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Is knowledge management a missing link? Linking entrepreneurial competencies and sustainable performance of manufacturing SMEs

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Abstract

Purpose – By combining relevant literature and using quantitative methodology, this study aims to look into the role of knowledge management (KM) as a mediator between entrepreneurial competencies (ECs) and the sustainable performance (SP) of manufacturing small and medium-sized enterprises (SMEs).

Design/methodology/approach – The relationships in the proposed model were examined with data collected from 122 Malaysian SMEs using a cross-sectional technique and a standardized questionnaire and analyzed using structural equation modeling path analysis.

Findings – According to the findings, ECs have a positive and considerable impact on KM as well as the SP of manufacturing SMEs. Importantly, KM partially mediates between ECs and the SP of manufacturing SMEs.

Research limitations/implications – This research provides a theoretical contribution through the integration of ECs, KM and SP within a unified framework that takes into account the viewpoints of the resource-based view, the knowledge-based view and the triple bottom line. The results corroborate that ECs directly affect SP and indirectly through KM. Nevertheless, the study's use of cross-sectional survey data makes it impossible to draw conclusions about causes. This is because ECs, KM and SP all have effects on time that this empirical framework cannot account for.

Practical implications – The findings of this research provide valuable insights for managers and decision-makers in SMEs, who are expected to show an increasing interest in adopting KM processes into their companies through which ECs can be translated into SP.

Social implications – By applying the proposed framework, SMEs can conduct their activities in ways that do not harm environmental and societal well-being while achieving appropriate economic performance at the same time.

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Originality/value – As a result, the findings of this study can add to the literature on ECs and KM, as well as boost the chances of SME sustainability. Directions for future research are also provided in relation to a better understanding of the factors affecting the SP of SMEs.

Keywords Entrepreneurial competencies, Knowledge management, Sustainable performance, SMEs

Paper type Research paper

1. Introduction

The sustainable development is gaining widespread recognition as a crucial global transition (Al-Swidi *et al.*, 2024a,b; Raworth, 2017). Similarly, small and medium-sized enterprises (SMEs) play a pivotal role in the imperative shift toward sustainability (Lopez-Torres, 2023). As a result, many SMEs, especially those in the manufacturing industry, are under increasing pressure to solve environmental and social concerns as a result of their position in the industry (Al-Swidi *et al.*, 2022). Overall, manufacturing SMEs are a major source of air pollution, accounting for 64% of overall pollution (Behjati, 2017). Moreover, their production activity, which accounts for around 38% of CO_2 emissions, is among the most significant contributors to global environmental degradation (Hertwich, 2021). Therefore, enhancing the sustainability of SMEs is a major concern (de Sousa Jabbour *et al.*, 2020; Yavuz *et al.*, 2023).

Indeed, for companies to engage in initiatives that support sustainable development, they need distinct resources that have the potential to create value (Seraj *et al.*, 2022). Since SMEs are the key sources of entrepreneurship, which subsequently bolsters a nation's competitiveness and yields revenue for entrepreneurs, it is essential to prioritize measures aimed at improving their efficiency, competitiveness and productivity (Ab Rahman and Ramli, 2014; Tehseen *et al.*, 2019). As a result, it is widely acknowledged that SMEs require competencies and personnel with abilities and personality traits that have a substantial influence on their long-term sustainability (Aidara *et al.*, 2021). Scholars agree that entrepreneurial competencies (ECs) are indispensable for individuals to successfully navigate and prosper in the fiercely competitive corporate environment (Hamzah and Othman, 2023; Khan *et al.*, 2023; Bansal *et al.*, 2023).

The presence of a skilled workforce is crucial for the commencement of entrepreneurial activities (Mokhtar, 2017) and the effective functioning of SMEs in both developed and emerging nations. Similar to numerous other developing nations, SMEs have garnered substantial attention in Malaysia's industrial policy agenda because of their crucial role in stimulating economic growth and development, as illustrated (Tajudin *et al.*, 2014). Aris (2007) emphasizes that SMEs in Malaysia make a substantial contribution to the economy through their production and labor-intensive characteristics. They represent 99.2% of all businesses and employ 56.4% of the total workforce (Tehseen *et al.*, 2019). Entrepreneurial activities in Malaysia, especially among SMEs, play a pivotal role in fostering both swift and equitable economic expansion by promoting innovation, generating employment opportunities and enhancing export capabilities (Jones *et al.*, 2021). Starting in the early 1970s, the Malaysian government has aggressively promoted entrepreneurship through the adoption of several governmental policies (Mokhtar, 2017), recognizing its diverse positive impacts on the country's economy. Nevertheless, governmental support did not seem to significantly influence the performance of firms in Malaysia (Tehseen *et al.*, 2019). This suggests that the success and performance of Malaysian businesses rely more heavily on entrepreneurial resources. Nevertheless, Malaysian entrepreneurs have the opportunity to leverage their ECs as a means of mitigating the deficiencies or inefficiencies in institutional support. However, no empirical research has taken into account the role of ECs in enhancing SMEs' sustainable performance (SP).

While the literature acknowledges the importance of ECs in enhancing the sustainability of SMEs (Chander *et al.*, 2020; Tehseen and Ramayah, 2015), prior research has produced inconclusive findings (Agyapong and Acquaah, 2016; Aquilani *et al.*, 2017). Furthermore, the

relationship between different ECs and the competitiveness of business performance is complex and warrants comprehensive examination (Al Mamun *et al.*, 2018, 2019; Tehseen and Anderson, 2020). Consequently, numerous researchers advocate for further investigations into the correlation between ECs and SP of SMEs (Yusoff *et al.*, 2018; Al Koliby *et al.*, 2022a, 2022b). These studies aim to provide a deeper understanding of the underlying mechanism of this relationship, including the potential direct and/or indirect effects of EC on SP. Consistent with this perspective, the present study centers on the knowledge management (KM), which is viewed as a strategic resource according to the knowledge-based view (KBV), as a potential mediator that links ECs to SP.

