

The effect of SMEs' dynamic capability on operational capabilities and organisational agility



Authors:

Ho-Taek Yi¹ 
 Donghun Oh² 
 Fortune Edem Amenuvor¹ 

Affiliations:

¹Department of Business Administration, Keimyung University, Daegu, Republic of Korea

²Daegu Disabled Business Support Center, Daegu, Republic of Korea

Corresponding author:

Fortune Edem Amenuvor,
 airdempolitics@gmail.com

Dates:

Received: 20 Oct. 2022

Accepted: 04 May 2023

Published: 27 July 2023

How to cite this article:

Yi, H.-T., Oh, D., & Amenuvor, F.E. (2023). The effect of SMEs' dynamic capability on operational capabilities and organisational agility. *South African Journal of Business Management*, 54(1), a3696. <https://doi.org/10.4102/sajbm.v54i1.3696>

Copyright:

© 2023. The Authors.
 Licensee: AOSIS. This work is licensed under the Creative Commons Attribution License.

Read online:



Scan this QR code with your smart phone or mobile device to read online.

Purpose: This study sets out to empirically investigate the effect of small and medium-sized enterprises' (SMEs) dynamic capability on operational capabilities, organisational agility and performance while assessing the moderating role of environmental uncertainty.

Design/methodology/approach: Data were gathered from 288 company representatives from the South Korean provinces of Daegu and Gyeongbuk. Companies in Daegu and Gyeongbuk are purposively sampled as research subjects and classified as manufacturing and/or distribution, and other industries, with a questionnaire administered to firm representatives and employees. The proposed hypotheses are tested using structural equations modelling.

Findings/results: The study finds that dynamic capability has a significant positive effect on marketing capability, managerial capability, and technical capability, respectively. The study also discovers that marketing capability positively affects organisational agility. Furthermore, the findings show that technical capability influences organisational agility, which in turn affects innovation capability positively. The study also reveals that technological uncertainty moderates the relationship between dynamic capability and technical capability.

Practical implications: The outcome of this study implies that rather than reducing the scale or scope of support projects, the technical and management levels should be prepared in the institutional system so that disabled companies can acquire and strengthen more diverse capabilities and resources.

Originality/value: The research emphasises the significance of an organisation's response to the external environment being agile, as customer needs and competitors' products and services change frequently. It also reveals that marketing capability is a vital variable that influences organisational agility, regardless of business classification.

Keywords: dynamic capability; organisational agility; market uncertainty; technological uncertainty; innovation performance; marketing performance.

Introduction

In this dynamic business environment, how to notice and respond to environmental changes faster than competitors is becoming a critical issue for firms (Yi et al., 2021). This study leverages on the resource-based view and the dynamic capability theory to identify the link between dynamic capability, firm operational capabilities, and firms' organisational agility to propose a strategy for responding to a rapidly changing business environment. The resource-based theory asserts that a company can achieve a competitive advantage if it has valuable, rare and inimitable resources or expertise that cannot be reproduced or replaced (Grant, 1991; Yi & Amenuvor, 2022). In other words, according to the resource-based approach, the component that might explain the performance difference between organisations is internal capabilities. Yet, in spite of the advantages of gaining a competitive edge and improving business performance through core competencies, the resource-based approach appears to have a limitation in that it cannot explain the performance differences between organisations with identical competencies.

Accordingly, the dynamic capability theory was proposed as a theory to overcome the limitations of the resource-based theory and to explain the disparities in performance among organisations with equivalent levels of resources. Dynamic capability theory emphasises the ability to adapt to a rapidly changing business environment (Magistretti et al., 2021; Teece et al., 1997). It identifies a firm's internal and external resources or technologies in reaction to environmental changes, integrates them, and shows how to reallocate resources inside the business. This approach can provide long-term competitive advantage by building new competencies and responding

promptly to environmental changes (Birkinshaw & Gibson, 2004; Ghosh et al., 2022). Consequently, dynamic capability is seen as a prerequisite for safeguarding value and long-term competitive advantage in a continuously changing external environment and global commercial market (Teece et al., 1997; Yuan & Cao, 2022).

Another characteristic that a business must have in order to thrive in a changing business environment is organisational agility. Organisational agility is operationalised as an organisation's strategic ability to respond quickly to difficulties in a fast-changing business environment and unpredictable business circumstances (Zain et al., 2005). In particular, in a fast-changing corporate environment, organisational agility is crucial for finding possibilities faster than competitors. Extant research indicates that the importance of organisational agility is increasing, and previous studies have highlighted the importance of organisational agility to organisational performance (Narasimhan & Das, 1999; Swafford et al., 2006; Tallon & Pinsonneault, 2011).

Thus, in a rapidly changing business environment, a firm can achieve its ultimate goal of generating profits while also achieving social ideals by building a sustainable management system. Companies will be able to secure capabilities that are appropriate for the rapidly evolving business environment and achieve business performance, thereby generating an ecosystem for high-quality job creation and the formation of a virtuous cycle of economic sustainability and social service.

Consequently, this study sets out to first confirm the relationship between dynamic capability and operational capabilities drawing on both the dynamic capability and resource-based theories. We assess how these constituent factors affect the firm's operational capabilities. Dynamic capability is divided into sensing capability, learning capability, integration capability and coordination capability. Furthermore, the firm's operational capabilities are classified into marketing capability, managerial capability and technical capability, and the impact of these components on organisational agility is examined. The importance of organisational agility in today's uncertain and unpredictable business environment has increased the need for firms to respond swiftly and agilely to changing circumstances. Accordingly, we investigate the impact of operational capabilities on increasing organisational agility.

Moreover, we examine the relationship between organisational agility and organisational performance. Organisational agility allows a company to respond to the market more sensitively than its competitors to gain a competitive advantage, and it ultimately plays a role in improving organisational performance (Van Oosterhout et al., 2006). In the continuously unpredictable and fast-changing competitive system, such organisational agility is emerging as a crucial capability of firms to survive and respond to corporate crises. However, despite the growing

importance of organisational agility and the growing awareness of its importance, it appears that the majority of previous studies have examined organisational agility at the level of individual behaviour. In particular, research on organisational agility aimed at SMEs who lack organisational capabilities when compared with large-scale enterprises is woefully inadequate. Consequently, we empirically examine the relationship between organisational agility and performance, to ascertain whether organisational agility characteristics have a significant effect on organisational performance in marketing-related research.

More so, the role of environmental uncertainty in moderating the relationship between dynamic and operational capabilities is investigated. Market uncertainty and technological uncertainty are two types of environmental uncertainty. Therefore, this study tests whether market uncertainty has any effect on the relationship between dynamic capability and marketing capability, and whether technological uncertainty has any effect on the relationship between dynamic capability and technical capability.

Theoretical background

Resource-based theory and dynamic capability theory

Grant (1991) argues that a firm's competitive advantage in the market is determined by how it builds its resources and capabilities to become competitive, and thus to derive firm's performance. This assertion emphasises the significance of a firm's ability to properly build and utilise its resources and capabilities in its environment. Previous studies from the perspective of industrial organisation theory have focused on determining whether a firm's external environment is an opportunity or a threat, observing that it is the business environment that allows a firm to remain competitive in the market (Amenuvor et al., 2022; Bain, 1956; Caves & Porter, 1977). Since then, studies from the perspective of industrial organisation theory have suggested limitations in the notion that a firm's performance is determined by its external environment. For instance, in today's rapidly advancing technology and highly competitive market, it is difficult to make accurate predictions about the future. Similarly, it is difficult for businesses to ensure long-term viability in a similar business environment. The goal of resource-based theory is to find a way to gain a competitive advantage within a firm that is not based on the existing industrial organisation theory, which focuses on the external market environment.

The resource-based theory perspective provides a theoretical foundation for achieving performance and goals in a competitive market by assuming that the firm's resources should be continuously maintained. However, in today's rapidly changing business environment, such as the digital economy, globalisation and the rapid emergence of new technologies, the question of how a firm can sustainably gain a competitive advantage has not been adequately addressed (Cahyono et al., 2023; Eisenhardt & Martin, 2000). Resources

with static characteristics that are based on a given environment take a long time to adapt to the rapidly changing environment or to change the resources they have to match the environment. This results in a difference between the rate of change in resources and the rate of change in the environment (Leonard-Barton, 1992). In other words, the firm's previous resources were static, making it difficult to respond quickly to the rapidly changing environment or diverse customer needs. Hence, in order to respond to the rapidly changing business environment, many scholars have expanded the content of the resource-based theory from the perspective of dynamic capability theory, which involves the integration and relocation, or reorganisation of internal and external resources and competencies owned by companies (Teece et al., 1997).

