Multiple flexible suppliers and competitive advantage during market turbulence: the role of digital capabilities

Aluisius Hery Pratono
Faculty of Business and Economics, Universitas Surabaya, Surabaya, Indonesia

Received 15 September 2022
Revised 22 December 2022
8 April 2023
Accepted 17 June 2023

Abstract

Purpose – This article aims to examine the impact of multiple suppliers on competitive advantage by exploiting digital capabilities.

Design/methodology/approach – The author propose a structural equation model with the adopted measure from the literature. Hence, the study conducted an online survey in Indonesia with 450 qualified respondents involving managers and owner-managers.

Findings – The results indicate multiple suppliers help the firms to exploit digital capabilities, which foster them to achieve competitive advantage. Hence, different level of market turbulences determines the impact of numerous suppliers on competitive advantage. Specifically, the multiple-suppliers approach is more effective in supporting buyer firms to gain a competitive advantage during high market turbulence than low market turbulence.

Research limitations/implications – This study offers empirical evidence with unit analysis of buyer firms that seek competitive advantage by exploiting digital capability. However, this approach focusses on a single unit analysis, which is buyer firms. Hence, there is an opportunity to adopt qualitative approach to explore the suppliers and end-users from different perspectives from other supply chain players.

Originality/value – This article contributes to the growing literature on the resource-based theory by examining the relationship between the multiple-sourcing model and competitive advantage. The authors also discuss the intersection between resource-based, dynamic capability and stakeholder theory.

Keywords Competitive advantage, Market turbulence, Multiple suppliers, Digital capabilities

Paper type Research article

Introduction

Multiple flexible suppliers refer to a sourcing strategy where a firm uses multiple suppliers that can offer flexible solutions to deal with changing needs (Sarkar and Bhuniya, 2022). The flexible suppliers allow the firm access to a diverse pool of suppliers that can provide customized solutions and adjust to the firm's needs. With numerous flexible suppliers, a firm can diversify its risk by spreading its sourcing across different suppliers and minimizing its reliance on a single supplier (Piprani *et al.*, 2022). In contrast to a traditional sourcing strategy where a firm relies on a few key suppliers for its needs, multiple flexible suppliers provide more flexibility and agility (Rogers, 2005). The rise in economic uncertainty over the last decades has affected business performance and fostered firms to incorporate multiple flexible suppliers (Rajesh, 2021).

This sourcing strategy is becoming increasingly popular in the digital age, where firms need to adapt quickly to changing market conditions and technological innovations. As a result, adopting the multiple-suppliers model becomes one of the most popular approaches for firms that seek to access a desirable raw material during environmental turmoil, while others prefer to adopt a resilience approach (Burin *et al.*, 2020; Gheibi and Fay, 2021; Blessley and Mudambi, 2022). With multiple suppliers, a firm can leverage different capabilities, capacities and geographical locations to optimize its supply chain and better respond to changes in demand, disruptions or other unforeseen events (Pratono and Maharani, 2023). However,

Journal of Enterprise Information Management

1741-0398
DOI 10.1108/JEIM-09-2022-0339

heavily relying on flexible suppliers also comes with risks, such as excessive collaboration, which calls for further studies (Villena *et al.*, 2021; Constantino and Pellegrino, 2022). Hence, this article highlights some research gaps that need to be addressed.

First, there is an opportunity to examine the practice of purchasing strategy that raises a trade-off between single-source or multiple-source models for procuring goods or services. For example, working with a single supplier leads to more consistent quality control since the supplier clearly understands the business's needs and expectations (Pratono and Maharani, 2023). On the other hand, multiple suppliers allow buyer firms to spread out the risk of supply chain disruptions and financial difficulties, reducing the overall risk to the business (Wang *et al.*, 2022). In addition, having multiple suppliers gives a firm more substantial bargaining power (Minner, 2003). Firms with multiple suppliers can increase bargaining power, allowing the business to negotiate better terms (Constantino and Pellegrino, 2022). However, building strong relationships with various suppliers can be more challenging, as buyer firms still have to deal with the wholesale price (Matsui, 2022).

The second issue is how firms deal with market turbulence by exploiting multiple suppliers. During market turbulence, one of the main risks is that all of a business's suppliers may be unable to provide the necessary materials, resulting in production delays or even stoppages (Sun *et al.*, 2022). In addition, suppliers may prioritize their more prominent customers, leaving smaller customers needing the necessary materials or products. A firm with a solid relationship with its multiple suppliers may still achieve its competitive advantage during market turbulence, but its incremental profit decreases over time (Kumar *et al.*, 2011). Another study argues that market turbulence increases the complexity of a business's supply chain, which can reduce supply chain performance due to poor sharing of collective wisdom, information and knowledge (Arora *et al.*, 2022).

Last, a firm can choose between investing in technology and finding partnerships later or finding multiple suppliers first and then investing in technology. A firm that seeks to develop digital capabilities may complement the partnership strategy to improve its operation, increase efficiency and drive innovation (Bongiorno *et al.*, 2018). By developing cutting-edge technology, a firm can improve its competitiveness and enhance its ability to meet the evolving needs of its customers (Calatayud *et al.*, 2018). However, investing in technology first can be expensive and require the right talent with digital capabilities (Frankiewicz and Chamorro-Premuzic, 2020). Although the primary literature acknowledges the role of information technology, a few firms can demonstrate their capability to align digital technology by transforming their organization into a digital business model (Canhoto *et al.*, 2021).

On the contrary, finding multiple partners first can help a firm mitigate supply chain risks and access a broader range of expertise and resources. By working with numerous suppliers, a firm can tap into the specialized knowledge of each supplier in different areas of digital capability (Gheibi and Fay, 2021). For example, one supplier may excel in cloud computing, while another may be proficient in artificial intelligence or cybersecurity. However, a hybrid approach that combines elements of both strategies may be most effective. For example, a firm may actively seek out and build relationships with multiple partners to mitigate supply chain risks and invest in critical digital technologies to react to dynamic environments (Ishfaq *et al.*, 2022). Hence, there is an opportunity to investigate the complexity of the supply chain networks by exploring the type of partnership related to digitalization (Centobelli *et al.*, 2022).

This article aims to examine how firms with multiple suppliers achieve competitive advantage during market turbulence. The following section presents literature in which the analysis underpins the relational approach, contingency and behavioural theories to test the flexible supply chain under turbulence by examining the moderating effect of market turbulence. Hence, the article involves an online survey in Indonesia, which includes 450 qualified respondents to the questionnaire, including managers and owner-managers.

The last section provides finding discussion, theoretical contribution, managerial implication and opportunities for further studies.

Literature review

This article underpins resource-based theory (RBT), which assumes that firms exploit unique resources to achieve their competitive advantage. A firm demonstrates a competitive advantage by generating more economic value than others (Barney *et al.*, 2021). RBT suggests that a firm's resources and capabilities are the key determinants of its competitive advantage. On the other hand, dynamic capability theory (DCT) emphasizes the importance of a firm's ability to adapt to changing environments and create new capabilities. According to DCT, a firm's dynamic capabilities allow it to sense, seize, and transform its resources and capabilities in response to environmental changes.

The resource orchestration theory attempts to explain the mechanism process, which seeks to maximize knowledge assets and capabilities. The resource orchestration approach is part of an emerging research stream that extends the understanding of RBT by examining the role of business leaders in leveraging firm resources (Sirmon *et al.*, 2011). Burin *et al.* (2020) demonstrate the resource orchestration approach by examining the role of flexible supply chain resources and digital competence in encouraging business organizations to exploit their potential resources. Asiaei *et al.* (2021) highlight the part of the firm capability in managing various knowledge resources on organizational performance.

