

Ledi, Klenam Korbla

Article

Surviving black swan: competitive intelligence and frugal innovation as panaceas to SME value creation during crisis

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Surviving black swan: competitive intelligence and frugal innovation as panaceas to SME value creation during crisis

Klenam Korbla Ledi 

Department of Marketing and Corporate Strategy, Business School, Kwame Nkrumah University of Science Technology, Kumasi, Ghana

ABSTRACT

This study proposes mechanisms for firms to thrive in a turbulent business environment by investigating the mediating role of frugal innovation in the relationship between competitive intelligence and value creation. The study also examined absorptive capacity as a critical boundary condition that influences the impact of competitive intelligence on frugal innovation. A survey questionnaire was administered to 302 SMEs, and the data were analysed using Amos. Structural equation modelling (SEM) was employed to test the hypothesis. The findings demonstrate a significant positive impact of competitive intelligence on SME value creation. The study also found that frugal innovation acts as a mechanism to amplify the impact of competitive intelligence on value creation, and this relationship is anchored by a high level of absorptive capacity. The study demonstrates how competitive intelligence and frugal innovation synergistically drive value creation amid turbulence under the auspices of absorptive capacity, thereby increasing SMEs' resilience and competitiveness. The study sheds light on previously unexplored aspects of value creation in a turbulent business environment, offering novel perspectives on dynamic capabilities.

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1. Introduction

Organisations frequently encounter unexpected events and crises in today's highly competitive and volatile business environment, including natural disasters, economic downturns, pandemics, cyber-attacks, and political instability, which can significantly impact their operations and survival (Douglas & Haley, 2024; Duchek, 2020; Ledi et al., 2024; Monazzam & Crawford, 2024; Zutshi et al., 2021). Crises can disrupt established business models and threaten organisational survival. Therefore, to survive in uncertain environments, organisations must be able to handle the manifestations of crises (Duchek, 2020; Lin et al., 2024; Marquez-Tejon et al., 2024). Consequently, organisations must cultivate a resilience capability that allows them to effectively respond to unforeseen circumstances and exploit opportunities that may pose a risk to the survival of the organisation (Baird et al., 2024; Duchek, 2020; Oiku, 2024). Therefore, effectively managing crises is crucial for organisational survival and long-term success.

Competitive intelligence plays a critical role in equipping organisations with relevant and timely information about their competitors, market trends, and emerging risks (Bulger, 2016; Drihem & Bouklikha, 2024; Markovich et al., 2019; Nte et al., 2023). It enables organisations to identify potential threats, capitalise on opportunities, and make informed decisions that enhance their competitive advantage, as suggested by the dynamic capability theory (Bartus, 2023; Calof, 2017; Farley & Freyn, 2023; Wu et al., 2023). Additionally, competitive intelligence assists firms in being ready for potential crises. It helps establish early warning systems by continuously monitoring competitors, market trends, economic indicators, and industry developments, allowing firms to anticipate potential crises and prepare accordingly (Adewusi et al., 2024; Drihem & Bouklikha, 2024; Farley & Freyn, 2023; Silva & Bação, 2023). The study therefore

argues that competitive intelligence, as a unique dynamic capability, aids companies in maintaining and enhancing their competitiveness in a turbulent environment. However, the application of competitive intelligence in value creation during crises has received limited attention in literature despite the unprecedented recession caused by one of the biggest crises in history—the COVID-19 pandemic.

The COVID-19 pandemic has resulted in substantial disruptions in multiple sectors, including SMEs (Ledi et al., 2024; Papadopoulos et al., 2020; Zutshi et al., 2021). These SMEs, which play a crucial role in economic growth, employment generation, and poverty alleviation, have been particularly vulnerable to the impact of the pandemic (Juergensen et al., 2020; Papadopoulos et al., 2020). Despite their critical role in economic growth, SMEs still struggle with their innovation initiatives due to challenges such as limited access to capital, infrastructure, financial and technological resources, and social capital (Ferreira & Coelho, 2020; Hassani & Mosconi, 2021; Santos et al., 2020). In such contexts, where resources are often limited and constraints are prevalent, the study posits that there is a need for SMEs to explore and exploit frugal innovation.

The study argues that leveraging frugal innovation during crises enables SMEs to develop cost-effective strategies, optimise resource utilisation, and create value by offering innovative solutions that address market needs in times of uncertainty (Al-Omoush et al., 2024; Farooq, 2017; Hossain, 2020; Ploeg et al., 2021; Prabhu, 2017; Qin, 2024). SMEs benefit by adopting frugal practices to create accessible products, services, and processes, reach a larger customer base, achieve higher market penetration, and ultimately carve out a niche market. This market responsiveness, as the study argued, is a stepping stone for SMEs to enhance customer satisfaction, create long-term relationships, build customer loyalty, and gain a competitive advantage in a dynamic business environment. This is because innovation enables businesses to establish a competitive edge, particularly when operating in volatile environments (Lien & Timmermans, 2023; Santos et al., 2020).

Despite the increasing adoption of competitive intelligence practices in organisations (e.g. Bartuś, 2023; Calof & Wright, 2008; Cavallo et al., 2021; Chevallier et al., 2016; Farley & Freyn, 2023; Markovich et al., 2019; Tahmasebifard, 2018; Vashishth et al., 2024; Wu et al., 2023), the relationship between competitive intelligence and value creation in a turbulent business environment remains relatively unexplored. As most studies emphasise coping strategies, crisis management approaches, and the ability of firms to resume expected performance levels after crises (Douglas & Haley, 2024; Duchek, 2020; Lin et al., 2024; Oiku, 2024; Zutshi et al., 2021), literature has paid little attention to the value creation capacity of firms, especially SMEs, during crises. Therefore, the extent of achieving and securing value creation in a turbulent market remains unclear. Furthermore, the existing literature on value creation primarily neglects the unique challenges and opportunities faced by SMEs (Ferreira & Coelho, 2020; Juergensen et al., 2020; Papadopoulos et al., 2020). While value creation is crucial for SMEs to survive and thrive, there is a limited understanding of how SMEs navigate and capitalise on these crises or turbulent market conditions to foster resilience (Dahlke et al., 2021; Duchek, 2020; Zutshi et al., 2021).

Despite a substantial body of research establishing competitive intelligence as a crucial tool for achieving organisational success (e.g. Adewusi et al., 2024; Calof, 2017; Drihem & Bouklikha, 2024; Jasima et al., 2020) and the growing popularity of frugal innovation (e.g. Berndt et al., 2024; Hossain, 2018; Ploeg et al., 2021; Prabhu, 2017; Saleem et al., 2024), there is a crucial gap regarding the interrelation between the two concepts and their rippling effect on value creation. The lack of a comprehensive understanding of these interactions hampers the ability of SMEs to fully harness their innovative potential. The study seeks to answer the research question, 'To what extent does competitive intelligence influence value creation via the mechanism of frugal innovation under varying conditions of absorptive capacity?'

The study's contribution is threefold: Firstly, the study advances knowledge in both competitive intelligence (e.g. Adewusi et al., 2024; Drihem & Bouklikha, 2024; Farley & Freyn, 2023; Khalid Alrashedi, 2023; Sassi et al., 2022; Vashishth et al., 2024) and value creation literature (e.g. Howell et al., 2018; Karakulak & Faul, 2023). While prior research has primarily explored the link between competitive intelligence and overall firm performance (e.g. Du Plessis & Gulwa, 2016; Jasima et al., 2020), the findings shed light on competitive intelligence's direct influence on value creation. The study highlights a strategic pathway for organisations to leverage competitive intelligence effectively and enhance value creation during crises. This contributes to the theoretical understanding of how competitive intelligence can enable SMEs to

identify value creation opportunities and enhance their competitiveness. Secondly, the study demonstrates the importance of leveraging frugal innovation and absorptive capacity as mechanisms to amplify the impact of competitive intelligence on value creation. SMEs can effectively translate their competitive intelligence into value creation with frugal innovation and absorptive capacity, thereby increasing their resilience and competitiveness. Finally, the study provides novel perspectives on crisis management literature by integrating dynamic capabilities and absorptive capability theories, as well as shed light on previously unexplored aspects such as utilising competitive intelligence and frugal innovation in value creation in turbulent markets.