Based on the dynamic capability theory, Pavlou and El Sawy (2011) argued in their study that as a firm's business environment changes rapidly, reinforced dynamic capability is required. Accordingly, the dynamic capability theory is a theory that can explain the difference in performance between companies with similar levels of resources, and it emerges as an alternative to make up for the limitation in the resource-based theory (Battisti et al., 2022; Eisenhardt & Martin, 2000).

Organisational agility

Organisational agility research began in the 1990s in the field of production operation management and most of the research has been performed in the field of organisation since 2010. When the motivations for recent research on agility in the field of organisation are examined, it is clear that the need to study agility at the firm level rather than the field of production management or one department is growing as the external environment becomes more uncertain (Wendler, 2013).

The importance of organisational agility has gained attention in a more intense and rapidly changing business environment and previous studies have suggested that organisational agility positively influences organisational performance (Wendler, 2016). An early study on the effect of organisational agility on corporate performance was undertaken by Narasimhan and Das (1999), in which organisational performance was compared among organisations with high and low levels of organisational agility. Other scholars also found that organisational agility improved management performance.

Organisations can create long-term competitive advantage and performance by securing organisational agility capabilities. This can be accomplished by focusing internal competencies on customer needs, making it difficult for competitors to imitate internal competencies such as technology and knowledge (Overby et al., 2006). This implies that businesses should work to improve organisational agility in order to keep an eye on large and small business environment changes and respond quickly at the organisational level (Gogichaty et al., 2023; Saragih et al., 2023).

Technological uncertainty

Businesses must embrace how they deal with uncertain and dynamic business environments, and they must be able to adapt and adjust to changes in the environment in general (Jilke, 2020). Environmental uncertainty, according to Ansoff and McDonnell (1990), is a measure that combines variability, instability and predictability as reflected in the complexity and novelty of environmental change. Uncertainty grows as the market environment changes rapidly. Companies must actively respond to consumer needs, new technologies and competitor threats in order to survive. In other words, the greater the external environmental change and uncertainty, the greater the need to respond to the change by accurately forecasting and analysing the flow of change (Gelderman et al., 2016).

There are two types of environmental uncertainty: market uncertainty and technological uncertainty (Jaworski & Kohli, 1993). Market uncertainty refers to various customer needs and the degree of change in their preferences, and it is especially important in a market environment where customers' perceptions of the services provided by companies to customers are rapidly changing. On the other hand, technological uncertainty is emphasized in industries with rapidly changing technology, and it can be directly related to survival in companies that value innovation.

As environmental uncertainty grows, companies face challenges in determining corporate performance and results because of the unpredictable environment. This makes it critical for businesses to respond to environmental changes quickly and flexibly and to strategically acquire new knowledge and information in order to respond to environmental uncertainty (Beatty & Smith, 1987).

Hypothesis development

Effect of dynamic capability on operational capabilities

In a study by Helfat and Peterf (2003), the firm's capabilities were largely divided into dynamic capabilities and operational capabilities. They argued that operational capability represents a business activity such as product manufacturing, and dynamic capability is the ability to integrate, build and redeploy operational capabilities. In an unpredictable and rapidly changing business environment, a firm's competitive advantage can also change rapidly, so the resources and capabilities of a firm that were important at a certain point in time become obsolete and less useful as time passes. Accordingly, when there is a capability gap between the resources and capabilities that a firm already has, technologies and marketing capabilities that were effective in the market may become useless to the firm (Day, 1994).

Early studies on the resource-based theory and capability-based perspective did not focus on environmental changes, and therefore, operational capability plays a greater role than dynamic capability in a business environment where market

changes are predictable and stable. However, in a rapidly changing and unpredictable business environment, operational capabilities are at risk of obsolescence (D'Aveni et al., 2010); so, a competitive advantage cannot be sustained solely through the possession of specific resources or capabilities (Teece et al., 1997). Consequently, dynamic capabilities should be used to boost the efficiency and competitiveness of operational capabilities.

According to Eisenhardt and Martin (2000), dynamic capability is a means for firms to rapidly build and develop marketing capabilities, which are sub-factors of operational capabilities, based on market conditions. Companies can improve their market knowledge by identifying changes in technology and in the needs of existing customers through market sensing activities and their understanding of future environmental changes to which companies must respond is improved (Morgan et al., 2005; Slater & Narver, 2000). A firm's ability to bond with customers is enhanced by these activities, which ultimately improves the firm's marketing capabilities (Day, 1994; Narasimhan et al., 2006).

Accordingly, a firm with strong market sensing capabilities can react to market changes faster than its competitors, and organic organisational learning can occur, increasing the firm's marketing capability (Day, 1994; Tariq et al., 2022; Tolstoy et al., 2022). Hence, we propose that:

H1: Dynamic capability will have a positive effect on marketing capability.

According to Helfat and Peterf (2003), dynamic capability is the ability to integrate, build and redeploy operational capabilities that directly or indirectly affect corporate performance. Besides, because the firm has flexibility in product development and delivery speed, production, and management as a result of sensing and learning of market changes, it is possible to efficiently improve the overall process of the firm's operations (Wilden & Gudergan, 2015).

This appears to be because of the fact that overall management of corporate operations or the development of products and services rely on dynamic capabilities to quickly recognise and detect changes in the business environment and market (Hayes & Pisano, 1996). Hence, it is predicted that dynamic capability will have a positive impact on management capability, which is the ability to perform activities associated with firm's operation and management.

H2: Dynamic capability will have a positive effect on management capability.

Firms can detect new technological changes in the market faster than competitors by engaging in market sensing activities (Cohen & Levinthal, 1990). This market sensing activity can improve R&D capabilities, allowing a company to further enhance its technological expertise by detecting and recognising new technologies (Kohli & Jaworski, 1990). Businesses will be able to improve their technological capabilities by learning information and knowledge caused

by environmental changes through actions that detect market changes quickly (Wilden & Gudergan, 2015). Empirical analysis on the relationship between technical capability and corporate performance was conducted in a number of studies (Acha, 2000; Aw & Batra, 1998; Tsai & Shih, 2004), which confirmed that technical capability has a significant effect on performance (Schoenecker & Swanson, 2002).

As already intimated, previous studies have confirmed a relationship between dynamic capability and technical capability and we argue that dynamic capability will positively affect technical capability, which leads to performance. Therefore, we advance the following:

H3: Dynamic capability will have a positive effect on technical capability.

Firm's operational capabilities and organisational agility

Operational capability is a capability that is close to the foundation of a company and is defined as the entire process of producing and selling a product (Winter, 2000). Marketing capability, a sub-factor of operational capability presented in this study, is the ability to develop products and services that meet market environment and needs while also adding value by leveraging the firm's overall internal knowledge and resources. It is thought to have a considerable impact on organisational agility. The ability to perform operations and management-related activities that occur within a firm is referred to as managerial capability. Technical capability is also defined as the ability to provide new technologies-based products and services that meet the needs of a rapidly changing market. This is accumulated through the process of improving newly acquired skills in an innovative manner and through training in the external environment. It is expected that by responding quickly to external environmental changes and applying them to technology development, technology-based services that meet customer needs will be provided through this process.

Marketing capability is the ability to respond quickly and flexibly to perceived opportunities in market conditions in order to fully meet customer's needs by recognising and forecasting market opportunities (Zhou et al., 2005). These corporate capabilities are regarded as influencing factors for dynamic capabilities (Lu & Ramamurthy, 2011). Day (1994) reckoned that a firm senses market and environmental changes faster than its competitors through its marketing capabilities, allowing it to respond to customer needs more quickly. As a result, organisational agility is deemed critical, in which a firm quickly detects market opportunities and provides value by identifying customer needs.

As suggested in the preceding studies, the marketing ability to quickly integrate market requirements with internal resources is deemed to have a positive effect on organisational agility to respond quickly to the market. Consequently, we set the following hypothesis:

H4: Marketing capability will have a positive effect on organisational agility.

The ability to effectively manage unpredictable and rapidly changing business environments is also included in the concept of organisational agility (Van Oosterhout et al., 2006). Management capability necessitates the sharing of high-quality knowledge and information in order to provide members with judgement and timely information tailored to market conditions. Companies with exceptional organisational agility demand that information pertinent to the situation be delivered at the appropriate time and place (Dove, 1999). The overall process of evaluating and reorganising the firm's resources as the capability to perform all activities related to operation and management that have occurred within the firm is referred to as managerial capability. These capabilities are expected to improve organisational agility, allowing it to respond quickly to rapidly changing environments. Based on the foregoing, we suggest the following hypothesis:

H5: Managerial capability will have a positive effect on organisational agility.

An important antecedent factor for organisational agility is the ability to collect and share a variety of external knowledge to capture changes in the market environment and business opportunities confronting the organisation and to quickly make decisions such as developing innovative services that reflect market requirements and opening new markets.

