsky, 2006; Ucbasaran *et al.*, 2010). This dynamic alignment underscores the critical role of EA in enabling firms to translate environmental dynamism into strategic entrepreneurial behaviours.

By complementing scanning and search with association and connection, entrepreneurs can move beyond passive information acquisition to active value creation, enabling their firms to thrive in dynamic contexts. This interplay ensures that EA functions as a dynamic mechanism, transforming environmental dynamism into sustained entrepreneurial behaviours and improved performance. Therefore, we state:

H1a: The effect of environmental dynamism on EO and performance is positively mediated by the scanning and search dimension of EA when this is followed by association and connection.

Whilst association and connection can suffice for processing information and enabling rapid entrepreneurial action in certain scenarios, there are conditions where entrepreneurs must assess the feasibility, risks and potential outcomes of entrepreneurial actions to make informed decisions. The judgment and evaluation dimension of EA enables entrepreneurs to systematically integrate newly acquired information with existing knowledge frameworks, providing the analytical foundation required for prioritizing and executing strategic actions (Gielnik *et al.*, 2014; Tang, Kacmar and Busenitz, 2012). This structured evaluation helps entrepreneurs prioritize options that align with their strategic goals, enabling efficient resource allocation and higher potential for success (Frese, 2009). By transitioning rapidly from information acquisition to judgment and evaluation, entrepreneurs reduce delays and avoid decision inertia, a common pitfall in dynamic contexts (Frese, 2007).

Unlike association and connection, which focuses on uncovering patterns and generating novel insights, judgment and evaluation involve critical analysis and decision-making grounded in assessing risks, trade-offs and strategic alignment (Baron and Tang, 2011; Shepherd, Haynie and McMullen, 2012). This distinction becomes particularly relevant in contexts where environmental cues are well structured or closely aligned with pre-existing schemas. For example, when entrepreneurs encounter scenarios where feasibility and value can be ascertained through evaluative processes, the judgment and evaluation dimension may suffice for decision-making without the need for extensive associative thinking (Heinemann, Mussel and Schäpers, 2022). This efficiency is especially advantageous in dynamic contexts, where time-sensitive decisions are critical for securing competitive advantages.

Additionally, judgment and evaluation processes create feedback loops that refine entrepreneurial decision-making. This feedback reduces uncertainty and builds confidence, enabling entrepreneurs to act decisively whilst maintaining a strong EO (Camuffo *et al.*, 2020). By systematically analysing the implications of potential actions, judgment and evaluation ensure that entrepreneurial behaviours are aligned with the firm's strategic objectives and market realities (Rosenbusch, Rauch and Bausch, 2013). Furthermore, Sleptsov and Anand (2008) highlight the importance of dynamic adaptability in linking information acquisition to

action. This adaptability resonates with the role of judgment and evaluation as a link between scanning and search activities and entrepreneurial decision-making. In dynamic contexts, judgment and evaluation processes can directly transform environmental information into strategic action, bypassing the need for creative recombination. This capability enables firms to sustain EO whilst navigating the complexities of dynamic markets.

Taken together, the integration of judgment and evaluation with scanning and search reinforces EA as a comprehensive mechanism for navigating environmental dynamism. This interplay allows firms to sustain EO, fostering resilience and innovation in rapidly changing markets.[2] Accordingly, we hypothesize:

H1b: The effect of environmental dynamism on EO and performance is positively mediated by the scanning and search dimension of EA when this is followed by judgment and evaluation.

Information acquisition not complemented by information processing

Whilst information acquisition through scanning and searching is a critical initial step for entrepreneurs navigating dynamic environments, prolonged engagement in these activities without transitioning to information processing can significantly hinder entrepreneurial outcomes (Fiet, Norton and Van Clouse, 2013; Fiet and Patel, 2008; Frese, 2007). Excessive information acquisition often results in cognitive overload, where the sheer volume of data prevents entrepreneurs from distinguishing actionable insights from extraneous details (Dimov and Shepherd, 2005; Malone and Lusk, 2017). In such scenarios, entrepreneurs face difficulties in identifying meaningful patterns, undermining the confidence and commitment needed for effective decision-making and risk-taking (Sirmon, Hitt and Ireland, 2007). This misalignment between information acquisition and processing stalls the entrepreneurial process, leaving firms ill-equipped to respond to the demands of dynamic markets.

Research also underscores that without integrating information acquisition with subsequent cognitive processes, entrepreneurial efforts risk becoming unfocused and inefficient (Sleptsov and Anand, 2008). This view highlights the importance of not only gathering information but also evaluating its relevance and applicability to specific strategic contexts. Building on these insights, we argue that when scanning and search are isolated from other EA dimensions, such as association and connection or judgment and evaluation, their effectiveness diminishes in dynamic environments, where swift and coherent responses are paramount. The absence of association and connection processes exacerbates this challenge. Without these mechanisms, entrepreneurs struggle to synthesize fragmented data into coherent patterns, limiting their ability to derive innovative solutions or actionable insights (Baron, 1998; Tang, Kacmar and Busenitz, 2012). Association and connection processes are essential for recognizing patterns, enabling creative recombination of knowledge and forming hypotheses about entrepreneurial actions (Baron and Ensley, 2006). When neglected, scanning and search devolve into aimless data collection, resulting in strategic inertia rather than progression.

Similarly, the absence of judgment and evaluation processes compounds the problem. These processes provide the critical structure for assessing the feasibility, value and alignment of acquired information with strategic goals. Entrepreneurs who fail to engage in judgment and evaluation risk prolonging information-gathering activities, delaying decisions and allowing fleeting opportunities to lapse (Baron and Tang, 2011). Judgment and evaluation ensure that information is actionable, transforming raw data into decisions that can drive entrepreneurial behaviour. Without this dimension, entrepreneurs are more likely to waste organizational resources, such as time, effort and capital, on low-priority or irrelevant activities (Fiet, 2007).