The subsequent sections comprise the theoretical review and hypothesis, methodology, results, discussion, conclusion, and study implications.

2. Theoretical review and hypothesis development

2.1. Theoretical review

Dynamic capabilities refer to an organisation's ability to adapt, integrate, and reconfigure its resources and competencies in response to a changing business environment (Teece et al., 1997). Dynamic capability depicts how organisations can adapt and thrive in dynamic and uncertain environments. The theory emphasises the relevance of a firm's ability to sense, seize, and reconfigure its resources and capabilities in response to changing market conditions and emerging opportunities (Ambrosini & Bowman, 2009; Teece, 2007). Therefore, for firms to be competitive in the market, there's a need to develop specific capabilities and engage in continuous learning, especially in a new or changing market environment (Teece et al., 1997; Ferreira & Coelho, 2020). SMEs can increase value creation by leveraging competitive intelligence as a distinct capability, which will position them to achieve better performance amidst crises.

Absorptive capacity theory seeks to explain how organisations acquire, assimilate, and utilise external knowledge to innovate and improve their performance (Cohen & Levinthal, 1990; Kogut & Zander, 1992). The theory emphasises the importance of an organisation's ability to effectively recognise, absorb, and apply new knowledge from external sources, such as suppliers, customers, and competitors (Cohen & Levinthal, 1990; Pavlou & El Sawy, 2010). Absorptive capacity is crucial for organisations, particularly in rapidly changing and competitive environments, as it allows them to stay ahead of the curve by continuously adapting and innovating. Organisations with higher absorptive capacity are more likely to innovate and seize opportunities in their markets (Bellamy et al., 2014; Hassani & Mosconi, 2021; Moilanen et al., 2014). SMEs with high absorptive capacity can adapt quickly to changing market conditions and emerging opportunities, which is essential for staying relevant and continuously improving frugal solutions.

2.2. Competitive intelligence and value creation

The concept of value creation has played a crucial role in the advancement of various fields of management research (Farooq, 2017; Howell et al., 2018; Karakulak & Faul, 2023; Lepak et al., 2007; Lindman et al., 2016; Porter & Kramer, 2011; Yousaf et al., 2022). In the past, value creation was primarily focused on companies' financial value (Karakulak & Faul, 2023). However, there is now a growing demand from businesses, stakeholders, and society as a whole to expand the conceptualization of a firm's impact to include environmental, social, and governance factors (Karakulak & Faul, 2023; Lepak et al., 2007). Porter and Kramer (2011) argue that enhancing corporate competitiveness necessitates recognising and enlarging the interdependencies between economic and societal progress. The study has adopted a broader understanding of value creation, as proposed by Prahalad and Hart (2002). 'Value creation highlights satisfying the demands of low-income customers while simultaneously profiting from these transactions, thereby creating economic value for the business' (Prahalad & Hart, 2002, p. 6).

According to dynamic capabilities theory, the deployment or utilisation of various competencies generates value for the company (Achtenhagen et al., 2013; Teece, 2007). Firms need to constantly enhance and reconfigure their competencies and capabilities in order to survive and thrive in environments

characterised by high levels of uncertainty (Teece, 2007). Therefore, for a company to consistently achieve success—conceptualised in this study as value creation—it necessitates effective leveraging of competences and resources (Achtenhagen et al., 2013; Teece, 2007). During turbulent market conditions or crises, competitive intelligence becomes even more crucial for value creation. This is because the dynamic and unpredictable nature of such situations requires organisations to gather timely and accurate information about the market, competitors, and customer behaviour (Ashton & Stacey, 1995; Hassani & Mosconi, 2021; Salles, 2006; Somers, 2009). The study therefore conceptualises competitive intelligence as a unique dynamic capability significant for better value creation for SMEs as well as maintaining and/or enhancing their competitiveness in a changing environment or during a crisis.

The literature widely acknowledges that an organisation with distinctive resources has the potential to achieve a competitive advantage (Ambrosini & Bowman, 2009; Ferreira & Coelho, 2020). Organisations gain competitive advantage when their value creation strategies, resources, and distributional resources cannot be imitated by rival organisations (Teece et al., 1997; Wu et al., 2023). As sustainable competitive advantage can be achieved by leveraging distinctive resources (Teece et al., 1997), the study argues that competitive intelligence—which is ‘the process by which organisations gather actionable information about competitors and the competitive environment and, ideally, apply it to the decision-making and planning process to improve their performance’ (Fleisher & Blenkhorn, 2001, p. 13)—as a unique resource plays a significant role in value creation for SMEs by setting the overall tone for the value creation process in a turbulent market. The study argues that competitive intelligence provides organisations with the necessary information to develop effective strategies (Bose, 2008; Markovich et al., 2019) and facilitates strategic decision-making (Calof, 2017; Wu et al., 2023). This is done by gathering and analysing information about competitors, market trends, and industry dynamics (Fleisher & Blenkhorn, 2001; Jasima et al., 2020). For instance, competitive intelligence provides organisations with insights into their competitors’ strengths, weaknesses, and strategies (Bose, 2008; Calof, 2017; Sheffi, 2007). This information helps companies make informed decisions about product development, market entry, pricing, and other strategic initiatives (Calof, 2017; Jasim et al., 2020).

The study therefore further argued that the more SMEs understand their competitive landscape, the better they are in a position to identify unique opportunities and allocate resources more effectively, leading to superior value creation. Therefore, the study posits that integrating competitive intelligence into value creation efforts during crises can provide SMEs with a competitive edge by enabling them to anticipate and proactively respond to crisis situations, as well as adapt and thrive amidst uncertainty. As a result, the study proposes that:

H1: Competitive intelligence has a significant positive relationship with SME value creation

2.3. Mediating role of frugal innovation

Frugal innovation is defined as the capacity to produce increased value for consumers while substantially diminishing the consumption of plentiful resources (Farooq, 2017). Frugal innovation is characterised by products that offer substantial cost advantages over existing alternatives. The ultimate goal is to decrease the cost of ownership while simultaneously meeting or surpassing specific predetermined standards of acceptable quality (Brem & Wolfram, 2014; Tiwari & Herstatt, 2012). Frugal innovation prioritises the creation of solutions under resource-constrained conditions. In emergent markets, businesses are creating innovative solutions to address the needs of middle- and low-income segments that have limited resources (Howell et al., 2018; Tiwari & Herstatt, 2012). The study posits that frugal innovation is the mechanism through which competitive intelligence is translated into value creation. The study’s position is based on the following considerations:

Firstly, for innovation to support a firm’s competitive advantage and performance, their strategic practices must be relevant, appropriate, and sufficiently detailed (Ferreira & Coelho, 2020; Guimaraes et al., 2016). In line with this, dynamic capabilities such as competitive intelligence play a vital role in exploration, exploitation, and deploying innovative strategies (Ashton & Stacey, 1995; Calof, 2017; Cavallo et al., 2021; Denise Lemos & Carlos Porto, 1998; Tanev & Bailetti, 2008). Competitive intelligence helps organisations sense changes, emerging trends, and unmet customer needs in the competitive landscape that can be addressed

through frugal innovation. The sensing capabilities enable SMEs to stay ahead of the competition and identify opportunities for cost-effective solutions, effectively seizing those opportunities to gain a competitive advantage (Bulger, 2016; Poblano-Ojinaga, 2021; Salles, 2006; Sassi et al., 2022). The study argues that competitive intelligence positively influences the identification of market gaps and untapped market opportunities, as well as providing SMEs with insights into competitors' products, services, and strategies, which are crucial for frugal innovation. SMEs can therefore uncover unmet customer needs and discover areas where frugal innovations can provide cost-effective solutions by leveraging competitive intelligence. This is in line with the sensing and seizing capabilities of the dynamic capability theory (Teece, 2007).