Technical capability refers to the ability to develop new products using new technologies, which includes understanding new technologies, product designs, and evaluating prototypes and technologies (Pisano, 1994). Such technical capability is defined as the ability to create innovative products or services that meet market demands, and it is regarded as a prerequisite for organisational agility. By synthesizing previous studies, it can be predicted that technical capability would have a positive effect on organisational agility, and hence, the following hypotheses is established:

H6: Technical capability will have a positive effect on organisational agility.

Organisational agility and organisational performance

Organisational agility is a source of gaining a competitive advantage in market competition and is critical in developing effective marketing strategies (Bradley & Nolan, 1998). Organisational agility, according to Yusuf et al. (1999), improves financial performance by rapidly adapting to environmental changes and increasing market share, sales, and net profit. Furthermore, in Yi et al.'s (2021) study, financial performance of a firm was conceptualised as new product performance.

Several studies define organisational performance as innovative or technological performance (Kump et al., 2016; Pavlou & El Sawy, 2011; Schilke et al., 2018; Yi et al., 2018,

2019). For instance, Yi et al. (2018) investigated the effect of SMEs' dynamic capabilities on technological performance as well as the moderating effect of the corporate life cycle in their study. They also used indicators such as the number of patents and intellectual property rights acquired to assess technological performance. Souitaris (2002) posits that a firm's technical capability is the foundation for developing innovative performance, noting that there is a significant relationship between capability related to new technology development and innovation performance.

In this regard, many studies have argued that organisational agility has a positive effect on organisational performance, and that the degree to which one responds quickly and agilely to a rapidly changing environment is a direct influencing factor on organisational performance (Swafford et al., 2006; Tallon & Pinsonneault, 2011). Based on the preceding studies, the following hypotheses were developed, predicting that organisational agility will have a positive effect on organisational performance, such as marketing and innovation performance.

H7: Organisational agility will have a positive effect on marketing performance.

H8: Organisational agility will have a positive effect on innovation performance.

Moderating effect of environmental uncertainty on the relationship between dynamic capability and operational capability

As the environment changes rapidly, businesses will try to strengthen their internal capabilities and increase their ability to adapt to the uncertain environment by implementing a collaborative problem-solving approach within the organisation (Uzzi, 1997). As a result, the stronger the mutual influence between a firm's dynamic capacity, operational capacity, and organisational agility, the higher the intensity of environmental uncertainty (Dess & Beard, 1984; Zollo & Winter, 2002).

Recent research extends uncertainty beyond environmental uncertainty, which represents changes in industries and products, and contends that technological uncertainty, such as market uncertainty and changes in products and market competitors, will have different effects on a firm's capabilities (Jaworski & Kohli, 1993; Pavlou & El Sawy, 2010). According to Eisenhardt and Martin (2000), the characteristics of dynamic capability change in response to environmental uncertainty, and when the market is stable, it is possible to plan for the foreseeable future, despite the fact that it may result in unpredictable results.

Environmental uncertainty is divided into two categories: market uncertainty and technological uncertainty (Jaworski & Kohli, 1993). Market uncertainty refers to market and technological changes that reflect how much a firm's customer preferences for products within an industry change (Jaworski & Kohli, 1993). Dynamic competencies are readjusted within an organisation in response to market

conditions by integrating or building internal and external competencies nurtured by companies in response to changes in the external environment. Such dynamic capabilities are expected to improve marketing capabilities in uncertain market conditions where product and service preferences change rapidly.

Consequently, we predict that market uncertainty will play a moderating role in the relationship between dynamic capability and marketing capability, and we propose the following hypothesis:

H9: Market uncertainty will have a positive moderating effect on the relationship between dynamic capability and marketing capability.

When it is difficult for a firm to establish a consistent technical manual with rapidly changing technology or to provide a variety of products to customers quickly, the need for technical capability and flexibility in the enterprise increases (Heide & Weiss, 1995; Weiss & Heide, 1993). As a result of the fact that dynamic capability emphasises the ability to detect, learn, integrate, and adjust to changing technologies, the impact on technical capability is expected to be greater in a market experiencing significant technological change than in a market facing little technological change. Based on the previous discussions, the following hypothesis is developed with the assumption that technological uncertainty would play a moderating role in the relationship between dynamic capability and technical capability.

H10: Technological uncertainty will have a positive moderating effect on the relationship between dynamic capability and technical capability.

Methodology

Measurement of variables

We adopted a quantitative research approach using structured questionnaires. According to Hair et al. (2010), this approach allows for the examination of actual statistical measures of empirical data. Dynamic capability, marketing capability, management capability, technical capability, organisational agility, marketing performance, innovation performance, market uncertainty, and technological uncertainty are the constructs covered in the questionnaire. The statements measuring these variables were assessed on a five-point Likert scale with 1 being strongly disagree, 5 being strongly agree, and 3 being neutral. The items used to assess all constructs were adapted from the existing literature. Items measuring dynamic capability were adapted from Teece et al. (1997); items measuring marketing capability were adapted from Vorhies and Morgan (2005); items measuring management capability were adapted from Sethi et al. (2001); and items measuring technical capability were adapted from Song and Parry (1997). Similarly, items measuring organisational agility were adapted from Tallon and Pinsonneault (2011); items measuring marketing performance

were adapted from Weerawardena (2003); and items measuring innovation performance were adapted from Prajogo and Sohal (2004). Finally, items measuring both market and technological uncertainty were adapted from Milliken (1987) and Jaworski and Kohli (1993). Part two of the questionnaire focused on the respondents' demographic information. To purify the scale items, we used confirmatory factor analysis (CFA) and the scale generation and purification procedures proposed by King et al. (2014) and DeVellis (2003).

Sampling and data collection

To empirically test the study's hypotheses, companies in Daegu and Gyeongbuk were classified into manufacturing and/or distribution, and other industries and chosen as research subjects, with a questionnaire administered to 288 firm representatives and employees. Prior to administering the questionnaire, it was assessed by marketing researchers and managers for the psychometric properties of the scale items (Bagozzi & Yi, 1988). Table 1 summarizes the demographics of the respondents.

Test of reliability and validity

Before testing and analysing the hypotheses advanced in this research model, Cronbach's values were used to examine the reliability of each variable. Furthermore, CFA was used to determine whether each variable represents the research unit. The values of average variance extracted (AVE) and composite reliability (CR) were assessed. It was confirmed that the acceptable levels of 0.5 and 0.7 were exceeded. Moreover, the standardized path coefficient values were greater than 0.6, indicating that certain latent variables were relevant to each item (Bagozzi & Yi, 1988). Table 2 shows the results of a CFA used to assess the reliability and validity of the measuring items used in this study.

Through CFA, the fit of the measurement model was $\chi^2 = 2034.899$, $df = 1418$, $\chi^2 / df = 1.435$, root mean squared residual (RMR) = 0.026, goodness of fit index (GFI) = 0.806, normed fit index (NFI) = 0.881, incremental fit index (IFI) = 0.961, Tucker-Lewis index (TLI) = 0.957, comparative fit index (CFI) = 0.960 and with an root mean square error of approximation index (RMSEA) of 0.039, the fitness indices generally met the recommended criteria, and so it was established that the measurement model was generally acceptable (Hair et al., 2006).

Furthermore, correlation analysis was performed to confirm the rough connection between variables and to confirm discriminant validity. The correlations between variables determined from the hypothesis were found to have a direction consistent with the hypothesis overall, and discriminant validity was also confirmed because the AVE values were greater than the squared values of the correlations of the respective variables (Fornell & Larcker, 1981). Table 3 shows the correlation outputs between each variable used in this study.

TABLE 1: Demographic characteristics of the respondents.

Classification	N	%
Industry sector		
Textile product	16	5.6
Apparel, apparel accessories and fur	3	1.0
Leather, bags and shoes	2	0.7
Wood and wood products	3	1.0
Chemicals and chemicals	17	5.9
Medical substances and pharmaceuticals	3	1.0
Rubber and plastic product	10	3.5
Non-metallic mineral products	4	1.4
Primary metal	5	1.7
Metalworking	14	4.9
Electronic parts, computer, video, sound and communication equipment	36	12.5
Medical, precision, optics and watches	14	4.9
Electrical equipment	9	3.1
Machinery and equipment	39	13.5
Autos and trailers	14	4.9
Transportation equipment	3	1.0
Furniture	4	1.4
Other products	92	31.9
Corporate certification		
Venture	41	14.2
Innobiz	18	6.3
Women's business	17	5.9
Disabled companies	80	27.8
Social enterprise	1	0.3
No corporate certification	46	16.0
Etc.	33	11.5
Export		
Yes	98	34.0
No	188	65.3
No response	2	0.7
Industry types		
Manufacturing	171	59.4
Distribution	23	8.0
Both	60	20.8
Etc	34	11.8
Respondent job position		
Employee or Junior	14	4.9
Deputy or Senior	23	8.0
Manager	32	11.1
Deputy Manager or Director or Team Leader	41	14.2
Managing Director	32	11.1
CEO	146	50.7
Age		
20–29	14	4.9
30–39	59	20.5
40–49	100	34.7
50–59	85	29.5
60–69	30	10.4
Gender		
Male	216	75.0
Female	70	24.3
No response	2	0.6
Work experience		
Less than 5 years	120	41.7
More than 5 ~ less than 10	95	33.0
More than 10 ~ less than 15	35	12.2
Over 15 years	38	13.2
Etc., et cetera.		

