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Linking entrepreneurial competencies, innovation and sustainable performance of manufacturing SMEs

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Abstract

Purpose – The purpose of this study is twofold: to examine the impact of entrepreneurial competencies and innovation on manufacturing small and medium-sized enterprises' (SMEs) sustainable performance and to explore the role of innovation as a mediator on the relationship between entrepreneurial competencies and manufacturing SMEs' sustainable performance.

Design/methodology/approach – Data collected from manufacturing SMEs in Malaysia were analysed via the partial least squares-structural equation modelling (PLS-SEM) approach.

Findings – The results reveal that entrepreneurial competencies play a robust and noteworthy role in promoting innovation and the sustainable performance of manufacturing SMEs, respectively. Further, innovation has a partially mediated effect on the link between entrepreneurial competencies and manufacturing SMEs' sustainable performance. Manufacturing SMEs' aspirations to be the first to market with new products are reflected in these SMEs' implementation of positive entrepreneurial competencies or capabilities which enable them to scan the environment to identify high-quality business opportunities and respond through these SMEs' Research and Development (R&D) activities to create products that provide real benefit to customers' needs. Hence, these SME's seize the market opportunities.

Practical implications – Manufacturing SMEs' sustainable performance should be strengthened by linking entrepreneurial competencies with innovation to nurture greater agility to respond quickly to change and market demands. These SMEs should conduct tactical meetings on a regular basis to discuss current projects and assess critical indicators, as well as to identify and test fresh ideas for innovation and new business ventures in order to achieve sustainable performance in challenging business environments.

Originality/value – By applying the resource-based view (RBV) theory and the triple bottom line (TBL) framework into a single framework, this study highlights the role of innovation as a meaningful mediator between entrepreneurial competencies and manufacturing SMEs' sustainable performance. As exploration of this relationship has been very limited, the study makes a novel contribution to the extant literature.

Keywords Entrepreneurial competencies, Innovation, Sustainable performance, SMEs, Manufacturing

Paper type Research paper

Introduction

The role of small and medium-sized enterprises (SMEs) is critical for the majority of countries since these enterprises contribute substantially to the expansion of economic growth (Hallam *et al.*, 2017; Ismail, 2022). In particular, manufacturing has been the most vibrant sector contributing to the growth of economies around the world (Halabí and Lussier, 2014; Hessels and Parker, 2013; Makhmadshoev *et al.*, 2015; Oparaocha, 2015). In developed economies (high-income countries), SMEs have contributed more than 55% of GDP and 65% of jobs, whilst in emerging economies (low-income countries), they have presented more than 60% of GDP and 70% of jobs (Zafar and Mustafa, 2017). In the Malaysian setting, manufacturing

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SMEs have contributed significantly to the nation's GDP. They account for 97% of the country's total production and act as the main contributors to national economic growth (SME Corporation Malaysia, 2018). For example, manufacturing sales grew 6.4% year-on-year to RM118.4 billion in February 2021 (Department of Statistics Malaysia, 2021). The upsurge was led by electrical and electronics products (10.3%), followed by food, beverages and tobacco products (9.0%), and transport equipment and other products (8.2%). These figures suggest that the increase in sales is the outcome of improved entrepreneurial competencies, innovation, and business performance.

However, many SMEs have been unable to maintain their businesses across the globe, with losses of nearly half in the first five years and two-thirds in the first ten years (Nikolić *et al.*, 2019). Lack of entrepreneurial competence is seen to pose a significant impediment to SMEs' development (Nasir *et al.*, 2017; Tehseen and Ramayah, 2015; Yoshino *et al.*, 2016). Entrepreneurial competencies are defined as "the underlying characteristics such as traits, motives, specific knowledge, social roles, skills and self-images that lead to the birth of a new venture, its survival and growth" (Bird, 1995, p. 51). SMEs also continue to lag behind in terms of understanding the nature of innovation and diffusion (Hameed and Naveed, 2019; Ipinnaiye *et al.*, 2017; Taghizadeh *et al.*, 2017). Innovation is referred to as "the multi-stage process whereby organizations transform ideas into new/improved products, services or processes, to advance, compete and differentiate themselves successfully in their marketplace" (Baregheh *et al.*, 2009, p. 1323). The predicament may have led to the drop in the employment statistics and growth for the manufacturing sectors including the manufacturing SMEs. Past scholars like Bertello *et al.* (2022), and Chabbouh and Boujelbene (2022) have stressed that it is essential for SMEs to instil an organisational culture of openness to others, and to ensure that assertiveness and balancing skills are present amongst employees to achieve SMEs' collaborative innovation. Innovation is desirable as shown in a study by Ciriaci *et al.* (2016) that concluded high employment growth for small firms is to likely be triggered by innovation. Linking and empirically testing entrepreneurial competencies, innovation, and manufacturing SMEs' sustainable performance into a single research framework has been very limited (Chatterjee *et al.*, 2022; De Sousa Jabbour *et al.*, 2020; Soto-Acosta *et al.*, 2016).