Additionally, competitive intelligence, which involves systematically gathering, analysing, and acting on information about competitors and market conditions, equips SMEs with the strategic insights necessary to innovate under constraints (Drihem & Bouklikha, 2024; Vashishth et al., 2024). This ability to make informed decisions based on limited resources is particularly critical for fostering frugal innovation in resource-constrained environments. From the perspective of the dynamic capabilities theory, competitive intelligence plays a critical role in enhancing a firm's ability to innovate frugally by developing dynamic capabilities—specifically, the ability to sense, seize, and reconfigure resources in response to environmental changes (Teece, 2007). Specifically, competitive intelligence enables firms to detect emerging market trends, consumer needs, and opportunities, particularly those related to underserved markets or cost-sensitive customer segments (Fleisher, 2008; Sassi et al., 2022). This awareness allows SMEs to identify areas where resource-efficient innovation can create value. Competitive intelligence also guides the strategic decisions to seize or leverage frugal innovation opportunities (Berndt et al., 2024; Ploeg et al., 2021). Competitive intelligence thus provides the data and insights necessary to make these decisions under uncertainty (Khalid Alrashedi, 2023). Competitive intelligence also assists firms in reallocating and transforming their resources to implement innovative solutions that optimise functionality while minimising costs (Adewusi et al., 2024; Farley & Freyn, 2023; Saleem et al., 2024). For example, competitive intelligence can help identify cost-effective alternatives to traditional materials or production methods, thereby fostering frugal innovation.

Competitive intelligence empowers SMEs to manage the innovation process efficiently by guiding decision-making and resource allocation (Calof, 2017; Cavallo et al., 2021; Ferreira & Coelho, 2020; Guimaraes et al., 2016). Competitive intelligence enables firms to innovate within their resource constraints by providing insights into competitors' strategies, technological trends, and market demands. For this reason, the market, competitor, and technological aspects of competitive intelligence equip SMEs with the ability to make smart decisions or strategic choices, which is vital for frugal innovation, where firms concentrate on core functionalities instead of extra features. For instance, SMEs can tailor their frugal innovation strategies by understanding the needs of cost-conscious customers and identifying opportunities to develop affordable yet effective products or services (Hossain, 2018; Prabhu, 2017). Similarly, learning from competitors' successes and failures allows SMEs to avoid costly mistakes and focus on resource-efficient innovations (Calof, 2017; Jasima et al., 2020). SMEs can leverage new, low-cost technologies to drive frugal innovation by staying informed about technological advancements (Brem & Wolfram, 2014; Sharma & Iyer, 2012).

The study therefore argues that competitive intelligence serves as a catalyst for frugal innovation by providing the necessary knowledge and understanding of the competitive landscape, thus laying the foundation for creating value. Frugal innovation plays a vital role by translating competitive intelligence insights into strategies that drive value. Competitive intelligence informs organisations about market gaps and customer preferences, while frugal innovation transforms this knowledge into cost-effective solutions that deliver value. Frugal innovation, in effect, acts as the bridge that connects the insights gained from competitive intelligence to the actual creation of value for customers and stakeholders, ultimately leading to a sustainable competitive advantage. As a result, the study proposes that:

H2: Frugal innovation mediates the relationship between competitive intelligence and SME value creation.

2.4. The moderating role of absorptive capacity

The study argued in the previous sections that competitive intelligence and frugal innovation are vital to creating value for SMEs. However, additional factors may intensify this existing association. Thus, the

study suggests absorptive capacity as one of the most critical characteristics influencing competitive intelligence and frugal innovation for value creation. The study's position is based on the following considerations:

Firstly, absorptive capacity enables an organisation to recognise and acquire new knowledge from external sources, as well as effectively assimilating and integrating this knowledge with its existing internal knowledge (Cohen & Levinthal, 1990). It generates new knowledge and effectively utilises existing technology by leveraging its internal competencies (Cohen & Levinthal, 1990; Pavlou & El Sawy, 2010). Absorptive capacity, therefore, improves the organisation's engagement with the external environment by increasing its ability to assimilate external knowledge and facilitating knowledge sharing and learning among different parts of the organisation (Cohen & Levinthal, 1990; Kogut & Zander, 1992). The importance of SME absorptive capacity becomes particularly critical during crises or in turbulent market conditions. This is because crises and turbulent market environments are characterised by heightened uncertainty and rapidly changing circumstances (Teece, 2007), which often require SMEs to adapt quickly to changing circumstances. The study argues that in such situations, SMEs with strong absorptive capacity are better equipped to navigate through crises and concurrently seize opportunities that emanate from them. Absorptive capacity therefore enables SMEs to acquire and assimilate new knowledge from external sources, including information about changes in market or consumer behaviour and emerging trends (Božič & Dimovski, 2019; Hassani & Mosconi, 2021). This adaptability allows SMEs to modify their strategies and operations to remain relevant and competitive in a dynamic business environment.

Secondly, absorptive capacity theory explains how organisations acquire, assimilate, and utilise external knowledge to innovate and improve their performance (Cohen & Levinthal, 1990). The theory emphasises the importance of an organisation's ability to effectively recognise, absorb, and apply new knowledge from external sources, such as suppliers, customers, and competitors (Cohen & Levinthal, 1990). Competitive intelligence plays a central role in knowledge acquisition for an organisation, such as information about their competitors' strategies, strengths, weaknesses, and market positions (Bose, 2008; Bulger, 2016; Rouach & Santi, 2001). This external knowledge provides insights that can be absorbed and utilised to make informed decisions and gain a deeper understanding of the competitive landscape. In light of this, the study suggests that, while competitive intelligence helps organisations identify emerging opportunities and potential threats in the market (Bose, 2008; Bulger, 2016; Jasima et al., 2020), absorptive capacity allows SMEs to effectively recognise and assimilate this external knowledge, enabling them to capitalise on opportunities and respond proactively to threats. For instance, competitive intelligence contributes to the organisation's market sensing capability, allowing it to monitor changes in customer preferences, industry trends, and technological advancements. SMEs with strong absorptive capacity can effectively process this information and apply it to their strategies, products, and services, resulting in greater responsiveness to market changes and aiding the value creation process.

Thirdly, existing literature demonstrates a clear association between absorptive capacity and innovation (Andreeva & Kianto, 2011; Guimaraes et al., 2016; Moilanen et al., 2014). Therefore, absorptive capacity contributes to improving innovative capacity and innovation performance within the firm (Bellamy et al., 2014; Cohen & Levinthal, 1990; Hassani & Mosconi, 2021; Moilanen et al., 2014). More specifically, absorptive capacity plays a crucial role in the frugal innovation process. Frugal innovation often involves repurposing existing technologies, materials, and processes to create affordable and effective solutions (Ploeg et al., 2021; Prabhu, 2017). The ability to absorb external knowledge and apply it creatively enables organisations to identify innovative ways to optimise resource utilisation, reduce costs, and create affordable solutions that address the needs of underserved markets. SMEs with strong absorptive capacity can effectively assimilate knowledge and apply it to the innovation process (Bellamy et al., 2014; Guimaraes et al., 2016; Ploeg et al., 2021). The ability to acquire, assimilate, and apply external knowledge allows organisations to ideate, develop, and implement resource-efficient, frugal solutions. This symbiotic relationship creates a foundation for sustainable and impactful innovation in resource-constrained environments, driving economic growth and improving the overall performance of the organization. As a result, the study proposes that:

H3: Absorptive capacity moderates the relationship between competitive intelligence and SME frugal innovation

Figure 1 illustrates how the study uses dynamic capability theory and absorptive capacity to create a multilevel conceptual framework. Figure 1 displays the study's hypothesis paths. The H1 depicts the direct relationship between competitive intelligence and value creation. The H2 depicts the mediating role of frugal innovation in competitive intelligence and the value creation link, and the H3 depicts the moderating role of absorptive capacity in competitive intelligence and the frugal innovation link.