Hypothesis testing

The structural equation modelling technique was used to test the hypotheses set in this study. Applying the standardized chi-square index (χ^2/df), the GFI, and CFI, model fitness was assessed. This was followed by the TLI, RMR, and RMSEA, as Anderson and Gerbing (1988) underscore. Via this sequence of fit indices, the CFA resulted in a model with $\chi^2 = 1678.434$, $df = 911$, $\chi^2/df = 1.842$, RMR = 0.057, GFI = 0.804, NFI = 0.879, IFI = 0.941, TLI = 0.935, CFI = 0.940, RMSEA = 0.054 deemed as having a goodness of fit. This model can be described to be appropriate because it meets the general evaluation indicators of the structural analysis of covariance (Hair et al., 2006). Table 4 shows the results of the path coefficients set in this study and the verification results of the research hypotheses. Specifically, H1 ($\beta = 0.917$, $p < 0.05$), H2 ($\beta = 0.720$, $p < 0.05$), H3 ($\beta = 0.607$, $p < 0.05$), H4 ($\beta = 0.729$, $p < 0.05$), H6 ($\beta = 0.215$, $p < 0.05$), H7 ($\beta = 0.318$, $p < 0.05$) and H8 ($\beta = 0.466$, $p < 0.05$) were supported in that order. However, H5 ($\beta = -0.071$, $p > 0.05$) was not supported.

Consequently, except for hypotheses 5, all the hypotheses established in the study were supported. In determining why hypothesis 5 was not supported, it could be attributed to the fact that managerial capability, described as a series of activities related to operation management that occur within a firm, has a negative impact on organisational agility, or the ability to respond quickly and agilely to changes in the business environment.

The moderating effect of environmental uncertainty was tested in Table 5, and it was found that technological uncertainty has a positive moderating effect on the relationship between dynamic competency and technical capability, but market uncertainty did not have a significant moderating effect on the relationship between dynamic capability and marketing capability. Hence, although there is a direction in Hypothesis 9, it was found not to be statistically significant, necessitating further research with a larger sample size.

Further analysis

Descriptive statistics were also performed on each unit variable to examine the differences between firm type, firm life cycle, and firm capability, as well as marketing performance and innovation performance in the effect of firm dynamic capability on operational capability, organisational agility, and organisational performance. To begin, as shown in Table 6, companies were classified into seven certification categories.

The difference in influence of each variable was examined. Firstly, it can be noticed that, on average, venture businesses or companies that have acquired Innobiz certification are concerned about market or technological uncertainties. Most variables in women's businesses do not reach the average level, but practically all variables in disabled businesses do.

TABLE 2: Result of reliability and validity test.

Item	Construct	St. estimate	SE	CR	AVE	CR	Cronbach's alpha
2nd order							
Sensing	Dynamic capability	0.768	-	-	0.581	0.847	0.950
Learning	-	0.815	0.093	12.001	-	-	-
Integrated	-	0.691	0.094	9.031	-	-	-
Coordinating	-	0.769	0.092	9.784	-	-	-
Sensing capa1	Sensing capability	0.820	0.071	14.121	0.684	0.897	0.908
Sensing capa2	-	0.862	0.068	15.006	-	-	-
Sensing capa3	-	0.828	0.056	16.502	-	-	-
Sensing capa4	-	0.798	-	-	-	-	-
Learning capa1	Learning capability	0.842	-	-	0.695	0.919	0.926
Learning capa2	-	0.860	0.040	24.868	-	-	-
Learning capa3	-	0.886	0.053	18.785	-	-	-
Learning capa4	-	0.785	0.054	15.580	-	-	-
Learning capa5	-	0.790	0.057	15.728	-	-	-
Integrated capa1	Integrated capability	0.817	-	-	0.718	0.927	0.930
Integrated capa2	-	0.896	0.059	18.459	-	-	-
Integrated capa3	-	0.834	0.060	16.620	-	-	-
Integrated capa4	-	0.836	0.063	16.578	-	-	-
Integrated capa5	-	0.851	0.061	17.034	-	-	-
Coordinating capa1	Coordinating capability	0.821	-	-	0.747	0.922	0.921
Coordinating capa2	-	0.880	0.061	18.249	-	-	-
Coordinating capa3	-	0.906	0.058	19.066	-	-	-
Coordinating capa4	-	0.847	0.062	17.211	-	-	-
Marketing capa1	Marketing capability	0.841	0.064	15.576	0.663	0.887	0.903
Marketing capa2	-	0.821	0.064	15.104	-	-	-
Marketing capa3	-	0.794	0.044	22.143	-	-	-
Marketing capa4	-	0.800	-	-	-	-	-
Managerial capa1	Managerial capability	0.818	-	-	0.730	0.915	0.914
Managerial capa2	-	0.887	0.061	18.049	-	-	-
Managerial capa3	-	0.863	0.060	17.353	-	-	-
Managerial capa4	-	0.847	0.063	16.889	-	-	-
Technical capa1	Technical capability	0.868	-	-	0.798	0.922	0.920
Technical capa2	-	0.940	0.051	22.378	-	-	-
Technical capa3	-	0.870	0.053	19.878	-	-	-
Organ_Agility1	Organisational agility	0.788	-	-	0.693	0.947	0.949
Organ_Agility2	-	0.813	0.055	19.392	-	-	-
Organ_Agility3	-	0.866	0.072	16.622	-	-	-
Organ_Agility4	-	0.847	0.072	16.245	-	-	-
Organ_Agility5	-	0.865	0.069	16.770	-	-	-
Organ_Agility6	-	0.850	0.075	16.245	-	-	-
Organ_Agility7	-	0.808	0.073	15.196	-	-	-
Organ_Agility8	-	0.818	0.071	15.542	-	-	-
Marketing_PERF1	Marketing performance	0.915	0.045	24.300	0.847	0.957	0.956
Marketing_PERF2	-	0.946	0.041	26.534	-	-	-
Marketing_PERF3	-	0.930	0.040	25.320	-	-	-
Marketing_PERF4	-	0.890	-	-	-	-	-
Innovation_PERF1	Innovation performance	0.919	0.063	17.468	0.823	0.949	0.954
Innovation_PERF2	-	0.920	0.059	19.006	-	-	-
Innovation_PERF3	-	0.929	0.046	24.497	-	-	-
Innovation_PERF4	-	0.858	-	-	-	-	-
Market_UNCERT1	Market uncertainty	0.832	-	-	0.661	0.921	0.923
Market_UNCERT2	-	0.836	0.051	19.462	-	-	-
Market_UNCERT3	-	0.790	0.056	15.413	-	-	-
Market_UNCERT4	-	0.789	0.055	15.394	-	-	-
Market_UNCERT5	-	0.839	0.055	16.502	-	-	-
Market_UNCERT6	-	0.791	0.059	15.219	-	-	-
Tech_UNCERT1	Technological uncertainty	0.850	-	-	0.760	0.940	0.937
Tech_UNCERT2	-	0.863	0.050	18.865	-	-	-
Tech_UNCERT3	-	0.834	0.052	18.201	-	-	-
Tech_UNCERT4	-	0.892	0.050	20.557	-	-	-
Tech_UNCERT5	-	0.916	0.055	21.190	-	-	-

AVE, average variance extracted; SE, standard error; CR, composite reliability; ST, Standard.

TABLE 3: Result of correlation analysis test.

Construct	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dynamic capability (1)	3.759	0.517	1	-	-	-	-	-	-	-	-
Marketing capability (2)	3.500	0.658	0.711**	1	-	-	-	-	-	-	-
Managerial capability (3)	3.553	0.662	0.564**	0.576**	1	-	-	-	-	-	-
Technological capability (4)	3.622	0.772	0.507**	0.472**	0.534**	1	-	-	-	-	-
Organisational agility (5)	3.673	0.606	0.706**	0.688**	0.496**	0.541**	1	-	-	-	-
Marketing performance (6)	3.267	0.822	0.354**	0.309**	0.211**	0.207**	0.278**	1	-	-	-
Innovation performance (7)	3.339	0.810	0.459**	0.372**	0.199**	0.342**	0.412**	0.637**	1	-	-
Market uncertainty (8)	3.447	0.621	0.332**	0.220**	0.134*	0.153**	0.289**	0.094	0.263**	1	-
Technological uncertainty (9)	3.586	0.754	0.400**	0.277**	0.146*	0.156**	0.260**	0.134*	0.251**	0.660**	1

SD, standard deviation.
 **, $p < 0.01$; *, $p < 0.05$.

