

The power of strategic knowledge management in the relationship between innovation and the performance of large manufacturing firms in Malaysia

Power of
strategic
knowledge
management

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Abstract

Purpose – This study aims to explore the interaction of strategic knowledge management (SKM) and innovation on the performance of large manufacturing firms (LMFs) in Malaysia.

Design/methodology/approach – This study used a quantitative approach in investigating this interaction. Smart partial least-squares analysis was performed to test the hypotheses.

Findings – It was observed that administrative innovation, process innovation and product innovation were effective drivers of LMF performance. It was also ascertained that SKM has no moderating effect on the product innovation relationship with performance, although it does moderate the relationships between LMF performance and administrative innovation and process innovation, respectively.

Research limitations/implications – The main limitation of this study is its focus on Malaysian LMFs. It nevertheless contributes to the literature by extending understanding of SKM and innovation dimensions from multi-faceted perspectives. As this is largely ignored in the literature, the study paves the way for additional research.

Practical implications – The findings may be used as guidelines for chief executive officers, particularly on the way SKM and innovation can be developed for enhanced LMF performance, in the context of South Asian countries.

Originality/value – To the best of the authors' knowledge, this is the first empirical work to confirm the main drivers of SKM, including in the analysis the effect of administrative innovation, process innovation and product innovation and performance, in the context of the manufacturing sector. In support of an original conceptual model, the insights contribute to the literature on innovation, LMFs, SKM and emerging economies.

Keywords Administrative innovation (ADM), Process innovation (PRC), Product innovation (PRD), Strategic knowledge management (SKM), Performance (PER), Large manufacturing firms (LMF)

Paper type Research paper



1. Introduction

Innovation and knowledge are the facilitators of our growth, prosperity, progress and the terrible damage that we are doing to our planet (Guo *et al.*, 2019; Hameed *et al.*, 2021; Santoro *et al.*, 2018). The meaning and role of these two small words are so significant that our lives and the future of our planet depend on them (Engels *et al.*, 2019). Innovation is essential to progress, and the more organized it is, the more sustainable and amenable. Only organizations that develop real strategic plans for development will be able to enjoy a more advanced and competitive future. Organizations not interested in innovation, research and development will continue to live as consumers only, which can be seen as failure (Voinea *et al.*, 2021; Edmondson, 2012).

Innovation is largely responsible for all levels of our present development, the key to national and organizational success (Weerakoon and McMurray, 2020; Von Hippel, 2016; Rogers, 2010). The term was used for the first time in its modern sense by the political economist Joseph Schumpeter in 1940, when he defined it as the first commercial use of a product, service, or process that had not been used before (Kleinknecht, 2016). More recently, Berman (2000) added that it is individual and unexpected, extending to the invention and new creation. In the current environment of fierce competition, whether local or international, innovation is considered as of paramount importance for manufacturing firms (Chan *et al.*, 2019; Na *et al.*, 2019; Hameed *et al.*, 2018). In Malaysia, however, manufacturing firms suffer from insufficient innovation. Malaysia was ranked 35 for innovation capability in 2018 and 2019, indicating the need to pay more attention to innovative activities to compete with international organizations. Azmi *et al.* (2020), Sanusi *et al.* (2018) and Abdullah and Ku Ismail (2017) claim that this low level of performance results from insufficient use of new technology training for employees.

Contemporary enterprises need to develop their competitive advantage, a difficult process (Alqershi *et al.*, 2020). Superior performance is one of the requirements for organizational success, in a variety of environments, while excellence is one of the concepts of contemporary management and business (Pietrobelli *et al.*, 2018; Soto-Acosta *et al.*, 2016). The goal of achieving and maintaining success involves excellence and leadership, especially in the transition towards the globalization of markets, the diversity of competitive methods and tools and the spread of concepts and standards of innovation and knowledge (Hislop *et al.*, 2018).

Business organizations, with their different tasks, types and sizes, face many issues and problems that require their leaders and employees to think about reducing reliance on the traditional approach to solving problems, based on trial and error (Head and Alford, 2015); trying to use an innovative approach depends on creating new ideas to achieve the desired objectives (Mootee, 2013).

Many studies agree that the urgent need for organizations to innovate is imposed by economic, social, political, cultural and other changes (Berry, 2019; Berthet *et al.*, 2018). Researchers have also emphasized that the ability of organizations to maintain their competitive advantages is related to their ability to raise the level of innovation and knowledge (Abubakar *et al.*, 2019; Heisig *et al.*, 2016) and respond to changing customer needs (Rajapathirana and Hui, 2018; Brunswicker and Chesbrough, 2018; Garcia-Perez-de-Lema *et al.*, 2017).

At the same time, strategic knowledge management (SKM) has become a new axis of management science in the face of a competitive environment characterized by innovation, quality and rapid, continuous development (Ferreira *et al.*, 2018). This is especially true in light of the great changes occurring in management, where knowledge is increasingly recognized as a source of organizational strength (Haas, 2018). Through its role in encouraging strategic thinking skills and the ideal of strategic intellectual construction of human resources (Venkitachalam and Willmott, 2017), SKM is now considered as an especially important source of competitive advantage, through which employees acquire

knowledge and crystallize it into concrete work models, giving the organization a unique position and unmatched advantages (Laihonen and Mantyla, 2018; Huang *et al.*, 2016).