Dynamic environments further magnify these challenges by increasing the complexity, rate of change and ambiguity of information. The heightened cognitive demands in such settings intensify the need for structured processing activities. Entrepreneurs who rely solely on scanning and search without integrating processing activities face a greater risk of analysis paralysis, where excessive consideration of options inhibits decisive action (Baron, 1998). This inaction erodes entrepreneurial strategic orientation, impairing the firm's ability to maintain an EO that is crucial for competitive advantage and sustained performance (Rosenbusch, Rauch and Bausch, 2013). By isolating scanning and search from other EA dimensions, entrepreneurs limit the coherence and effectiveness of their strategic responses. Whilst scanning and search are invaluable for acquiring insights into market trends, technological advancements and consumer preferences, their value is fully realized only when integrated with association and connection or judgment and evaluation processes, which transform data into actionable strategies. Without this integration, scanning and search

[2]We acknowledge that an enactment of EA dimensions sequentially (i.e. in a three-stage model), where association and connection is followed by evaluation and judgment (Levasseur *et al.*, 2020) is also possible. However, we consider this as a special case of the functional path hypothesized in H1a and assume that the arguments we offer about information processing activities are pertinent. Although we do not formulate additional hypotheses for the three-stage model for the sake of parsimony, we tested the three-stage mediation in our post-hoc analysis and report a significant positive mediation effect in line with our expectations (see Results section).

become counterproductive, leading to inaction, resource misallocation and diminished entrepreneurial outcomes.

In dynamic environments, where opportunities are fleeting and competition is intense, the inability to transition from information acquisition to processing represents a significant bottleneck in the entrepreneurial process. Entrepreneurs who fail to complement scanning and search with the subsequent information-processing EA dimensions struggle to align their cognitive activities with the demands of dynamic contexts, impairing their ability to sustain an EO and achieve superior performance. Therefore, we hypothesize:

H2: The effect of environmental dynamism on EO and performance is negatively mediated by the scanning and search dimension of EA when it is not followed by association and connection or judgment and evaluation (i.e. when it is isolated).

Methods

Study setting – Ghana

Our research context, Ghana, was selected for its unique attributes that contribute to our study on EA and EO. First, Ghana represents one of the most stable countries in Sub-Saharan Africa, providing a compelling contrast to developed nations in terms of economic, financial and infrastructural development (Spillan and King, 2017). According to a 2024 report by the European Innovation Council and SMEs Executive Agency,[3] Ghana is emerging as a leading innovation hub in West Africa, fuelled by a dynamic ecosystem that supports entrepreneurship, creativity and economic growth. SMEs, which make up 85% of all enterprises and contribute 70% of the country's GDP, are central to this transformation. Additionally, in Ghana, founders often play a dominant role in new venture activities, which typically results in pronounced power disparities between founders and employees (Amoako and Matlay, 2015; Fainshmidt *et al.*, 2018).

Second, despite notable strides in economic growth and development, Ghana continues to face persistent challenges due to institutional voids (Adomako *et al.*, 2021; Ahsan *et al.*, 2023). These socioeconomic issues contribute to a dynamic business environment filled with both opportunities and constraints for entrepreneurs. Investigating how Ghanaian entrepreneurs navigate and respond to these economic challenges can offer valuable insights into the adaptive strategies and resilience mechanisms that support EO amidst environmental dynamism. Consequently, Ghana provides an excellent setting to examine our research hypotheses.

Sample and data collection

The sampling frame for this study was developed from the Ghana Company Register (GCR) database. The GCR database was used to identify a random selection of 700 SMEs. We focus on founder-led SMEs as the empirical setting of our study, given that founders' preferences and choices have more direct effects on firm-level outcomes in these firms (Lanivich *et al.*, 2023). Accordingly, our sample met the following criteria: (1) firms with complete information about the founders or group of founders; (2) firms with no affiliation with any company group or subsidiary; (3) firms employing fewer than 250 full-time employees (i.e. to meet the definition of an SME in Ghana); and (4) firms owned and controlled by an individual founder or a team of founders with at least 50% ownership.

We conducted data collection in two phases, separated by approximately 12 months. The time lag between the first survey wave (T1) and the second wave (T2) was about 3 months. This interval was necessary due to the complexities associated with data collection in a developing country (Adomako and Ahsan, 2022; Hoskisson *et al.*, 2000). The time lag design was utilized to attenuate common method bias often associated with cross-sectional data (Podsakoff, MacKenzie and Podsakoff, 2012). We visited the head offices of the SMEs in person and collected data in two waves from three groups of informants: founder-CEOs and other senior managers in the first wave and finance managers in the second wave. In the first wave, founder-CEOs provided answers to the alertness questions as well as the control variables, whilst other senior managers (e.g. general managers, marketing managers and operations managers) completed the EO and dynamism questionnaire. Of the 700 ventures contacted, 239 surveys were completed, of which 11 responses were unusable due to significant missing data. Thus, we obtained 228 usable responses in our first wave (32.57%).

The second wave took place 12 months after the first wave. In this wave, solely finance managers were contacted for information on firm performance. This time, we mailed the surveys in a pre-paid envelope to the finance managers of the 228 ventures whose information we had collected in the first wave. We followed up with a telephone call approximately 2 months later to non-respondents. Of the 228 mailed surveys, we received a total of 213 responses. We discarded four questionnaires due to missing data, leading to a total of 209 complete matched responses (29.85%). The 209 firms in our final sample operate in a variety of industries: retailing or trade (24%); manufacturing (45%); and services (31%).

[3]https://intellectual-property-helpdesk.ec.europa.eu/news-events/news/ghana-and-its-innovation-ecosystems-opportunities-smes-2024-10-30_en

On average, the firms employed 14 full-time employees and were 11 years old. The average age of the entrepreneur was 39 years. Females constituted the majority of the respondents (56%). Whilst this is unusual in most countries, it is not unusual in Ghana (Quartey *et al.*, 2018).