TABLE 4: Result of hypothesis testing.

H	Path	St. estimate	SE	p	Result
H1	Dynamic capability → Marketing capability	0.917	0.132	***	Supported
H2	Dynamic capability → Managerial capability	0.720	0.113	***	Supported
H3	Dynamic capability → Technical capability	0.607	0.121	***	Supported
H4	Marketing capability → Organisational agility	0.729	0.071	***	Supported
H5	Managerial capability → Organisational agility	-0.071	0.053	0.245	Not supported
H6	Technical capability → Organisational agility	0.215	0.04	***	Supported
H7	Organisational agility → Marketing capability	0.318	0.09	***	Supported
H8	Organisational agility → Innovation capability	0.466	0.091	***	Supported

Note: Model fit: $\chi^2 = 1678.434$, $df = 911$, $\chi^2/df = 1.842$, RMR = 0.057, GFI = 0.804, NFI = 0.879, IFI = 0.941, TLI = 0.935, CFI = 0.940, RMSEA = 0.054.
 SE, standard error; ST, Standard; H, hypothesis.
 ***, $p < 0.05$.

TABLE 5: Result of moderating effect of environmental uncertainty.

H	Path	St. estimate		$\Delta\chi^2$ difference	Result
		Low group	High group		
H9	Dynamic capability → Marketing capability	0.902**	0.923**	0.570	Not supported
H10	Dynamic capability → Technical capability	0.557**	0.634**	5.173	supported

St, Standard; H, hypothesis.
 **, $p < 0.01$.

Almost all indicators show values that exceed the average for companies without corporate certification.

Secondly, there are some discriminatory effects of the corporate life cycle (start-up, growth, maturity, decline) on corporate capability in terms of the effect of dynamic capability on operational capability (marketing capability, management capability, technical capability), organisational agility, and organisational performance. Table 7 shows the results of the analysis and presentation. To begin, it is clear that there are significant differences in all variables except marketing capabilities by company life cycle, which includes start-up, growth, maturity, and decline. Respondents believe that market and technological uncertainties are quite high during the startup period, and they believe that dynamic capability and organisational agility are vital in such a company environment. Marketing capability is seen as a very significant capability during the start-up, growth, and maturity stages, although management and technical capability are regarded as more

TABLE 6: Differences between constructs by firm's certification.

Classification (n)	Venture (41)	Innobiz (36)	Female (18)	Disable (99)	Social (2)	Non (59)	Etc. (33)	F
Market uncertain	3.472	3.713	3.083	3.406	4.417	3.410	3.460	3.447
Technological uncertainty	3.878	3.856	3.333	3.465	4.000	3.522	3.521	3.586
Dynamic capability	3.873	3.731	3.590	3.713	4.167	3.811	3.759	3.759
Marketing capability	3.598	3.521	3.389	3.444	3.625	3.585	3.424	3.500
Managerial capability	3.482	3.611	3.528	3.402	3.250	3.809	3.606	3.553
Technological capability	3.707	3.713	3.704	3.539	3.500	3.588	3.687	3.622
Organisational agility	3.747	3.688	3.465	3.636	3.938	3.708	3.712	3.673
Marketing performance	3.598	3.000	3.181	3.293	3.000	3.258	3.152	3.267
Innovation performance	3.585	3.257	3.417	3.359	3.750	3.229	3.197	3.339

Etc., et cetera; F, F-value.

vital during the maturity stage than during the start-up or growth stages.

Thirdly, in terms of the effect of dynamic capability on operational capability, organisational agility, and organisational performance, disabled companies ($N = 99$) and non-disabled companies ($N = 189$) were divided into companies with and without disabilities and additional analysis of this research model was carried out. Consequently, the fit indices of the non-disabled company model was $\chi^2 = 1529.224$, $df = 911$, $\chi^2/df = 1.679$, RMR = 0.059, GFI = 0.753, NFI = 0.833, relative fit index (RFI) = 0.818, IFI = 0.925, TLI = 0.918, CFI = 0.924, and the fit of the disabled company model was $\chi^2 = 1539.726$, $df = 911$, $\chi^2/df = 1.690$, RMR = 0.063, GFI = 0.640, NFI = 0.751, RFI = 0.730, IFI = 0.881, TLI = 0.869, CFI = 0.879, indicating that the fitness indices for both non-disabled and disabled companies generally meet the recommended criteria, so it was found that the measurement model was generally acceptable (Hair et al., 2006). Table 8 summarizes the results of the comparative analysis of non-disabled companies and disabled companies.

Summary and findings

General discussions

The present study set out to examine the effect of dynamic capability on corporate capability, organisational agility, and corporate performance, with a focus on enterprises in the manufacturing and/or distribution, and other industries in the

Daegu and Gyeongbuk region of South Korea. Furthermore, the causal relationship between variables was established by categorizing the surveyed companies into certification classification, firm life cycle, non-disabled, and disabled statuses.

In summary, the study found a significant positive effect of dynamic capability on marketing capability, management capability, and technological capability, respectively. In today's fast changing business climate, it is clear that it is vital to detect the company's resources, as well as the skills and environmental elements spread outside the firm, and to adjust and redeploy them in accordance with the firm's internal environment.

In addition, it was established that marketing capability, a sub-dimension of operational capability, had a significant effect on organisational agility, but the effect of managerial capability on organisational agility was not supported. Although this outcome was not expected, it can be attributed to the fact that management's ability to share information and knowledge among members, as well as focus on continuous product and service testing and overall process inspection, has a negative impact on organisational agility, which is defined as the ability to respond quickly to market conditions. Besides, because this study was conducted on small- and medium-sized enterprises (SMEs) with small companies and established commercial ties, the effect of managerial capability on organisational agility appeared insignificant.

Moreover, technical capability was found to have a positive effect on organisational agility. Organisational agility

emphasises the ability to collect and share a wide range of external knowledge in order to capture changes in the market environment and business opportunities confronting the organisation, as well as to make quick decisions such as developing innovative services that meet market demands and entering new markets. This outcome corroborates previous studies, which argue that technical capability is a key antecedent of organisational agility.

More so, organisational agility was found to have a positive effect on organisational performance. In the light of the fast-changing business environment, it is recognised that the organisation's marketing and innovation performance can be improved by responding to the market quickly with products and services that identify customer needs.

Besides, the moderating effect of environmental uncertainty on the relationship between dynamic capability and operational capability was validated. Because of environmental uncertainty, firm's technical capabilities can be improved by swiftly producing new technology-based products and services (Zahra & Bogner, 2000). In other words, when businesses produce products and services that fulfill complex and diverse consumer expectations in a quickly changing technological environment, the need for technical capability and adaptability within the organisation grows. This study further reveals that the effect of dynamic capability on technical capability is greater in a market with high technological uncertainty than in a market with low technological uncertainty.

Uncertainty about the market environment, on the other hand, suggests that new technology development capabilities are more important than marketing expansion. These include various campaigns and promotions that use existing products in a situation where new technologies must be used to develop products that meet diverse and rapidly changing customer needs.

In addition, additional analysis found that firstly, venture businesses or companies that acquired Innobiz certification experienced a high level of market or technological uncertainty. Accordingly, it can be reckoned that venture firms and Innobiz firms, which fall under different authentication types based on

TABLE 7: Differences between constructs by company life cycle.

Company life cycle (n)	Start-up (49)	Growth (136)	Maturity (82)	Decline (21)	F	p
Market uncertain	3.571	3.482	3.407	3.096	3.228	0.023
Technological uncertainty	3.836	3.610	3.512	3.133	4.827	0.003
Dynamic capability	3.901	3.792	3.700	3.430	4.783	0.003
Marketing capability	3.571	3.512	3.512	3.166	20.60	0.106
Managerial capability	3.377	3.551	3.710	3.357	3.388	0.019
Technological capability	3.551	3.620	3.772	3.207	3.280	0.021
Organisational agility	3.711	3.701	3.703	3.311	2.770	0.042
Marketing performance	3.291	3.474	3.076	2.619	9.492	0.000
Innovation performance	3.438	3.469	3.250	2.619	7.783	0.000

F, F-value.

TABLE 8: Comparative analysis of disabled and non-disabled companies.