The concepts of innovation, SKM and performance are not new, although the literature focuses on the direct relationship between innovation and performance with different moderating variables. However, the need to examine these variables in a single study is becoming stronger (Turulja and Bajgoric, 2019; Tariq *et al.*, 2019; Chan *et al.*, 2016), and the current study contributes to the body of knowledge by examining the moderating effects of SKM on the relationship between innovation and performance.

For several years, scholars have explored the effect of innovation on performance (Alqershi *et al.*, 2020; Silva *et al.*, 2017), although rarely in the context of large manufacturing firms (LMF) (Gomes and Wojahn, 2017; Ndesaulwa and Kikula, 2016; Roach *et al.*, 2016). Several studies have found that innovation significantly enhances a firm's performance (Hameed *et al.*, 2020; Zhang *et al.*, 2019; Rajapathirana and Hui, 2018), while others have found no significant relationship between them (Darroch, 2005; Roper and Love, 2002). Previous studies have recommended using moderators in the relationship between innovation and organizational performance (Alqershi *et al.*, 2020), and so our research adds SKM as a moderator in this relationship, specifically in the context of LMF. SKM is considered a significant predictor of organizational performance (Cabrilo and Dahms, 2018), although while some authors have confirmed its vital role (Fernandez-Lopez *et al.*, 2018), others have largely ignored it (Claver-Cortés *et al.*, 2018; Marques *et al.*, 2016). This study aims to determine performance through SKM as moderator, and will be beneficial to both industrial practitioners and scholars.

The motivation for this study is therefore that previous studies have had limited interest in innovation determining performance in LMF in Malaysia, with the moderating role of SKM. In filling this gap, we will attempt to answer the following research questions, considering innovation in three dimensions: administrative (ADM), product (PRD) and process (PRC) innovation:

RQ1. Is there any relationship between innovation dimensions (ADM, PRC and PRD) and performance?

RQ2. Does strategic knowledge management moderate the relationship between innovation dimensions (ADM, PRC and PRD) and performance?

The research objectives are to answer these questions.

The most important of several contributions to the body of knowledge made by this pioneer study is the design of a new framework to incorporate innovation, SKM and manufacturing performance, useful in improving the performance of Malaysian large manufacturing organizations.

2. Literature review and hypothesis development

2.1 Innovation and performance

The word innovation has been defined as exploring a completely new product, service or idea (Tidd and Bessant, 2020), working to change and renew what is available (Etzkowitz and Zhou, 2017), or as a package of new things which will be useful and contribute to the organization. It is not confined to discovering new products, but can also involve introducing new manufacturing systems, discovering new markets or finding new primary resources (Santoro *et al.*, 2018). Innovation is the discovery of a fundamentally different competitive strategy or business model in a given industry (Lockwood and Papke, 2017). It refers to the entire process through which firms redesign their business processes and products to enable them to offer superior products and services to their stakeholders (Berthet *et al.*, 2018).

The literature proposes that if organizations want to succeed, they must remove any obstacles to innovation, one of the most important of which is an administrative system and organizational structure that inhibits and resists creativity (Gentile-Lüdecke *et al.*, 2020). Other obstacles to innovation include the desire of the organization's leadership not to develop, innovate or change (Lockwood and Papke, 2017); the desire to maintain stereotypical ways and methods of work, and unwillingness to spend (McGee, 2021); establishing and entrenching a bureaucratic structure and culture (Rivera and Landahl, 2019); not wishing to create competition between workers to establish an environment dominated by the innovative pattern (Gozman *et al.*, 2018; Liao *et al.*, 2017); and the divergence between the institution's strategy and management's objectives in terms of innovation (Didenko *et al.*, 2018). Pietrobelli *et al.* (2018) argued that innovation is the exploitation of opportunities to gain a greater market share through the temporary establishment of a monopoly, and that continuous innovation is the most important source of success and continuity in the market. Also, Rajapathirana and Hui (2018) argued that innovation is the only way available for firms to achieve high performance and face the strength of competitors in the current business environment.

Studies on innovation (Sjodin *et al.*, 2020; Stoeckli *et al.*, 2018) have extended the points of view on value change and value creation capabilities and indicated that high performance and competitive advantage are achieved via superior organizational conditions; the value creation capabilities of the firm are achieved through innovation. In other words, high performance is also obtained through a firm's deployment and use of distinct, valuable and inimitable resources (Falahat *et al.*, 2020).