Competent business owners recognize knowledge as a fundamental resource for firms to achieve growth, development and competitive advantage (Tehseen and Ramayah, 2015; Ismail, 2022), while a lack of knowledge leads some entrepreneurs to be un-innovative, risk-averse and unenthusiastic about their work, unproductive and neither willing nor able to acquire new competencies (Pepple and Enuoh, 2020). Besides, knowledge dissemination within a firm makes it challenging for others to replicate its capabilities and competencies, highlighting the importance of this practice for success (Bloem and Salimi, 2022). KM processes, such as knowledge acquisition, dissemination of knowledge and knowledge application, are critical for boosting corporate sustainable development (Abbas and Sağsan, 2019). However, there are very few studies on the relationship between KM and sustainability (Demir *et al.*, 2023). On the other hand, earlier research underscores the significance of ECs in enhancing sustainability by leveraging various knowledge-related capabilities that contribute to improved business performance (e.g. Sapta *et al.*, 2021). When competencies and KM are put together, they can boost corporate sustainability; nonetheless, no comprehensive study has been conducted to disclose the linkages between ECs, KM and SP in an integrated manner. Furthermore, KM's mediating role has gotten less attention (Bozer and Jones, 2018). Therefore, to address the current shortcomings in previous studies, the following research questions are suggested:

RQ1. Do ECs and KM affect SP in manufacturing SMEs?

RQ2. Do ECs affect KM in manufacturing SMEs?

RQ3. Does KM significantly mediate the effect of ECs on SP of manufacturing SMEs?

This study makes a twofold contribution to the literature. Initially, it amalgamates the resource-based view (RBV), KBV and the triple bottom line (TBL) as guiding principles within a unified framework. This framework is devised to explore the connection between ECs, KM and SP in manufacturing SMEs. In addition, this study examines the function of KM as a mediator between ECs and SP. Moreover, the focus of this study is on SMEs in the manufacturing sector within the context of Malaysia, which is considered an emerging country, when assessing the ECs–SP link. Limited research, especially in the context of Malaysia, has endeavored to elucidate this association, mostly concentrating on environmental factors (Hamann *et al.*, 2017), social aspects (Kraus *et al.*, 2017) or economic indicators (Soto-Acosta *et al.*, 2016). In contrast, the present analysis integrates all three components. Moreover, studying KM in small businesses is highly important (Durst and Runar Edvardsson, 2012), given the importance of knowledge to company studies. In doing so, we respond to Durst *et al.*'s (2023) call for further investigation of this topic.

The paper is structured, starting with a review of the literature related to the study in Section 2. In Section 3, the methodology adopted to conduct the study is explained in detail. The findings of the study are presented in Section 4, providing a comprehensive overview of the results. Section 5 comprises a discussion of the findings, including their implications and limitations. Finally, Section 6 outlines potential avenues for future research.

2. Literature review

2.1 Theoretical basis

Theoretically, this study integrated RBV, KBV and TBL framework to examine the mediating role of KM between ECs and SP of manufacturing SMEs in Malaysia. According to the RBV, a firm's valuable, scarce, non-replicable and one-of-a-kind resources can contribute to achieving a competitive advantage of the firm (Barney, 1991). The firm possesses a wide range of resources comprising "assets, capabilities, organizational procedures, characteristics, information, and knowledge" that are under its control, which empower it to formulate and execute successful strategies (Al-Hakimi *et al.*, 2022b, 2023). Accordingly, human resources and distinctive qualities are important resources in firms' survival and sustainability (Collins, 2021; Yong *et al.*, 2020). In contrast, KBV theory emphasizes the role of knowledge as a critical resource for preserving competitiveness and generating exceptional results (Grant, 1996). Moreover, studies employing both theories remain fragmented in many aspects. The connection of knowledge as a resource with RBV and the powerful combination of RBV and KBV are evident. Despite these connections, the research field remains fragmented in many respects (Pereira and Bamel, 2021; Cooper *et al.*, 2023). KBV is still under-explored, particularly among SMEs (Mete and Belgin, 2022; Pereira and Bamel, 2021). Similarly, the TBL framework encourages long-term business practices that boost overall performance (Al Koliby *et al.*, 2023). TBL takes environmental, economic and social variables into account, so striking a balance between these dimensions promotes performance (Nguyen, 2019). RBV contributes to a better understanding of the role of ECs in establishing long-term competitive advantage and growth (Al Koliby *et al.*, 2022a). The KBV theory addresses KM, whereas the TBL framework promotes SP of manufacturing SMEs (Al Koliby *et al.*, 2023).

In investigating the determinants of SP, a diverse array of scholars have embraced various theoretical underpinnings and frameworks. These theories include the technology-organization-environment theory, social exchange theory, RBV, ecological modernization theory, social identity theory, natural RBV, dynamic capability theory and sustainable supply chain management framework, as discussed by Alraja *et al.* (2022), Wang and Huang (2022), Al-Hakimi *et al.* (2022a), Chowdhury *et al.* (2022) and Iqbal and Ahmad (2021). However, it is important to highlight that the primary focus of these studies has been on emerging economies, specifically Oman (Alraja *et al.*, 2022), Saudi Arabia (Al-Hakimi *et al.*, 2022a), China (Lin *et al.*, 2022; Wang and Huang, 2022), Colombia (Acosta-Prado and Tafur-Mendoza, 2022), Vietnam (Chowdhury *et al.*, 2022) and Pakistan (Iqbal *et al.*, 2021). Notably, none of the aforementioned studies have explored the interrelationships among ECs, KM and SP within the specific context of Malaysian manufacturing SMEs. Furthermore, these investigations have not amalgamated RBV, KBV and TBL framework into a unified and comprehensive conceptual framework.

2.2 Sustainable performance

From a business standpoint, sustainability embodies the balanced integration of environmental, social and economic elements (Dey *et al.*, 2020). SP could be perceived as the combination of environmental, social and economic performance. A method of the practice and assessment of sustainable development is also known as SP (Fauzi *et al.*, 2010). It includes actions, programs and policies that address environmental and social concerns while remaining profitable, thereby paving the way for a more sustainable future (Al-Hakimi *et al.*, 2022a; Shahab *et al.*, 2020). TBL model is occasionally used to describe this (Elkington and Rowlands, 1998). Therefore, organizations must assess their economic, environmental and social performance to attain sustainability (Jordão *et al.*, 2020; Al Koliby *et al.*, 2023).

Overall, economic performance is evaluated through operational and financial criteria. In operational terms, it pertains to manufacturers' capacity to reduce input costs, energy consumption and waste management (Afum *et al.*, 2020). Financially, it is gauged by market

share, profitability and return on investment (Al-Hakimi *et al.*, 2022a). In related studies, life-cycle cost emerges as a key indicator in evaluating economic sustainability, with many researchers considering it a primary measure within this dimension (Rajabi *et al.*, 2022). On the other hand, environmental sustainability focuses on reducing air pollution, energy consumption and material usage while adhering to environmental regulations (Piwowar-Sulej and Iqbal, 2023). Some studies have employed specific metrics, like emissions and pollution discharge data, to gauge overall environmental performance (Li *et al.*, 2018). Previous research has also explored indicators of corporate environmental performance, such as environmental, social and governance, corporate social responsibility and reducing CO_2 emissions (Khalil *et al.*, 2022). Finally, social sustainability is dedicated to enhancing the well-being and security of workers and communities, as well as fostering positive relationships, ensuring workplace safety and improving living conditions (Al Koliby *et al.*, 2022a). Social well-being encompasses emotions, human feelings, security, safety, satisfaction and comfort.