To assess nonresponse bias concerns, we split the data in two: respondents and late respondents/nonrespondents, based on Armstrong and Overton's (1977) recommendation. Using a t-test, we found no differences between the two groups in terms of firm age and firm size. Thus, we are confident that nonresponse bias does not substantially influence our results.

Measures

We derived our measures from previously established studies. Table 1 presents specific Likert-scale items used in our surveys and their respective standardized factor loadings (SFL).

Firm performance. We measured firm performance with eight items derived from prior research (Luk *et al.*, 2008; Sheng, Zhou and Li, 2011). In emerging markets, obtaining objective accounting measures for SME performance is difficult due to the unwillingness of entrepreneurs to reveal their sales and profit data to the public (Malik and Kotabe, 2009). Furthermore, a perceptual measure enables us to compare across industries, which might not be possible when using objective data due to contextual differences (Boyd, Dess and Rasheed, 1993). Therefore, we employed perceptual performance measures by asking respondents to compare their firms' performance with their competitors in the past 3 years on the following: (1) growth in profitability; (2) profit margins; (3) return on investment; (4) market share; (5) return on assets; (6) sales growth; (7) employment growth; and (8) overall performance.

Entrepreneurial alertness. We measured EA by adopting Tang, Kacmar and Busenitz's (2012) three-dimensional alertness scale. We asked respondents to rate on a seven-point Likert scale (1 = 'strongly disagree' and 7 = 'strongly agree') the extent to which each item described them. Six items measured *scanning and search*; three items captured *association and connection*; and four items tapped *evaluation and judgment*. Variables for each dimension were created by averaging the respective items.

Entrepreneurial orientation. We used Covin and Slevin's (1989) nine-item scale to operationalize EO. According to Covin and Slevin (1989), this scale consists of three subscales with three items for each subscale: innovativeness, proactiveness and risk-taking. The combined mean of the three dimensions constitutes the overall EO variable.

Environmental dynamism. We conceptualized environmental dynamism as a function of competitive intensity, market turbulence and technological turbulence, in line with the literature. Accordingly, we used five items to measure each of these scales, in line with existing studies (Jaworski and Kohli, 1993; McKelvie, Wiklund and Brattström, 2018; Morgan, Kaleka and Katsikeas, 2004). Upon conducting a factor analysis and investigating the scree plots, we observed that all items strongly loaded on a single item with a high eigenvalue, whereas eigenvalues of the other factors remained very low. The emerging factor with the highest eigenvalue captured 79% of the variation, supporting our unidimensional conceptualization. Accordingly, we averaged all the items and used the emerging score as the measure of environmental dynamism.

Control variables. We controlled for a set of variables to avoid omitted variable bias in our estimations. We controlled for age, gender, education, managerial experience and entrepreneurial experience of the respondent as well as firm size, firm age and industry, consistent with prior studies (Hooi *et al.*, 2016; Senyard *et al.*, 2014; Stenholm and Renko, 2016).

The entrepreneur's age is argued to capture the varying entrepreneurial intentions as well as the general human capital effects, aside from the ones considered in our study (Cassar, 2006), and therefore we captured age as a continuous variable. Similarly, gender is argued to be one of the factors affecting access to resources, especially in the African context (Brixiová and Kangoye, 2016), and therefore we included it as an indicator variable, taking the value 1 if the respondent was female. Other human capital-related controls – university education (Dai and Si, 2018; Escribá-Esteve, Sánchez-Peinado and Sánchez-Peinado, 2009), managerial experience (in years) and entrepreneurial experience (in years) – were included in our models, given that these are related to the performance outcomes (Stenholm and Renko, 2016). We also controlled for the firm size and age by including the number of employees and years since the incorporation (logged to an approximate normal distribution), as larger and older firms may possess a substantial amount of resources (Robson, Haugh and Obeng, 2009), which may affect EO (Anderson and Eshima, 2013; Rauch *et al.*, 2009). In addition, we controlled for industry type, given the possible variation in requirements for entrepreneurial action, perception of competitive pressures and resource munificence (Stenholm and Renko, 2016). Summary statistics and pairwise correlations of all the variables used in the study can be seen in Table 2.