3. Research context and methodology

3.1. Sample and data collection procedure

The study adopts a quantitative research design, which allows for the collection and analysis of numerical data to establish relationships and test hypotheses. The study's target population consists of Ghanaian SMEs. SMEs in Ghana often operate in informal sectors, which typically lack financial buffers and access to formal financial institutions. Therefore, during crises, these businesses are more susceptible to closure, bankruptcy, or reduced productivity due to limited resources and restricted access to capital. Ghana is suitable for this study because, apart from the profound impact of the COVID-19 pandemic on SMEs, which created additional challenges for SMEs running businesses in already resource-constrained environments, Ghana is currently grappling with massive economic woes that have seen several businesses fold up (Ledi Ledi, Ameza-Xemalordzo, & Owusu Ansah, 2023). This economic uncertainty is negatively impacting Ghana's overall investment climate, ultimately deterring potential investors from supporting SMEs or establishing new ventures, further restricting access to capital and resources. To survive and recover, SMEs in Ghana would have to be able to adapt their businesses and engage in innovative practices. This therefore requires a comprehensive business approach that can provide SMEs with the means to weather economic shocks to achieve business survival and growth.

In Ghana, the categorization of small and medium-sized enterprises (SMEs) exhibits considerable variation over time and among different organisations. The Ghana Enterprise Agency (previously the National Board for Small Scale Industries) (NBSSI) established the definition of SMEs, which the current study adopts. NBSSI classifies businesses as 'micro' (containing fewer than five employees), 'small' (six–29), 'medium' (30–99), or 'large' (100+), with fixed assets not exceeding \$10,000 (excluding land and buildings). The study carefully selected 600 SMEs listed by the Ghana Enterprise Agency using a simple random technique. The sampling strategy ensures a representative sample of SMEs in manufacturing and service sectors. The study distributed the questionnaires to top executives of SMEs. Top executives were selected because they possess the necessary knowledge about the operations of the firm and make strategic decisions on behalf of the firm. The survey instrument was developed based on established scales in the literature (details provided in the measurement section) and adapted to the specific context

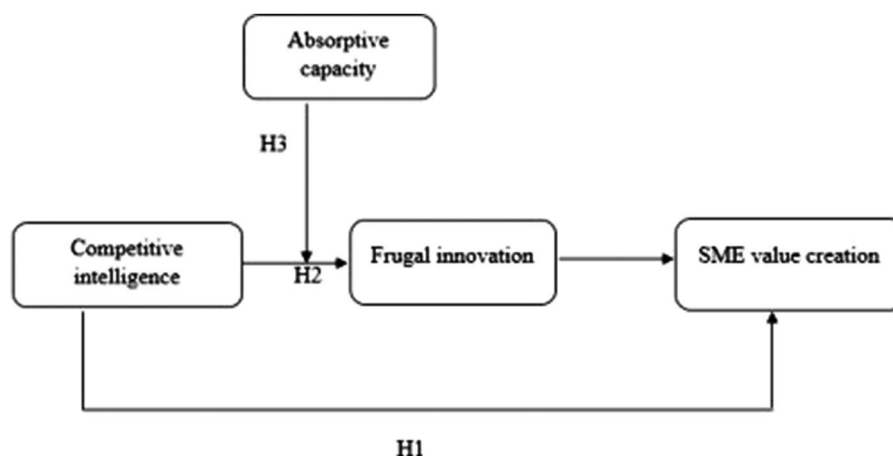


Figure 1. Conceptual framework.

of this research. The study was conducted in accordance with ethical research guidelines, and written informed consent was obtained from the respondents prior to their participation. The study administered the questionnaires via email invitations using Google Forms. The questionnaire distribution took place between October 2023 and February 2024. After several rounds of reminders, 321 SMEs participated in the research, representing a 53.5% response rate. However, 302 questionnaires were eventually considered for the study after a preliminary check, representing a 50.3% effective response rate. The sampled SMEs include a higher proportion of manufacturing firms (57.9%) compared to service firms (42.1%). On average, 81.1% of the firms were over 10 years old, and 74.8% had more than 30 employees. Amos was used to analyse the collected data. The study used structural equation modelling (SEM) to test its hypothesis.

3.2. Measurement

The study conducted a comprehensive literature review to identify key variables and measures related to the constructs. The study conducted the literature search using multiple academic databases, specifically Scopus and Web of Science. The study selected these platforms to ensure a broad and comprehensive collection of relevant studies. The study used specific keywords related to its core constructs, such as 'competitive intelligence', 'frugal innovation', 'SME value creation', and 'measurement scales'. The study applied the following criteria to ensure the relevance and rigour of the studies included in the review: peer-reviewed journal/conference articles, and studies published within the last ten years to capture the most recent developments in the field. Through this systematic process, the study identified the most frequently used and validated measurement scales for competitive intelligence, frugal innovation, and SME value creation. First, the study extracted the measurement items from selected publications, considering their frequency of mention, relevance to the research objectives, and empirical support. Second, the selected measures were those that demonstrated strong reliability and validity across multiple studies, ensuring their appropriateness for the present research. The internal research ethics committee of Kwame Nkrumah University of Science and Technology (KNUST) subsequently reviewed and approved the measurement instrument to ensure validity and ethical considerations before distributing it to the respondents. The study assessed the constructs using Likert scales ranging from 1 to 5.

3.2.1. Independent variable

Competitive intelligence refers to the systematic collection of practical data regarding rivals and the competitive landscape, which is ideally incorporated into the strategic planning and decision-making processes of organisations in an effort to enhance performance (Fleisher & Blenkhorn, 2001). Competitive intelligence functions by promptly identifying pertinent information, conducting audits of an organisation's scientific and technical resources, comparing them to those of its rivals, and assisting the company in making more effective technological decisions (Rouach & Santi, 2001). The study adopted six items from Saayman et al. (2008) to measure competitive intelligence. This scale is a validated and reliable instrument for assessing CI capabilities in organisations, including SMEs. The chosen items focus on key dimensions of CI relevant to our research, such as environmental scanning, competitor analysis, and information dissemination. This makes it particularly relevant to this study, which focuses on competitive intelligence in SMEs.

3.2.2. Mediating variable

'Frugal innovation is a resource scarce solution (i.e. product, service, process, or business model) that is designed and implemented despite financial, technological, material, or other resource constraints, whereby the final outcome is significantly cheaper than competitive offerings (if available) and is good enough to meet the basic needs of customers who would otherwise remain unserved' (Hossain, 2018, p. 929). The study measured frugal innovation using items adopted from Rossetto et al. (2023). This recently published scale offers a robust and efficiency-driven perspective on frugal innovation capabilities, which is particularly relevant to resource-constrained SMEs. After a careful review of Rossetto et al.'s original 10-item scale,

the study selected 5 items that aligned with the operational definitions and practical examples of frugal innovation in the SME sector. The selection of these five items was based on their relevance to the core dimensions of frugal innovation—cost-effectiveness, resource efficiency, and sustainability. These dimensions are critical for capturing the essence of frugal innovation, which focusses on developing affordable, resource-efficient solutions that meet specific customer needs, particularly in resource-constrained environments. The study eliminated the remaining five items, as they were deemed to either conceptually overlap with the selected items or did not significantly load very well due to contextual differences. For instance, the items ‘significant cost reduction in the operational process’, ‘savings of organisational resources in the operational process’, and ‘rearrangement of organisational resources in the operational process’ share a common focus on resource optimisation and cost reduction. While these items may represent different aspects of this concept, they essentially measure the same underlying principle. Similarly, ‘efficient and effective solutions to customers’ social/environmental needs’ and ‘environmental sustainability in the operational process’ items overlapped, as providing efficient and effective solutions to customers’ social/environmental needs often involves implementing environmentally sustainable practices. Additionally, the study conducted a pre-test with a sample of 31 respondents from the target population to ensure that the reduced scale still comprehensively captures the frugal innovation construct. The pre-test results confirmed that the selected items were well understood and relevant to the context of frugal innovation in Ghana. Moreover, the study conducted exploratory and confirmatory factor analyses to validate the scale, ensuring that the reduced scale upholds strong construct validity and reliability. The study specifically tested the reduced scale for reliability using Cronbach’s alpha and composite reliability, revealing acceptable levels of internal consistency (above 0.70). The average variance extracted (AVE) was also used to check for convergent validity (above 0.50). The results showed that the items chosen adequately captured the concept of frugal innovation. The rigorous pre-testing and validation steps undertaken ensured that the reduced scale remains a robust measure of frugal innovation. Therefore, by carefully selecting these five items and validating the reduced scale, the study retained the essential aspects of frugal innovation, ensuring the scale remains both reliable and valid for the study’s purposes.