The study applies the resource-based view (RBV) theory and the triple bottom line (TBL) framework as the guiding principles. The RBV theory of Barney (1991) offers competitive advantages based on a firm's capital and capabilities. Amongst the capabilities are entrepreneurial competencies, which are excellent intangible tools for business success. Using this theory, Chatterjee *et al.* (2022) determined that big data-driven innovation and SME techno-functional capability have an impact on supply chain capability. In a separate study, Jeong and Chung (2022) also apply the RBV theory and reveal the role of internal and external social capital in boosting the marketing innovation, competitive advantage, and financial performance of Korean SMEs in export markets. Because this theory is the most appropriate of all the theories, Kruesi and Bazelmans (2022) advocate for an increase in research that applies this theory, focuses on industry contexts other than hotels, and transcends the Western perspective. Some limited efforts have been made in relation to sustainability that focus on environmental (see Hamann *et al.*, 2017), social (see Krauss, 2017), and economic performance. Such perspectives are known as the TBL framework introduced by Elkington (1998). This approach enables the implementation of sustainable business practices that can in turn help achieve sustainable performance. It is accepted that the TBL theory has become more applicable as a metric for calculating sustainable performance which adds to the value of the product (Rashid *et al.*, 2015; Venkatraman and Nayak, 2015). The need for long-term business sustainability by incorporating environmental, economic, and social factors into decision-making processes has become critical for business success (Lacy *et al.*, 2010; Müller and Pfleger, 2014; Silvius, 2017). Accordingly, the present study put forward that

the RBV is suitable for considering the capacity of entrepreneurial competencies to predict manufacturing SMEs' innovation and sustainable performance, and that innovation acts as a mediator on this relationship. And, the TBL framework is related to the manufacturing SMEs' sustainable performance, which has not been investigated with the RBV theory concurrently in a single framework by previous scholars. SMEs should concentrate on how to deal with issues such as entrepreneurial competencies, innovation, and the failure to compete aggressively (i.e. Ismail and Zakaria, 2018; Tehseen *et al.*, 2019). Drawing on the previous research findings, this study asks the research questions as follows:

RQ1. What is the impact of entrepreneurial competencies and innovation on manufacturing SMEs' sustainable performance?

RQ2. Does innovation mediate the relationship between entrepreneurial competencies and manufacturing SMEs' sustainable performance?

This research illustrates how the RBV theory and the TBL framework can be incorporated into a single framework with the inclusion of the mediating role of innovation, to enrich the findings of extant research. The study highlights that entrepreneurial competencies play a robust and noteworthy role in promoting innovation, and the sustainable performance of manufacturing SMEs, respectively. Further, advanced testing demonstrates the meaningful mediating role of innovation on the link between entrepreneurial competencies and manufacturing SMEs' sustainable performance. As the exploration of these relationships has been very limited, the present efforts mark a novel contribution to the literature. The empirical findings clarify the impact of entrepreneurial competencies and innovation on manufacturing SMEs' sustainable performance and provide guidance to those enterprises on their business strategies.

The following section presents the literature review, and the third section explains the methodology employed. The results are detailed in section four, and a discussion of the findings appears in section five. Implications of the study and future research directions are identified in the final section.

Literature review

Sustainable performance

Sustainable performance is the synthesis of environmental, economic, and social performance that benefits both the natural environment and society whilst also offering economic sustainability benefits and competitive advantage to a firm (Du *et al.*, 2022; Gong *et al.*, 2018; Hameed *et al.*, 2015). The environmentally-sustainable performance depicts a firm's positive impact on the natural environment, both internally and externally, as a result of its sustainability activities (Rao and Holt, 2005). It requires a reduction in air pollution, energy use, material use, and adherence to environmental standards (Laosirihongthong *et al.*, 2013). As innovation is a dynamic mechanism that drives sustainable competitive advantage and economic development for individual companies and nations, SMEs need to be innovative to improve business profitability (Chen *et al.*, 2018; Thome *et al.*, 2016; Thome and Scavarda, 2015), differentiate a business, and gain competitive advantage (Agyapong *et al.*, 2017; Anning-dorson, 2016). Meanwhile, economically-sustainable performance occurs when a company's increased market share and strengthened market position, bring benefit and return on investment (Eltayeb *et al.*, 2011). The environmental-friendly output entails a decrease in CO_2 discharges, wastewater, strong squander, energy utilisation, perilous synthetic compounds, and material use, simultaneous with more prominent consistency with ecological norms and well-designed goods and packaging that can be reused, repaired, or recycled (Abdul-Rashid *et al.*, 2017; Delai and Takahashi, 2016; Starik and Kanashiro, 2013).