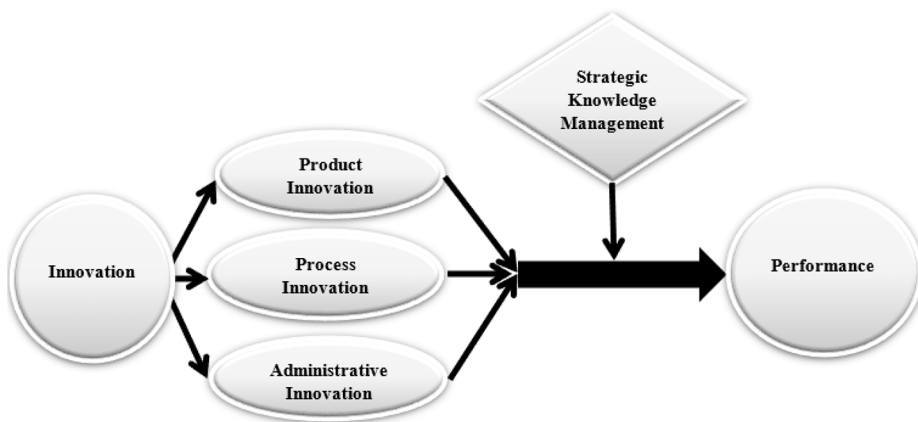
Many researchers have explored the relationship between innovation and performance, their arguments based on the points outlined above (Doluca *et al.*, 2018; Naidoo, 2010; Garcia-Perez-de-Lema *et al.*, 2017; Rajapathirana and Hui, 2018; Pavie, 2020; Godin and Vinck, 2017; Aksoy, 2017). Our study intends to identify the effect of innovation on performance specifically in Malaysian LMF. Given the significant role played by manufacturing firms in national growth and development (Ahmad and Zabri, 2016), innovation in the context of large organizations has received much interest (Mazzarol and Reboud, 2020; Arshi and Burns, 2018; Pietrobelli *et al.*, 2018), acknowledging similar benefits and constraints to those already presented here.

The theoretical model on which this study is based is presented in Figure 1. The main thread is between innovation dimensions and LMF performance, and based on a wide range of relevant literature, the following hypotheses are proposed:

- H1a.* There is a significant relationship between administrative innovation and LMF performance in Malaysia.
- H1b.* There is a significant relationship between process innovation and LMF performance in Malaysia.
- H1c.* There is a significant relationship between product innovation and LMF performance in Malaysia.

2.2 Strategic knowledge management

Knowledge is vital to the efficiency and effectiveness of business organizations (Silva *et al.*, 2017; Hislop *et al.*, 2018), and its management enables them to create new products quickly and at low cost, and provides an opportunity to obtain a permanent competitive advantage through offering new goods and services (Webb, 2017; Rao *et al.*, 2018; Lee *et al.*, 2016; Von Krogh *et al.*, 2000).



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Figure 1.
Study framework

Preserving knowledge and using it to generate new knowledge to achieve the organizational goals (Kianto *et al.*, 2017; Zaim *et al.*, 2019; O'Sullivan, 2007) is the essence of SKM. It is the main source of creativity and innovation in the organization (López-Nicolás and Meroño-Cerdán, 2011; Ricceri, 2008).

To summarize, the literature defines SKM as valuable knowledge and the procedures indispensable for an organization's responsibilities and setting limits and efficiency goals for all knowledge management initiatives (Laihonen and Mantyla, 2018). Huang *et al.* (2016) claim that it is therefore a dynamic and efficacious learning operation and procedure related to exploration, exploitation and the sharing of human knowledge that uses convenient and adequate technology and cultural environments to improve a company's human capital and performance. That is, SKM is a systematic and effective process of managing and activating the knowledge stored in the organization and using it in achieving the goals of the organization (Abubakar *et al.*, 2019). It simplifies procedures and reduces costs (Dalkir, 2017), creating an interactive environment to collect, document and transfer the cumulative experience gained from and during daily work practices.

Additionally, according to several authors (Kianto *et al.*, 2017; Gold *et al.*, 2001), knowledge is the most valuable asset in knowledge-based organizations; the primary task of these organizations is how to preserve this asset, and how to use it to generate new knowledge to create value and high performance and achieve competitive advantage (Zaim *et al.*, 2019). Indeed, these major tasks are the essence of SKM through which it contributes to achieving the organization's goals (O'Sullivan, 2007). Given that innovation is the process of transforming new knowledge into new products, and is a source of value creation and achieving competitive advantage, it can be said that SKM is the main source of creativity and innovation in the organization (López-Nicolás and Meroño-Cerdán, 2011; Ricceri, 2008).

Some researchers have linked SKM with performance (Cabrilo and Dahms, 2018); it is through SKM that an organization can develop the capabilities of its employees, which ultimately helps in value creation and sustaining a superior position. Extensive empirical literature exists on the commitment of SKM to performance in various enterprises (Marques *et al.*, 2016; Heisig *et al.*, 2016; Fernandez-Lopez *et al.*, 2018). Numerous researchers investigated the relationship between knowledge management and innovation and found a significant relationship between the two variables (Obeidat *et al.*, 2016; Dickel and de Moura, 2016; Mardani *et al.*, 2018; Fagerberg *et al.*, 2012; De Zubielqui *et al.*, 2019).

Another study investigating the relationship between innovation and performance (Gupta and Gupta, 2019) emphasized that researchers may also extend their work by testing moderating effects on the relationship. Cabrilo and Dahms (2018) recommended that SKM could be used as a moderating variable. However, this innovation and performance relationship may contain other control variables related to firm characteristics (e.g. variables that focus on the firm's knowledge may also add value to the success of innovation projects) (Jugend *et al.*, 2018).

Overall, scholars consider SKM as an important factor encouraging innovation and high levels of performance. However, some inconsistent findings concerning the relationship between innovation and performance (Sardi *et al.*, 2020; Tajeddini *et al.*, 2020; Darroch, 2005; Roper and Love, 2002; Heunks, 1998) question the evaluation of SKM as moderator. LMFs in Malaysia have not always taken advantage of their size and capital to invest in innovation, although their structure gives them more flexibility and independence in fostering innovation. Based on the above literature, the study proposes that:

- H2a.* Strategic knowledge management moderates the relationship between administrative innovation and LMF performance in Malaysia.
- H2b.* Strategic knowledge management moderates the relationship between process innovation and LMF performance in Malaysia.
- H2c.* Strategic knowledge management moderates the relationship between product innovation and LMF performance in Malaysia.