2.3 Entrepreneurial competency and sustainable performance

ECs are a set of traits that help entrepreneurs to attain organizational goals effectively. These competencies, which are distinguished by interpersonal and creative thinking abilities, offer organizations strategic alternatives for improving performance (Aftab *et al.*, 2022; Taleb *et al.*, 2023; Tehseen and Ramayah, 2015). They are seen as an essential indicator of SMEs' long-term success and development, as well as a source of competitiveness that competitors are unable to replicate (Al Koliby *et al.*, 2022a).

López-Núñez *et al.* (2022) assert that ECs have a significant role as predictors of sustainability. Hence, it is imperative for organizations to possess the requisite competencies to foster growth and progress (Al Mamun *et al.*, 2018). Certainly, it is evident that managers and proprietors of manufacturing SMEs possessing robust ECs prioritize long-term performance objectives, emphasizing factors such as environmental sustainability, community well-being and public safety, as highlighted by Al Koliby *et al.* (2022a). The empirical findings indicated that ECs are a notable predictor SP (Seraj *et al.*, 2022). Similarly, Fazal *et al.* (2022) demonstrated that pertinent competencies have a notable and positive impact on the sustainability of businesses. Consistent with the RBV, which asserts that a company's performance is influenced by intangible processes, empirical evidence indicates that the lack of managerial competencies leads to the failure of SMEs (Seraj *et al.*, 2022). Hence, based on the above, we suggest that:

H1. ECs positively affect SP.

2.4 Entrepreneurial competency and knowledge management

From RBV, competencies are defined as tangible and intangible assets, capabilities, processes and knowledge that are difficult to replicate (Grant, 1996; Agarwal and Lenka, 2017). Entrepreneurs who possess ECs are often imaginative and creative, producing new ideas and information within the organization. They should also be able to manage organizational knowledge assets effectively, resulting in greater productivity, quality and innovation (Correia and Sarmento, 2004; Latif *et al.*, 2020). Therefore, organizations should prioritize human resource management, business operations and management development while emphasizing knowledge strategy implementation and understanding the KM process (Correia and Sarmento, 2004). Furthermore, providing training opportunities for employees improves their KM skills and develops a knowledge-sharing culture throughout the organization (Zack, 2002). Likewise, when owners and staff have the knowledge, skills and

entrepreneurial attributes, SMEs can improve performance and continuity (Nabiswa and Mukwa, 2017).

RBV defines ECs as a strategic resource that helps SMEs enhance knowledge-sharing practices for value creation (Zahoor *et al.*, 2021). Indeed, ECs empower SME managers to enhance knowledge sharing and acquire new knowledge more effectively. This helps to create knowledge assimilation mechanisms that allow SMEs to acquire external knowledge (Hughes *et al.*, 2018). In this context, Zahoor *et al.* (2021) discovered that ECs encourage SMEs' external knowledge absorption. ECs may be expected to assist SMEs in improving their external knowledge absorption by providing opportunities for external information search and internal application (IBID). Besides, according to emphasizing the importance of core competence-based knowledge, managers' competencies and understanding of knowledge, along with its sources, influence their knowledge acquisition and utilization processes (Yin *et al.*, 2019). Based on this discussion, the proposition is put forward:

H2. ECs positively affect KM.

2.5 Knowledge management and sustainable performance

According to KBV, knowledge is an organization's basic competence (Hwang *et al.*, 2020). KM is the oversight of all aspects of knowledge within an organization, including its acquisition, organization, processing, storage, use and dissemination (Anand *et al.*, 2023; Forés and Fernández-Yáñez, 2023). It is a comprehensive approach to managing knowledge that seeks to increase an organization's efficiency, productivity and creativity (Obeso *et al.*, 2020). KM contributes to a variety of sustainability factors. According to Migdadi (2022) and Trivedi and Srivastava (2022), KM processes, output and people are the primary determinants of performance excellence.

Organizations must decide what to keep, develop and discard in light of the need for sustainability (Abbas and Khan, 2023). These issues can be answered by an organization's effective KM system (Al-Swidi *et al.*, 2023; Abbas, 2020; Singh *et al.*, 2021). SP flourishes when businesses succeed at acquiring, sharing and using knowledge (Shahzad *et al.*, 2020). Numerous previous studies (e.g. Abbas, 2020; Abbas and Khan, 2023; Shahzad *et al.*, 2020) support the link between KM and SP. Many firms recognize knowledge as a crucial resource and recognize its critical role in attaining SP (Jilani *et al.*, 2020). Based on KBV theory, experts argue that KM can lead to SP that aligns with TBL framework (Bedford and Harrison, 2015). Based on the above, we suggest that:

H3. KM positively affect SP.

2.6 Mediating role of knowledge management

While existing research, albeit limited (e.g. Fazal *et al.*, 2022; Seraj *et al.*, 2022), has established the direct influence of ECs on SP. However, there is a conspicuous lack of focus on exploring the potential mediating role of KM in this relationship. ECs play a crucial role in aligning the strategic objectives of SMEs with their long-term performance targets, with a focus on environmental sustainability, community well-being and public safety (Al Koliby *et al.*, 2022a). However, the lack of knowledge in this area leads some entrepreneurs to become non-innovative and risk-averse, have diminished enthusiasm for their work, reduced productivity and a reluctance to acquire new skills (Pepple and Enuoh, 2020). Therefore, when competencies and KM are combined, they form a vital connection that can drive and determine a company's sustainability. Firm decision-makers value knowledge, and inadequate KM implementation can

lead to poor decision-making and delayed growth (Adam *et al.*, 2022). Al-Abbadi *et al.* (2020) state that KM has the potential to facilitate employee involvement in organizational decision-making and propose innovative solutions to challenges, ultimately benefiting corporate sustainability. According to the theories of RBV and KBV, KM is a resource that can be managed to improve competence, innovation and performance (Sahibzada *et al.*, 2020). Despite the importance of KM, managers' competencies are essential to the acquisition, use and exchange of knowledge to promote KM and employee cooperation (Yin *et al.*, 2019). Therefore, improving competence is needed, especially to answer organizational demands (Prabawati and Aoktariyanda, 2018). Therefore, in line with RBV and KBV theories, the effective utilization of capabilities and competencies in harnessing valuable knowledge has a positive impact on overall performance (Jalilvand *et al.*, 2019). Accordingly, we argue that KM can serve as an important mediator in the link between ECs and SP of the firm. Based on the above, we suggest that:

H4. KM mediates between ECs and SP.