Next, socially sustainable performance refers to a company's ability to improve its social prosperity, through attending to the wellbeing and security of its workers and the overall population (Paulraj, 2011). It improves community and stakeholder relationships, job safety, the work climate, and the living conditions of the local community (Abdul-Rashid *et al.*, 2017; Delai and Takahashi, 2016; Starik and Kanashiro, 2013). Effective sustainable performance is imperative for firms wishing to achieve a holistic combination of environmental, economic, and social goals (Abdul-Rashid *et al.*, 2017; Afum *et al.*, 2020; Delai and Takahashi, 2016; Starik and Kanashiro, 2013; Yusliza *et al.*, 2020).

Entrepreneurial competencies

Entrepreneurial competencies are the umbrella term referring to the amount of expertise, skills, and attitudes needed to create, coordinate, and manage a business venture and all of the risks that entails (Novojen and Birnaz, 2019). Such competencies help entrepreneurs to build profitable and sustainable businesses as they combine to provide firms with a competitive advantage (Sajilan *et al.*, 2016; Tehseen and Ramayah, 2015; Okolie *et al.*, 2021; Vu and Nwachukwu, 2021). Individual characteristics such as relationship orientation, conceptuality, commitment, opportunity recognition, strategic, and organising capabilities are relevant competencies associated with effective work performance (Suhaimi *et al.*, 2018; Tehseen *et al.*, 2019). Further, knowledge-intensive enterprises' growth potential and their actual growth are influenced by the aspects of the enterprise profile, such as innovation capability and its members' personal, organisational, and demographic characteristics (Kotsopoulos *et al.*, 2022). Entrepreneurial expertise identifies business opportunities, formulates entrepreneurial visions, develops business models, creates business strategies, and drives the company (Amini Sedeh *et al.*, 2021; Ferreras-Garcia *et al.*, 2019). These various entrepreneurial competencies and attributes are critical in stimulating innovation (Kazemi *et al.*, 2016; Mohsin *et al.*, 2017; Umar *et al.*, 2018) since they downgrade and even eliminate the negative impacts of innovation barriers (Amini Sedeh *et al.*, 2021). Indeed, entrepreneurial competencies are viewed as the most important predictor of sustainable performance and growth of SMEs (Al-Mamun *et al.*, 2016; Mitchelmore and Rowley, 2013). This study employs the RBV to predict manufacturing SMEs' innovation and sustainable performance by taking into account the capacity of entrepreneurial competencies. Accordingly, the following relationships are hypothesised:

H1. Entrepreneurial competencies have a positive effect on manufacturing SMEs' innovation.

H2. Entrepreneurial competencies have a positive effect on manufacturing SMEs' sustainable performance.

Innovation

Innovation is the introduction of a new concept, process, service, or product in an organisation to adapt to environmental changes, and may be seen as the adoption of a new idea, method, service, or product (Shamsuddin *et al.*, 2017). Innovation is widely recognised as a necessity to ensure a company's sustainability and development; indeed, to be the first to market new products and services is critical for SMEs' long-term success (Rosenburch *et al.*, 2011; Salman *et al.*, 2016; Soto-Acosta *et al.*, 2016; Yustian *et al.*, 2021). Indeed, innovative entrepreneurship is one of the primary drivers of economic development (Amini Sedeh *et al.*, 2021). Previous studies have acknowledged that sustainability does contribute as a significant source of competitive business (see Delmas and Cuerel Burbano, 2011; Schiederig *et al.*, 2012; Varadarajan, 2017). The intensified competition brought on by globalisation and the development of regional businesses requires SMEs to innovate by seeking out novel

means of doing things to remain competitive in the global economy (Chen *et al.*, 2018; Pouresmaeili *et al.*, 2018). SMEs that embrace innovation to improve their market competitiveness claim that innovation is a critical force for firm competitiveness and can be seen as embedded within a firm's organisational structures, procedures, goods, and services (Asad *et al.*, 2018; Kim-Soon *et al.*, 2017; Yan, 2022).