Path	St. estimate		CR		p-value	
	Non-disabled	Disabled	Non-disabled	Disabled	Non-disabled	Disabled
Dynamic capability → Marketing capability	0.953	0.861	7.466	6.124	***	***
Dynamic capability → Managerial capability	0.520	0.740	5.479	6.132	***	***
Dynamic capability → Technical capability	0.657	0.770	6.135	6.292	***	***
Marketing capability → Organisational agility	0.774	0.588	8.015	4.333	***	***
Managerial capability → Organisational agility	0.059	-0.234	0.857	-2.232	0.391	0.026
Technical capability → Organisational agility	0.067	0.485	1.144	4.564	0.252	***
Organisational agility → Marketing performance	0.235	0.462	3.085	4.437	0.002	***
Organisational agility → Innovation performance	0.363	0.651	4.151	6.007	***	***

Note: Model fit (Non-disabled Company): $\chi^2 = 1529.224$, $df = 911$, $\chi^2/df = 1.679$, RMR = 0.059, GFI = 0.753, NFI = 0.833, RFI = 0.818, IFI = 0.925, TLI = 0.918, CFI = 0.924. Model fit (Disabled Company): $\chi^2 = 1539.726$, $df = 911$, $\chi^2/df = 1.690$, RMR = 0.063, GFI = 0.640, NFI = 0.751, RFI = 0.730, IFI = 0.881, TLI = 0.869, CFI = 0.879.

CR, critical ratio; χ^2 , chi-Square; df , degrees of freedom; RMR, to mean square residual; GFI, goodness of fit; NFI, normed fit index; RFI, relative frequency; IFI, incremental fit index; TLI, Tucker-Lewis index; CFI, comparative fit index. St, standard.

***, $p < 0.05$.

technological superiority, respond sensitively to technological environmental uncertainty.

Secondly, it was established that there was a significant difference between all variables except marketing capabilities for each company's life cycle, such as the start-up, growth, maturity, and decline stages, via assessing the differences in major variables according to the firm's life cycle. This is not to say that marketing capability is unimportant in the corporate lifecycle; however, it is believed that among the major variables presented in this study, the ability to actively respond to environmental changes, such as dynamic capability or organisational agility, is more important in the corporate lifecycle.

Thirdly, the study revealed that marketing capability is an important variable affecting organisational agility, and it was found to be more important for non-disabled companies than for disabled companies, as a result of analysing the differences in required capability and organisational agility between non-disabled companies and the types of disabled companies. Similarly, the effect of disabled companies' managerial capability on organisational agility was found to be inverse. In the case of managerial capability that necessitates processes such as decision-making processes and technological tests, the results are deemed to be in the opposite direction because they can have a detrimental impact on organisational agility. Finally, the effects of managerial and technical capabilities on organisational agility were shown to be statistically insignificant in the case of non-disabled companies. This outcome could be attributed to the fact that the subject of this study is SMEs with relatively small production and firm sizes, as well as restricted supply or transaction relationships.

Theoretical implications

The academic and theoretical implications of the research findings are as follows. Firstly, it was confirmed that dynamic capability has a positive effect on operational capability. Moreover, it was shown that, among the operational capability components, it had the highest influence on marketing capability. The study confirmed previous studies' findings that a firm must integrate, build, and readjust its resources, information, and knowledge in a rapidly changing business environment. As these research findings indicate the relationship between dynamic capability and corporate capability, further studies about clearer academic establishment of the causal relationship between the two variables is required.

Secondly, an analysis of the effect of operational capability on organisational agility indicated that marketing capability had the greatest influence on organisational agility among marketing capability, managerial capability, and technical capability (which are recommended as operational capability). Most previous studies on organisational agility have examined individual behaviour, and studies on SMEs that require agile responses to the business environment are limited. These findings are significant because they reiterate the importance of organisational agility variables in

establishing organisational performance and highlights antecedent factors that can enhance organisational agility.

Thirdly, it was established that organisational agility has a positive effect on organisational performance (such as marketing and innovation performance), through an analysis of the effect of organisational agility on organisational performance. This study's findings are consistent with earlier research findings, confirming the importance of organisational agility in securing a competitive advantage and generating performance in a rapidly changing business environment. This implies that more substantial organisational agility research in marketing-related studies is required.

Finally, an additional analysis was undertaken on the differences between non-disabled companies and disabled companies, and differences in the capabilities required and strengthened between non-disabled companies and disabled companies were discovered. These findings indicate the resources required for the operation of firms with disabilities, as well as the capabilities that need to be strengthened. It also advances theory in that it highlights the necessity for scalable research from the perspective of a corporation rather than one-dimensional study in the form of existing welfare or actual condition analysis.

Practical implications

In terms of practical implications, the findings of this study imply that in a fast-changing environment, a firm must promptly recognise changes in the environment and recalibrate and maximize the use of internal and external resources.

In addition, it was proven that the organisation's response to the external environment must be agile, as customer needs and competitors' products and services change frequently. This study demonstrates that managerial capability had no significant impact on organisational agility. These findings imply that the importance of managerial capability should be reduced in order to improve organisational agility.

Similarly, the study found that marketing capability is an essential variable that influences organisational agility independent of business classification as a result of evaluating non-disabled organisations separately from disabled companies. Marketing capabilities were discovered to be more crucial for non-disabled companies than for disabled companies. Accordingly, disabled businesses that actively use existing government support systems or policies are assessed to have a lack of desire and strength to diversify or enhance their internal capabilities. In other words, rather than limiting the scale or scope of support projects, support projects at the technical and managerial levels should be created in the institutional framework so that disabled firms can acquire and strengthen more diversified capabilities and resources. This study proposes that disabled businesses must develop and implement business plans aimed at minimizing their reliance on the

existing government support system and boosting their ability to respond swiftly to environmental changes.

Although we acknowledge that some research has been performed on dynamic capability (Eriksson, 2014; Jafari-Sadeghi et al., 2022; Mohaghegh et al., 2021; Wang & Ahmed, 2007), our study differs from previous studies because it appears to be the first to model the effect of dynamic capabilities on multilevel operational capabilities (marketing capability, managerial capability, and technical capability). Equally, this study is unique in that it examines how the (above mentioned) operational capabilities influence organisational agility and how the latter engenders both marketing and innovation performance.

Our research advances knowledge by demonstrating that businesses that actively use existing government support systems or policies lack the will and ability to diversify or strengthen their internal capabilities. Hence, rather than reducing the scale or scope of support projects, institutional support projects at the technical and management levels should be set up so that businesses can acquire and strengthen more diverse capabilities and resources.

Limitations of research and future research directions

Considering the given constraints, the findings of this research must be interpreted with caution. Initially, the generalizability of the study's findings is limited. Because we collected data from small- and medium-sized businesses in Daegu and Gyeongsangbuk-do, it is anticipated that generalizing the findings will be challenging because of regional and corporate size biases. Similarly, although this study provides theoretical and practical insights, future research should broaden the scope of research subjects to include all organisations, including SMEs nationwide and SMEs in various nations. It is vital to supplement the research and survey methodologies in order to improve the generalizability of the results and the validity of the research.

Equally, because of a lack of existing domestic and foreign prior studies in conducting research by grafting organisational agility variables, which are primarily used in individual behaviour and departmental units, to the fields of management and B2B marketing, there may be limitations in explaining the causal relationship between variables and to situate the findings within extant literature. Based on the findings of this study, it is suggested that future multidimensional research on organisational agility in various management sectors such as companies and management strategies is required. Because scholars define organisational agility differently and various constituent factors have been proposed, it is also necessary to identify detailed organisational agility factors required to create organisational performance by classifying it into detailed sub-factors such as marketing agility, responsiveness, and flexibility.

Likewise, environmental uncertainty was categorized in this study into market uncertainty and technological uncertainty. However, multi-dimensional uncertainty sub-factors should be proposed in future studies to recommend a strategic

plan that allows organisations to respond flexibly in more diverse external environments.

Acknowledgements

The authors highly acknowledge all authors of this study for their fantastic contributions to this study and all respondents for the useful information they provided to make this work a success.

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

H.-T.Y. and D.O. conceived of the presented idea. H.-T.Y., D.O. and F.E.A. developed the theory and performed the computations. H.-T.Y., D.O. and F.E.A. verified the analytical methods. H.-T.Y. encouraged D.O. and F.E.A. to carry out this study and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

Funding information

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Data availability

The data that support the findings of this study are available from the corresponding author, F.E.A., upon reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

References

- Acha, V. (2000). *The role of technological capabilities in determining performance: The case of the upstream petroleum industry*. Paper prepared for the DRUID Winter Conference on Industrial Dynamics, Hillerod, Denmark, 6–8 January 2000. SPRU, Brighton.
- Amenuvor, F.E., Basilisco, R., Boateng, H., Shin, K.S., Im, D., & Owusu-Antwi, K. (2022). Salesforce output control and customer-oriented selling behaviours. *Marketing Intelligence & Planning*, 40(3), 344–357. <https://doi.org/10.1108/MIP-08-2021-0269>
- Anderson, J.C., & Gerbing, D.W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological bulletin*, 103(3), 411.
- Ansoff, H.I., & McDonnell, E. (1990). *Implanting strategic management* (2nd ed.). Prentice-Hall.
- Aw, B.Y., & Batra, G. (1998). Technical capability and firm efficiency in Taiwan. *The World Bank Economic Review*, 12(1), 59–79. <https://doi.org/10.1093/wber/12.1.59>
- Bagozzi, R.P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16(1), 74–94. <https://doi.org/10.1007/BF02723327>
- Bain, J.S. (1956). *Barriers to new competition*. Harvard University Press.