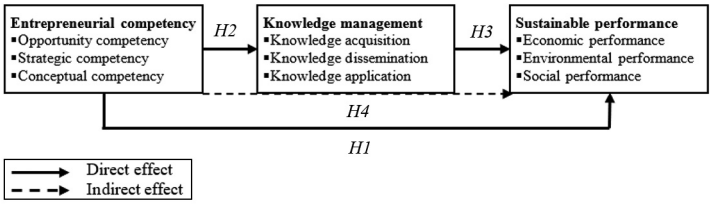
Based on the preceding discussion, a theoretical framework is presented in Figure 1.

3. Methods

3.1 Sample and procedure

To understand the relationships illustrated in Figure 1, we conducted a questionnaire to gather primary data from SMEs in the Malaysian manufacturing industry. This approach was considered suitable for our chosen objectivist/positivist philosophical stance, as our research objectives required a robust evaluation of effects and correlations (Allwood, 2012). To achieve this, we employed a cross-sectional design, a well-recognized and effective method in the social sciences for examining how various variables interact (Williams, 2007). This approach allows for precise modeling and statistical analysis of the key elements in our study, and it also enables us to collect quantitative data from samples of the population, which we can use to draw meaningful conclusions, as demonstrated (Trivedi and Srivastava, 2022). Our study specifically concentrated on manufacturing SMEs situated in the northern region of Malaysia, specifically in Perlis, Kedah and Penang, where a significant concentration of manufacturing SMEs is found (Yusr *et al.*, 2022). Also, these states are more important for an economic development strategy (Athukorala and Narayanan, 2018). We used a simple random sampling method to select companies from a list of registered manufacturing SMEs provided by SME Corporation Malaysia (2018) and the Federation of Malaysian Manufacturers (FMM) (2019). This method ensured that every unit in the population had an equal chance of being included, following the approach described by Sekaran and Bougie. (2016).

Selection criteria for SMEs were in line with those defined by SME Corporation Malaysia (2018), which specified that the chosen SMEs should have fewer than 200 full-time employees and an annual sales turnover of less than RM 50m. In total, we gathered data from 428 top



Source: Authors' own work

Figure 1.
Research model

executives out of a pool of 1,538 SMEs located in the northern region of Malaysia. These SMEs covered a wide spectrum of industries, including metal goods manufacturing, chemicals and electronic components. Of the 428 questionnaires distributed, 122 usable responses were obtained, a response rate of approximately 29%. This sample size exceeds Hair *et al.* (2019a) recommended threshold of 100 surveys. Furthermore, Ho *et al.* (2016) found that this sample size is appropriate, given that SMEs typically have response rates of around 10%. Furthermore, according to Sekaran and Bougie (2016), it is within the predicted range for response rates in social science research, which normally varies from 5% to 35%. According to the G*Power analysis, the sample size of 92 is sufficient, and hence, G*Power version 3 was used to confirm that the sample size was sufficient (Faul *et al.*, 2007). In addition, as established by previous research (Sekaran and Bougie, 2016), hand delivery and compilation typically give a greater response rate and speed up questionnaire completion. Overall, a questionnaire used in quantitative research is beneficial as the primary tool for collecting data within a short period while reducing response bias (Sekaran and Bougie, 2016; Zikmund *et al.*, 2013). Earlier research on SMEs in Malaysia indicated a poor response rate, averaging roughly 20% (Ahmed *et al.*, 2004; Kanapathy and Khan, 2012). Following these procedures, data collection took seven months (August 2021–February 2022). In this study, we conducted a comprehensive review of each completed questionnaire to ensure that all questions received appropriate answers. Descriptive statistics indicated that no missing values were present in any of the responses. Table 1 shows the sample details.

The participants of the research exhibited diversity in terms of their demographic and organizational traits. The majority of respondents (62.3% of the total) were men, with 37.7% being women. The Chinese were the most numerous participants, accounting for 48% of the sample. The bulk of participants (59% of the sample) were college graduates. Managers held the most jobs (39%), followed by proprietors (29%), senior managers (16%) and CEOs (16%). Manufacturing SMEs were made up of 60% private limited companies, 25% sole proprietorships and 15% partnerships. A small percentage of the SMEs (16%) were above the age of 25, with 14% being under the age of 5, 36% being between the ages of 5 and 15 and 34% being between the ages of 16 and 25. In relation to workforce size, the majority of SMEs, constituting 72%, had a staff of fewer than 75 individuals, with the remaining 28% using a range of 76–200 people. The food industry had the highest percentage of representation in the sample (26%), subsequent to electrical products and components (24%) and other firms (24%). Textiles and clothing (13%) are the most popular, followed by beverages (9%), spare parts and accessories (4%) and wood items (3%).

3.2 Questionnaire development and instrument

A self-administered questionnaire was used in this study to collect data for analyzing linkages in the suggested model. The study's metrics were built based on previous research. The questionnaire has three sections aimed at extracting useful information. The first segment provided background by focusing on the demographic profiles of respondents. The second phase examined corporate performance profiles to gather relevant indicators and data. The final portion assessed manufacturing SMEs' attitudes toward ECs, KM and SP. Participants scored items on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree).

ECs were assessed using 14 measures from Man *et al.* (2008) that evaluated opportunity, strategic and conceptual abilities. Many prior investigations, for example (Al Mamun *et al.*, 2019; Al Koliby *et al.*, 2022a; Aftab *et al.*, 2022), have been empirically confirmed. Similarly, KM was assessed using 12 items from Al Koliby *et al.* (2022b) that evaluate knowledge acquisition, dissemination and application. Furthermore, SP was assessed using 13 items from Al Koliby *et al.* (2023), that examine economic, environmental and social elements. Appendix has the scale items.