Umar *et al.* (2018) have also discovered a strong and positive link between entrepreneurial competencies and innovation, as well as between innovation and business performance. Similarly, Kazemi *et al.* (2016), and Sa'ari *et al.* (2013) found that companies with strong entrepreneurial competencies tend to be more innovative and successful. Additionally, innovation has also been shown to mediate both the connection between social capital and the performance of micro and small businesses in Ghana (Agyapong *et al.*, 2017); and the association between the degree of internationalisation and company performance amongst Malaysian internationalised enterprises (Pouresmaeili *et al.*, 2018). Furthermore, innovation is found to mediate the connection between customer orientation and performance, as well as the link between inter-functional orientations and performance (Bamfo and Kraa, 2019). Correspondingly, innovation capability mediates the relationship between access to resources and SME sustainability, as well as the link between access to information and SME sustainability in Pakistan (Imran *et al.*, 2019). However, the role of innovation as a mediator in the link between entrepreneurial competencies and business performance has not been thoroughly investigated in previous research (see Ng *et al.*, 2019; Umar and Ngah, 2016). Based on the past research findings, this study posits as follows:

H3. Innovation has a positive effect on manufacturing SMEs' sustainable performance.

H4. Innovation mediates the relationship between entrepreneurial competencies and manufacturing SMEs' sustainable performance.

Given the above discussion, the following conceptual framework is developed for the study as illustrated in Figure 1. The conceptual framework consists of entrepreneurial competencies, innovation, and SMEs' sustainable performance. The entrepreneurial competencies have been treated as the independent variable and SMEs' sustainable performance is treated as the dependent variable. The framework takes into account the mediating role of innovation in the relationship between entrepreneurial competencies and innovation.

Methodology

Participants and procedure

A survey was self-administered to 428 top and middle-level managers in higher management positions who were well-versed in the company operations of manufacturing SMEs in Malaysia's northern region. Participants have given consent to respond to the survey. In the Malaysian manufacturing sector, the term SME is used to define a firm with a sales turnover of less than RM50 million or with less than 200 full-time workers. In the services and other

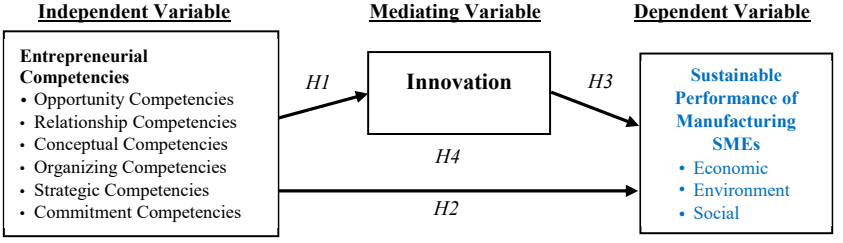


Figure 1.
Conceptual framework

industries, firms having a sales turnover of less than RM20 million and fewer than 75 full-time workers are categorised as SMEs (SME Corporation Malaysia, 2018). A disproportionate stratified random sample approach was adopted using the list of manufacturing SMEs registered with the SME Corporation Malaysia (2018) and the Federation of Malaysian Manufacturers (2019) as the total population. This strategy gave every unit in the population an equal chance of being chosen (Sekaran and Bougie, 2010). Of the original sample size, 122 completed questionnaires were received (valid recovery rate of 28.5%) and utilised for data analysis. The balance was omitted owing to incomplete and missing data. This sample size exceeds the recommended 100 questionnaires by Hair *et al.* (2019a, b). According to Ho *et al.* (2016), this sample size is appropriate since SMEs typically have a response rate of about 10%. Indeed, the sample size is within the expected response rate between 5 and 35% for social science research (see Sekaran and Bougie, 2016).

Questionnaire development and instrument

The self-administered questionnaire encompassed three sections: respondents' demographic profiles, the profile of business performance, and respondents' perception of innovation, entrepreneurial competencies and sustainable performance of the manufacturing SMEs. Appendix details the measurement items of the instruments employed. Entrepreneurial competencies were operationalised by a multi-dimensional construct with 30-measurement items covering six components, namely "opportunity competencies", "relationship competencies", "conceptual competencies", "organising competencies", "strategic competencies", and "commitment competencies" adapted from Man *et al.* (2008). Innovation was measured by six items drawn from Bamfo and Kraa (2019), and Imran *et al.* (2019). Sustainable performance was operationalised by a multi-dimensional construct that consisted of 13 items covering three aspects, namely environment (adapted from Laosirihongthong *et al.*, 2013), economic (adapted from Eltayeb *et al.*, 2011; Smith, 2015), and social (adapted from Abdul-Rashid *et al.*, 2017; Paulraj, 2011). These items were designed on a five-point Likert scale, i.e. 1 = Strongly Disagree and 5 = Strongly Agree.

Statistical technique

The data were analysed via the partial least squares-structural equation modelling (PLS-SEM) approach by using Smart-PLS 3.0 software as this promotes analytic rigour and more consistent estimates (Henseler and Schuberth, 2020; Sarstedt *et al.*, 2016). The approach was chosen for the model specification, simplicity, and lack of hard distributional assumptions (Sarstedt *et al.*, 2016).