Table 1. Measurement scales, items and reliability diagnostics

Scales and items	SFL (p-value)
Scanning and search: $\alpha = 0.740$; CR = 0.767; AVE = 0.400	
I have frequent interactions with others to acquire new information	0.611 (0.000)
I always keep an eye out for new business ideas when looking for information	0.710 (0.000)
I read news, magazines or trade publications regularly to acquire new information	0.670 (0.000)
I am always actively looking for new information	0.635 (0.000)
I browse the internet every day	0.514 (0.000)
Association and connection: $\alpha = 0.729$; CR = 0.727; AVE = 0.483	
I see links between seemingly unrelated pieces of information	0.710 (0.000)
I am good at 'connecting the dots'	0.662 (0.000)
I often see connections between previously unconnected domains of information	0.684 (0.000)
Evaluation and judgment: $\alpha = 0.794$; CR = 0.798; AVE = 0.497	
I have a gut feeling for potential opportunities	0.684 (0.000)
I can distinguish between profitable opportunities and not-so-profitable opportunities	0.750 (0.000)
I have a skill for telling high-value opportunities apart from low-value opportunities	0.714 (0.000)
When facing multiple opportunities, I am able to select the good ones	0.668 (0.000)
Competitive intensity: $\alpha = 0.837$; CR = 0.839; AVE = 0.512	
There are many 'promotion wars' in our industry	0.713 (0.000)
Anything that one competitor can offer, others can readily match	0.655 (0.000)
Price competition is a hallmark of our industry	0.617 (0.000)
Competition in our industry is very intense (i.e. cutthroat)	0.677 (0.000)
One hears of a new competitive move almost every day	0.652 (0.000)
Market turbulence: $\alpha = 0.782$; CR = 0.786; AVE = 0.425	
Competitive market conditions are highly unpredictable	0.563 (0.000)
Competitor activities in the markets are quite uncertain	0.601 (0.000)
Customer product demand and preferences are highly uncertain	0.551 (0.000)
It is difficult to predict changes in customer needs and preferences	0.514 (0.000)
Changes in customer needs are quite unpredictable	0.594 (0.000)
Technological turbulence: $\alpha = 808$; CR = 0.810; AVE = 0.461	
Technologies in our industry are changing rapidly	0.643 (0.000)
It is very difficult to forecast technology developments in our industry	0.574 (0.000)
Newly developed technologies and processes in our industry can easily become out of date	0.576 (0.000)
Technological changes provide big opportunities in our industry	0.580 (0.000)
Several new product ideas have been made possible through technological breakthroughs in our industry	0.599 (0.000)
Innovativeness: $\alpha = 0.798$; CR = 0.836; AVE = 0.592	
We have a strong emphasis on R&D, technological leadership and innovation	0.599 (0.000)
Changes in product or service lines have usually been quite dramatic to achieve competitive advantage	0.676 (0.000)
One of the main goals is to launch many new lines of products/services in the next 3 years	0.730 (0.000)
Proactiveness: $\alpha = 0.756$; CR = 0.793; AVE = 0.518	
We tend to be ahead of competitors regarding the introduction of products and ideas	0.662 (0.000)
We typically initiate actions which competitors then respond to	0.690 (0.000)
We are often the first to introduce new products and services, new ways to produce or administrate	0.691 (0.000)
Risk-taking: $\alpha = 0.787$; CR = 0.822; AVE = 0.562	
We see that bold, wide-ranging acts are necessary to achieve the firm's objectives	0.694 (0.000)
We have a strong aptitude for high-risk projects (with chances of high returns)	0.651 (0.000)
Our firm typically adopts a bold posture when confronted with decisions involving uncertainty, to maximize the exploration of opportunities	0.661 (0.000)
Firm performance: $\alpha = 0.892$; CR = 0.885; AVE = 0.499	
Growth in profitability	0.832 (0.000)
Profit margins	0.691 (0.000)
Return on investment	0.672 (0.000)
Market share	0.690 (0.000)
Return on assets	0.651 (0.000)
Sales growth	0.880 (0.000)
Employment	0.693 (0.000)
Overall performance	0.567 (0.000)

Validity and reliability assessment

We employed the maximum likelihood (ML) estimation method and STATA 16 to examine the psychometric properties of our multi-item measures with confirmatory factor analysis (CFA). The CFA approach was used to detect potential problems with each indicator in our study. The results of the CFA estimation indicate that each item loaded onto its theoretical factor and was positive and significant, confirming the conver-

Table 2. Pairwise correlations and summary statistics

No.	Variable	Mean	SD	Min.	Max.	1	2	3	4	5	6
1	Entrepreneurial orientation	4.76	0.78	2.44	6.56	1.00					
2	Environmental dynamism	4.64	0.79	2.80	6.40	0.63***	1.00				
3	Scanning and search	4.69	0.93	1.60	7.00	0.27***	0.36***	1.00			
4	Association and connection	4.67	0.92	1.67	7.00	0.55***	0.61***	0.60***	1.00		
5	Evaluation and judgment	4.72	0.90	2.75	7.00	0.55***	0.66***	0.41***	0.54***	1.00	
6	Firm performance	4.67	0.85	1.75	6.88	0.57***	0.56***	0.39***	0.51***	0.51***	1.00
7	Female	0.56	0.50	0.00	1.00	0.03	−0.03	−0.05	−0.07	−0.02	0.05
8	Entrepreneur age	38.70	8.17	22.00	68.00	0.11	0.09	0.08	0.09	0.05	0.13*
9	University education	0.22	0.42	0.00	1.00	−0.22***	−0.23***	−0.14**	−0.19***	−0.19***	−0.17**
10	Firm age (log)	2.18	0.77	0.00	3.53	0.03	0.01	0.02	0.03	−0.10	0.03
11	Number of employees	14.29	14.93	3.00	90.00	−0.26***	−0.23***	−0.25***	−0.30***	−0.29***	−0.10
12	Managerial experience	6.21	6.41	0.00	32.00	0.20***	0.24***	0.10	0.19***	0.17**	0.26***
13	Entrepreneurial experience	2.19	4.02	0.00	31.00	−0.04	−0.07	0.01	−0.00	−0.01	−0.08
14	Trade industry	0.45	0.50	0.00	1.00	0.24***	0.26***	0.15**	0.23***	0.23***	0.26***
15	Manufacturing industry	0.24	0.43	0.00	1.00	−0.11	−0.12*	0.00	−0.02	−0.18***	−0.08

No.	Variable	7	8	9	10	11	12	13	14	15
7	Female	1.00								
8	Entrepreneur age	−0.02	1.00							
9	University education	0.13*	0.15**	1.00						
10	Firm age (log)	0.03	0.67***	0.17**	1.00					
11	Number of employees	0.05	0.17**	0.32***	0.35***	1.00				
12	Managerial experience	−0.08	0.64***	0.20***	0.42***	0.13*	1.00			
13	Entrepreneurial experience	−0.15**	0.31***	0.02	0.35***	0.16**	0.16**	1.00		
14	Trade industry	0.01	0.08	0.04	0.01	−0.11	0.21***	−0.04	1.00	
15	Manufacturing industry	−0.25***	−0.04	−0.01	0.05	0.16**	−0.13*	0.22***	−0.51***	1.00