Hence, stakeholder theory explores the role of stakeholders in supporting value creation with various levels of bargaining positions (Freeman *et al.*, 2010; Barney and Harrison, 2018). The theory has helped shift businesses' focus towards a more inclusive and sustainable approach to value creation and continues to be a key driver of social and environmental responsibility in the business world. However, the complement resource orchestration theory argues that firms can adopt a flexible and adaptable approach to manage their resource during uncertainty (Li *et al.*, 2020). Nevertheless, there is a risk of an influential stakeholder who may constrain the firms' choice to engage in value-creation partnerships (Chowdhury *et al.*, 2021).

Contingency theory and the RBT provide a fundamental view that explains what conditions foster flexibility and how flexible business-to-business partnerships enhance their performance (Frederick, 2005). Adopting flexibility strategies presents a classical contingency approach, such as technology, uncertainty and business competition (Ketokivi, 2009). Firms maximize performance through supply chain integration (Shukor *et al.*, 2021). Hence, integrating resource-based and contingency approaches explains how firms deal with environmental turbulence theory (Pratono, 2022). However, contingency and RBT still needs a managerial-centric tone and need to examine the role of entrepreneurs in achieving performance (Bigelow and Barney, 2021).

Multiple suppliers and competitive advantage

Multiple suppliers provide a firm with greater flexibility and adaptability. This approach can help the firm to be more agile and responsive to gain a competitive advantage (Rajesh, 2021). For example, suppose one supplier cannot meet the company's needs or faces a disruption. In that case, the company can turn to other suppliers to ensure it can continue its operations without interruption (Burke *et al.*, 2007). Diversifying a company's supplier base can reduce the risk of disruptions or supply chain issues. If one supplier experiences a problem, the company can turn to other suppliers to mitigate the impact and ensure its operations can continue (Wassmer, 2010).

Competition between suppliers can also drive down costs for a company. Suppliers may offer more competitive pricing to win the company's business, which can help reduce costs

and improve the company's bottom line (Burke *et al.*, 2007; Gheibi and Fay, 2021). However, the feasibility drastically changes if multiple suppliers present a similar source simultaneously (Cohen and Lee, 2020). Moreover, a flexible supply chain offers specific paths, unique asset positions and distinctive processes (Barreto, 2010). Hence, the internal complexity of a supplier and the complicated relationship between suppliers raise a disruption experience in the market. In addition, the multiple suppliers imply a complex set of tasks for a buying company, which has to deal with numerous initiatives simultaneously (Jørgensen *et al.*, 2022).

On the contrary, a single supplier demonstrates a captive-buyer or supplier-dominant relationship, indicating that the buyer firm is highly dependent on the supplier firm (MacKenzie and Hardy, 1996). A single supplier allows firms to manage a long-term relationship, essential to promote a just-in-time supply chain (Minner, 2003). Managing fewer suppliers reduces coordination efforts, possibly implying cost efficiency following the cumulative volume necessary for long-term relationships (Minner, 2003). However, high dependence on suppliers dampens performance (Wissuwa *et al.*, 2022; Li *et al.*, 2022).

H1. Having multiple suppliers has a positive impact on competitive advantage.

Flexible supplier and digital capability

Having multiple suppliers can provide a firm with more options and opportunities to find a flexible supplier that can help them to enhance its digital capability in various ways (Gheibi and Fay, 2021). Working with multiple suppliers means a firm can tap into a wider pool of expertise and knowledge, which can help them to develop their digital capabilities more quickly and effectively. Stiff competition enhances supply chain resilience through an adaptive capacity (Massari and Giannoccaro, 2021). In addition, each supplier may have unique skills or experiences that can contribute to the firm's digital transformation. However, each partnership presents a distinct journey in which a firm must customize business interactions across digital platforms and channels (Hayes and Kelliher, 2022).

Second, digital capability is about more than just delivering a one-off customer journey. Instead, it is merely about implementing dynamic capability, which fosters innovative product or service loyalty (Dörner and Edelman, 2015). Hence, a company using multiple suppliers can create healthy competition, encouraging them to be flexible, innovate and improve their products and services. In addition, supplier competition allows buyer firms to enhance their technical capability by managing the relationship in their supply chain strategy (Chatterjee and Chaudhuri, 2021). Online suppliers foster competition between firms and suppliers, significantly when a new supplier intrudes into the market segment (Tahirov and Glock, 2022). Buyer firms seek to develop their digital capability to reduce the blind spots that opportunism partners can take for granted and to increase their bargaining position again their suppliers (Son *et al.*, 2021). Firms with multiple suppliers have more opportunities to find the best partner to access the valuable partners' skills with their core competence (Bonamigo *et al.*, 2022).

Multiple suppliers can help a firm innovate and quickly develop new digital solutions. Suppliers can work independently on different aspects of a project, leading to faster results by leveraging human adaptability to meet the dynamic digital technology (Frankiewicz and Chamorro-Premuzic, 2020). Another way that multiple partners can enhance a company's digital capability is by providing different perspectives and approaches. Relational governance can also help to build stronger relationships between companies and their suppliers based on mutual trust and respect, which lead to a more collaborative and productive working environment where both parties are committed to the success of the project and the transfer of knowledge (Son *et al.*, 2021). Hence, a lack of resources to maintain the supplier–buyer partnership during market turbulence negatively impacts digital transformation in flexible supply chains (Li, 2022).

H2. Flexible suppliers have a positive impact on digital capability.

Companies continue to adapt to a dynamic business environment by enhancing their digital capability (Shukor *et al.*, 2021). Rapid information and communication technology (ICT) has supported supply chain integration by sharing knowledge and improving flexibility (Hou, 2020). However, high-quality data are only sufficient to establish a solid partnership if trust among the players turns into relational satisfaction (Agarwal and Nayarana, 2020). Digital capability development allows buyer firms to process standardized risks without human intervention although some cases require a human approach through stakeholder interdependency (Birkel and Hartmann, 2020).

The technology helps firms focus on where they have to deal with emerging requirements concerning firm competitive advantage (Chen *et al.*, 2020). Furthermore, digital platforms collect data to uncover potential resources in decision-making, especially during pandemic outbreaks (Ivanov and Dolgui, 2020; Steinberg, 2021). Moreover, firms acquire new information by employing cooperative relationships to explore input markets for better configurations. Hence, gradual adaptation improves their resources through their competencies following the supplier competition (Massari and Giannoccaro, 2021).

Digital skill is about harnessing valuable data by translating data into the act with meaningful insights (Frankiewicz and Chamorro-Premuzic, 2020). For example, the cloud platform can support to plan the production resources of multiple suppliers in a unified manner. Furthermore, AI and machine learning, edge computing and big data analytics help firms to achieve information fusion to reallocate production resources and thus improve resilience and viability (Shen *et al.*, 2020). Hence, firms' digital integration with suppliers positively influences their digital supply chain capability and consequently enhances supply chain performance (Queiroz *et al.*, 2021).

H3. Digital capability has a positive impact on competitive advantage.

Market turbulence and competitive advantage

Market turbulence refers to rapid and significant changes in market conditions, including price fluctuations, demand, supply and other economic indicators. These periods of turbulence can be triggered by various factors, including geopolitical events, economic shifts, natural disasters, technological disruptions and more (Shekarian *et al.*, 2020). Market turbulence can have a significant impact on a multiple flexible supplier strategy. Firms face risks related to market turbulence due to the unpredictable nature of demand and supply in the market. Firms struggle to manage various suppliers when uncertainty increases (Stevenson and Spring, 2007). Market turbulence can pose several risks for firms that adopt numerous suppliers to achieve a competitive advantage.