Results

Demographic profiles of the respondents

The demographic profiles of the respondents are summarised in Table 1. Of the total respondents, 62.3% were males and 37.7% were females. About half of the participants were Chinese (48%) and bachelor's degree holders (59%). More than half of the manufacturing SMEs (i.e. 60%) were private limited companies, 25% were sole proprietorships, and 15% were partnerships. Fourteen percent of the manufacturing SMEs had been established for less than five years, 36% between 5 and 15 years, and 34% between 16 and 25 years. Only 16% of the manufacturing SMEs had been in operation for more than 25 years. More than 70% of the manufacturing SMEs (i.e. 72%) had a total of fewer than 75 employees and 28% of manufacturing SMEs had between 76 and 200 employees. In terms of sub-sector industry, the participating SMEs were mostly in the food industry (26%) followed by electrical products and components (24%) and other manufacturers (24%). Other sub-sectors include machinery

Characteristics	Frequency	Percentage
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
Bachelor's degree	72	59.0
Master	13	10.7
PhD	5	4.1
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

Table 1.
Profile of respondents and manufacturing SMEs

and equipment (16%), textiles and clothing (13%), beverages (9%), spare parts and accessories (4%) and wood products (3%).

Common method bias and multicollinearity test

The principal component analysis was used to check for common method bias (CMB) using Harman's single factor test (Harman, 1976). In this study, the total variance explained by the first component was 34.21%, significantly less than the cut-off of 50% recommended by Podsakoff *et al.* (2003). Furthermore, the test for CMB was conducted using variance inflation factors (VIFs), revealing that the VIF values ranged from 1.06 to 2.184, which fell below the

value of 3.3 recommended by Kock (2015) and well below the threshold of 10 suggested by O'brien (2007). As a result, there is no multicollinearity issue or any threat of CMB in this study.

Partial least squares-structural equation modelling

The PLS-SEM approach was used to predict the relationships amongst variables and was conducted via a two-stage assessment: the measurement model and the structural model.

Measurement model assessment

The measurement model was checked via several tests, namely internal reliability consistency, convergent validity, and discriminant validity. The outer loadings of the indicator were used to determine the construct item reliability, which must be at least 0.70 to be considered reliable (Hair *et al.*, 2019a, b). Convergent validity was assessed via three criteria: (1) factor loading needs to be more than 0.70, (2) composite reliability needs to surpass 0.70, and (3) average variance extracted (AVE) needs to be greater than 0.50 (Hair *et al.*, 2019a, b). Table 2 indicates that these conditions were fulfilled and therefore that the model had adequate internal consistency reliability and convergent validity.

Discriminant validity was evaluated to measure the uniqueness of each construct (Hair *et al.*, 2019a, b). The HTMT0.85 parameters were used to assess discriminant validity, in which connection the coefficient values should be less than 0.85 (Henseler *et al.*, 2015). This criterion was met as shown in Tables 3 and 4.

Structural model assessment

Following validation of the measurement model's psychometric properties, the structural model was assessed to inspect the relationship between the constructs illustrated in Figure 1 using the bootstrapping method (5,000 resamples). R^2 and the level of significance of the path coefficients were used to assess the goodness of the structural model (Hair *et al.*, 2019a, b). The model explained 62.7% of the variation in innovation and 67.8% of the variation in the sustainable performance of manufacturing SMEs, according to the R^2 values. The results of the PLS-SEM approach shown in Table 5 revealed that entrepreneurial competencies had a positive effect on the innovation of manufacturing SMEs ($\beta_1 = 0.705$, t-value $= 12.792$, $p < 0.05$); thus, H1 was supported. Likewise, the sustainable performance of manufacturing SMEs was significantly and positively influenced by entrepreneurial competencies ($\beta_2 = 0.517$, t-value $= 6.143$ $p < 0.05$), giving support for H2. For H3, the results of $\beta_3 = 0.277$ with a t-value $= 3.041$ at $p < 0.05$ indicated that the relationship between innovation and sustainable performance of manufacturing SMEs was positive and significant.