Note: Significance levels are indicated as follows: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

gent validity of the measures. In Table 1, we report these high factor loadings, which give credence to the convergent validity of our measures (Anderson and Gerbing, 1988; Hair *et al.*, 2019). Furthermore, the high Cronbach alpha and composite reliability scores reported in Table 1 also offer support for the reliability of our measures (Bagozzi and Yi, 2012; Kline, 2015; Nunnally and Bernstein, 1994). Although average variance extracted (AVE) for some of our scales is below 0.50, Fornell and Larcker (1981) show that if the composite reliability of the scales is above the threshold of 0.60, an AVE value above 0.40 is adequate (see Gaur *et al.*, 2011; Hughes *et al.*, 2018; Psychogios *et al.*, 2019). Furthermore, values lower than the common thresholds are often acceptable in newer research settings (such as Ghana), which are more distant from those in which the scales were developed (De Clercq, Haq and Azeem, 2023). Nonetheless, as a robustness check, we re-evaluated our scales and removed items as suggested by Hair *et al.* (2019) to enhance the convergent validity of the scales. As we obtained AVEs exceeding the threshold of 0.50, we also ensured that composite reliability values for all our scales remained above 0.70 and made sure that all standardized factor loadings of our items exceeded 0.50 (Cheung *et al.*, 2024). Adapting these altered scales for our analyses did not change the results. Therefore, we retained the original scales in our main analyses to ensure comparability with other studies using the same scales.

Moreover, high correlations between EA dimensions warrant a thorough analysis of discriminant validity. Accordingly, we assessed the discriminant validity of our EA dimensions in line with the suggestions of Rönkkö and Cho (2022). First, we checked and ensured that the confidence intervals for each of our factor pair correlations strictly exclude 0.95. We then utilized chi-squared difference tests to see if constraining models by fixing factor pair covariances to 1 or merging the factor pairs generated better results. The p-values reported in Table 3, panel A show that none of those constrained models offer a better fit than our original model, and in fact, our original model has a significantly better fit than the constrained models.

Common method variance assessment

After verifying the psychometric properties of our multi-item constructs, we further examined the potential for common method variance (CMV). Using multi-informants in different time periods for the independent, dependent and moderating/mediating variables decreased the chances of our results being affected by a strong common method bias (Podsakoff, MacKenzie

Table 3. CFA models

Panel A. Models used to test discriminant validity

No.	Models	χ^2	df	RMSEA	TLI	CFI	SRMR	$\Delta\chi^2$	p($\Delta\chi^2$)
1	Original	1803.551	887	0.070	0.783	0.796	0.068	–	–
2	Constrained: cov(scanning, association) = 1	1817.696	888	0.071	0.780	0.793	0.070	14.145	0.000
3	Constrained: cov(association, evaluation) = 1	1842.010	888	0.072	0.774	0.788	0.07	38.459	0.000
4	Constrained: cov(scanning, evaluation) = 1	1906.934	888	0.074	0.759	0.773	0.071	103.383	0.000
5	Constrained: merge(scanning, association)	1869.066	892	0.073	0.77	0.783	0.069	65.515	0.000
6	Constrained: merge(association, evaluation)	1851.835	892	0.072	0.774	0.787	0.072	48.284	0.000
7	Constrained: merge(scanning, evaluation)	1945.214	892	0.075	0.752	0.766	0.073	141.663	0.000

Panel B. Common method bias nested models

No.	Models	χ^2	df	RMSEA	TLI	CFI	SRMR	$\Delta\chi^2$	p($\Delta\chi^2$)
1	Baseline (null)	5442.491	946	0.151	0.000	0.000	0.313	–	–
2	Method-only	2327.558	901	0.087	0.667	0.683	0.082	−3114.933	0.000
3	Trait-only	1803.551	887	0.070	0.783	0.796	0.068	−524.007	0.000
4	Method and trait	1634.316	851	0.067	0.806	0.826	0.064	−169.235	0.000

Notes: χ^2 = chi-squared; $\Delta\chi^2$ = difference of chi-squares between constrained and original (panel A) or baseline (panel B) model; CFI = composite fit index; df = degrees of freedom; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; TLI = Tucker–Lewis index; p($\Delta\chi^2$) = p-value of difference of chi-squares. In panel A, cov refers to constrained models with factor pair covariances fixed at 1, whilst merge refers to merged factor pairs (see Rönkkö and Cho, 2022).

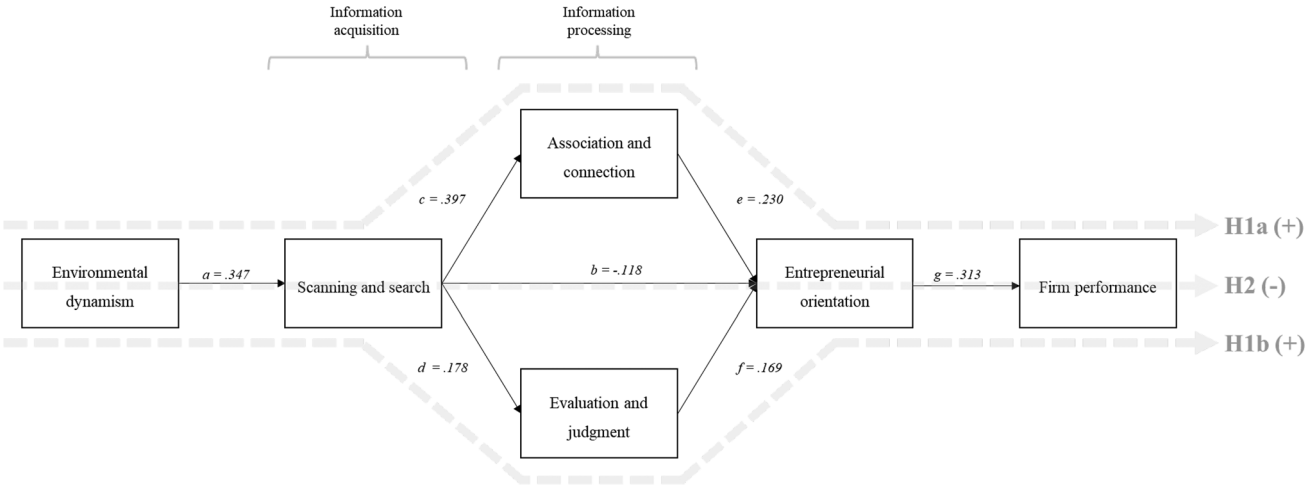
and Podsakoff, 2012). In addition, the complex modelling decisions we made involving parallel and multiple-stage serial mediations decreased the chances a priori that CMV became an issue for our estimations (Siemsen, Roth and Oliveira, 2010).