3.2.3. Moderating variable

Absorptive capacity is ‘the ability of a firm to recognise the value of new, external information, assimilate it, and apply it to commercial ends (Cohen & Levinthal, 1990, p. 128)’. The study adopted five items from Fernhaber and Patel (2012) to measure absorptive capacity. This scale offers a concise approach to measuring key dimensions of absorptive capacity relevant to knowledge acquisition, assimilation, and exploitation. The selected items capture essential aspects of absorptive capacity, such as the ability to acquire external knowledge, internal capacity to process and integrate new knowledge, and the ability to use knowledge for innovation. This focus on absorptive capacity aligns with the research goal of understanding how SMEs leverage their knowledge capabilities to create value during a crisis.

3.2.4. Dependent variable

Value creation is the primary focus of every corporate entity. Value creation refers to an organisation’s ability to meet the needs of low-income consumers while generating financial gain from these transactions, ultimately generating economic value for the organisation as well (Prahalad & Hart, 2002). This study posits that value creation during crises involves identifying and capitalising on opportunities that arise from disruptive events, reconfiguring business models, and delivering innovative solutions to meet customer needs in challenging circumstances. The study measured value creation using five items from Zahoor et al. (2023) and Yousaf et al. (2022). This combined approach provides a more comprehensive understanding of how SMEs create value during challenging times. To achieve growth and survival in emerging economies, it is imperative to provide greater value to marginalised customers at a reduced cost (Farooq, 2017). Therefore, the study selected these items to measure value creation because they capture the social and economic aspects of value creation and also reflect value creation in developing economies. The scales by Zahoor et al. (2023) and Yousaf et al. (2022) are based on extensive literature reviews and theoretical frameworks related to value creation. This grounding ensures that the scales reflect well-established and contemporary understandings of value creation.

3.2.5. Control variables

The study considered firm size, firm age, managerial position, R&D function, and industry as control variables.

4. Results

The study takes a two-step structural equation modelling (SEM) approach. The initial stage involved validating the measurement model using confirmation factor analysis (CFA) in Amos software. In the second step, the hypothesised paths were tested using SEM.

4.1. Reliability and validity of the constructs

The study conducted a confirmatory factor analysis (CFA) model to determine whether the latent variables adequately describe the data. Table 1 presents the results of the measurement model. First, the study examined the factor loadings for the items and found them to be above the threshold of 0.50 (Sanchez, 2013; Sarstedt et al., 2019). The study also assessed the measurement model by examining its internal consistency and convergent validity. The study checked internal consistency by evaluating the unidimensionality of indicators using Cronbach's alpha. If Cronbach's alpha has large values above 0.70, we can assume internal consistency (Sarstedt et al., 2019). Table 1 shows that all of the latent variables exhibited Cronbach's alpha values above 0.70 (CI = 0.900; FI = 0.891; AC = 0.890; VC = 0.885), indicating the relationships between the latent variables and indicators are appropriate for further analysis.

Further, to check for convergent validity, the study also calculated the average variance extracted (AVE) and the composite reliability (C.R.) for each construct. These values are generally expected to be above 0.50 and 0.70, respectively (Sanchez, 2013; Sarstedt et al., 2019). From Table 1, there were no latent variables with a low AVE (CI = 0.604; FI = 0.631; AC = 0.619; VC = 0.608) and CR (CI = 0.901; FI = 0.895; AC = 0.892; VC = 0.886), indicating that each latent variable accounted for a significant portion of the indicator's variance. The study also assessed the CFA model to determine its level of adequate data description. The results are Chi-square = 265.096, DF = 183, Chi-square/DF = 1.449, TLI = 0.976, GFI = 0.925, CFI = 0.979, NFI = 0.936, SRMR = 0.025, RMSEA = 0.037, which implies that the model adequately fits the data. It is generally recommended to report the 90% confidence interval to better understand the precision of the RMSEA estimate. The confidence interval gives a range within which the true RMSEA value is likely to fall, considering the sample data. For the study's model, the 90% confidence interval for the RMSEA is [0.021, 0.038]. This interval is well below the threshold of 0.05, reinforcing the conclusion that the model fit is very good.

4.2. Discriminant validity

The study tested discriminant validity to determine if each latent variable in the model is distinct from other latent variables. This prevents any issues with multicollinearity among the latent variables. The study used the Fornell-Larcker criterion to assess the discriminant validity. A Fornell-Larcker criterion is assessed by making a comparison between the square root of the average variance explained and the construct score correlations (Fornell & Larcker, 1981). The square root of the AVE should always be larger than any correlation associated with that construct. The result in Table 2 shows that no construct violated the Fornell-Larcker criterion, indicating that the study achieved discriminant validity. Table 2 illustrates the Fornell-Larcker criterion, with the diagonal signifying the AVE of the constructs and the lower triangle signifying the correlations between the construct scores.

4.3. Heterotrait-monotrait ratio (HTMT)

The study further assessed the discriminant validity of the constructs using the heterotrait-monotrait ratio (HTMT) criterion. HTMT compares the average correlation between a construct and its measures (monotrait) to the average correlations between the construct and other constructs in the model

Table 1. Confirmatory factor analysis (CFA).

	Loading	CR	CA	AVE
Competitive intelligence		0.901	0.900	0.604
Our firm has a variety of methods for collecting information (e.g. trade shows, web sites, industry reports, etc.)	0.773			
Our firm analyses our competitors' plans and strategies to predict and anticipate their actions	0.783			
Our firm produces assessments that address several possible outcomes of our competitors' actions that might be threats of opportunities for our company	0.779			
Our firm use information management tools (e.g. data mining, data warehousing, or "business intelligence" software) to understand our customers	0.757			
Our firm develops profiles on emerging technologies to better understand their characteristics, potential applications and market advantages	0.761			
Senior management use competitive intelligence results in their strategic planning and decision-making	0.808			
Frugal Innovation		0.895	0.891	0.631
The firm regularly focuses on improving the core functionality of products rather than developing additional functionality	0.772			
The firm regularly focuses on offering good value products with satisfactory quality	0.808			
The firm regularly focuses searching on for novel solutions to deliver easier-to-use/ durable products	0.821			
The firm regularly focuses on environmental sustainability in the operational process	0.749			
The firm regularly focuses on reducing the cost of operational processes to achieve operational efficiency	0.781			
Absorptive capacity		0.892	0.890	0.619
We are quick to recognize shifts in the environment (e.g. competition, regulation, and demography)	0.773			
We have frequent interactions with other firms and stakeholders in the industry to acquire new knowledge	0.799			
We quickly recognize the usefulness of new external knowledge to existing knowledge.	0.801			
We quickly analyze and interpret changing market demands.	0.815			
We constantly consider how to better exploit knowledge in order to implement new products and new processes.	0.782			
Value creation		0.886	0.885	0.608
Our beneficiaries/society are satisfied with our services	0.807			
Our firm activities have a significant impact on general well-being	0.788			
Our firm not only focus into the product quality and production scale, we also pay attention to the efficiency and readiness of the product	0.749			
Our firm consistently seeks innovative ways to enhance the quality of our offerings and value to customers	0.796			
Our firm has efficiently use low-cost materials resulting in substantial cost savings	0.758			

(heterotrait). Ideally, constructs should be more strongly related to their own measures than to other constructs' measures. HTMT values closer to 1 indicate a lack of discriminant validity, while values below a threshold of 0.85 suggest acceptable distinctiveness (Kline, 2011). Gratifyingly, the HTMT values reported in Table 3 fall below the recommended threshold of 0.85 for all construct pairs. This indicates that each construct's measures are more strongly correlated with their intended construct than with any other construct in the model. This finding provides support for the discriminant validity of our measurement model.