3. Research methodology

3.1 Sampling description, procedures and measurements

This study examines the relationship between innovation dimensions ADM, PRC and PRD, and LMF performance in Malaysia, with SKM as moderator. The validity of the constructs in the theoretical model was tested, with assistance from academics; after revising the original survey questionnaire, data was collected from Malaysian LMFs in, for analysis of the hypotheses.

The target population was Malaysian LMF, identified from the 2019 Directory of Federation of Malaysian Manufacturers (FMM, 2019). Data collection was by self-administered questionnaires distributed by hand and mail. Considering the general low response rate of such surveys, a total of 537 questionnaires were distributed to chief executive officers (CEOs); 228 were returned, of which 11 were incomplete, making the total useable number 217. The unit of analysis was CEOs, because they are responsible for the development, planning and implementation of strategies, for making decisions and creating complete business plans for the attainment of goals and objectives. Table 1 presents their demographic characteristics.

A quantitative cross-sectional research design was used. The items in the third part of the questionnaire covered the three dimensions of innovation, ADM, PRD and PRC, adapted from Sciarelli *et al.* (2020); performance items adopted from Gupta and Govindarajan (1984); and SKM adopted from Cabrilo and Dahms (2018). A five-point Likert scale was used to measure the responses, ranging from 1 indicating strongly disagree to 5 indicating strongly agree. In checking the internal consistency, figures above 0.70 are considered as satisfactory for an adequate model (Cappelleri *et al.*, 2007). The results of Cronbach's α confirmed that each construct was within the acceptable limits: ADM (0.837), PRC (0.816), PRD (0.907), SKM (0.803) and LMF performance (0.851) (Gliem and Gliem, 2003).

Stratified random sampling was used to select the CEOs. Partial least-squares-structural equation modelling analysis (PLS-SEM) was appropriate for the sample size. Finally, to

Demographic characteristics of the respondent			Power of strategic knowledge management
Age	1 = less than 26	2	
	2 = 26 to 30 years	19	
	3 = 31 to 35 years	53	
	4 = Above 35	143	
Gender	1 = Male	191	
	2 = Female	26	
Working experience	1 = Less than 5 years	5	
	2 = Between 5 and 10 years	64	
	3 = Between 10 and 20 years	114	
	4 = Above 20 years	34	
Education	1 = School certificate/SPM and STPM	0	
	2 = Diploma	3	
	3 = Degree	163	
	4 = Postgraduate degree	49	
	Others	2	

Table 1. Demographic characteristics of the respondents

Notes: STPM = Sijil Tinggi Persekolahan Malaysia; SPM = Sijil Pelajaran Malaysia

determine the presence of non-response bias, our work compared the LMF which returned the questionnaires. From the χ^2 and *t*-statistics, no significant differences were found between the respondents and the sample, or between early respondents and late ones, indicating that non-response bias was not a problem (Alqershi *et al.*, 2021; Groves and Peytcheva, 2008).

4. Study results

4.1 Mean and standard deviation

The descriptive statistics presented in Table 2 represent the three dimensions of innovation, SKM and LMF performance. Firstly, for the innovation dimensions, ADM (mean = 2.72, standard deviation = 0.74), PRC (mean = 2.51, standard deviation = 0.86) and PRD (mean = 2.90, standard deviation = 0.31) indicated that most of the respondents were of the opinion that the level of innovation was not satisfactory in Malaysian LMF. Secondly, the SKM (mean = 2.93, standard deviation = 0.80) and thirdly, LMF performance approaches (mean = 3.15, standard deviation = 0.71) indicate that the CEOs agree with statements that SKM and performance are not very good among Malaysian LMF.

4.2 Assessment of partial least-squares-structural equation modelling path model results

Our study followed a two-step process to evaluate and report the results of PLS-SEM (Henseler *et al.*, 2009): assessment of the measurement and structural models (Hair *et al.*, 2010).

	N	Descriptive statistics			
		Minimum	Maximum	Mean	SD
ADM	217	1	5	2.7261	0.7481
PRC	217	1	5	2.5134	0.8602
PRD	217	1	5	2.9017	0.3175
PER	217	1	5	3.1536	0.7109
SKM	217	1	5	2.9372	0.8044
Valid N (listwise)	217				

Table 2. Descriptive statistics for latent variables

4.2.1 Measurement model. The main aim of the measurement model is to confirm convergent and discriminant validity. Following previous studies, ours used reflective constructs. The factor loadings, average variance extracted (AVE), and composite reliability must all be examined and checked to confirm convergent validity. The loading factor for each variable was determined for the purpose of testing the internal consistency of the items. The individual item reliability assessment involves the examination of the outer loadings of constructs' measurements. The rule of thumb established by [Hair et al. \(2016\)](#) concerning the items' retention requires values between 0.50 and 0.70; as a result, two of the 21 items were dropped for insufficient loadings, leaving 19 items (0.587–0.943). Values for composite reliability ranged from 0.766 to 0.917 and for AVE 0.524 to 0.706. All these values confirmed the measures' reliability. The details shown in [Table 3](#) confirm that the study's constructs satisfy the convergent validity test. [Table 3](#) indicates that all the scores for the study item constructs are within the acceptable limits ([Hair et al., 2016](#)). The full estimates of the measurement model are depicted in [Table 3](#).