Characteristics	Categories	Frequency	%
Gender	Male	76	62.3
	Female	46	37.7
Race	Malay	48	39.3
	Chinese	59	48.4
	Indian	12	9.8
	Other	3	2.5
Highest education level	Secondary school	12	9.8
	Diploma	20	16.4
	Degree	72	59.0
	Master	13	10.7
	PhD	5	4.1
Job position	Owner	35	28.7
	CEO	19	15.6
	Senior manager	20	16.4
	Manager	48	39.3
Period of firm establishment	< 5 years	17	13.9
	5–10 years	14	11.5
	11–15 years	30	24.6
	16–20 years	14	11.5
	21–25 years	28	23
	> 25 years	19	15.6
Ownership structure of the firm	Sole proprietorship	31	25.4
	Partnership	18	14.8
	Private limited company	73	59.8
Number of employees in the firm	5–30 people	56	45.9
	31–75 people	32	26.2
	76–200 people	34	27.9
Sub-sector industry of the firm	Food	26	21.3
	Beverages	11	9.0
	Textiles and clothing	12	9.8
	Wood products	4	3.3
	Electrical products and components	24	19.7
	Machinery and equipment	16	13.1
	Spare parts and accessories	5	4.1
	Others	24	19.7

Source: Derived from the statistical analysis of this study (SPSS 25)

Table 1. Profile of respondents and manufacturing SMEs

3.3 Common method bias

Herman's single-factor model, proposed by Podsakoff and Organ (1986), examines common method bias (CMB). 42.27%, which falls below the recommended threshold of 50%, was discovered, indicating that there is no major CMB problem. Similarly, to test for multicollinearity, variance inflation factors (VIF) were calculated, and all VIF values were less than 5. This finding aligns with guidance from Salmerón *et al.* (2018), signifying that there were no notable multicollinearity concerns in the study.

3.4 Statistical method

The present study employed the partial least squares structural equation modeling (PLS-SEM) method with Smart-PLS 4.0 software for data analysis. It was chosen because of its precision, adaptability and usability (Henseler and Schuberth, 2020). Moreover, when applied to complex models, it demonstrates greater statistical power compared to

covariance-based SEM (Gelaidan *et al.*, 2023). The evaluation procedure consisted of two stages: the measurement model, which evaluates the constructs, and the structural model, which predicts the relationships between variables.

4. Results

4.1 Measurement model assessment

The internal consistency, convergent validity and discriminant validity of the measuring model were evaluated. The loadings of indicators were analyzed for internal consistency, with a value of 0.70 indicating dependability (Hair *et al.*, 2019). Hair *et al.* (2019) determined convergent validity based on three criteria: "factor loadings > 0.70, composite reliability > 0.70, and average variance extracted > 0.50." Table 2 demonstrates that these criteria were satisfied, indicating convergent validity and reliability.

Furthermore, the "Heterotrait–Monotrait ratio of correlations (HTMT)" with 0.85 criteria was used to examine discriminant validity, with coefficients less than 0.85 indicating adequate discriminant validity (Henseler and Schuberth, 2020). Tables 3 and 4 demonstrate that this criterion was attained.

4.2 Structural model assessment

The structural model was used to assess the hypothesized correlations in Figure 1 to validate the measurement model's psychometric features. In this stage, the goodness of fit of the model was evaluated using the standardized root mean square (SRMR) index. Henseler *et al.* (2016) recommend that the SRMR should be below 0.08, and recent research by Cho *et al.* (2020) suggests that values below 0.08 are suitable for sample sizes exceeding 100. Our study indicates a satisfactory model fit, as the SRMR value obtained is 0.069. Furthermore, Hair *et al.* (2019) used R^2 values and path coefficients to assess the structural model's fit. The model explained 45.7% of the variance in KM and 57.4% of the variance in manufacturing SMEs' SP, according to Chin's (1998) prediction standards. The findings can be evaluated using Chin's prediction guidelines (0.10 = weak; 0.33 = moderate; 0.67 = big).

In addition, the model's prediction ability was assessed using Stone–Geisser's (Q^2). The endogenous constructs' Q^2 values are KM (0.441) and SP (0.482), which are both more than zero, indicating adequate prediction (Peng and Lai, 2012).

Furthermore, bootstrapping with 5,000 resamples yielded robust path estimates for hypothesized associations. PLS-SEM supports the predicted correlations in Table 5.

According to the findings shown in Table 5, ECs improved manufacturing SMEs' SP (b = 0.44, t-values = 5.53, $p < 0.05$), supporting *H1*. ECs also improved KM in manufacturing SMEs (b = 0.68, t-values = 13.62, $p < 0.05$), supporting *H2*. In addition, there was a positive and significant connection (b = 0.38, t-values = 4.93, $p < 0.05$) between KM and manufacturing SMEs' SP, which supports *H3*. These findings highlight the importance of ECs and KM in manufacturing SME sustainability.

4.3 Mediation analysis

This study used bootstrapping indirect effects based on Preacher and Hayes (2008, 2004) to examine the mediating role of KM between ECs and SP of manufacturing SMEs, as recommended by Hair *et al.* (2022). According to the results shown in Table 6, KM mediates the association between ECs and SP (b = 0.26, t-values = 5.51, $p < 0.05$). Although ECs had a significant indirect effect on SP, they also had a significant direct effect (b = 0.44, t-values = 5.53, $p < 0.05$), implying that KM partially mediates the ECs–SP relationship; therefore, *H4* is supported.

Constructs	Items	Loading	Composite reliability	Average variance extracted
Entrepreneurial competency			0.898	0.747
Opportunity			0.928	0.763
	OPP1	0.831		
	OPP2	0.896		
	OPP3	0.914		
	OPP4	0.850		
Strategic			0.931	0.731
	STRA1	0.826		
	STRA2	0.888		
	STRA3	0.913		
	STRA4	0.834		
	STRA5	0.810		
Conceptual			0.899	0.641
	CON1	0.753		
	CON2	0.783		
	CON3	0.845		
	CON4	0.856		
	CON5	0.760		
Knowledge management			0.859	0.672
Acquisition			0.905	0.705
	KA1	0.793		
	KA2	0.862		
	KA3	0.873		
	KA4	0.827		
Dissemination				
	KD1	0.859	0.895	0.741
	KD2	0.882		
	KD3	0.840		
Application			0.890	0.669
	KAP1	0.813		
	KAP2	0.802		
	KAP3	0.866		
	KAP4	0.787		
Sustainable performance			0.912	0.775
Economic			0.931	0.772
	SE1	0.841		
	SE2	0.911		
	SE3	0.890		
	SE4	0.871	0.924	0.710
Environment				
	SEN1	0.764		
	SEN2	0.849		
	SEN3	0.875		
	SEN4	0.871		
Social	SEN5	0.847	0.917	0.734
	SS1	0.849		
	SS2	0.842		
	SS3	0.885		
	SS4	0.851		

Sources: Derived from the statistical analysis of this study (Smart-PLS 4.0)