4.4. Hypothesis testing

The study employed the structural equation model to test the hypothesis paths. The coefficients were evaluated using 95.00% confidence intervals to determine the significance of the hypothesis paths (Sanchez, 2013). Table 4 shows the results for the hypothesis paths.

The study starts by reporting the findings on the relationship between control variables and value creation. The study found that firm size ($\beta=0.017$, $t=0.450$, $p>0.05$), firm age ($\beta=0.001$, $t=0.032$, $p>0.05$), dedicated R&D function ($\beta=0.112$, $t=1.239$, $p>0.05$), and industry type ($\beta=0.024$, $t=0.259$, $p>0.05$) have an insignificant positive relationship with value creation. Managerial position, however, has a significant positive relationship with value creation ($\beta=0.168$, $t=1.873$, $p<0.05$). This lends credence to the upper echelon theory that posits top management team (TMT) composition is crucial to the process of making strategic decisions, which in turn influence the performance of the organisation (Hambrick & Mason, 1984).

The result of the hypothesised path demonstrates that competitive intelligence significantly predicted SME value creation ($\beta=0.300$, $t=3.353$, $p<0.05$). Thus, hypothesis 1—that competitive intelligence has a positive and significant relationship with SME value creation—is supported. SMEs can leverage competitive intelligence to innovate their products or services, optimise their processes, and reallocate resources to achieve organisational performance. In line with this, competitive intelligence boosts the ability of SMEs to transform their capabilities to adapt and thrive in turbulent markets, ultimately achieving stellar organisational success.

Furthermore, the study found that competitive intelligence has a positive and significant relationship with SME frugal innovation capability ($\beta=0.183$, $t=2.195$, $p<0.05$). Frugal innovation also has a positive and significant relationship with SME value creation ($\beta=0.348$, $t=3.895$, $p<0.05$). This finding is consistent with some existing studies that argue that frugal innovation significantly contributes to value creation (Farooq, 2017; Yousaf et al., 2022). The study tested the mediation hypotheses using a bootstrapping

Table 2. Correlation matrix and discriminant validity.

Variables	1	2	3	4	5	6	7	8	9
Firm size	1								
Firm age	0.084	1							
Managerial position	−0.065	−0.023	1						
R & D Function	0.071	0.045	−0.076	1					
Industry	0.072	−0.009	−0.011	−0.119*	1				
Competitive intelligence	0.004	−0.102	0.099	0.070	0.028	0.777			
Frugal innovation	0.047	0.034	0.100	0.124*	−0.049	0.467**	0.794		
Absorptive capacity	−0.025	−0.001	0.150**	0.039	−0.067	0.401**	0.383**	0.787	
Value creation	0.001	0.048	0.168**	0.003	0.011	0.480**	0.476**	0.470**	0.780

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

√AVE are bold.

Table 3. Heterotrait-Monotrait (HTMT) ratio analysis for discriminant validity.

Variables	1	2	3	4
Competitive intelligence				
Frugal innovation	0.622			
Absorptive capacity	0.605	0.497		
Value creation	0.643	0.601	0.583	

Table 4. Hypothesis testing.

Testing path	β	S.E	<i>T</i>	<i>p</i> Value	95% CI	Decision
Direct effect						
Firm size	0.017	0.038	0.450	0.653	−0.093–0.057	
Firm age	0.001	0.045	0.032	0.974	−0.088–0.092	
Managerial position	0.166	0.090	1.873**	0.004	0.011–0.345	
R & D function	0.112	0.090	1.239	0.215	0.094–0.157	
Industry	0.024	0.093	0.259	0.795	−0.152–0.213	
CI → VC	0.300	0.089	3.353**	0.000	0.131–0.478	Supported
FI → VC	0.348	0.089	3.895**	0.000	0.167–0.520	Supported
CI → FI	0.183	0.083	2.195**	0.000	0.038–0.358	Supported
AC → FI	0.122	0.055	2.098**	0.002	0.041–0.329	Supported
Indirect effect						
CI → FI → VC	0.064	0.033	1.939**		0.011–0.137	Supported
Conditional indirect effect						
CI × AC → FI	0.143	0.035	4.067**		0.028–0.274	Supported
Fit indices						
R square, DV=FI, 0.363						
R square DV=VC, 0.542						

CI: competitive intelligence; FI: frugal innovation; AC: absorptive capacity.

VC: value creation. **Significant at the 0.05.

procedure with 5,000 bootstrap samples. Ultimately, the study found a significant indirect effect of competitive intelligence on SME value creation through frugal innovation ($\beta=0.064$, $t=1.939$, CI = 0.011–0.137). The confidence interval (lower and upper level) for the mediated effect did not straddle a zero, indicating a statistically significant mediation effect. Thus, hypothesis 2—that frugal innovation mediates the relationship between competitive intelligence and SME value creation—is supported. Implacably, competitive intelligence serves as a catalyst for frugal innovation by providing the necessary knowledge of the competitive landscape, while frugal innovation transforms this knowledge into cost-effective solutions that deliver value.

Additionally, the study assessed the interactive effect of competitive intelligence and absorptive capacity on frugal innovation. The study found a significant interactive effect of competitive intelligence and absorptive capacity on SME value creation ($\beta=0.143$, $t=4.067$, CI = 0.028–0.274). Therefore, the study supports hypothesis 3, which suggests that absorptive capacity moderates the relationship between competitive intelligence and frugal innovation. This suggests that SMEs with strong absorptive capacity are better positioned to convert or translate market and competitive insights into frugal innovations. Firms that can efficiently assimilate and exploit knowledge gained from their environment are more adept at creating cost-effective and innovative solutions that meet market demands despite resource constraints. Absorptive capacity serves as an enabler for competitive intelligence to fulfil its potential in driving frugal innovation. Without sufficient absorptive capacity, the knowledge gathered through competitive intelligence might remain underutilised or misapplied, leading to suboptimal innovation performance. Therefore, SMEs that invest in enhancing their absorptive capacity can significantly strengthen their ability to innovate frugally by transforming competitive intelligence insights into practical and impactful innovations.

Figure 2 depicts the absorptive capacity's interactive effect. It shows that competitive intelligence has a high positive impact on frugal innovation when absorptive capacity levels are high. Thus, a high level of absorptive capacity demonstrates a stronger beneficial effect of competitive intelligence on frugal innovation. The interactive impact of absorptive capacity and competitive intelligence on frugal innovation was feasible because, firstly, SMEs are more capable of exploiting and leveraging any advantages, particularly during times of crisis, as a result of their smaller size, flexible structures, and informal environment (Ledi, Ameza-Xemalordzo, Amoako, et al., 2023; Wiklund et al., 2009). Secondly, SMEs possess the capacity to promptly make strategic choices (Zahoor et al., 2023), including the inclination to rapidly absorb, assimilate, and utilise market information to create and introduce products or services using cost-efficient tools. Competitive intelligence is thus a useful resource that SMEs use to achieve better firm performance when engineered with their absorptive capacity.

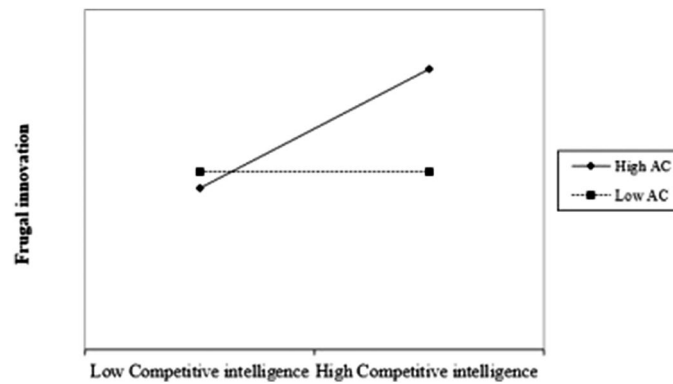


Figure 2. Interactive effect of absorptive capacity.