Two further steps were used to check the discriminant validity. Firstly, the heterotrait-monotrait (HTMT) ratio results, shown in [Table 4](#), indicated that the values were below 0.90, as suggested by [Henseler et al. \(2016\)](#). Secondly, this was confirmed by comparing the indicator loadings with the cross-loadings, as suggested by [Henseler et al. \(2009\)](#). According to [Hair et al. \(2016\)](#), for adequate discriminant validity, the indicator loadings should be higher than the cross-loadings, as presented in [Table 3](#). Additionally, [Fornell and Larcker's \(1981\)](#) conditions were tested ([Table 5](#)), with AVE of 0.5 or above. The square root of the

Constructs	Items	Loadings	Composite reliability	AVE
ADM	ADM1	0.934	0.874	0.706
	ADM2	0.596		
	ADM4	0.943		
PER	PER1	0.851	0.917	0.654
	PER2	0.885		
	PER3	0.883		
	PER4	0.822		
	PER5	0.613		
	PER6	0.850		
PRC	PRC1	0.875	0.826	0.620
	PRC2	0.587		
	PRC3	0.866		
PRD	PRD1	0.623	0.766	0.524
	PRD2	0.751		
	PRD3	0.787		
SKM	SM1	0.693	0.817	0.530
	SM2	0.780		
	SM3	0.786		
	SM5	0.643		

Table 3.
Loadings, composite reliability and AVE

Heterotrait-Monotrait Ratio	ADM	PRC	PRD	SKM
ADM				
PRC	0.207			
PRD	0.683	0.306		
SKM	0.632	0.456	0.775	

Table 4.
HTMT ratio

AVE should exceed the correlations among the latent variables, and all exceeded the cutoff (0.50), confirming that the measures have sufficient discriminant validity.

4.2.2 Structural model. The structural model was next evaluated to check the results of the relationships between the variables. In addition, our study used a bootstrapping technique with 5,000 bootstrap samples (two-tailed) for the significance relationship of the proposed path, predictive relevance and goodness-of-fit. The explanatory power for the endogenous constructs, ADM, PRC and PRD, and LMF performance, was 0.216 and 0.203, respectively.

To test the hypotheses, the direct relationships in our study model were calculated; the results are presented in [Table 6](#) and [Figure 2](#). *H1a* is supported: it predicted a significant relationship between administrative innovation and performance ($\beta = 0.263, t = 4.729, p < 0.001$). Process innovation is significantly related to performance ($\beta = 0.248, t = 4.222, p < 0.000$), supporting *H1b*. Finally, the direct relationship between product innovation and performance was significant ($\beta = -0.173, t = 2.139, p < 0.21$), supporting *H1c*.

4.2.3 Testing the moderating effect on relationships. PLS-SEM was also used to test the strength of the moderating role of SKM on the relationships between the innovation dimensions (ADM, PRC and PRD) and LFM performance. Accurate results were obtained by using the product term and group comparison approaches ([Hair et al., 2016](#)). The former was used to examine the influence of SKM's moderating role, and product terms were generated between the latent independent construct indicators and the latent moderating variable indicators ([Murphy et al., 2014](#)). [Table 7](#) summarizes the results.

SKM significantly moderates the first two relationships, ADM and PRC with performance ($\beta = 0.129, t = 2.020, p < 0.018$) and ($\beta = 0.158, t = 2.465, p < 0.033$), respectively, but not PRD ($\beta = -0.071, t = 1.364, p < 0.091$). The results are presented in [Table 7](#) and [Figures 3–5](#). The predictive significance is considered high, exceeding the 0.31 threshold. In addition, in our hypothesis testing, the path coefficients ranged from 0.766 to 0.917, all significant at the 0.001 level. The Stone Geisser Q^2 value and blindfolding technique were used to test the model's predictive ability with an omission distance of seven. The innovation dimensions and LMF performance values in Q^2 are both greater than zero ([Jony and Serradell-López, 2021](#)).

Constructs	ADM	PER	PRC	PRD	SKM
ADM	0.840				
PER	0.404	0.808			
PRC	0.238	0.353	0.787		
PRD	0.290	0.335	0.255	0.724	
SKM	-0.319	-0.306	-0.278	-0.585	0.728

Table 5. Fornell and Larcker

Relationships	Std. Beta	Std. Error	<i>t</i> -values	<i>p</i> -values	Confidence intervals		Decision
					LLCI	ULCI	
ADM -> PER	0.263	0.058	4.729	0.0001	0.163	0.361	Supported
PRC -> PER	0.248	0.061	4.222	0.000	0.109	0.324	Supported
PRD -> PER	0.173	0.088	2.139	0.021	0.063	0.224	Supported

Table 6. Direct relationship

Notes: ULCI = Upper Limit Confidence Interval; LLCI = Lower Limit Confidence Interval