Table 2.
Construct reliability and validity

5. Discussion

From the results, initially, ECs affect manufacturing SMEs' SP. This discovery helps explain manufacturing SMEs' long-term success and viability. The link shows how ECs affect manufacturing SME sustainability. ECs include a variety of skills, knowledge and characteristics possessed by individuals or organizations engaged in entrepreneurial activities. These qualities include the capacity to identify and seize opportunities, develop strategy, think critically and create new solutions. ECs have direct effect on SP; consequently, strong ECs are

Table 3. Discriminant validity by HTMT (first order)

Variable	1	2	3	4	5	6	7	8	9
(1) Conceptual competency									
(2) Knowledge acquisition	0.684								
(3) Knowledge application	0.654	0.654							
(4) Knowledge dissemination	0.418	0.517	0.665						
(5) Opportunity competency	0.832	0.607	0.431	0.391					
(6) Economic performance	0.624	0.574	0.571	0.450	0.588				
(7) Environmental performance	0.666	0.690	0.650	0.396	0.525	0.778			
(8) Social performance	0.623	0.741	0.519	0.335	0.494	0.583	0.848		
(9) Strategic competency	0.739	0.680	0.590	0.318	0.518	0.561	0.561	0.636	

Source: Derived from the statistical analysis of this study (Smart-PLS 4.0)

Table 4. Discriminant validity by HTMT (second order)

Variable	1	2	3
(1) Entrepreneurial competency			
(2) Knowledge management	0.814		
(3) Sustainable performance	0.833	0.815	

Source: Derived from the statistical analysis of this study (Smart-PLS 4.0)

Table 5. Direct effects

H	Path	Standardized beta	Standard error	*t*-value	Confidence interval BCI LL	Confidence interval BCI UL	f^2	Results
H1	ECs → SP	0.444*	0.080	5.526	0.306	0.569	0.252	Supported
H2	ECs → KM	0.676*	0.050	13.623	0.597	0.758	0.842	Supported
H3	KM → SP	0.383*	0.087	4.925	0.259	0.513	0.186	Supported

Note: * Significant at $p < 0.05$
Source: Derived from the statistical analysis of this study (Smart-PLS 4.0)

Table 6. Mediation effect

H	Path	Standardized beta	Standard error	*t*-value	Confidence interval BCI LL	Confidence interval BCI UL	Results
H4	ECs → KM → SP	0.259*	0.057	5.505	0.172	0.365	Supported

Note: * Significant at $p < 0.05$
Source: Derived from the statistical analysis of this study (Smart-PLS 4.0)

crucial for managers of manufacturing SMEs to connect strategic goals with long-term performance targets and achieve environmental sustainability, community welfare and public safety. This aligns with prior research conducted by Al Koliby *et al.* (2022a), Chander *et al.* (2020) and Kisubi *et al.* (2022).

The results also demonstrate that ECs positively affect KM. This aligns with earlier research indicating variations among SME managers in terms of their cognitive and behavioral traits, particularly concerning the processes of knowledge integration and absorption (Zahoor *et al.*, 2021). Entrepreneurs' skills, knowledge and capacities improve SME manufacturers' KM. Thus, entrepreneurs are more likely to seek out and use the information to capitalize on opportunities within their manufacturing SMEs or externally. Strategically competent entrepreneurs have a better ability to make informed decisions, plan clear goals, allocate resources efficiently, adapt to changing market conditions, seize opportunities, conceptualize innovative solutions and identify entrepreneurial resilience, all of which contribute to the success of manufacturing SMEs and its sustainability (Khan *et al.*, 2023). In line with the previous discussion, Al Mamun *et al.* (2019) discovered a positive relationship between ECs, networking in entrepreneurship and skills with the performance of micro-sized firms in Malaysia. This finding aligns with research connecting HR competency to KM, underscoring the significance of KM strategies for SMEs (Rezaei *et al.*, 2021; Al Koliby *et al.*, 2023). In addition, the findings confirm that KM directly impacts manufacturing SMEs' SP. Knowledge lets manufacturers and SMEs use experience, share it and meet critical competitive needs. It also helps people overcome unexpected challenges. KM also reduces energy use and improves environmental compliance. This result is consistent with numerous studies that show the positive effect of KM practises on SP (Abbas, 2020; López-Torres *et al.*, 2019). Knowledge implementation can also promote worker safety and community interest awareness. Abbas and Sağsan (2019) underline that knowledge can be a strategic advantage to preserve competitiveness.

Moreover, KM partially mediates between ECs and SP of SMEs manufacturing. This suggests that ECs and KM are vital for manufacturing SME sustainability and problem-solving. ECs leverage KM by acquiring, sharing and applying knowledge, this, in turn, influences SP positively by fostering innovation, enhancing operational efficiency and enhancing the capacity to create and deliver customer value. With KM practices like knowledge-sharing platforms, training programs and knowledge transfer mechanisms, SMEs can leverage their ECs to drive sustainable growth, establish a culture of learning and ensure the longevity and success of their ventures. This positive result is consistent with those discovered by previous researchers (Kordab *et al.*, 2020; Iqbal *et al.*, 2023).

5.1 Theoretical implications

This study has several theoretical implications. This study made a noteworthy contribution by amalgamating RBV, KBV and TBL frameworks into a cohesive and integrated conceptual framework. While RBV explains the important role of ECs in predicting SP, it falls short in elucidating distinctions between general resources and knowledge-based capabilities. Consequently, supplementing the analysis of KM with KBV becomes essential, as KBV views firms as entities capable of integrating, disseminating and applying knowledge (Grant, 1996). Likewise, the other significant criticism of the theory is that it disregards the connection between businesses and their contexts, for example, society and the natural environment (Tate and Bals, 2018). Also, assessing social (and environmental) implications has become a requirement in practically every field of research (Wadood *et al.*, 2022). In this case, the approach of reinforcing the natural, social and economic structures that comprise the success mechanism of SMEs is critical to achieving continuous business

growth. Researchers, like Hussain *et al.* (2018) and Muñoz-Pascual *et al.* (2019), have employed the TBL framework to study the sustainable growth or performance of SMEs. Developing-country industries are more likely to emphasize economic growth above environmental and social performance (Cherrafi *et al.*, 2016), as they may regard these metrics as unrelated to their principal business. Distelhorst *et al.* (2017) posited that environmental and social standards are routinely breached in developing countries, not as a result of a company's commitment to sustainability or the rigor of local regulations, but rather as a result of pressure from international customers (Henao and Sarache, 2022). While studies employing the two theories remain fragmented in many aspects, KBV is still under-explored, particularly among SMEs (Mete and Belgin, 2022; Pereira and Bamel, 2021). Furthermore, it is crucial to recognize that there are various areas that require further exploration. A study gap that merits attention is the interplay and amalgamation of these diverse hypotheses (Ogutu *et al.*, 2023). Furthermore, the incorporation of TBL's framework, which is interconnected with the sustainable development goals outlined in the 2030 Agenda for Sustainable Development, was deemed necessary. This framework is specifically tailored to tackle the multifaceted difficulties pertaining to social, economic and environmental aspects (Mendes *et al.*, 2023).