- Battisti, E., Nirino, N., Leonidou, E., & Thrassou, A. (2022). Corporate venture capital and CSR performance: An extended resource-based view's perspective. *Journal of Business Research*, 139, 1058–1066. <https://doi.org/10.1016/j.jbusres.2021.10.054>
- Beatty, S.E., & Smith, S.M. (1987). External search effort: An investigation across several product categories. *Journal of Consumer Research*, 14(1), 83–95. <https://doi.org/10.1086/209095>
- Birkinshaw, J., & Gibson, C. (2004). Building ambidexterity into an organization. *MIT Sloan Management Review*, 45(4), 47–55.
- Bradley, S.P., & Nolan, R.L. (1998). *Sense & respond: Capturing value in the network era*. Harvard Business School Press.
- Cahyono, Y., Purwoko, D., Koho, I., Setiani, A., Supendi, S., Setyoko, P., Sosiady, M., & Wijoyo, H. (2023). The role of supply chain management practices on competitive advantage and performance of halal agroindustry SMEs. *Uncertain Supply Chain Management*, 11(1), 153–160. <https://doi.org/10.5267/j.uscm.2022.10.012>
- Caves, R.E., & Porter, M.E. (1977). From entry barriers to mobility barriers: Conjectural decisions and contrived deterrence to new competition. *The Quarterly Journal of Economics*, 91(2), 241–261. <https://doi.org/10.2307/1885416>
- Cohen, W.M., & Levinthal, D.A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152. <https://doi.org/10.2307/2393553>
- D'Aveni, R.A., Dagnino, G.B., & Smith, K.G. (2010). The age of temporary advantage. *Strategic Management Journal*, 31(13), 1371–1385. <https://doi.org/10.1002/smj.897>
- Day, G.S. (1994). The capabilities of market-driven organizations. *Journal of Marketing*, 58(4), 37–52. <https://doi.org/10.1177/002224299405800404>
- Dess, G.G., & Beard, D.W. (1984). Dimensions of organisational task environments. *Administrative Science Quarterly*, 29(1), 52–73. <https://doi.org/10.2307/2393080>
- DeVellis, R. (2003). *Scale development: Theory and applications* (2nd ed.). Sage.
- Dove, R. (1999). Knowledge management, response ability, and the agile enterprise. *Journal of Knowledge Management*, 3(1), 18–35. <https://doi.org/10.1108/13673279910259367>
- Eisenhardt, K., & Martin, J. (2000). Dynamic capabilities: What are they?. *Strategic Management Journal*, 21(10–11), 1105–1121. [https://doi.org/10.1002/1097-0266\(200010/11\)21:10<1105::AID-SMJ1133>3.0.CO;2-E](https://doi.org/10.1002/1097-0266(200010/11)21:10<1105::AID-SMJ1133>3.0.CO;2-E)
- Eriksson, T. (2014). Processes, antecedents and outcomes of dynamic capabilities. *Scandinavian Journal of Management*, 30(1), 65–82. <https://doi.org/10.1016/j.scaman.2013.05.001>
- Fornell, C., & Larcker, D.F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*, 18(3), 382–388. <https://doi.org/10.1177/002224378101800313>
- Gelderman, C.J., Semeijn, J., & Mertschuweit, P.P. (2016). The impact of social capital and technological uncertainty on strategic performance: The supplier perspective. *Journal of Purchasing and Supply Management*, 22(3), 225–234. <https://doi.org/10.1016/j.pursup.2016.05.004>
- Ghosh, S., Hughes, M., Hodgkinson, I., & Hughes, P. (2022). Digital transformation of industrial businesses: A dynamic capability approach. *Technovation*, 113, 102414. <https://doi.org/10.1016/j.technovation.2021.102414>
- Gogichaty, M., Ivanov, V., Kruglov, A., Pedrycz, W., Samatova, A., Succi, G., & Valeev, R. (2023). A systemic approach to evaluating the organisational agility in large-scale companies. In *IEEE access*, 11, 3307–3323. <https://doi.org/10.1109/ACCESS.2023.3234424>
- Grant, R.M. (1991). The resource-based theory of competitive advantage: Implications for strategy formulation. *California Management Review*, 33(3), 114–135. <https://doi.org/10.2307/4116664>
- Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate data analysis* (7th ed.). Prentice Hall.
- Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., & Tatham, R.L. (2006). *Multivariate data analysis* (pp. 1–816). Pearson Prentice Hall, New Jersey.
- Hayes, R.H., & Pisano, G.P. (1996). Manufacturing strategy: At the intersection of two paradigm shifts. *Production and Operations Management*, 5(1), 25–41. <https://doi.org/10.1111/j.1937-5956.1996.tb00383.x>
- Heide, J.B., & Weiss, A.M. (1995). Vendor consideration and switching behavior for buyers in high-technology markets. *Journal of Marketing*, 59(3), 30–43. <https://doi.org/10.1177/002224299505900303>
- Helfat, C.E., & Peteraf, M.A. (2003). The dynamic resource-based view: Capability lifecycles. *Strategic Management Journal*, 24(10), 997–1010. <https://doi.org/10.1002/smj.332>
- Jafari-Sadeghi, V., Mahdiraji, H.A., Busso, D., & Yahiaoui, D. (2022). Towards agility in international high-tech SMEs: Exploring key drivers and main outcomes of dynamic capabilities. *Technological Forecasting and Social Change*, 174, 121272. <https://doi.org/10.1016/j.techfore.2021.121272>
- Jaworski, B.J., & Kohli, A.K. (1993). Market orientation: Antecedents and consequences. *Journal of Marketing*, 57(3), 53–70. <https://doi.org/10.1177/002224299305700304>
- Jilke, S. (2020). Impact of technological uncertainty and technological complexity on organisational information processing capability: The moderating role of work experience. *European Journal of Innovation Management*, 24(5), 1485–1501. <https://doi.org/10.1108/EJIM-04-2020-0151>
- King, D.B., O'Rourke, N., & DeLongis, A. (2014). Social media recruitment and online data collection: A beginner's guide and best practices for accessing low-prevalence and hard-to-reach populations. *Canadian Psychology/Psychologie Canadienne*, 55(4), 240. <https://doi.org/10.1037/a0038087>
- Kohli, A.K., & Jaworski, B.J. (1990). Market orientation: The construct, research propositions, and managerial implications. *Journal of Marketing*, 54(2), 1–18. <https://doi.org/10.1177/002224299005400201>
- Kump, B., Engelmann, A., Kessler, A., & Schweiger, C. (2016). Towards a dynamic capabilities scale: Measuring sensing, seizing, and transforming capacities. *Academy of Management*, 2016(1), 10510. <https://doi.org/10.5465/ambpp.2016.13839abstract>
- Leonard-Barton, D. (1992). Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management Journal*, 13(S1), 111–125. <https://doi.org/10.1002/smj.4250131009>
- Lu, Y., & Ramamurthy, K. (2011). Understanding the link between information technology capability and organisational agility: An empirical examination. *MIS Quarterly*, 35(4), 931–954. <https://doi.org/10.2307/41409967>
- Magistretti, S., Ardito, L., & Messeni Petruzzelli, A. (2021). Framing the microfoundations of design thinking as a dynamic capability for innovation: Reconciling theory and practice. *Journal of Product Innovation Management*, 38(6), 645–667. <https://doi.org/10.1111/jipim.12586>
- Milliken, F.J. (1987). Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. *Academy of Management Review*, 12(1), 133–143. <https://doi.org/10.2307/257999>
- Mohaghegh, M., Blasi, S., & Groessler, A. (2021). Dynamic capabilities linking lean practices and sustainable business performance. *Journal of Cleaner Production*, 322, 129073. <https://doi.org/10.1016/j.jclepro.2021.129073>
- Morgan, N.A., Anderson, E.W., & Mittal, V. (2005). Understanding firms' customer satisfaction information usage. *Journal of Marketing*, 69(3), 131–151. <https://doi.org/10.1509/jmkg.69.3.131.66359>
- Narasimhan, O., Rajiv, S., & Dutta, S. (2006). Absorptive capacity in high-technology markets: The competitive advantage of the haves. *Marketing Science*, 25(5), 510–524. <https://doi.org/10.1287/mksc.1060.0219>
- Narasimhan, R., & Das, A. (1999). An empirical investigation of the contribution of strategic sourcing to manufacturing flexibilities and performance. *Decision Sciences*, 30(3), 683–718. <https://doi.org/10.1111/j.1540-5915.1999.tb00903.x>
- Overby, E., Bharadwaj, A., & Sambamurthy, V. (2006). Enterprise agility and the enabling role of information technology. *European Journal of Information Systems*, 15(2), 120–131. <https://doi.org/10.1057/palgrave.ejis.3000600>
- Pavlou, P.A., & El Sawy, O.A. (2010). The “third hand”: IT-enabled competitive advantage in turbulence through improvisational capabilities. *Information systems research*, 21(3), 443–471.
- Pavlou, P.A., & El Sawy, O.A. (2011). Understanding the elusive black box of dynamic capabilities. *Decision Sciences*, 42(1), 239–273.
- Pisano, G.P. (1994). Knowledge, integration, and the locus of learning: An empirical analysis of process development. *Strategic Management Journal*, 15(S1), 85–100. <https://doi.org/10.1002/smj.4250150907>
- Prajogo, D.I., & Sohal, A.S. (2004). Transitioning from total quality management to total innovation management: An Australian case. *International Journal of Quality and Reliability Management*, 21(8), 861–875. <https://doi.org/10.1108/02656710410551746>
- Saragih, R., Prasetyo, A.P., Luturlean, B.S., & Ayuningtias, H.G. (2023). The impact of effective leadership style, employee readiness, and moderation of job level on organization agility: Case study in public telecommunication company in Indonesia. In D.P. Ramadhani, I. Rachmawati, Cahyaningsih, N. Dudija, H.G. Ayuningtias, A.A. Gunawan, & D.S. Dennyra (Eds.), *Acceleration of digital innovation & technology towards Society 5.0* (pp. 238–247). Routledge.
- Schilke, O., Hu, S., & Helfat, C.E. (2018). Quo vadis, dynamic capabilities? A content-analytic review of the current state of knowledge and recommendations for future research. *Academy of Management Annals*, 12(1), 390–439. <https://doi.org/10.5465/annals.2016.0014>
- Schoenecker, T., & Swanson, L. (2002). Indicators of firms technical capability: Validity and performance implications. *IEEE Transactions on Engineering Management*, 49(1), 36–44.
- Sethi, R., Smith, D.C., & Park, C.W. (2001). Cross-functional product development teams, creativity, and the innovativeness of new consumer products. *Journal of Marketing Research*, 38(1), 73–85. <https://doi.org/10.1509/jmkr.38.1.73.18833>
- Slater, S.F., & Narver, J.C. (2000). The positive effect of a market orientation on business profitability: A balanced replication. *Journal of business research*, 48(1), 69–73.
- Song, X.M., & Parry, M.E. (1997). Teamwork barriers in Japanese high-technology firms: The sociocultural differences between R&D and marketing managers. *Journal of Product Innovation Management*, 14(5), 356–367.
- Souitaris, V. (2002). Firm-specific competencies determining technological innovation: A survey in Greece. *R&D Management*, 32(1), 61–77. <https://doi.org/10.1111/1467-9310.00239>
- Swafford, P.M., Ghosh, S., & Murthy, N. (2006). The antecedents of supply chain agility of a firm: Scale development and model testing. *Journal of Operations Management*, 24(2), 170–188. <https://doi.org/10.1016/j.jom.2005.05.002>
- Tallon, P.P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organisational agility: Insights from a mediation model. *MIS Quarterly*, 35(2), 463–486.
- Tariq, E., Alshurideh, M., Akour, I., & Al-Hawary, S. (2022). The effect of digital marketing capabilities on organisational ambidexterity of the information technology sector. *International Journal of Data and Network Science*, 6(2), 401–408. <https://doi.org/10.5267/j.iidns.2021.12.014>
- Teece, D.J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533. [https://doi.org/10.1002/\(SICI\)1097-0266\(199708\)18:7<509::AID-SMJ882>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z)