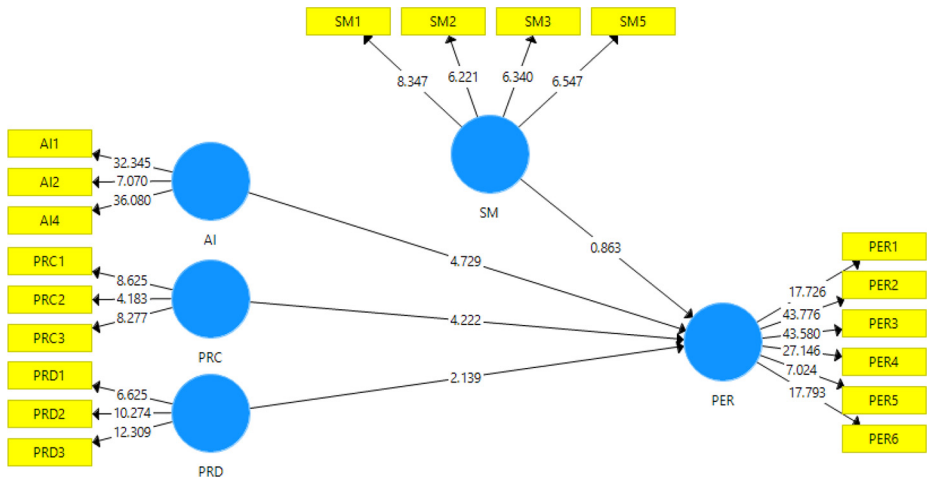


Figure 2. Structural model

Relationships	Std. Beta	Std. Error	t-values	p-values	Confidence intervals		Decision
					LLCI	ULCI	
SKM*ADM → PER	0.129	0.049	2.020	0.018	0.041	0.212	Supported
SKM*PRC → PER	0.158	0.052	2.465	0.004	0.033	0.304	Supported
SKM*PRD → PER	-0.071	0.067	1.364	0.091	-0.148	0.029	Not supported

Table 7. Indirect

Note: ULCI = Upper Limit Confidence Interval; LLCI = Lower Limit Confidence Interval

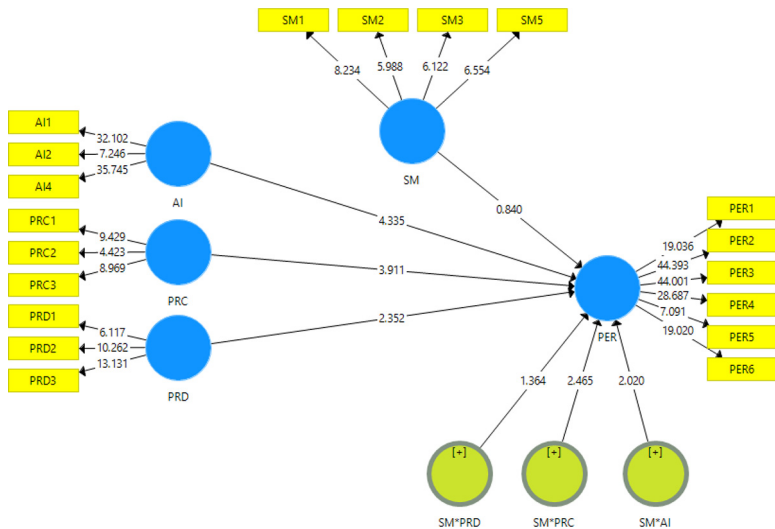


Figure 3. SKM moderation algorithm

Table 8 shows that the R^2 values for the variables exceed the minimum suggested by Chin (1998); performance has an R^2 value of 0.514, SKM 0.094 and ADM, PRC and PRD 0.117, 129 and 107, respectively. The formula of the effect calculation provided by Cohen (1988) is as follows:

$$\text{Effect size: } f^2 = R^2 \text{ included} - R^2 \text{ Excluded}$$

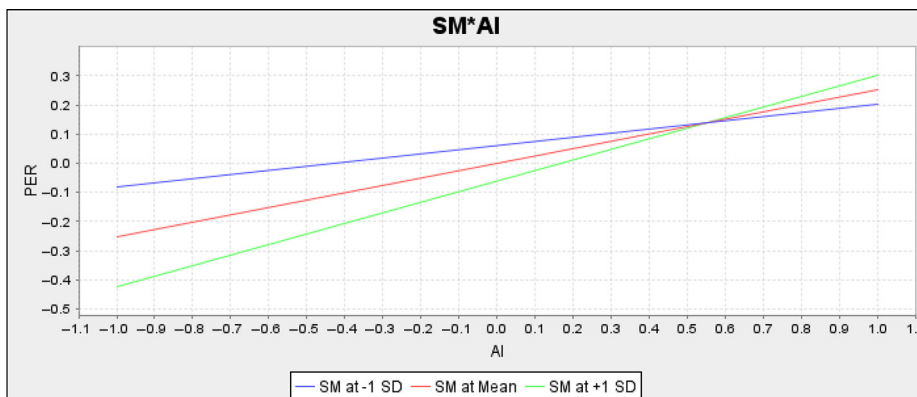


Figure 4. Interaction effect of administrative innovation (ADM) and SKM on performance (PER)