Mediating effect of innovation

The mediating effect of innovation on the relationship between entrepreneurial competencies and the sustainable performance of manufacturing SMEs as posited in H4 was performed using the method of bootstrapping indirect effects recommended by Preacher and Hayes (2008). This method is superior to the causal procedure suggested by Baron and Kenny (1986) and "works for simple and multiple mediator models" whilst also allowing for the simultaneous testing of the relationship between variables (Preacher and Hayes, 2008). The indirect influence of innovation with $\beta_4 = 0.196$ was significant as its t-value $= 2.923$ (see Table 6). The method of Preacher and Hayes (2008) indicated that the trend, with 0.196, 95% Boot CI: [LL = 0.069, UL = 0.330], was not overlapping zero in between the values, which suggests the existence of mediation. It was determined that innovation partially mediated the

Constructs	Items	Loading	Composite reliability	Average variance extracted
Entrepreneurial competencies (EC)				
Opportunity (OPP)	OPP1	0.862	0.939	0.795
	OPP2	0.901		
	OPP3	0.921		
	OPP4	0.881		
Relationship (REL)	REL1	0.791	0.918	0.692
	REL2	0.832		
	REL3	0.885		
	REL4	0.837		
	REL5	0.810		
Conceptual (CON)	CON1	0.780	0.906	0.661
	CON2	0.726		
	CON3	0.887		
	CON4	0.883		
	CON5	0.776		
Organising (ORG)	ORG1	0.855	0.932	0.697
	ORG2	0.813		
	ORG3	0.911		
	ORG4	0.854		
	ORG5	0.785		
	ORG6	0.784		
Strategic (STRA)	STRA1	0.827	0.931	0.731
	STRA2	0.888		
	STRA3	0.912		
	STRA4	0.833		
	STRA5	0.811		
Commitment (COMM)	COMM1	0.812	0.944	0.770
	COMM2	0.881		
	COMM3	0.909		
	COMM4	0.912		
	COMM5	0.871		
Innovation (IN)	IN1	0.849	0.884	0.567
	IN2	0.860		
	IN3	0.812		
	IN4	0.801		
	IN5	0.608		
	IN6	0.518		
Sustainable performance (SP)				
Economic (SE)	SE1	0.833	0.928	0.762
	SE2	0.904		
	SE3	0.882		
	SE4	0.872		
Environment (SEN)	SEN1	0.743	0.921	0.700
	SEN2	0.847		
	SEN3	0.895		
	SEN4	0.871		
	SEN5	0.820		
Social (SS)	SS1	0.847	0.922	0.747
	SS2	0.861		
	SS3	0.896		
	SS4	0.852		

Table 2.
Construct reliability and validity

relationship between entrepreneurial competencies and the sustainable performance of manufacturing SMEs; thus, H4 was accepted.

Discussion

This study confirmed that entrepreneurial competencies had a significant impact on manufacturing SMEs' capacity to innovate. The findings imply that manufacturing SMEs

Table 3. Discriminant validity by HTMT (1st order)

Variable	1	2	3	4	5	6	7	8	9
(1) Commitment									
(2) Conceptual	0.757								
(3) Opportunity	0.557	0.831							
(4) Organising	0.769	0.848	0.601						
(5) Relationship	0.594	0.839	0.640	0.709					
(6) Economic	0.563	0.662	0.567	0.601	0.519				
(7) Environment	0.592	0.640	0.514	0.626	0.526	0.796			
(8) Social	0.569	0.641	0.507	0.598	0.513	0.568	0.835		
(9) Strategic	0.703	0.727	0.478	0.79	0.636	0.554	0.615	0.649	

Table 4. Discriminant validity by HTMT (2nd)

Variable	1	2	3
(1) Entrepreneurial competencies			
(2) Innovation	0.781		
(3) Sustainable performance	0.808	0.745	

Table 5. Hypothesis testing

Relationships	Standardised beta	Standard error	*t*-value	*p*-value	Confidence interval BCI LL	Confidence interval BCI UL	f^2	Results
Entrepreneurial competencies → Innovation	0.705*	0.055	12.792	0.000	0.593	0.809	0.991	H1 Supported
Entrepreneurial competencies → Sustainable Performance	0.517*	0.084	6.143	0.001	0.350	0.680	0.295	H2 Supported
Innovation → Sustainable Performance	0.277*	0.091	3.041	0.003	0.095	0.448	0.085	H3 Supported

Note(s): *significant at $p < 0.05$; BCI UL = bias confidence interval upper level; BCI LL = bias confidence interval lower level

Table 6. Mediating effect of innovation

Relationships	Standardised beta	Standard error	*t*-value	*p*-value	Confidence interval BCI LL	Confidence interval BCI UL	Results
Entrepreneurial competencies → Innovation → Sustainable Performance	0.196*	0.067	2.923	0.001	0.069	0.330	H4 Supported