First, during high market turbulence, suppliers may be more likely to experience disruptions in production or delivery. Market turbulence can cause disruptions in the supply chain, such as delays in shipping or delivery, shortages of materials or goods or price increases. These disruptions can affect the ability of suppliers to deliver products on time and at the agreed-upon price, which can impact the firm's operations and profitability. The firms may fail to forecast market demand (Huang *et al.*, 2017). On the contrary, low market turbulence presents a situation when the demand is highly predictable. Hence, firms can estimate the market demand. Moreover, suppliers have more capacity and be more willing to work with their customers (Chatzikontidou *et al.*, 2017).

Second, high market turbulence can lead to price volatility, with prices for materials, goods, or services fluctuating rapidly. This environment can make it difficult for companies to plan and budget effectively and may result in higher costs if prices rise unexpectedly. Market turbulence can also cause increases in costs, such as higher prices for raw materials,

transportation costs or tariffs. These increased costs can eat into a firm's profit margins and make it more challenging to remain competitive (Ivanov and Dolgui, 2020). On the contrary, prices may be more stable during periods of low market turbulence, but it can still be an excellent time to negotiate better terms or discounts with suppliers. In addition, companies can improve quality and delivery times with more stable demand and pricing. Investing in quality control measures and working with suppliers to improve their processes can help strengthen the supply chain and build a competitive advantage (Ivanov and Dolgui, 2020).

Third, market turbulence can cause quality issues with products or services, particularly if suppliers are forced to cut corners or use substandard materials to meet demand. This phenomenon can result in a loss of reputation and customer trust, which can have long-term impacts on the firm's ability to compete (Dadzie *et al.*, 2022). Although adopting a multiple-supplier strategy can reduce the risk of dependence on a single supplier, it can also increase the risk of reliance on a limited number of suppliers. If multiple suppliers do not commit to sufficient volume or do not have enough resources to meet a customer's needs, they may lose the business to another supplier. This phenomenon can lead to a loss of revenue and potential damage to their reputation. If these suppliers are all affected by the same market turbulence, it can create a significant risk for the firm (Arora *et al.*, 2022).

H4. Market turbulence moderates the relationship between multiple suppliers and competitive advantage. Under low market turbulence, multiple suppliers have a more positive impact on competitive advantage than under high market turbulence.

Research method

This study aims to understand the relationship between multiple suppliers and competitive advantage by proposing a structural equation model, which entails some exogenous variables, namely digital capability and market turbulence. Structural equation modeling (SEM) is a statistical method used to examine the relationships between latent and observed variables. This multivariate technique allows researchers to test complex theoretical models and hypotheses. Furthermore, we propose digital capability as a mediating variable to explain the complex relationship between numerous suppliers and competitive advantage.

We adopt the partial least square-structural equation model (PLS-SEM), which is relevant for modelling complex relationships between latent variables which are not directly observed but inferred from measured variables. In the context of supplier relationships and competitive advantage, the model involves market turbulence as a moderating variable to explain the particular conditions that could change the strength or direction of the relationship between multiple suppliers and competitive advantage. By estimating the relationships between latent and measured variables, this study provides insights into how a firm manages supplier relationships to generate a sustainable competitive advantage.

Measure

This study uses a reflective measure type, which assumes that a construct is the cause of the observed indicators and that the indicators are reflective of the latent variable. In a reflective measurement model, each observed indicator is assumed to be a measure of the same underlying latent variable, and the relationships between the latent variable and each observed indicator are estimated using factor analysis or other suitable methods. The latent variable is treated as the cause or independent variable, and the observed indicators are treated as the effects or dependent variables. We adopt the measure from previous studies.

The first construct is multiple suppliers, which help a firm to manage flexible supply chain approach (Rajesh, 2021). The measure of multiple suppliers involves five reflective items: short- and long-term lifecycle products, new supplier selection, alternative suppliers

and changed suppliers. The second construct is a competitive advantage, which adopted from Singh *et al.* (2019). We obtain a subjective measure of competitive advantage on six reflective items: product or service, research and development, managerial capability, profitability and image, which relate to survey questions.

The measure of digital capability pertains to five items, which serve as a mediating variable. This study adopts the work of Zhou and Wu (2010), which identifies five items of reflective indicators: acquiring, identifying, responsive, mastering and embracing digital technology for innovation. The construct demonstrates technological capability in exploiting and exploring innovations. We use market turbulence as unidimensional construct concerning consumer preference, new products, new customers and price sensitivity adapted from Kumar *et al.* (2011). The survey adopts the 7-type Likert scale with 1 for strongly disagree and 5 for strongly agree. The measurements indicate quality regarding how well the answers represented each dimension.

Content validity involves interviews with experts within the organizational behaviour to review the existing questionnaire using a literature review (Lund *et al.*, 2014). This study translates the reflective measurements for Indonesian-speaking respondents following a set of validity-testing procedures (Sousa and Rojjanasrinat, 2011; Chen *et al.*, 2021). The first step is the recruitment of two bilingual translators, followed by a group meeting with five experts in organizational behaviour. Next, the panel finalizes the translated measures to ensure culture free, which includes a back-translated version. The next step is the face and content validity test, which entails a pilot project survey with 15 respondents by pondering each item (Table 1). After a brief presentation of the research project, the researchers subsequently inquire FGD participants to fill in the 21-item questionnaire. The results show that V-Aiken values range from 0.819 to 0.901, indicating that the measures meet the validity standard (Table 2).

Data collection

We designed a survey that encouraged owners or managers from various business organizations to respond to questions regarding their perception of multiple suppliers,

Profile	Pilot project (n = 15)	Survey (n = 450)
Gender		
Female	8	261 (58%)
Male	7	189 (42%)
Age (years)		
<30	5	98 (22%)
30–40	4	169 (38%)
>40	6	183 (40%)
Occupation social class		
Managers	4	193 (43%)
Owner managers	11	118 (26%)
Seniors workers	4	139 (30)%
Industries		
Retail	3	95 (21%)
Fashion	4	108 (24%)
Food and beverage	5	157 (35%)
Services	2	81 (18%)
Others	0	9 (2%)

Source(s): Authors work

Table 1.
Respondent profiles

	Measurement variables	V Aiken	VIF	CA	CR	AVE
	Competitive Advantage			0.916	0.935	0.706
CC01	My firm's products/services are better than its competitors	0.901	1.771			
CC02	My firm's R&D capabilities are better than its competitors	0.891	2.786			
CC03	My firm's managerial capabilities are better than its competitors	0.882	3.170			
CC04	My firm's profitability is better than its competitor	0.812	2.743			
CC05	My firm's image is better than its competitors	0.829	3.256			
CC06	My firm's competitive advantage is better than its competitors	0.857	2.534			
	Multiple suppliers			0.898	0.925	0.712
FSM1	Our company has multiple suppliers for short lifecycle products	0.882	2.683			
FSM2	My firm options for multiple suppliers for long lifecycle products	0.828	2.431			
FSM3	My firm prefers to have a multiple supplier strategy for new supplier selection	0.880	3.191			
FSM4	My firm has one chief supplier with alternatives available in the crisis	0.829	1.867			
FSM5	Our company has changed its suppliers during supply crisis in the past	0.821	2.177			
	Digital capabilities			0.867	0.903	0.652
DCA1	My firm acquiring important digital technologies	0.878	1.872			
DCA2	My firm identifies new digital opportunities	0.845	2.398			
DCA3	My firm responds to digital transformation	0.861	2.299			
DCA4	My firm masters the state-of-the-art digital technologies	8.21	2.108			
DCA5	My firm develops innovative products/service/process using digital technology	8.37	2.609			
	Market turbulence			0.867	0.904	0.653
TP1	In our company, customers' product preferences change quite a bit over time	0.819	1.895			
TP2	Our customers tend to look for new products all the time	0.829	2.097			
TP3	Our company is witnessing demand for our products and services from customers who never bought them before	0.891	2.631			
TP4	New customers tend to have product-related needs different from those of our company's existing customers	0.837	2.333			
TP5	Price sensitivity is a character of our customers	0.853	2.060			

Table 2.
Validity and reliability test results

Source(s): Authors work

competitive advantage, digital capability and market turbulence in their respective industries. Hence, we submit the research proposal to the ethics committee from the Universitas Surabaya to gain acknowledgement that this study meets the ethical standard to minimize harm and risks, including confidential survey and conflict of interest. Moreover, confidentiality entails a researcher's commitment to ensure that the collected information from human subjects respects the respondents' dignity and autonomy by making promises not to disclose personal data (Bos, 2020).