- Tolstoy, D., Nordman, E.R., & Vu, U. (2022). The indirect effect of online marketing capabilities on the international performance of e-commerce SMEs. *International Business Review*, 31(3), 101946. <https://doi.org/10.1016/j.ibusrev.2021.101946>
- Tsai, M.T., & Shih, C.M. (2004). The impact of marketing knowledge among managers on marketing capabilities and business performance. *International Journal of Management*, 21(4), 524–530.
- Uzzi, B. (1997). Towards a network perspective on organisational decline. *International Journal of Sociology and Social Policy*, 17(7–8), 111–155. <https://doi.org/10.1108/eb013318>
- Van Oosterhout, M., Waarts, E., & Van Hillegerberg, J. (2006). Change factors requiring agility and implications for IT. *European Journal of Information Systems*, 15(1), 132–145.
- Vorhies, D.W., & Morgan, N.A. (2005). Benchmarking marketing capabilities for sustainable competitive advantage. *Journal of Marketing*, 69(1), 80–94. <https://doi.org/10.1509/jmkg.69.1.80.55505>
- Wang, C.L., & Ahmed, P.K. (2007). Dynamic capabilities: A review and research agenda. *International Journal of Management Reviews*, 9(1), 31–51. <https://doi.org/10.1111/j.1468-2370.2007.00201.x>
- Weerawardena, J. (2003). The role of marketing capability in innovation-based competitive strategy. *Journal of Strategic Marketing*, 11(1), 15–35.
- Weiss, A.M., & Heide, J.B. (1993). The nature of organisational search in high technology markets. *Journal of Marketing Research*, 30(2), 220–233. <https://doi.org/10.1177/002224379303000207>
- Wendler, R. (2013). The structure of agility from different perspectives. In M. Ganzha, L. Maciaszek, & M. Paprzycki (Eds.), *Federated conference on computer science and information systems* (pp. 1165–1172). IEEE.
- Wendler, R. (2016). Dimensions of organisational agility in the software and IT service industry: Insights from an empirical investigation. *Communications of the Association for Information Systems*, 39(1), 21. <https://doi.org/10.17705/1CAIS.03921>
- Wilden, R., & Gudergan, S.P. (2015). The impact of dynamic capabilities on operational marketing and technological capabilities: Investigating the role of environmental turbulence. *Journal of the Academy of Marketing Science*, 43(2), 181–199. <https://doi.org/10.1007/s11747-014-0380-y>
- Winter, S.G. (2000). The satisficing principle in capability learning. *Strategic Management Journal*, 21(10–11), 981–996.
- Yi, H.T., & Amenuvor, F.E. (2022). The effect of door-to-door salespeople's individual sales capabilities on selling behavior and performance: The moderating effect of competitive intensity. *Sustainability*, 14(6), 3327. <https://doi.org/10.3390/su14063327>
- Yi, H.T., Amenuvor, F.E., & Boateng, H. (2021). The impact of entrepreneurial orientation on new product creativity, competitive advantage and new product performance in SMEs: The moderating role of corporate life cycle. *Sustainability*, 13(6), 3586. <https://doi.org/10.3390/su13063586>
- Yi, H.T., Fortune, A.E., & Yeo, C.K. (2019). Investigating relationship between control mechanisms, trust and channel outcome in franchise system. *Journal of Distribution Science*, 17(9), 67–81. <https://doi.org/10.15722/jds.17.9.201909.67>
- Yi, H.T., Han, C.N., & Cha, Y.B. (2018). The effect of entrepreneurship of SMEs on corporate capabilities, dynamic capability and technical performances in South Korea. *The Journal of Asian Finance, Economics and Business*, 5(4), 135–147. <https://doi.org/10.13106/jafeb.2018.vol5.no4.135>
- Yuan, B., & Cao, X. (2022). Do corporate social responsibility practices contribute to green innovation? The mediating role of green dynamic capability. *Technology in Society*, 68, 101868. <https://doi.org/10.1016/j.techsoc.2022.101868>
- Yusuf, Y.Y., Sarhadi, M., & Gunasekaran, A. (1999). Agile manufacturing: The drivers, concepts and attributes. *International Journal of Production Economics*, 62(1–2), 33–43.
- Zahra, S.A., & Bogner, W.C. (2000). Technology strategy and software new ventures' performance: Exploring the moderating effect of the competitive environment. *Journal of Business Venturing*, 15(2), 135–173. [https://doi.org/10.1016/S0883-9026\(98\)00009-3](https://doi.org/10.1016/S0883-9026(98)00009-3)
- Zain, M., Rose, R.C., Abdullah, I., & Masrom, M. (2005). The relationship between information technology acceptance and organisational agility in Malaysia. *Information and Management*, 42(6), 829–839. <https://doi.org/10.1016/j.im.2004.09.001>
- Zhou, K.Z., Yim, C.K., & Tse, D.K. (2005). The effects of strategic orientations on technology and market-based breakthrough innovations. *Journal of Marketing*, 69(2), 42–60. <https://doi.org/10.1509/jmkg.69.2.42.60756>
- Zollo, M., & Winter, S.G. (2002). Deliberate learning and the evolution of dynamic capabilities. *Organization Science*, 13(3), 339–351. <https://doi.org/10.1287/orsc.13.3.339.2780>