Note(s): * significant at $p < 0.05$; BCI UL = bias confidence interval upper level; BCI LL = bias confidence interval lower level

aspire to be innovative so that they are the first to market with new products and that this aspiration is reflected by the implementation of positive entrepreneurial competencies or capabilities that enable them to scan the environment and seize high-quality business opportunities. These opportunities are taken by using Research and Development (R&D) to produce products that provide real benefit by satisfying customers' needs. Moreover, when manufacturing SMEs have the flexibility to select strategic actions by evaluating costs and benefits, they tend to be innovative in their methods of business operation, and have the capability to uncover long-term challenges, problems, or opportunities, as well as to redesign business to better achieve long-term goals. Furthermore, they continue to monitor existing progress to ensure the business focuses on its strategic goals. Thus, a wide variety of entrepreneurial competencies are seen to directly influence the innovation capability of manufacturing SMEs. Chabbouh and Boujelbene (2022) observe that open innovation and dynamic organisational capacity (i.e. dynamic capabilities, absorptive capability, and appropriation capability) contribute to SMEs' capacity to innovate. Amini Sedeh *et al.* (2021) acknowledge that entrepreneurial competencies are becoming increasingly important for innovative entrepreneurship as they help to overcome the many obstacles to innovation. This significant finding corresponds with that of previous studies (see Amini Sedeh *et al.*, 2021; Chabbouh and Boujelbene, 2022; Mohsin *et al.*, 2017; Umar *et al.*, 2018).

Further examination of the quantitative results revealed that the direct effect between entrepreneurial competencies and the sustainable performance of manufacturing SMEs was significant. The results deduce that manufacturing SMEs' sustainable performance is reinforced when they have the capability to protect the community's claims and rights whilst producing products that decreased environmental and public safety hazards. They interact effectively and form long-term trusted connections with people by creating a harmonised form of negotiation and a positive work climate through discussion and problem-sharing, as well as maintaining a personal professional network. Innovative entrepreneurial competencies equip manufacturing SMEs with the capability to handle reasonable job-related risks and treat new issues as opportunities. These competencies aid them in deciding critical strategic activities and actions concerned with producing products with value-added quality for clients. The significant finding is consistent with previous research (see Al-Mamun *et al.*, 2016; Mitchelmore and Rowley, 2013), which identified entrepreneurial competencies as the most important predictor of SMEs' sustainable performance and growth.

Additionally, this research found that innovation has a significant impact on the sustainable performance of manufacturing SMEs. The significant finding implies that as manufacturing SMEs endorse innovation in business operations and experiment with new ideas in a sustainable manner to gain competitive advantage, they benefit from increased profits and return on investment, as well as improved position in the marketplace. Preceding research by Salman *et al.* (2016), Soto-Acosta *et al.* (2016), and Yustian *et al.* (2021) support these findings. On top of that, an additional test was performed to establish the strength of the role of innovation as a mediator on the relationship between entrepreneurial competencies and the sustainable performance of manufacturing SMEs. This test confirmed that innovation is significant in mediating the association between entrepreneurial competencies and the sustainable performance of manufacturing SMEs with partially-mediated effects. The results infer entrepreneurial competencies combined with an element of innovation are a major requirement for the improvement of manufacturing SMEs' sustainable performance, and for solving business-related problems. Leveraging innovation to find new ways to do things enables manufacturing SMEs to design innovative products that still adhere to strict environmental regulations. They also ensure that the consumption of hazardous materials and CO^2 emissions are reduced in tandem with the creation of new and innovative products and ventures. SMEs must ensure that all product packaging can be reused, repaired, or recycled to save the environment. These positive outcomes are comparable with those

revealed by previous researchers (see Chen *et al.*, 2018; Pouresmaeili *et al.*, 2018) that SMEs must remain innovative by looking for new ways to do things to stay competitive in the global economy.

Conclusions

In a nutshell, this study examined the impact of entrepreneurial competencies and innovation on manufacturing SMEs' sustainable performance. Additionally, the mediating effect of innovation on the relationship between entrepreneurial competencies and manufacturing SMEs' sustainable performance was investigated. The present empirical discoveries add vital contributions to knowledge and practice that focus on entrepreneurial competencies, innovation, and the sustainable performance of manufacturing SMEs. With regards to its contribution to knowledge, this study has fused the RBV theory and the TBL framework to provide a unified conceptual model for use in the context of Malaysian manufacturing SMEs' sustainable performance. The study has confirmed that the RBV is suitable for considering the capacity of entrepreneurial competencies to predict manufacturing SMEs' sustainable performance and that innovation acts as a mediator on this relationship. And, the TBL framework is related to the manufacturing SMEs' sustainable performance, which has not been investigated with the RBV theory concurrently in a single framework by previous scholars. Through the PLS-SEM approach, this study provided answers to the research questions as follows:

RQ1. What is the impact of entrepreneurial competencies and innovation on manufacturing SMEs' sustainable performance?

RQ2. Does innovation mediate the relationship between entrepreneurial competencies and manufacturing SMEs' sustainable performance?