First, we made an appointment with the owner or managers. Second, we sent the questionnaire through email or social media to obtain permission. In the next step, we conducted the online interview via video call following the appointment. As a result, we identified 450 qualified respondents to the questionnaire, including managers and owner-managers. This study used computer-assisted telephone interviews to collect data by asking

respondents' perceptions of their organizations. The inner models in SEM describe the measurement models, which assume that the construct causes the measurement of the indicator variables.

Table 1 provides four types of respondent profiles. The first is the gender category, which shows that 261 people (58%) represent female respondents, and another 42% are male. According to the age category, 183 people (40%) belong to the respondent groups over 40 years old. The respondents aged between 30 and 40 comprise 169 people or 38% of the total respondents. The occupation social class category indicates that most respondents represent a manager, with 193 people or 43% of total participants, followed by senior workers with 30% of total respondents. The next group presents the industry, with the majority belonging to the food and fashion industries, 35% and 24%, respectively.

Findings

The first step of analysis SEM adopts outer loading approach in assessing the relationship between observed variables and their underlying latent factors. Table 1 shows that outer loadings are above 0.75, which indicates acceptable items that explain more than 60% of the indicators' variance. The second step is internal consistency reliability by adopting composite reliability (CR), and Cronbach's alpha (CA) to measure how well a set of items or variables measure the same underlying construct. is internal consistency reliability. The results indicate that the CR values range from 0.9 to 0.93, which is satisfactory to good. Hence, Cronbach's alpha (CA) is another measure which presents similar results (Table 2).

The third step is convergent validity, which examines the extent to which a measurement instrument or scale measures a construct or concept it is intended to measure. The approach reflects the degree to which different measures of the same construct are related to one another. This study adopts the average variance extracted (AVE) approach to examine the convergent validity. Table 2 shows that the average variance extracted approaches (AVE) indicate that the model has greater convergent validity with more than 65% of the items' variance. The variance inflation factor (VIF) presents the collinearity level, which is less than five or the threshold for a critical collinearity problem (Table 2).

Table 3 shows various fit indices for saturated and estimated models. Standardized root mean square residual (SRMR) measures the average absolute standardized difference between the observed and reproduced covariances, with lower values indicating a better fit. SRMR of 0.064 is considered acceptable. Normed fit index (NFI) value is 0.889, showing that the model reasonably fits the data. The NFI is a fit index used to assess the relative fit of a model by comparing it to a null model. Degree of generalized fit (d_G) shows that the saturated model has a d_G value of 0.328, while the estimated model has a slightly higher value of 0.38.

Turning to the structural model assessment, the results indicate that the R^2 value is 0.544, which is a moderate level for explanatory power Figure 1. The R^2 value indicates that multiple suppliers, digital capability and market turbulence jointly explain 54.4% of the

	Saturated model	Estimated model
SRMR	0.043	0.064
d_ULS	0.431	0.946
d_G	0.328	0.38
Chi-Square	863.597	917.733
NFI	0.889	0.882

Source(s): Authors work

Table 3. Goodness of fit

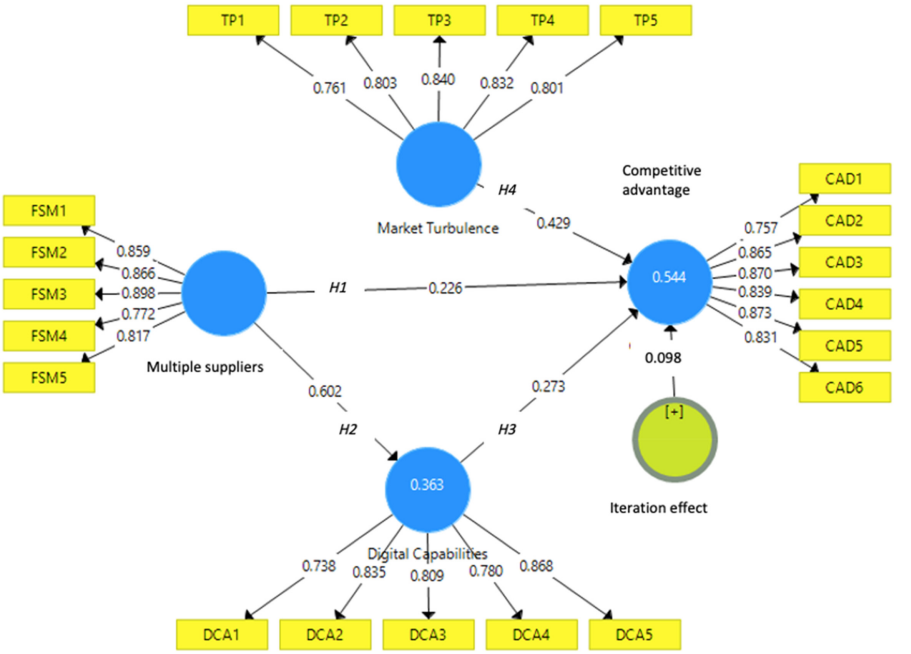


Figure 1.
Path analysis

Source(s): Authors work

variance of competitive advantage (Figure 1). In SEM, R^2 presents the coefficient of determination and is calculated for each endogenous variable in the model. It represents the proportion of the total variance in the endogenous variable that is accounted for by the exogenous variables in the model.

The next step is to discuss the hypotheses test. Table 4 indicates that multiple suppliers positively and significantly impact competitive advantage with a t-statistic of 4.32 and a p value of 0.00. The numerous suppliers also significantly impact digital capability with a t-statistic of 11.91 and p value of 0.00, which explains 36.2% variance of the endogenous construct of digital capability. Moreover, the multiple suppliers provide a significant impact and a more substantial effect on digital capability than on competitive advantage. On the

Path	Original sample (O)	Standard deviation	T statistics |O/STDEV|	p values
Multiple suppliers → Competitive advantage	0.230	0.052	4.323	0.000
Multiple suppliers → Digital capability	0.603	0.051	11.915	0.000
Digital capability → Competitive advantage	0.271	0.068	4.036	0.000
Market turbulence → Competitive advantage	0.429	0.428	0.074	5.775
Moderating Effect → Competitive advantage	0.093	0.043	2.299	0.022

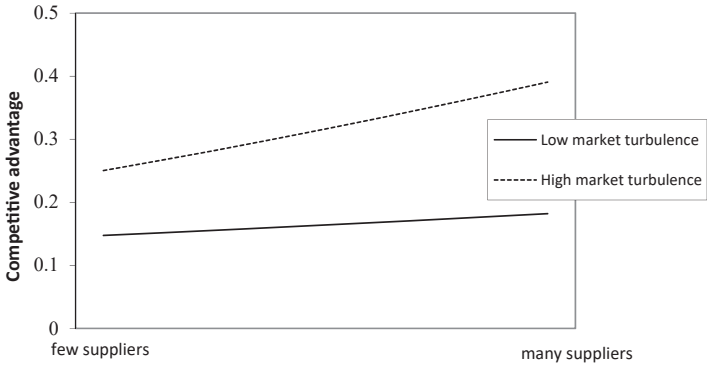
Table 4.
Bootstrapping path analysis

Source(s): Authors work

contrary, market turbulence has no significant effect on competitive advantage, with a t-test of market turbulence on the competitive advantage of 0.074 and a p value of 5.77. Hence, hypotheses 4 and 5 are not acceptable.