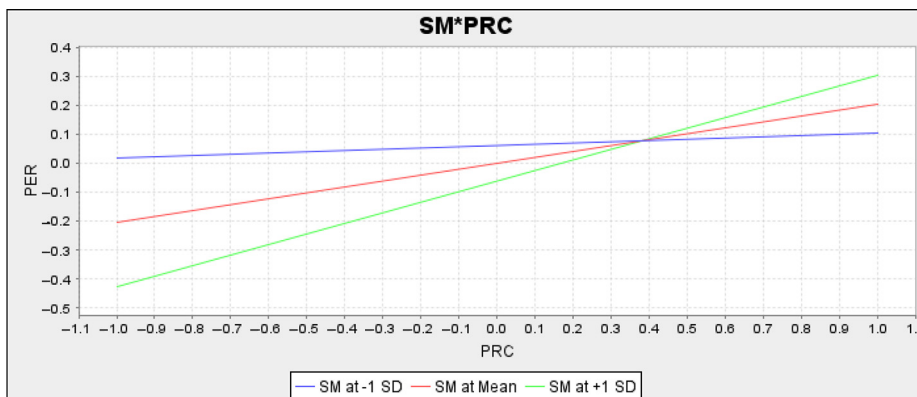


Figure 5. Interaction effect of process innovation (PRC) and SKM on performance (PER)

Heterotrait-Monotrait Ratio	R^2
ADM	0.117
PRC	0.129
PRD	0.107
SKM	0.094
PER	0.514

Table 8. Variance explained in the endogenous latent variable (R^2)

The effect size f^2 for the study variables was examined; according to Cohen (1988), values of 0.02, 0.15 and 0.35 indicate weak, moderate and strong effects, respectively. Results of f^2 values shown in Table 9 indicate effects for the following relationships: innovation on performance, SKM on innovation and performance.

To summarize, the PLS-SEM measurement model confirmed that all the constructs met the requirements for validity and reliability, measured by Cronbach alpha and AVE. The second stage of PLS analysis, the path model, was used to investigate the relationship between the independent and dependent variables. Of our six hypotheses, five were found to be significant, with high explanatory power of 51% meaning that the model was able to adequately explain the factors influencing performance.

5. Discussion

Building knowledge is characterized by a process that is gradual and cumulative in nature and, as such, it is challenging to find accurate managerial implications from just a single study. Nevertheless, the conclusions that can be inferred from the present study are, first, that researchers from various academic fields have a tendency to concentrate on specific areas when it comes to exporter-intermediary relationships, as a result of which the majority of studies are fragmented in nature. Hence, this study provides an enriching insight into the way innovation is related to SKM, which, in turn, explains the business performance of Malaysian manufacturing companies.

Our study contributes to the body of knowledge by applying SKM to examine its effect on the relationships between the three dimensions of innovation and LMF performance. It proposes a global model to explore the effect of three innovation dimensions (ADM, PRC and PRD) on large manufacturers' performance, and examines the moderating effects of SKM on these relationships. Many studies have examined the ties between ADM, PRD and PRC and performance, but have failed to empirically address the inclusion of the SKM variable as a moderator.

Our study has several key messages. Firstly, it examines how innovation contributes to the achievement of high performance in LMF, with respect to ADM, PRC and PRD as the three key functions. Our work also provides empirical evidence that SKM facilitates a firm's efficiency, which, in turn, significantly impacts its performance. That is, we have attempted to answer two questions: Is there a relationship between innovation dimensions (ADM, PRC and PRD) and performance? And does SKM moderate this relationship? In this respect, the significance of the direct relationship of the three innovation components and LMF provides support for *H1a* ($\beta = 0.263, t = 4.729, p < 0.001$), *H1b* ($\beta = 0.248, t = 4.222, p < 0.000$) and *H1c* ($\beta = -0.173, t = 2.139, p < 0.21$), respectively, supporting earlier work in other contexts (Zhang *et al.*, 2018; Ortiz-Villajos and Sotoca, 2018). Our findings also reveal a significant interaction influence of SKM on the relationship with ADM and PRC but not with PRD, supporting *H2a* ($\beta = 0.129, t = 2.020, p < 0.018$) and *H2b* ($\beta = -0.071, t = 1.364, p < 0.091$)

Constructs	F-values	Effect size
ADM	0.009	None
PRC	0.007	None
PRD	0.063	Small
SKM	0.017	None

Table 9.
Effect size (f^2)

but not $H2c$ ($\beta = 0.158, t = 2.465, p < 0.033$). That is, SKM has no moderating effect on the relationship between PRD and performance, despite its influence on the association of ADM and PRC with performance. SKM strengthens the significant relationship between innovation advantages and performance, suggesting that organizations that are able to provide superior administrative and process innovation to exploit the opportunities provided by SKM can gain above-normal revenue and enhance performance.

Innovation scholars (De Vasconcelos Gomes *et al.*, 2018; Aragon-Correa *et al.*, 2007; Swan *et al.*, 2002) have not considered the individual dimensions of innovation but use an overall definition of innovation determined by the harmony and compatibility of the dimensions. Future studies can seek to illustrate the basis of this conflict by considering both overall and disaggregated scores of innovations. In general, the results indicate that an organization that increases the volume of knowledge is distinct from other organizations.