We also utilized some post-hoc statistical remedies to ensure that our results were not affected by common method variance (Podsakoff *et al.*, 2003). First, we conducted Harman's one-factor test to see if items considered in our study loaded to a single factor. Our factor analysis showed six components with eigenvalues >1.0. Variance extracted by the largest component accounted for 44% of the total variance, which is below the suggested value of 50%, indicating no issues of common method bias (Podsakoff and Organ, 1986). Second, we followed the recommendations laid down by Bagozzi, Yi and Phillips (1991) and estimated the null, method-only, trait-only and trait–method CFA models. The model parameters in Table 3, panel B suggest that both trait and method factors are present in our data; however, the inclusion of a trait factor improves the model fit far more than the inclusion of a method factor in our data, implying that the trait factor explains the majority of the variance. Although this indicates that the CMV does not pose a big threat to our analysis (Cote and Buckley, 1987), we also utilize a marker variable approach to single out potential CMV effects in our regression models (Lindell and Whitney, 2001). For this purpose, we used a bricolage scale measured using the eight items suggested by Senyard *et al.* (2014). This scale qualifies as a valid marker for three reasons: (1) its low correlation below the 0.3 threshold with our variables of interest (Siemsen, Roth and Oliveira, 2010); (2) its exogenous nature to our theoretical frame considered in the study (Simmering *et al.*, 2015); and (3) the similarity of the measurement method (Likert scale) and cognitive mechanisms required to answer the items of this scale, which in turn enabled us to tap into the source of the CMV (Williams, Hartman and Cavazotte, 2010). All our results remained robust to the inclusion of this marker.

Results

Before the analysis, we ensured that our data complied with the Gauss–Markov assumptions. We also checked that multicollinearity was not a problem in our estimations, by ensuring that the variance inflation factors for each model were far below the suggested threshold of 10 (Allison, 2012; Neter, Wasserman and Kutner, 1985). We utilized the conditional process modelling technique recommended by Hayes (2017) to test our hypotheses involving multiple-stage mediations. Formal specifications of mediation effects shown in Figure 1 are derived and bootstrapped from the respective regression models in line with Hayes (2017) (see Appendix 1). We used STATA 16 to perform the analyses and obtain bootstrapped standard errors with 10,000 repetitions for inference.

In Figure 1, we also report the results of our mediation analyses corresponding to the hypotheses. H1a posits a positive mediation of scanning and search between environmental dynamism and SMEs' EO and



Hyp.	Path	Formal specification	Coeff.	SE	95% CI	
H1a	Environmental dynamism → Scanning & search → Association & connection → EO → Firm performance	a × c × e × g > 0	0.010	0.006	0.002	0.030
H1b	Environmental dynamism → Scanning & search → Judgment & evaluation → EO → Firm performance	a × d × f × g > 0	0.003	0.002	0.001	0.011
H2	Environmental dynamism → Scanning & search → EO → Firm performance	a × b × g < 0	-0.013	0.009	-0.040	-0.001

Figure 1. Conceptual model and hypotheses
Notes*: Solid black lines indicate path coefficients, whereas dashed grey lines indicate indirect (mediation)-effect hypotheses. Path coefficients obtained from the regression models in Appendix 1 are also shown. Hypothesized indirect effects are specified using the path coefficients in line with Hayes (2017). Indirect effect sizes derived from the specifications are bootstrapped 10,000 times with the* bootstrap *command of STATA 16 to create bootstrapped and bias-corrected standard errors for statistical inference.*

performance when it is complemented by association and connection. The positive significant mediation effect size (0.010, 95% CI = [0.002; 0.030]) reported in Figure 1 indeed corroborates this conjecture. As illustrated in the path diagram, scanning and search – when supplemented by association and connection – is positively related to SMEs' EO and performance.

Likewise, H1b posits a positive mediation of scanning and search between environmental dynamism and SMEs' EO and performance when it is complemented by judgment and evaluation. In Figure 1, we report the significantly positive mediation effect size (0.003, 95% CI = [0.001; 0.011]) offering support for this hypothesis. Similar to H1a, the mediation path characterizing H1b shows that scanning and search is positively associated with SMEs' EO and performance when it is complemented by judgment and evaluation.

H2 posits a negative mediation of isolated scanning and search (i.e. when it is not complemented by other EA dimensions) between environmental dynamism and SMEs' EO and performance. The negative significant mediation effect size (−0.013, 95% CI = [−0.040; −0.001]) we report in Figure 1 supports this hypothesis. The mediation path characterizing H2 shows that scanning and search is negatively associated with SMEs' EO and performance when isolated from other EA dimensions.

In addition to testing the proposed hypotheses, we also conducted a post-hoc analysis where we test both mediations argued in H1a and H1b in parallel. This analysis yields a positively significant mediation effect size (0.013, 95% CI = [0.004; 0.036]), suggesting that both association and connection, as well as evaluation and judgment, mediate in parallel the effect of scanning and association on EO and performance. Finally, we also test the serial mediation of three EA dimensions (i.e. when scanning and search precedes association and connection, which is followed by evaluation and judgment; see Levasseur *et al.*, 2020) and find a significantly positive indirect effect (0.001, 95% CI = [0.0002; 0.004]).

Discussion

Our findings highlight the critical role of information acquisition and processing activities in understanding the interplay between environmental dynamism, EO and firm performance. Specifically, the study demonstrates the benefits of integrating scanning and search with other EA dimensions – namely, association and connection, as well as judgment and evaluation. When scanning and search activities are complemented by these additional dimensions, there is a positive correlation between EO and performance. This underscores the importance of cognitive adaptability in entrepreneurial decision-making, as integrating diverse EA dimensions enhances the ability to process complex information and identify high-value opportunities under uncertainty (Frese and Gielnik, 2014; Heinemann, Mussel and Schäpers, 2022).