Figure 2 shows that firms with many suppliers can experience a more significant competitive advantage under high market turbulence than those with few. The findings extend the literature, which indicates that multiple suppliers allow firms to reduce the risk of disruption (Gheibi and Fay, 2021). However, under low market turbulence, when the business environment is relatively stable, firms with many suppliers only have a slightly higher competitive advantage than those with few. The results show that the impact of market turbulence on the competitive advantage of firms with many or few suppliers demonstrates the ability of firms to manage their supply chain relationships effectively.

Table 5 shows the strategic options following two main variables: market turbulence and the number of suppliers. Scenario I presents a situation where the firms attempt to manage many suppliers in low market turbulence. Firms exploit digital capabilities to manage many suppliers that help them to achieve competitive advantage by embracing digital capabilities. The results suggest the firms select some suppliers with a solid relationship to generate an interorganization learning process and increase digital capability. Scenario II entails a context in which buyer firms manage a few suppliers to deal with low market turbulence. Hence, firms should find new suppliers that support them in achieving a competitive advantage by enhancing their digital capability with a predictable market.



Source(s): Authors work

Figure 2.
Moderating effect

Strategic options	Low market turbulence	High market turbulence
Many suppliers	Scenario I Exploiting digital capabilities to manage the competitive advantage by selecting suppliers	Scenario II Selecting suppliers that support digital capability to seize new market opportunities
A few suppliers	Scenario III Finding new suppliers that can help them to achieve competitive advantage	Scenario IV Finding new suppliers, who support digital capability to identify the new customers' requirements

Source(s): Authors work

Table 5.
Scenarios for multiple suppliers

Scenario III shows that firms with many suppliers must deal with unpredictable market turbulence. Under market turbulence, some suppliers may prefer to exit from the market competition during tough times. Hence, firms must be adaptable to meet the customers' expectations by seeking alternate resources (Ivanov and Dolgui, 2020). Firms seeking competitive advantage must find the best suppliers that support them with the digital capability to respond to the dynamic market. Scenario IV indicates a firm with a few suppliers in high market turbulence. Hence, firms need to find alternative suppliers that help them to thrive in market turbulence by exploiting digital capability.

Discussion

Theoretical implication

First, this article contributes to the growing contingency and RBT literature that explores a managerial approach to achieving performance (Bigelow and Barney, 2021). This study indicates that multiple suppliers help firms achieve competitive advantage even during market turbulence. The results confirm that numerous suppliers present a critical mechanism to access valuable resources, enhancing firms' digital capability to gain competitive advantage (Wassmer, 2010). The results differ from previous studies stating that supply chain failure springs from market turbulence (Huang *et al.*, 2017; Tsai, 2016; Fan *et al.*, 2019). Finally, this study provides evidence that market turbulence does not affect firms with multiple suppliers to achieve competitive advantage.

Contingency theory and the RBT provide a fundamental view that explains what conditions foster flexibility and how flexible business-to-business partnership enhance their performance (Frederick, 2005). However, the value dramatically changes during the dynamic business environment, and the study should go beyond the RBT to explain the competitive advantage (Kraaijenbrink *et al.*, 2010). Firms develop their capability to adapt to dynamic markets by seeking alternate resources in the supply chain system (Ivanov and Dolgui, 2020).

The findings extend the explanation to the complement resource orchestration theory, which argues that a flexible and adaptable organization help firms retain their performance even during uncertainty (Li *et al.*, 2020). This study shows that various levels of market uncertainty have not affected the firm competitive advantage when firms enhance the supply chain responsiveness by investing in flexibility approaches. Moreover, when suppliers generate a high probability of disruption, the flexible supply chain can manage reserved capacity (Torres *et al.*, 2022).

Second, this article highlights the contingency theory that explains multiple suppliers as a condition that promotes supply chain agility. The results indicate that numerous suppliers present a capacity to react swiftly to short-term changes, which drives partnerships to adapt to consumer expectations quickly. Furthermore, the adaptability process involves information integration, which attaches directly to alignment, and leads to agility (Feizabadi *et al.*, 2019). Hence, supply chain alignment demonstrates how collaboration between firms and their supply chain members promotes sharing performance (Khan *et al.*, 2022).

On the other hand, supply chain adaptability refers to a capacity for structural changes in multiple suppliers to account by adopting various strategies, technologies and product innovation (Christopher and Lee, 2004). We confirm that embracing digital capability helps firms manage multiple suppliers by incorporating visibility across suppliers to respond to dynamic business environments (Calatayud *et al.*, 2018; Ishfaq *et al.*, 2022). Moreover, the business environment turbulence fosters firms to establish a resilient approach by leveraging valuable resources through solid partnerships with suppliers (Blessley and Mudambi, 2022).

Last, this article extends the stakeholder theory literature by exploring stakeholders' character in supporting value creation by generating digital capability. This study promotes

a more inclusive and sustainable approach to value creation by encouraging firms to adopt multiple suppliers, which provide greater flexibility and adaptability. Moreover, the findings show a different argument from the previous literature, which argues that market turbulence poses a risk from an influential stakeholder who may constrain the firms' choice to engage in value-creation partnerships (Chowdhury *et al.*, 2021). This article provides evidence that multiple suppliers help firms deal with the risk of market turbulence, allowing them to achieve a competitive advantage.

Managerial contribution

This study shows that multiple suppliers allow a firm to adopt a flexible supplier approach by providing the firm with more options and alternatives. A multiple-supplier strategy involves working with adaptable suppliers who can respond quickly to changing market conditions and customer needs. A firm can access a diverse range of suppliers with different capabilities and expertise by working with multiple suppliers. This approach can help the firm to choose the most suitable supplier for a specific project or task. Multiple suppliers also can bring new ideas and perspectives to the table, which can help the firm to improve its products, services, and processes. This strategy can help the firm to stay ahead of the competition and respond quickly to changing customer needs. Significant demand variations offer possible scenarios for a multisource approach, which allows buyer firms to embrace their digital capability to react to various demand fluctuations. An open mindset is essential for decision makers to generate flexible strategies and performance monitoring.

Second, in highly competitive and turbulent markets, firms face the challenge of achieving a sustainable competitive advantage. One way to do so is by working with multiple suppliers, which can help reduce costs, improve flexibility, and increase innovation. However, this strategy can also be complex and challenging to manage. To overcome these challenges, firms can leverage their digital capabilities to gain a competitive advantage. By using digital tools and technologies, such as supply chain management systems, predictive analytics and artificial intelligence, firms can improve their supplier relationships and enhance their overall supply chain performance. Under environmental turbulence, firms should adopt a continuous process to craft the strategy to achieve competitive advantage. Hence, business leaders must develop scenarios to generate various options with wildly differing payoffs (Table 5). Business leaders must understand what is happening at cognitive and emotional levels (Alvarez and Porac, 2020).

Third, adopting multiple and flexible suppliers can significantly enhance a firm's digital capability. By working with numerous suppliers, firms can access a broader range of expertise, resources and technological capabilities, which can help them improve their overall digital capabilities. Additionally, working with flexible suppliers can help firms adapt quickly to changing market conditions and customer needs. A firm can access a broader range of technology and expertise by working with multiple suppliers. This approach can help the firm stay at the forefront of digital innovation and ahead of the competition. Working with various suppliers can facilitate collaboration and knowledge-sharing within the firm, allowing for more effective problem-solving and innovation.

Research limitations

First, this study offers empirical evidence with unit analysis of buyer firms that seek competitive advantage by exploiting digital capability. This quantitative research method allows researchers to generalize findings to a larger population by focussing on a single-unit analysis of buyer firms. However, this approach focusses on a single unit analysis: buyer firms. Hence, there is an opportunity to adopt a qualitative approach to explore the suppliers and end-users from different perspectives that broadly support supply chain performance

in which all players need to integrate their system with flexible suppliers by aligning standards and conventions. Moreover, future studies should examine the role of digital enablers in building a framework that brings all players into an agreement standard that helps buyer firms to manage multiple suppliers.