The practical implications of these findings are particularly relevant for SMEs navigating crisis situations, such as economic downturns. In such contexts, competitive intelligence can provide vital information about competitors' strategies, market opportunities, and potential threats. However, without the absorptive capacity to process and apply this intelligence effectively, SMEs may struggle to innovate and adapt to the crisis. For SMEs, building absorptive capacity should be a strategic priority, especially in volatile environments. SMEs can maximise the benefits of competitive intelligence by strengthening their absorptive capacity, enabling them to develop frugal innovations that are not only cost-effective but also responsive to changing market conditions. This capability becomes crucial during crises, where the ability to innovate quickly and efficiently can determine the firm's survival and long-term success.

Additionally, it is worth noting that the moderating effect of absorptive capacity might vary depending on the industry or specific environmental conditions, such as market turbulence or technological change. In more dynamic environments, the role of absorptive capacity might be even more pronounced, as firms need to rapidly adapt to shifting competitive landscapes. Moreover, external factors such as regulatory pressures or market demands for sustainable products could also impact the extent to which competitive intelligence translates into frugal innovation. Exploring these contingencies in future studies would provide a more comprehensive understanding of how absorptive capacity interacts with competitive intelligence in different contexts.

4.5. Endogeneity assessment

The study acknowledges the possibility of endogeneity bias, where the omitted variables correlated with both competitive intelligence (CI) and value creation could potentially impact the results. To mitigate this concern, the study employed a two-pronged approach. First, the study incorporated relevant control variables established in the literature to influence value creation into the model. These include firm size, firm age, managerial position, R&D function, and industry type. For example, larger firms generally have more resources (financial, human, and technological) to invest in frugal innovation, as well as more extensive market reach and established distribution channels, enabling them to scale up frugal innovations and create value on a larger scale. Older firms often have established reputations and customer trust, facilitating the acceptance and success of frugal innovations in the market. They have a better understanding of customer needs and how to meet them cost-effectively. The R&D function can prioritise cost-effective research and development, focusing on creating more with less. This aligns well with the principles of frugal innovation. A dedicated R&D function can ensure a steady pipeline of innovative products and processes, ensuring they meet market needs and create value. The findings provide limited evidence for endogeneity concerns. While the control variables were included to mitigate potential endogeneity, they did not exert a significant influence on value creation, either individually or collectively. This suggests that omitted variables may not be a major driver of the relationship between competitive intelligence and value creation in this model.

To further mitigate endogeneity concerns, the study employed a two-stage least squares (2SLS) regression following Hult et al. (2018). This technique helps address potential bias arising from

variables omitted from the main model that might influence both competitive intelligence and value creation. In the first stage of 2SLS, the study regressed frugal innovation on competitive intelligence while controlling for the previously identified control variables. This generated predicted residuals, which essentially represent the influence of competitive intelligence on frugal innovation after accounting for the effects of the control variables. In the second stage, the study included these residuals as an independent variable in a new model predicting value creation. This isolates the effect of competitive intelligence on value creation, net of the influence of the control variables and any potential common biases. Gratifyingly, the effect size of the competitive intelligence residuals on value creation in this 2SLS model did not differ significantly from the results presented in [Table 4](#). This consistency strengthens the initial conclusion that endogeneity likely does not exert a major influence on our findings.

5. Discussion

The study found that competitive intelligence has a significant positive relationship with SME value creation. This finding aligns with prior research that emphasises the importance of competitive intelligence in identifying opportunities and making informed strategic decisions towards value creation (Jasima et al., 2020; Markovich et al., 2019; Rouach & Santi, 2001; Sassi et al., 2022; Wu et al., 2023). SMEs that effectively gather and analyse competitive intelligence are better equipped to remain competitive during crisis situations by making proactive decisions, adapting their business models, and seizing value-creation opportunities even in turbulent times (Calof, 2017; Cavallo et al., 2021; Rouach & Santi, 2001). According to the dynamic capabilities theory, firms operating in highly uncertain environments require continuously enriching and reconfiguring their capabilities, as well as developing new capabilities, in order to achieve competitive advantage (Teece, 2007). This is done by deploying and leveraging resources and competencies that are difficult to imitate (Teece, 2007). The findings of the study underscore the significance of leveraging competitive intelligence as a strategic tool for organisations operating in dynamic environments (Bose, 2008; Calof, 2017; Jasima et al., 2020; Markovich et al., 2019). SMEs are in a better position to identify unique opportunities and allocate resources more effectively, leading to better value creation.

Furthermore, the study found that frugal innovation mediates the relationship between competitive intelligence and SME value creation. Frugal innovation acts as a bridge between competitive intelligence and value creation as it aids SMEs to develop novel solutions and deliver value to customers in resource-constrained situations (Farooq, 2017; Ploeg et al., 2021; Prabhu, 2017; Yousaf et al., 2022). Competitive intelligence enables firms to gain knowledge about the external environment, which enables them to optimise their own operations, streamline processes, and adopt efficient technologies, contributing to cost reduction (Calof, 2017; Cavallo et al., 2021; Jasima et al., 2020). Competitive intelligence helps organisations reconfigure their resources, build new capabilities, and adopt innovative approaches to deliver cost-effective solutions to customers, thus gaining a competitive advantage in the marketplace (Farooq, 2017; Hossain, 2020; Jasima et al., 2020; Poblano-Ojinaga, 2021). In effect, competitive intelligence provides necessary knowledge, and frugal innovation transforms these insights into value creation.

Additionally, the study found that absorptive capacity moderates the relationship between competitive intelligence and frugal innovation. This is possible as a result of the fact that absorptive capacity improves the organisation's engagement with the external environment by increasing its ability to assimilate external knowledge and facilitating knowledge sharing within the organisation (Božič & Dimovski, 2019; Cohen & Levinthal, 1990; Pavlou & El Sawy, 2010). Absorptive capacity enables organisations to effectively assimilate and integrate the insights gained from competitive intelligence activities to improve innovation capacity or processes within the organisation (Bellamy et al., 2014; Guimaraes et al., 2016; Hassani & Mosconi, 2021). Absorptive capacity supports an organisation's ability to absorb and apply external knowledge effectively, aligning it with their internal capabilities and facilitating the development of contextually relevant frugal innovation initiatives (Guimaraes et al., 2016; Ploeg et al., 2021). In effect, the acquisition and assimilation of external knowledge enable organisations to identify new opportunities and create innovative solutions, which, in turn, contribute to value creation.

6. Conclusion

Ghanaian SMEs operate in an economic landscape characterised by high inflation rates, fluctuating currency values, limited access to financing, and a competitive yet underdeveloped market structure. These conditions create unique constraints that impact the ability of SMEs to innovate and sustain competitive advantage, especially when utilising competitive intelligence to foster frugal innovation. SMEs in Ghana face persistent challenges in accessing timely and relevant competitive information due to limited resources and underdeveloped market information systems. This economic environment can hinder their ability to fully leverage competitive intelligence, as acquiring high-quality market information often requires financial and technological resources that may be scarce. Consequently, the study demonstrates that competitive intelligence is linked to frugal innovation and value creation. Small and medium-sized businesses, on the other hand, may not be able to use competitive intelligence as effectively in this crisis situation due to economic factors such as access to capital, infrastructure, and skilled labour. Frugal innovation, by its nature, thrives in resource-constrained environments. Ghanaian SMEs often operate with limited resources, making the concept of frugal innovation particularly relevant. The study's findings suggest that SMEs with higher absorptive capacity can better utilise competitive intelligence to drive frugal innovation. However, in an economy where resources for research and development (R&D) are scarce, SMEs may need to rely heavily on external sources of knowledge and informal networks to build absorptive capacity. The economic challenges in Ghana necessitate a focus on cost-effective innovations, which aligns with the principles of frugal innovation. Yet, these same challenges may also limit the extent to which SMEs can engage in continuous innovation without external support, such as government interventions or international partnerships.