Furthermore, this study looks into the role of KM as a mediator between ECs and SP. Incorporating KM as a mediator in the model, particularly in the context of SMEs in the manufacturing sector of a developing country, advances our understanding by providing critical empirical insights that can assist SME owners and managers in evaluating the impact of ECs on SP. While McAdam and Reid (2001) posited that KM primarily evolved for large organizations, Durst *et al.* (2023) indicated that KM has recently found its place in various types of organizations, including SMEs. These organizations are encountering novel challenges such as transboundary crises, exemplified by threats that effortlessly transcend geographical and policy boundaries, as seen in events like COVID-19. These crises not only underscore the heightened significance of KM but also demand a fresh comprehension of knowledge resources, possibly necessitating a redefinition (Durst *et al.*, 2023).

Finally, this study represents one of the initial efforts to create an empirical model that contributes to the literature by highlighting the various dimensions of EC (opportunity, strategic and conceptual) as well as focusing on the mediating role played by the different aspects of KM (knowledge acquisition, knowledge dissemination and knowledge application) in the ECs–SP relationship. According to the results, KM serves as a link between ECs and SP in the context of manufacturing SMEs.

5.2 Practical implications

The findings of this study carry significant implications for managers and policymakers across various sectors. Firstly, this research enhances our comprehension of how ECs influence the SP of manufacturing SMEs in emerging economies. It sheds light on the synergy between ECs and KM in using resources effectively. In particular, it underscores the importance of integrating different resources to enhance SMEs' sustainability. Moreover, this study underscores the practical benefits for SME owners and managers. It highlights that the effective implementation of ECs can lead to improved operational efficiency and SP. These findings offer a roadmap for SMEs to select the right ECs to navigate the realm of KM successfully, ultimately paving the way for business success and sustainability. In this regard, SME managers and owners should consider focusing on competencies such as opportunity, strategic and conceptual to harness knowledge effectively and gain a competitive edge. Furthermore, the study emphasizes the critical role of human resources in this context. To leverage knowledge, identify opportunities, formulate effective strategies

and address operational challenges, it is imperative to train and equip employees with the necessary skills. Managers and owners must also acquire and disseminate knowledge throughout the organization, empowering them to make informed decisions that drive efficiency and performance.

The relevance of KM is further underscored not only in large organizations, as pointed out by McAdam and Reid (2001), but also in SMEs, as KM enables all firms to promptly identify potential opportunities. As Mohammadi and Taherkhani (2017) suggest, KM plays a pivotal role in enhancing performance by facilitating quicker recognition of opportunities. Al Koliby *et al.* (2022a) contend that SMEs facing financial constraints and technological limitations can reap substantial benefits by cultivating ECs. These competencies serve as the foundation for instilling an entrepreneurial mindset within the organization, as highlighted by Mitchelmore and Rowley (2010), and are not easily replicable (Hwang *et al.*, 2020). At the managerial level, the study underscores several noteworthy implications. It demonstrates that EC significantly impacts firm performance, reaffirming its positive role in achieving superior results. By harnessing these competencies, managers can set clear organizational objectives and establish actionable plans to attain corporate goals. This study can guide SME managers in identifying future steps to enhance their sustainable practices, offering a critical evaluation of the importance of sustainability in organizational success.

Notably, previous research has indicated that Malaysian SMEs often grapple with limited resources, a dearth of expertise, a skilled workforce, governmental support and financial backing (Tehseen and Ramayah, 2015; Al-Koliby *et al.*, 2022a). Consequently, enterprise managers and owners should proactively enhance their knowledge and skills through training, workshops and awareness seminars on KM. Furthermore, they should motivate employees to cultivate essential attributes, such as skills, knowledge and abilities, to achieve elevated firm performance. Finally, policymakers can extract valuable insights from this research to foster a conducive environment for SMEs to thrive and contribute to economic growth. The study suggests that governments and stakeholders should craft comprehensive policies and strategies that recognize the value of ECs and KM. This recognition can empower SMEs to excel, create employment opportunities, stimulate GDP growth and achieve long-term objectives. According to RBV and empirical evidence, a lack of managerial competencies contributes to SMEs' failure (Thornhill and Amit, 2003). Despite the importance of ECs, a lack of knowledge and information has led some entrepreneurs to be uninnovative, risk-averse, unenthusiastic about their work, unproductive and neither willing nor able to acquire new competencies (Pepple and Enuoh, 2020). According to Kassaneh *et al.* (2021), KM necessitates the engagement of all organizational members. When KM and competencies are put together, they can create a link that can boost and determine companies for sustainability (Al Koliby *et al.*, 2022b). KM increases staff productivity, innovation capacity, discretionary work behavior, corporate sustainability, employee job happiness, firm survival and entrepreneurial performance (Kassaneh *et al.*, 2021).

5.3 Economic and social implications

This study holds economic relevance for unstable and competitive emerging economies like Malaysia. In such markets, the ability to offer unique value products or services at a lower cost than competitors is critical, aligning with Trivedi and Srivastava (2022). Thus, ECs among SMEs carry significant economic implications. These competencies are pivotal for SMEs' survival and growth in a competitive market. When SMEs foster these competencies, they often lead to increased productivity, job creation and revenue generation. Moreover,

entrepreneurial SMEs tend to be more resilient in the face of economic downturns, as their ability to pivot and identify new opportunities allows them to weather challenges. Furthermore, SMEs equipped with robust ECs are better positioned to attract investments and secure financing, which further catalyzes their expansion. This underscores the importance of ECs and KM for the success of SMEs, both in emerging and developed economies, ultimately contributing to poverty reduction and increased GDP. The prevalence of SMEs signifies their potential to substantially enhance job creation, elevate income levels and stimulate economic growth. In light of these concerns, manufacturing SMEs are encouraged to promote a culture of continuous learning among their staff, stressing knowledge acquisition, distribution and application in different aspects of business operations, with special emphasis on research and development. Moreover, SMEs should integrate sustainability principles into their strategic goals and operational structures. This dual objective aims to enhance their financial performance while concurrently fostering environmental conservation and societal well-being. In these situations, businesses need to enhance their competencies and establish a knowledge base to effectively address environmental issues impacting their operations, as the development, sharing and utilization of information are pivotal drivers of sustainability within the knowledge-based economy. Consequently, Nguyen and Nguyen (2022) suggest that organizations should increase their investments in cultivating KM aspects to attain favorable business outcomes.