Second, this article adopts the general digital capability concept, which involves acquiring digital technologies, opportunities, and transformation. This approach uses standardized instruments and procedures, making replicating studies and comparing results across different settings or populations easier. However, digital technology has advanced rapidly in recent years, revolutionizing how we live and work. For example, augmented reality, artificial intelligence and cloud technology have provided immersive experiences for entertainment, education and training, as well as in industries such as architecture and manufacturing. Therefore, future studies should identify various levels of digital capability that support supply chain integration by facilitating open-source technology and data exchange.

Last, this study occurred in the Indonesian context with specific industry types, such as retail, fashion, food and service, presenting significant economic activities. In addition, this country has demonstrated growing digital capability driven by affordable smartphones and mobile data plans. Therefore, future studies should explore different industry types and specific contexts, presenting a unique business. By considering the various contextual factors that contribute to a particular situation, the readers can gain a deeper understanding of the meaning and significance of that situation and identify potential areas for intervention or improvement. In addition, the qualitative approach may allow future studies that offer a tentative explanation of multiple-supplier strategies by exploring a unique partnership.

Conclusion

This article presents the multiple suppliers and digital capability to extend the growing literature of RBT. This study proposes a structural equation model, which examines whether the additional exogenous variables provide valuable for extending the concept. Furthermore, this study involves market turbulence as a moderating variable to explain the under certain conditions that could change the strength or direction of the relationship between multiple suppliers and competitive advantage. While previous studies show that market turbulence provides a high probability of supply chain failure, this study indicates that firms with flexible supply chain via multiple suppliers will remain to achieve competitive advantage even under high market turbulence.

References

Agarwal, U. and Nayarana, S. (2020), "Impact of relational communication on buyer-supplier relationship satisfaction: role of trust and commitment", *Benchmarking: An International Journal*, Vol. 27 No. 8, pp. 2459-2496, doi: 10.1108/BIJ-05-2019-0220.

Alvarez, S.A. and Porac, J. (2020), "Imagination, indeterminacy, and managerial choice at the limit of knowledge", *Academy of Management Review*, Vol. 45 No. 4, pp. 735-744, doi: 10.5465/amr.2020.0366.

Arora, A., Arora, A., Anyu, J. and McIntyre, J. (2022), "Global value chains' disagregation through supply chain collaboration, market turbulence, and performance outcomes", *Sustainability*, Vol. 13 No. 8, p. 4151, doi: 10.3390/su13084151.

Asiaei, K., Rezaee, Z., Bontis, N., Barani, O. and Sapiei, N.S. (2021), "Knowledge assets, capabilities and performance measurement systems: a resource orchestration theory approach", *Journal of Knowledge Management*, Vol. 25 No. 8, pp. 1947-1976, doi: 10.1108/JKM-09-2020-0721.

Barney, J.B. and Harrison, J.S. (2018), "Stakeholder theory at the crossroads", *Business and Society*, Vol. 59 No. 2, doi: 10.1177/0007650318796792.

Barney, J.B., Ketchen, D.J. and Wright, M. (2021), "Resource-based theory and value creation framework", *Journal of Management*, Vol. 47 No. 7, pp. 1936-1955, doi: 10.1177/01492063211021655.

Barreto, I. (2010), "Dynamic capabilities: a review of past research and an agenda for the future", *Journal of Management*, Vol. 36 No. 1, doi: 10.1177/0149206309350.

Bigelow, L. and Barney, J. (2021), "What can strategy learn from the business model approach?", *Journal of Management Studies*, Vol. 58 No. 2, pp. 528-539, doi: 10.1111/joms.12579.

Birkel, H. and Hartmann, E. (2020), "Internet of Things – the future of managing supply chain risks", *Supply Chain Management*, Vol. 25 No. 5, pp. 535-548, doi: 10.1108/SCM-09-2019-0356.

Blessley, M. and Mudambi, S. (2022), "A trade war and a pandemic: disruption and resilience in the food bank supply chain", *Industrial Marketing Management*, Vol. 102, pp. 58-73, doi: 10.1016/j.indmarman.2022.01.002.

Bonamigo, A., da Silva, A.A., da Silva, B.P. and Werner, S.M. (2022), "Criteria for selecting actors for the value co-creation in startups", *Journal of Business and Industrial Marketing*, Vol. 37 No. 11, pp. 2332-2343, doi: 10.1108/JBIM-02-2021-0083.

Bongiorno, G., Rizzo, D. and Vaia, G. (2018), *CIO and the Digital Transformation*, Springer.

Bos, J. (2020), "Confidentiality", in *Research Ethics for Students in the Social Sciences*, Springer, Cham, doi: 10.1007/978-3-030-48415-6_7.

Burin, A., Arostegui, M. and Montes, J. (2020), "Ambidexterity and IT competence can improve supply chain flexibility? A resource orchestration approach", *Journal of Purchasing and Supply Management*, Vol. 26 No. 2, 100610, doi: 10.1016/j.pursup.2020.100610.

Burke, G., Carrillo, J. and Vakharia, A. (2007), "Single vs multiple supplier sourcing strategies", *European Journal of Operational Research*, Vol. 182, pp. 95-112, doi: 10.1016/j.ejor.2006.07.007.

Calatayud, A., Mangan, J. and Christopher, M. (2018), "The self-thinking supply chain", *Supply Chain Management*, Vol. 24 No. 1, pp. 22-38, doi: 10.1108/SCM-03-2018-0136.

Canhoto, A.I., Quinton, S., Pera, R. and Simkin, L. (2021), "Digital strategy aligning in SMEs: a dynamic capabilities perspective", *The Journal of Strategic Information Systems*, Vol. 30 No. 3, doi: 10.1016/j.jsis.2021.101682.

Centobelli, P., Cerchione, R., Cricelli, L. and Strazzullo, S. (2022), "The future of sustainable supply chains: a novel tertiary-systematic methodology", *Supply Chain Management: An International Journal*, Vol. 27 No. 6, p. 762, doi: 10.1108/SCM-08-2020-0383.

Chatterjee, S. and Chaudhuri, R. (2021), "Supply chain sustainability during turbulent environment: examining the role of firm capabilities and government regulation", *Operation Management Research*, Vol. 15, pp. 1081-1095, doi: 10.1007/s12063-021-00203-1.

Chatzikontidou, A., Longinidis, P., Tsiakis, P. and Georgiadis, M. (2017), "Flexible supply chain network design under uncertainty", *Chemical Engineering Research and Design*, Vol. 128, pp. 290-305, doi: 10.1016/j.cherd.2017.10.013.

Chen, Z., Ming, X. and Chang, Y. (2020), "Sustainable supplier selection for smart supply chain considering internal and external uncertainty: an integrated rough-fuzzy approach", *Applied Soft Computing*, Vol. 87, 106004, doi: 10.1016/j.asoc.2019.106004.

Chen, Y., Cheng, C., Osborne, R., Kayser, L., Liu, C. and Chang, L. (2021), "Validity testing and cultural adaptation of eHealth Literacy Questionnaire (eHLC) among people with chronic diseases in Taiwan: mixed methods study", *Journal of Medical Internet Research*, Vol. 24 No. 1, e35044310, doi: 10.2196/32855.

Chowdhury, P., Paul, S.K., Kaisar, S. and Moktadir, A. (2021), "COVID-19 pandemic related supply chain studies: a systematic review", *Transportation Research Part E.: Logistics and Transportation Review*, Vol. 148, 102271, doi: 10.1016/j.tre.2021.102271.