The economic volatility in Ghana, marked by fluctuating currency values and inflation, can also influence the ability of SMEs to implement frugal innovation. Economic instability can create uncertainty, making long-term planning and investment in innovation risky. SMEs may find it difficult to commit resources to innovation when they are constantly adapting to immediate financial pressures. In this context, the findings of the study highlight the importance of absorptive capacity, not just as a driver of innovation but as a buffer against economic shocks. SMEs that can quickly absorb and apply new knowledge are better positioned to adapt to changing economic conditions, turning crisis situations into opportunities for innovation. For instance, the textile industry in Ghana is an area where the study's findings can be contextualized. A small textile manufacturer that produces traditional fabrics for local markets has faced numerous economic challenges, including rising costs of imported raw materials and competition from cheaper, mass-produced fabrics from abroad. Despite these challenges, the SME can utilise competitive intelligence gathered through local trade associations and government export programs to identify opportunities for frugal innovation. The company can manage to innovate within its resource constraints by experimenting with locally sourced materials and traditional production techniques. However, the economic challenges—such as inconsistent access to electricity and the high cost of credit—can hinder the SME's ability to fully capitalise on these innovations. The company's absorptive capacity has been crucial to its survival, enabling it to adapt to changing market conditions and economic pressures. Applying intelligence enables the company to innovate frugally—developing cost-effective packaging solutions that meet international standards while keeping production costs low. This highlights how absorptive capacity can enhance the ability of SMEs to turn competitive intelligence into actionable innovation even in resource-scarce environments.

7. Implications of the study

7.1. Practical implications of the study

The study has several significant implications for managers and policymakers. Firstly, the findings highlight the importance of developing and investing in competitive intelligence capabilities among SMEs in Ghana. Given the significant positive relationship between competitive intelligence and SME value creation, managers should prioritise investments in competitive intelligence capabilities to strengthen their understanding of market dynamics, competitor behaviours, and emerging opportunities, as well as make informed decisions that ultimately lead to value creation during turbulence. This may involve allocating

resources towards shaping competitive intelligence capabilities and investing in technologies and tools that facilitate real-time competitive intelligence monitoring and decision-making.

Secondly, the study emphasises the value of incorporating frugal innovation practices into organisational strategies. Frugal innovation is particularly relevant for SMEs operating in resource-constrained environments because it enables them to respond quickly to changing environments. Managers should actively encourage a culture of innovation that embraces resource efficiency and cost-effectiveness, as frugal innovation serves as a channel through which competitive intelligence stimulates value creation. SMEs can improve their resilience during crises and generate better value creation by embracing and integrating frugal innovation into their organisational strategy. Third, the study stresses the importance of leveraging frugal innovation in conjunction with absorptive capacity to amplify the impact of competitive intelligence on value creation. SMEs can effectively translate their competitive intelligence into value creation when coalesced with frugal innovation and absorptive capacity, thereby increasing their resilience and competitiveness. The study therefore enhances our understanding of how organisations can adapt, innovate, and succeed in today's rapidly changing business environment.

7.2. Theoretical implications of the study

The study provides considerable theoretical contributions. Firstly, prior studies emphasise the need for companies operating in a turbulent environment to possess dynamic capabilities to improve organisational performance (Dahlke et al., 2021; Ferreira & Coelho, 2020; Lien & Timmermans, 2023; Wiklund et al., 2009; Zahoor et al., 2023; Zutshi et al., 2021). The study draws on dynamic capability theory to provide a comprehensive framework for understanding the strategic processes involved in leveraging competitive intelligence for value creation. Dynamic capability theory emphasises the importance of firms' ability to dynamically adapt and renew their resources and capabilities in response to environmental changes (Teece et al., 1997). In line with dynamic capability theory, the study results show a strong positive link between competitive intelligence and SME value creation. This means that companies with better competitive intelligence capabilities are better able to identify market opportunities, anticipate or predict competitors' actions, and strategically allocate resources to improve their overall firm performance and competitive advantage.

Second, our study contributes to the frugal innovation literature (Hossain, 2018; Rossetto et al., 2023; Santos et al., 2020). Competitive intelligence has traditionally focused on understanding competitors and their strengths and weaknesses (Bose, 2008; Bulger, 2016; Fleisher, 2008; Jasima et al., 2020), whereas frugal innovation emphasises doing more with less through the creative use of limited resources (Hossain, 2020; Ploeg et al., 2021). This study suggests that the seemingly disparate concepts are complementary. On the one hand, the study establishes a link between competitive intelligence and frugal innovation that is missing in the current literature, and on the other hand, it reveals the role of frugal innovation as a mechanism or strategic pathway through which SMEs translate competitive intelligence insights into value creation. The study's findings suggest that leveraging competitive intelligence can assist organizations in identifying opportunities for frugal innovation, and competitive intelligence and frugal innovation synergistically influence value creation. The study's demonstration of competitive intelligence and frugal innovation synergy contributes to dynamic capability theory by showing how strategic information gathering and analysis can inspire resourceful and efficient innovation.

Lastly, the study refines our understanding of the contingency factors influencing frugal innovation. While prior research has explored the effects of frugal innovation (Hossain, 2020; Ploeg et al., 2021; Rossetto et al., 2023; Santos et al., 2020), inconsistencies remain. The study addresses this gap by empirically examining absorptive capacity as a key boundary condition. The findings reveal that a high level of absorptive capacity strengthens the relationship between competitive intelligence and frugal innovation. In essence, firms with higher absorptive capacity are better equipped to assimilate external competitive intelligence insights and capitalise on them to drive frugal innovation initiatives, thereby amplifying the positive impact of competitive intelligence on value creation. The study's integration of dynamic capability theory and absorptive capability theory offers a new perspective on how firms can leverage competitive intelligence as a strategic resource to foster innovation and competitive advantage, while emphasising the pivotal role of absorptive capabilities in realising value from competitive intelligence investments.

The study's findings are based on a specific sample of SMEs in Ghana, which may limit the generalizability of the results to other contexts or industries. Future research should explore comparisons between SMEs in Ghana and other emerging economies or developed countries to provide insights into the contextual factors that influence these relationships in order to maximise the transferability and applicability of the findings. Furthermore, future research could extend the investigation to explore the long-term performance outcomes of SMEs that effectively use competitive intelligence and frugal innovation. Examining variables such as profitability, growth, and sustainability would provide insights into the broader impacts of competitive intelligence and frugal innovation on SME success. Additionally, the data collection for this study only includes manufacturing and service SMEs, excluding retail SMEs. This exclusion was due to the distinct operational dynamics and challenges faced by manufacturing and service sectors, which differ from those of retail SMEs. Future studies could address this limitation by including retail SMEs selling goods/products in order to provide a more comprehensive understanding of how competitive intelligence and frugal innovation contribute to value creation across different types of SMEs during crises.

Another limitation of this study is the lack of distinction between tech-based SMEs and traditional or non-digital native SMEs. Tech-based SMEs and traditional SMEs often possess different capabilities and face unique challenges, particularly in terms of dynamic and absorptive capacities. Future research should consider distinguishing between tech-based SMEs and traditional or non-digital native SMEs to provide a more detailed understanding of how competitive intelligence and frugal innovation affect value creation in these distinct groups.

Disclosure statement

No potential conflict of interest was reported by the author(s).

About the author

Klenam Korbla Ledi is a researcher at the department of marketing and corporate strategy at KNUST Business School, Kwame Nkrumah University of Science (KNUST). His main research areas are, marketing, corporate strategy, sustainability, entrepreneurship, and innovation.

ORCID

Klenam Korbla Ledi  <http://orcid.org/0000-0002-7759-3604>

Data availability statement

The dataset supporting the current study is available from the corresponding author, KKL, on reasonable request.

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