Conversely, our findings reveal that scanning and search conducted in isolation from other EA dimensions adversely affect EO and performance, leading to inefficiencies, information overload and entrepreneurial inertia (Malone and Lusk, 2017; Tang, Kacmar and Busenitz, 2012). These insights provide a nuanced understanding of how entrepreneurs can effectively leverage EA to navigate dynamic business environments.

Contributions to literature

The findings from our research make significant contributions to the literature. First, our study addresses a critical gap in the EO literature by elucidating the mechanisms through which environmental dynamism influences EO. Prior studies have largely focused on the direct effects of environmental dynamism on EO (Rosenbusch, Rauch and Bausch, 2013; Ruiz-Ortega *et al.*, 2013), with limited attention to the mediating processes that enable this relationship. We show that EA mediates the relationship between environmental dynamism and EO by enabling entrepreneurs to manage information flows effectively, thereby transforming environmental uncertainty into strategic entrepreneurial actions. The mediation occurs through distinct pathways: (1) scanning and search followed by association and connection, which facilitates creative problem-solving and proactive innovation; and (2) scanning and search followed by judgment and evaluation, which supports structured decision-making and calculated risk-taking. These pathways underscore the information acquisition and processing dimensions of EA and their critical role in navigating environmental dynamism. By empirically validating these mechanisms, our study contributes to a deeper understanding of how firms sustain EO amidst uncertainty and rapid change. Moreover, we also contribute to the EO literature by integrating individual-level cognitive and behavioural processes into the predominantly firm-level construct of EO. Whilst prior studies have explored the organizational and contextual antecedents of EO (Eshima and Anderson, 2017; Miller, Le Breton-Miller and Lester, 2011), limited attention has been given to the micro-level processes that underpin its development (McMullen, Brownell and Adams, 2021; Wales *et al.*, 2021). By investigating the mediating role of the dual cognitive and behavioural dimensions of EA, our study addresses this critical gap and presents a more comprehensive understanding of EO as a construct shaped by the interplay between organizational dynamics and individual entrepreneurial behaviours.

Second, our study contributes to the growing body of literature on EA by offering a refined conceptualization of its role in dynamic environments. Traditionally, EA has been viewed as a sequential process comprising scanning and search, association and connection, judgment and evaluation (Tang, Kacmar and Busenitz, 2012). Whilst this sequential model provides a foundational understanding of EA, it does not fully capture the complexities of entrepreneurial decision-making in dynamic contexts. Building on the insights of Sleptsov and Anand (2008) and Tang, Kacmar and Busenitz (2012), we relax this sequentiality assumption by proposing and empirically validating an alternative framework wherein the dimensions of EA can operate in flexible, non-linear pathways. Specifically, we demonstrate that scanning and search can be complemented either by association and connection or judgment and evaluation, depending on the nature of the environmental signals and the strategic requirements of the context. This flexibility highlights the cognitive adaptability of entrepreneurs and their ability to tailor information-processing strategies to the demands of dynamic environments. For instance, association and connection processes suffice in situations requiring creative recombination and pattern recognition, whilst judgment and evaluation processes are crucial when feasibility assessments and rapid prioritization are necessary. By conceptualizing EA as a dynamic and adaptive mechanism, our study extends the theoretical boundaries of EA and provides a nuanced understanding of its function in fostering EO.

Our findings also reveal that although scanning and search activities are crucial for understanding market dynamics, they are insufficient on their own to enhance EO and performance. Their greatest impact is realized when integrated with association and connection or judgment and evaluation processes, which transform environmental information into actionable strategies (Frese and Gielnik, 2023). This contribution builds on existing literature highlighting the adverse effects of disproportionately emphasizing scanning and search activities, which can lead to entrepreneurial inaction and inertia (Wood and Williams, 2014; Zeelenberg *et al.*, 2006). Additionally, our results empirically support aspects of the conceptual framework proposed by Sleptsov and Anand (2008) whilst extending it by clarifying the conditions under which information acquisition processes are most effective.

Finally, our study contributes to the literature by contextualizing entrepreneurial behaviour within the unique setting of Ghana, a developing economy characterized by institutional voids and dynamism (Adomako *et al.*, 2021; Ahsan *et al.*, 2023; Spillan and King, 2017). Whilst much of the existing research on EA and EO has focused on developed economies, our study highlights how these relationships function in resource-constrained, dynamic environments, where entrepreneurial actions are often shaped by localized challenges and opportunities. Ghana's entrepreneurial landscape, with its mix of stability and structural challenges, provides a fertile ground for examining how EA enables firms to navigate uncertainty and sustain EO. By demonstrating the applicability of our

findings to this context, we offer insights that are not only relevant to Ghana but also generalizable to other low-income countries facing similar conditions. This contextual contribution enriches the broader literature on entrepreneurship and innovation in developing economies, emphasizing the need for adaptive cognitive and behavioural processes to overcome institutional barriers and drive economic growth.

Contributions to practice

In addition to its theoretical contributions, our study offers significant practical implications for entrepreneurs, managers, policymakers and entrepreneurial ecosystem actors. By emphasizing the role of EA as a mediating mechanism between environmental dynamism and EO, our findings underline the need for targeted interventions to enhance both information acquisition and processing capabilities. These insights are particularly relevant in dynamic environments, where rapid yet strategic decision-making is essential to sustaining EO and performance.

Our findings highlight that whilst scanning and search activities are critical for identifying emerging trends and opportunities, their effectiveness depends on timely integration with processing activities, such as association and connection or judgment and evaluation. Entrepreneurs often feel compelled to engage in continuous information gathering to reduce uncertainty; however, excessive information acquisition can lead to cognitive overload and decision paralysis, hindering entrepreneurial action (Malone and Lusk, 2017). Structured decision protocols, such as 'stopping rules', can help entrepreneurs set clear boundaries for information search activities (Fiet, 2007; Tang, Kacmar and Busenitz, 2012). These protocols should define criteria for transitioning from acquisition to processing, ensuring that insights are efficiently converted into actionable strategies without unnecessary delays.