Christopher, M. and Lee, H. (2004), "Mitigating supply chain risk through improved confidence", *International Journal of Physical Distribution and Logistic Management*, Vol. 34 No. 5, pp. 388-396, doi: 10.1108/09600030410545436.

Cohen, M. and Lee, H.L. (2020), "Designing the right global supply chain network", *Manufacturing and Service Operations Management*, Vol. 22 No. 1, pp. 15-24, doi: 10.1287/msom.2019.0839.

Constantino, N. and Pellegrino, R. (2022), "Choosing between single and multiple sourcing based on supplier default risk: a real options approach", *Journal of Purchasing Supply Management*, Vol. 6 No. 1, pp. 27-40, doi: 10.1016/j.pursup.2009.08.001.

Dadzie, K., Dadzie, C., Johnston, W. and Winston, E. (2022), "The integration of logistics and marketing practice into baseline supply chain practices in the emerging markets", *Journal of Business and Industrial Marketing*, Vol. 38 No. 2, pp. 367-383, doi: 10.1108/JBIM-01-2022-0002.

Dörner, K. and Edelman, D. (2015), *What 'digital' Really Means*, McKinsey and Company, New York.

Fan, K., Li, X. and Wang, M. (2019), "Two-stage supply chain contract coordination of solid biomass fuel involving multiple suppliers", *Computers and Industrial Engineering*, Vol. 135, pp. 1167-1174, doi: 10.1016/j.cie.2019.01.016.

Feizabadi, J., Maloni, M. and Gligor, D. (2019), "Benchmarking the triple-A supply chain: orchestrating agility, adaptability, and alignment", *Benchmarking: An International Journal*, Vol. 26 No. 1, pp. 271-295, doi: 10.1108/BIJ-03-2018-0059.

Frankiewicz, B. and Chamorro-Premuzic, T. (2020), "Digital transformation is about talent, not technology", *Harvard Business Review*, available at: https://hbr.org/2020/05/digital-transformation-is-about-talent-not-technology (accessed 10 December 2022).

Frederick, E. (2005), "Infusing flexibility into business-to-business firms: a contingency theory and resource-based view perspective and practical implications", *Industrial Marketing Management*, Vol. 34 No. 6, pp. 555-565, doi: 10.1016/j.indmarman.2004.09.022.

Freeman, R.E., Harrison, J.S., Wicks, A.C., Parmar, B. and de Colle, S. (2010), *Stakeholder Theory: the State of the Art*, Cambridge University Press, New York, NY.

Gheibi, S. and Fay, S. (2021), "The impact of supply disruption risk on a retailer's pricing and procurement strategies in the presence of a substitute product", *Journal of Retailing*, Vol. 97 No. 3, pp. 359-376, doi: 10.1016/j.jretai.2020.11.005.

Hayes, Ó. and Kelliher, F. (2022), "The emergence of B2B omni-channel marketing in the digital era: a systematic literature review", *Journal of Business and Industrial Marketing*, Vol. 37 No. 11, pp. 2156-2168, doi: 10.1108/JBIM-02-2021-0127.

Hou, C.-K. (2020), "The effects of IT infrastructure integration and flexibility on supply chain capabilities and organizational performance: an empirical study of the electronics industry in Taiwan", *Information Development*, Vol. 36 No. 4, pp. 576-602, doi: 10.1177/0266666919884352.

Huang, Y.-S., Hung, J.-S. and Ho, J.-W. (2017), "A study on information sharing for supply chains with multiple suppliers", *Computers and Industrial Engineering*, Vol. 104 No. 2, pp. 114-123, doi: 10.1016/j.cie.2016.12.014.

Ishfaq, R., Sramek, B. and Gibson, B. (2022), "Digital supply chains in omnichannel retail: a conceptual framework", *Journal of Business Logistics*, Vol. 43 No. 2, pp. 169-188, doi: 10.1111/jbl.12277.

Ivanov, D. and Dolgui, A. (2020), "Viability of intertwined supply networks: extending the supply chain resilience angles towards survivability. A position paper motivated by COVID-19 outbreak", *International Journal of Production Research*, Vol. 58 No. 10, pp. 2904-2915, doi: 10.1080/00207543.2020.1750727.

Jørgensen, M., Ellegaard, C. and Kragh, H. (2022), "Boundary spanning in multiple supplier development initiatives: an exploratory study", *Supply Chain Management*, Vol. 28 No. 3, pp. 450-469, doi: 10.1108/SCM-11-2020-0585.

Ketokivi, M. (2009), "Elaborating the contingency theory of organizations: the case of manufacturing flexibility strategies", *Production and Operation Management*, Vol. 15 No. 2, pp. 215-228, doi: 10.1111/j.1937-5956.2006.tb00241.x.

Khan, S.A., Piprani, A. and Yu, Z. (2022), "Supply chain analytics and post-pandemic performance: mediating role of triple-A supply chain strategies", *International Journal of Emerging Markets*, Vol. 18 No. 6, pp. 1330-1354, doi: 10.1108/IJOEM-11-2021-1744.

Kraaijenbrink, J., Spender, J.C. and Groen, A.J. (2010), "The resource-based view: a review and assessment of its critiques", *Journal of Management*, Vol. 36 No. 1, pp. 349-372, doi: 10.1177/0149206309350775.

Kumar, V., Jones, E., Venkatesan, R. and Leone, R.P. (2011), "Is market orientation on source of sustainable competitive advantage or simply the cost of competing", *Journal of Marketing*, Vol. 75 No. 1, pp. 16-30, doi: 10.1509/jm.75.1.16.

Li, C., Wong, C. and Yang, C. (2020), "Value of supply chain resilience: roles of culture, flexibility, and integration", *International Journal of Physical Distribution and Logistics Management*, Vol. 50 No. 1, pp. 80-100, doi: 10.1108/IJPDLM-02-2019-0041.

Li, L. (2022), "Digital transformation and sustainable performance: the moderating role of market turbulence", *Industrial Marketing Management*, Vol. 104, pp. 28-37, doi: 10.1016/j.indmarman.2022.04.007.

Li, J., Chai, L. and Tangpong, C. (2022), "An empirical investigation of buyer–supplier relationship typologies and their behavioral and performance outcomes", *Journal of Business and Industrial Marketing*, Vol. 37 No. 4, pp. 874-892, doi: 10.1108/JBIM-06-2020-0281.

Lund, R., Nielsen, L., Henriksen, P., Schmidt, L., Avlund, K. and Christensen, Ul (2014), "Content validity and reliability of Copenhagen social relations questionnaire", *Journal of Aging and Health*, Vol. 26 No. 1, pp. 128-150, doi: 10.1177/0898264313510.

MacKenzie, H. and Hardy, K. (1996), "Manage your offering or manage your relationship?", *Journal of Business and Industrial Marketing*, Vol. 11 No. 6, pp. 20-37, doi: 10.1108/08858629610151280.

Massari, G. and Giannoccaro, I. (2021), "Investigating the effect of horizontal coopetition on supply chain resilience in complex and turbulent environments", *International Journal of Production Economics*, Vol. 237, 108150, doi: 10.1016/j.ijpe.2021.108150.

Matsui, K. (2022), "Should a retailer bargain over a wholesale price with a manufacturer using a dual-channel supply chain?", *European Journal of Operational Research*, Vol. 300 No. 3, pp. 1050-1066, doi: 10.1016/j.ejor.2021.09.012.

Minner, S. (2003), "Multiple-supplier inventory models in supply chain management: a review", *International Journal of Production Economics*, Vol. 81, pp. 265-279, doi: 10.1016/S0925-5273(02)00288-8.

Piprani, A.Z., Jaafar, N.I., Ali, S.M., Mubarik, S. and Shahbaz, M. (2022), "Multi-dimensional supply chain flexibility and supply chain resilience: the role of supply chain risks exposure", *Operations Management Research*, Vol. 15, pp. 307-325, doi: 10.1007/s12063-021-00232-w.