The model has a robust predictive capacity as it accounted for 62.7% of the variation in innovation and 67.8% of the variation in manufacturing SMEs' sustainable performance. The present research findings confirmed that entrepreneurial competencies had a significant impact on the innovation of manufacturing SMEs. Likewise, entrepreneurial competencies also had a positive and significant direct effect on manufacturing SMEs' sustainable performance. Subsequently, more advanced tests were conducted, and it was shown that innovation had a significant mediating role in this association. Henceforth, the present study has illustrated how the RBV theory and the TBL framework could be incorporated into the present proposed framework with the inclusion of the mediating role of innovation and eventually enrich the findings of extant research.

As for the contributions to practice, manufacturing SMEs' sustainable performance should be strengthened by linking entrepreneurial competencies with innovation by focussing on the development of a mixture of entrepreneurial capabilities such as opportunity competencies, relationship competencies, conceptual competencies, organising competencies, strategic competencies, and commitment competencies to nurture greater agility to respond quickly to change and market demands. They should also conduct tactical meetings regularly to discuss current projects and assess critical indicators for further action. Thereafter, they could identify and test fresh ideas for innovation and new business ventures whilst striving for their sustainable performance to remain innovative and competitive in the challenging business environment. Manufacturing SMEs should continuously be mindful of the need to alleviate detrimental ecological and safety effects on life and community, and to improve employees' occupational health and safety during the processes of new product innovation and R&D. Furthermore, a collaborative innovation platform for enterprises should be developed with the use of big data, and information technology should be

integrated into the recruitment and placement, training and development, career planning, and performance management of innovative talent, to boost internal entrepreneurial competencies and to assist manufacturing SMEs in becoming digital and increasing their sustainable performance. In respect of the implications for public policy, manufacturing SMEs' managers and employees should be encouraged to develop their entrepreneurial competencies by attending relevant training and upskilling and reskilling development programmes to remain innovative, energetic and abreast of current developments, thus contributing to business growth and survival.

This study has been limited to manufacturing SMEs in Malaysia and has not scrutinised the role of respondents' demography. Consequently, there is room for expansion of the methodology to include a larger research sample size, different demographic variables, such as income status, all types of SMEs, and SMEs in different countries, since such expansion would help to investigate the links between entrepreneurial competencies, innovation and sustainable performance. Future research should also investigate whether the demographic variables of gender and level of education are influential on the acquisition and development of entrepreneurial competencies, innovation and sustainable performance.

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Further reading

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Appendix

Label	Statements
Opportunity competencies	
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."
Relationship competencies	
REL1	"My firm has the capability to negotiate with others."
REL2	"My firm has the capability to maintain a personal network of work contacts."
REL3	"My firm has the capability to interact effectively with others."
REL4	"My firm has the capability to develop long-term trusting relationships with others."
REL5	"My firm has the capability to create a positive work climate through discussion and problem-sharing."
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."
Organising competencies	
ORG1	"My firm has the capability to organise resources."
ORG2	"My firm has the capability to lead subordinates."
ORG3	"My firm has the capability to organise people."
ORG4	"My firm has the capability to plan the operations of the business."
ORG5	"My firm has the capability to keep the organisation running smoothly."
ORG6	"My firm has the capability to delegate effectively."
Strategic competencies	
STRA1	"My firm has the capability to monitor progress toward strategic goals."
STRA2	"My firm has the capability to prioritise 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."
Commitment competencies	
COMM1	"My firm has the capability to dedicate to make the business work."
COMM2	"My firm has the capability to refuse to let the business fail."
COMM3	"My firm has the capability to have an extremely strong internal drive to succeed."
COMM4	"My firm has the capability to commit to long term business goals."
COMM5	"My firm has the capability to be commit to produce quality goods."
Innovation	
IN1	"My firm perceives to be able to frequently tries out new ideas."
IN2	"My firm perceives to be able to seek out new ways to do things."
IN3	"My firm perceives to be able to creative in its methods of operation."
IN4	"My firm perceives to be able to often the first to market with new products."
IN5	"Innovation in our firm is perceived as too risky and is resisted."
IN6	"Our new product introduction has increased over the last 5 years."

(*continued*)

Table A1. Measurement of instruments

Label	Statements
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	
SEN1	"My firm has improved compliance with environmental standards."
SEN2	"My firm has reduced energy consumption."
SEN3	"My firm has reduced CO2 emissions."
SEN4	"My firm has reduced the consumption of hazardous materials."
SEN5	"My firm has designed products and packaging to be reused, repaired or recycled."
Sustainable performance – socially	
SS1	"My firm has improved/enhanced the overall stakeholder welfare."
SS2	"My firm has reduced environmental impacts and risks to the general public."
SS3	"My firm has improved occupational safety and health of employees."
SS4	"My firm has improved the awareness and protection of the claims and rights of the community served."

Table A1.

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