Equipping entrepreneurs with cognitive tools and frameworks to balance information acquisition with processing is equally important. Training programmes that foster cognitive adaptability can address this need. For example, exercises in associative thinking, such as mind mapping and scenario planning, can help entrepreneurs synthesize diverse information sources into innovative solutions (Heinemann, Mussel and Schäpers, 2022). Similarly, workshops focused on judgment and evaluation can provide entrepreneurs with structured methods for assessing feasibility, risks and potential outcomes, boosting their confidence in decision-making. Technology also holds significant potential for enhancing EA dimensions. Data analytics tools can streamline information acquisition by identifying patterns within large datasets, whilst artificial intelligence (AI) applications can support processing activities such as association and connection or judgment and evaluation. These technologies can offer predictive insights and scenario analyses, enabling more informed and strategic entrepreneurial actions (Bauer, von Zahn and Hinz, 2023). Policymakers and ecosystem actors should prioritize facilitating access to such technologies for SMEs, particularly in resource-constrained environments. Future research could explore the extent to which technology amplifies EA dimensions and its impact on entrepreneurial practices.

Entrepreneurial ecosystems also play a critical role in supporting the development of EA. Incubators, accelerators and mentorship programmes should emphasize the balance between information acquisition and processing capabilities. Simulated dynamic scenarios in mentorship sessions can help entrepreneurs practise transitioning from scanning and search to actionable decision-making. Moreover, fostering peer connections among entrepreneurs can encourage knowledge sharing and associative thinking, strengthening the overall ecosystem (Patel *et al.*, 2015). In countries like Ghana, where institutional voids and resource constraints are prevalent, platforms that facilitate collaboration and shared learning are particularly valuable (Adomako *et al.*, 2018). These measures can enable entrepreneurs to sustain EO and navigate complexities effectively.

Finally, SMEs should institutionalize EA by embedding its dimensions into organizational strategy. Dedicated teams or roles focused on environmental scanning can ensure a continuous flow of relevant information. Decision-making frameworks that integrate scanning and search with association and connection or judgment and evaluation can enhance agility and responsiveness. By aligning EA with organizational processes, firms can maintain a robust EO, ensuring resilience and sustained performance in dynamic markets.

Limitations and future research

Whilst our study advances the understanding of EA and its mediating role in fostering EO under dynamic environmental conditions, it is not without limitations. These limitations open avenues for future research to deepen and broaden the insights presented here. First, although we employ a time-lagged dependent variable to address concerns regarding causality, the study's cross-sectional design constrains our ability to definitively establish causal relationships between environmental dynamism, EA, EO and firm performance. Longitudinal research designs could provide a more nuanced understanding of how these constructs evolve over time. For instance, tracking firms through multiple stages of environmental turbulence could reveal the dynamic nature of EA's mediation role and how its dimensions adapt

or interact differently depending on temporal and situational changes. Such longitudinal investigations would also enable researchers to explore the stability and variability of EO in response to prolonged or recurrent environmental shifts.

Second, our reliance on self-reported data, whilst mitigated through controls for common method bias, introduces potential limitations in the objectivity of some measures, particularly firm performance. Future studies should seek to incorporate more objective metrics, such as financial performance indicators, innovation output or external ratings, to validate and extend our findings. Relatedly, the single-country context of our research, whilst providing depth and focus, may limit the generalizability of our findings to other regions or institutional environments. Ghana's unique blend of entrepreneurial vibrancy and institutional constraints offers a fertile ground for studying EA and EO, yet cultural, institutional and economic differences across other developing and developed economies may shape these relationships differently. For instance, the extent to which regulatory unpredictability or resource constraints amplify the need for specific EA dimensions may vary. Future research could replicate this study across diverse national contexts to examine how variations in institutional frameworks, cultural orientations or market dynamics influence the efficacy of EA as a mediating construct.

Third, our emphasis on SMEs, whilst offering critical insights into the entrepreneurial processes within resource-constrained settings, may not fully capture the complexities of EA and EO in larger firms or non-traditional organizational structures. Larger firms often have formalized processes and access to advanced technologies, which might alter the role and interplay of EA dimensions. Similarly, startups in technology-intensive sectors may exhibit distinct patterns of information acquisition and processing due to the fast-paced and innovation-driven nature of their industries. Future studies could explore sectoral and firm size variations to determine whether the mechanisms identified in this study are equally applicable or require adaptation.

Fourth, whilst our study focuses on traditional dimensions of EA, emerging technologies present intriguing avenues for enhancing information acquisition and processing. For example, AI and machine learning tools can augment entrepreneurs' scanning and search capabilities by automating data collection and pattern recognition. These technologies also have the potential to enhance judgment and evaluation by providing predictive insights and scenario analyses, reducing cognitive load and improving decision accuracy. Future research could examine how digital tools and platforms influence the efficacy of EA dimensions and their integration within entrepreneurial processes. Exploring the interplay between human cognitive capabilities and AI-driven decision support systems could provide a richer understanding of how technology reshapes entrepreneurial action and strategy.

Conclusion

Our study makes significant contributions to the entrepreneurship literature by refining the conceptualization of EA and demonstrating its pivotal role as a mediator between environmental dynamism and EO. We show how individual-level processes integrate with firm-level outcomes to drive entrepreneurial success in dynamic environments. Specifically, our findings reveal that whilst information acquisition activities such as scanning and search are essential, their true value lies in their integration with robust information processing, including association and connection as well as judgment and evaluation. Without this integration, mere data acquisition can hinder EO and firm performance. By unpacking the nuanced interplay between EA dimensions, our research offers a comprehensive perspective on how entrepreneurs navigate uncertainty, providing actionable insights for both theory and practice.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section at the end of the article.