Pratono, A.H. (2022), "The strategic innovation under information technological turbulence: the role of organisational resilience in competitive advantage", *Competitive Review*, Vol. 32 No. 3, pp. 475-491, doi: 10.1108/CR-03-2021-0046.

Pratono, A.H. and Maharani, A. (2023), "Enhancing global supply chain resilience in the Indonesian medical device industry: a dynamic capability perspective", *Journal of Asia Business Studies*, Vol. ahead-of-print No. ahead-of-print, doi: 10.1108/JABS-03-2022-0081.

Queiroz, M., Pereira, S., Telles, R. and Machado, M. (2021), "Industry 4.0 and digital supply chain capabilities", *Benchmarking: An International Journal*, Vol. 28 No. 5, pp. 1761-1782, doi: 10.1108/BIJ-12-2018-0435.

Rajesh, R. (2021), "Flexible business strategies to enhance resilience in manufacturing supply chains: an empirical study", *Journal of Manufacturing Systems*, Vol. 60, doi: 10.1016/j.jmsy.2020.10.010.

Rogers, P.A. (2005), "Optimising supplier management and why co-dependency equals mutual success", *Journal of Facilities Management*, Vol. 4 No. 1, pp. 40-50, doi: 10.1108/14725960610644212.

Sarkar, B. and Bhuniya, S. (2022), "A sustainable flexible manufacturing–remanufacturing model with improved service and green investment under variable demand", *Expert Systems with Applications*, Vol. 202 No. 9, 117154, doi: 10.1016/j.eswa.2022.117154.

Shen, W., Yang, C. and Gao, L. (2020), "Address business crisis caused by COVID-19 with collaborative intelligent manufacturing technologies", *IET Collaborative Intelligent Manufacturing*, Vol. 2 No. 2, pp. 96-99, doi: 10.1049/iet-cim.2020.0041.

Shekarian, M., Nooraie, S. and Parast, M. (2020), "An examination of the impact of flexibility and agility on mitigating supply chain disruptions", *International Journal of Production Economics*, Vol. 220 No. 2, 107438, doi: 10.1016/j.ijpe.2019.07.011.

Shukor, A., Newaz, M.S., Rahman, M. and Taha, A. (2021), "Supply chain integration and its impact on supply chain agility and organizational flexibility in manufacturing firms", *International Journal of Emerging Markets*, Vol. 16 No. 8, pp. 1721-1744, doi: 10.1108/IJOEM-04-2020-0418.

Singh, S., Chen, J., Del Giudice, M. and El-Kassar, A. (2019), "Environmental ethics, environmental performance, and competitive Advantage: role of environmental training", *Technological Forecasting and Social Change*, Vol. 146, pp. 203-2011, doi: 10.1016/j.techfore.2019.05.032.

Sirmon, D., Hitt, M. and Gilbert, B. (2011), "Resource orchestration to create competitive advantage: bread, depth, and life cycle effects", *Journal of Management*, Vol. 37 No. 5, doi: 10.1177/0149206310385695.

Son, B.-G., Kim, H., Hur, D. and Subramanian, N. (2021), "The dark side of supply chain digitalisation: supplier-perceived digital capability asymmetry, buyer opportunism and governance", *International Journal of Operations and Production Management*, Vol. 41 No. 7, pp. 1220-1247, doi: 10.1108/IJOPM-10-2020-0711.

Sousa, V. and Rojjanasrinat, W. (2011), "Translation, adaptation and validation of instruments or scales for use in cross-cultural health care research: a clear and user-friendly guideline", *Journal of Evaluation in Clinical Practice*, Vol. 17 No. 2, pp. 268-274, doi: 10.1111/j.1365-2753.2010.01434.x.

Steinberg, M. (2021), "From automobile capitalism to platform capitalism: toyotism as a prehistory of digital platforms", *Organization Studies*, Vol. 43 No. 7, pp. 1069-1090, doi: 10.1177/01708406211030681.

Stevenson, M. and Spring, M. (2007), "Flexibility from a supply chain perspective: definition and review", *International Journal of Operations and Production Management*, Vol. 27 No. 7, pp. 685-713, doi: 10.1108/01443570710756956.

Sun, J., Tekleab, A., Cheung, M. and Wu, W.-P. (2022), "The contingent roles of market turbulence and organizational innovativeness on the relationships among interfirm trust, formal contracts, interfirm knowledge sharing and firm performance", *Journal of Knowledge Management*, Vol. 27 No. 5, pp. 1436-1457, doi: 10.1108/JKM-04-2022-0289.

Tahirov, N. and Glock, C. (2022), "Manufacturer encroachment and channel conflicts: a systematic review of the literature", *European Journal of Operational Research*, Vol. 302 No. 2, pp. 403-426, doi: 10.1016/j.ejor.2021.12.006.

Torres, A., Mahmoodi, F. and Ohmori, S. (2022), "Suppliers portfolio and returner incentive decisions in closed-loop remanufacturing systems under multiple stochastic scenarios", *International Journal of Sustainable Engineering*, Vol. 15 No. 1, pp. 210-217, doi: 10.1080/19397038.2022.2110330.

Tsai, W.C. (2016), "A dynamic sourcing strategy considering supply disruption risks", *International Journal of Production Research*, Vol. 54 No. 7, pp. 2170-2184, doi: 10.1080/00207543.2015.1129465.

Villena, V., Choi, T. and Revilla, E. (2021), "Mitigating mechanism for the dark side of collaborative buyer-supplier relationships: a mixed method study", *Journal of Supply Chain Management*, Vol. 57 No. 4, pp. 86-116, doi: 10.1111/jscm.12239.

Wang, F., Chen, J., Yang, H. and Yu, B. (2022), "Supplier selection with information disclosure in the presence of uninformed consumers", *International Journal of Production Economics*, Vol. 243, 108341, doi: 10.1016/j.ijpe.2021.108341.

Wassmer, U. (2010), "Alliance portfolios: a review and research agenda", *Journal of Management*, Vol. 36 No. 1, pp. 141-171, doi: 10.1177/0149206308328484.

Wissuwa, F., Durach, C. and Choi, T. (2022), "Selecting resilient suppliers: supplier complexity and buyer disruption", *International Journal of Production Economics*, Vol. 253, 108601, doi: 10.1016/j.ijpe.2022.108601.

Zhou, K.Z. and Wu, F. (2010), "Technological capability, strategic flexibility, and product innovation", *Strategic Management Journal*, Vol. 31 No. 5, pp. 547-561, doi: 10.1002/smj.830.

Further reading

Duclos, L., Vokurka, R. and Lummus, R. (2003), "A conceptual model of supply chain flexibility", *Industrial Management and Data Systems*, Vol. 103 No. 6, pp. 446-456, doi: 10.1108/02635570310480015.

Mosch, P., Schweiki, S. and Obermaier, R. (2021), "Trapped in the supply chain? Digital servitization strategies and power relations in the case of an industrial technology supplier", *International Journal of Production Economics*, Vol. 236, 108141.

Sodhi, M., Tang, C.S. and Willenson, E.T. (2021), "Research opportunities in preparing supply chains of essential goods for future pandemics", *International Journal of Production Research*, Vol. 61 No. 8, pp. 2416-2431, doi: 10.1080/00207543.2021.1884310.

van Hoek, R. (2020), "Research opportunities for a more resilient post-COVID-19 supply chain – closing the gap between research findings and industry practice", *International Journal of Operations and Production Management*, Vol. 40 No. 4, pp. 341-355, doi: 10.1108/IJOPM-03-2020-0165.

Corresponding author

Aluisius Hery Pratono can be contacted at: hery_pra@staff.ubaya.ac.id