According to Tehseen *et al.* (2021), Malaysia, like other nations globally, is distinguished by its multicultural society, which comprises numerous ethnic groups, reminiscent of countries such as the USA, Canada, China and India. Moreover, SMEs have positively impacted the quality of life in communities by addressing social and environmental concerns. KM practices have also played a crucial role in improving customer relations (Chaithanapat *et al.*, 2022). This proactive approach encourages SMEs to develop innovative strategies for achieving better financial, marketing and operational outcomes. Also, emphasizes close collaboration with customers to gain a competitive edge. Meeting customer needs and demands through KM (Klein and Todesco, 2021). Furthermore, the study has indicated that SMEs contribute more effectively to job creation compared to larger firms (Alonso *et al.*, 2019). In this study, the contribution is attributed to their enhanced EC and KM, allowing SMEs to produce high-quality outputs for society.

6. Conclusions, limitations and future research directions

This study aims to evaluate the mediating effect of KM in the link between ECs and SP using cross-sectional survey data acquired from Malaysian manufacturing SMEs. The findings of this study contribute to our understanding of the subject and fill a large research vacuum in the literature on sustainability. Overall, the findings are consistent with RBV, KBV theories and the TBL framework, as they provide empirical evidence supporting the positive and notable influence of ECs on SP via KM for Malaysian manufacturing SMEs. More precisely, the results suggest a positive relationship between ECs and KM, which has a positive relationship with SP. Importantly, KM serves as a mediator between ECs and SP.

Despite the contributions of this study, it has some limitations. First, due to possible differences in the characteristics of SMEs in Malaysia and other countries, the conclusions of this study cannot be generalized to a larger population, particularly to SMEs beyond Malaysia. As a result, future studies should broaden the approach, include a larger sample size and include SMEs from diverse contexts outside of Malaysia, regardless of economic situation or industry. In addition, future research should investigate the organizational structure of SMEs in the manufacturing sector versus larger manufacturing entities to see how it affects the acquisition. Besides, this study focused only on SME manufacturing in

northern Malaysia and does not take into account the influence of characteristics such as culture, leadership, top management and government support. In addition, the findings do not apply to large firms in Malaysia. However, Eisenhardt (1989) argues that the findings may not be limited to the context, as the research impact comes from its implications for a large portion of society (Jordão *et al.*, 2022). Second, SMEs in developing countries like Malaysia face unique challenges distinct from those in developed nations like the EU, USA and Japan. These challenges encompass resource limitations, small-size liabilities, marketing, export, technology, organizational and environmental barriers, along with managerial and institutional issues. Therefore, future research should consider these challenges and the role of institutions and government support and focus on how entrepreneurs can leverage these resources. Furthermore, the dynamic nature of entrepreneurial activities offers ample room for studying entrepreneurship as a driver of SMEs in fast-growing Asian economies. Thus, researchers can explore SME strategies for entering foreign markets in developing economies (Al Koliby *et al.*, 2022a; Chandra *et al.*, 2020). Third, this study used cross-sectional survey data, limiting respondents' ability to explore significant themes into relevant ones. To get new perspectives, future research should combine qualitative and quantitative data collection methods. Finally, since ECs and KM did not explain all SP variability, future studies must examine other predictive elements. Additional mediators in the EC–SP interaction must be investigated.

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Appendix

Questionnaire items

Label	Items
Entrepreneurial Competencies	
Opportunity Competency	
OPP1	My firm has the capability to perceive unmet consumer needs.
OPP2	My firm has the capability to seize high-quality business opportunities.
OPP3	My firm has the capability to scan the environment to look for opportunities.
OPP4	My firm has the capability to look for products that provide real benefit to customers.
Strategic Competency	
STRA1	My firm has the capability to monitor progress toward strategic goals.
STRA2	My firm has the capability to prioritize work in alignment with business goals.
STRA3	My firm has the capability to identify long-term issues, problems or opportunities.
STRA4	My firm has the capability to redesign business to better meet long term objectives.
STRA5	My firm has the capability to determine strategic actions by weighing costs and benefits.
Conceptual competencies	
CON1	My firm has the capability to explore new ideas.
CON2	My firm has the capability to take reasonable job-related risks.
CON3	My firm has the capability to look at old problems in new ways.
CON4	My firm has the capability to treat new problems as opportunities.
CON5	My firm has the capability to monitor progress towards objectives in risky actions.
Knowledge Management	
Knowledge Acquisition	
KA1	My firm has the capability to acquire knowledge from our customers.
KA2	My firm has the capability to acquire new knowledge from existing knowledge.
KA3	My firm has the capability to acquire knowledge about our suppliers.
KA4	My firm has the capability to acquire knowledge about new products/services within our industry.
Knowledge Dissemination	
KD1	My firm has the capability to standardized reward systems for sharing knowledge.
KD2	There are regular meetings between departments to discuss trends and developments.
KD3	My firm has the capability to encourage people with similar interests to work together to solve a problem.
Knowledge Application	
KA1	My firm has the capability to apply knowledge learned from experiences.
KA2	My firm has the capability to match sources of knowledge to problems and challenge.
KA3	My firm has the capability to take advantage of new knowledge.
KA4	My firm has the capability to quickly apply knowledge to critical competitive needs.
Sustainable performance	
Sustainable Performance - Economically	
SE1	My firm has improved its market share.
SE2	My firm has improved its position in the marketplace.
SE3	My firm has increased its profits.
SE4	My firm has increased its return on investment.
Sustainable Performance - Environmentally	
E1	My firm has improved compliance with environmental standards.
E2	My firm has reduced energy consumption.
E3	My firm has reduced CO_2 emissions.
E4	My firm has reduced the consumption of hazardous materials.
E5	My firm has designed products and packaging to be reused, repaired or recycled.
Sustainable Performance - Socially	
S1	My firm has improved/ enhanced the overall stakeholder welfare.
S2	My firm has reduced environmental impacts and risks to the general public.
S3	My firm has improved occupational safety and health of employees.
S4	My firm has improved the awareness and protection of the claims and rights of the community served.

Source: Authors' own work based on the literature review