This study also shows that some of the advantages of the innovation dimensions' influence LMF performance indirectly through the emphasis put on SKM. This confirms that the more organizations benefit from the knowledge, the more this leads to discrimination in innovation and the improvement and development of performance (Pancholi *et al.*, 2019; Santoro *et al.*, 2018; Kallmuenzer and Scholl-Grissemann, 2017). In addition, these results confirm that SKM is one of the most important changes affecting the sustainability of organizations. SKM stems from the results of strategic thinking to determine its features, guiding management in defining strategic objectives, as the SKM outlines the organization's future movement and its internal characteristics and the mechanism of its interaction with its external environment. Continuity and success thus require contemporary companies to develop appropriate SKM, which will serve to improve their performance and satisfy the needs and desires of consumers, which are currently rapidly changing.

Given the study results, our work makes several contributions to filling the gap in the literature. Firstly, although separation of a strong ADM, PRC and PRD may result in high and unique performance, there is a deep understanding of the ingredients that simplify and assist their implementation. Reliance on the organization's resources characterizes innovation as a highly valued resource that has great potential to influence performance. It particularly indicates that understanding the contribution of innovation to performance depends on active components aligned with ADM, PRC and PRD. The results of this study support this view, that when knowledge is treated as a strategic resource and of strategic value, it actually contributes to creating distinctive innovations, simplifying and expediting the creation of unique and high performance. This study also discusses the new work of Alqershi *et al.* (2020), who recommended further research to explore other types of innovation that are aligned with organizational knowledge and superior performance.

To conclude, the framework proposed in this study provides new directions for CEOs and top management in gaining a better understanding of the innovation and knowledge management concept and its implementation for accomplishing superior performance.

6. Theoretical implications

From the theoretical perspective, our work makes important contributions to several aspects of the literature of innovation, SKM and LMF performance. Firstly, the theoretical relationships identified in the study model underlined the significant direct relationships between innovation dimensions (ADM, PRC and PRD) and LMF performance, evidence of the major role that innovation plays as a key variable for high performance of LMFs in Malaysia. The findings also reduce the gap in quantitative studies about LMF performance

in the region. The three direct hypothesized innovation dimensions' relationships were supported, making significant contributions to the body of knowledge.

Secondly, although innovation concern is regarded as a pre-requisite for achieving superior performance (Na *et al.*, 2019; Gomes and Wojahn, 2017) until now no study has examined the moderating role of SKM on the relationship between innovation and LMF performance. Thus, our work contributes by linking innovation dimensions (ADM, PRC and PRD) to performance through the moderation of SKM in the context of LMF. Specifically, it shows that when firms accept the importance of SKM, they are likely to adopt innovation, contributing to superior performance. In addition, SKM as a moderating variable on the relationship between innovation dimensions and LMF performance plays a key role by encouraging novel professional ideas that facilitate and promote competitive advantage. Hence, acknowledging innovation and its role in LMF performance, based on the research framework, can lead CEOs to open up market opportunities and leverage them with skilled human resources. It is pertinent for these CEOs to understand the growth of their firms (theoretical and practical) for performance enhancement.

Thirdly, our work contributes to extending the literature of SKM and LMF performance by providing a comprehensive overview of the effect of knowledge and innovation in promoting performance. In particular, AlQershi *et al.* (2020) encouraged incremental development in innovation to improve the reputation of industrial sectors and enhance the firm's market share and profit margin; these authors believe that innovation and SKM, with the focus on performance, is the only way forward in the current difficult business environment. They also found it interesting that Arranz *et al.* (2019) explored innovation and performance with a population of manufacturing firms in Spain, although they measured innovation as unidimensional, unlike our own multi-dimensional approach, following Sciarelli *et al.* (2020).

Finally, our work provides insight into the innovation dimensions (e.g. administrative, product and process innovation) among manufacturing companies in Malaysia. This is pertinent as SKM and innovation are important factors in achieving superior performance, and yet their impact on Malaysian manufacturing companies has been largely overlooked; our work tried to fill this gap in the literature. Our results also found a significant three-directional relationship between three of the innovation dimensions (process, administrative and product) and performance. This reflects the need to refine innovation practices within manufacturing companies in Malaysia. SKM is a very important reason for the change in organizations, and the different directions stem from the different concepts of strategy, and may also be a reason for the desired effect in the different dimensions of SKM, in turn, achieving the sustainability required. From this standpoint, the importance of SKM as a moderating variable is evident, although all previous studies have ignored it in the relationship between innovation and large manufacturing performance, also much of the literature reviewed concerning innovation and SKM among LMFs referred to advanced countries (Zaragoza-Sáez *et al.*, 2020; Cabrilo and Dahms, 2018; Santoro *et al.*, 2018), with very few studies conducted in South Asian countries. Thus, our study highlights the innovation and SKM of LMFs and the variables required for their enhancement.

7. Managerial implications

This study shows the importance of ADM, PRC and PRD in improving large manufacturers' performance and thus promoting their knowledge and competitive advantage. Traditional relationships between innovation and performance should then be reviewed. It is especially important here to understand the importance and peculiarities of ADM, PRD and PRC. Firstly, innovation requires special attention for the development of the firm in an extremely

competitive environment, while knowledge management stresses the most important assets for innovation.

The findings have several implications for practitioners, motivating them to take more interest in novel approaches to addressing the requirements of markets, and new opportunities to differentiate their products from their competitors. Firstly, they point to the significance of underlying knowledge that motivates and fosters innovative capabilities. The knowledge with which firms should equip their staff encourages and supports innovative ideas. In particular, in introducing new products or developing current ones (e.g. considering their vision and opinions), managers show an appreciation of the new ideas of their staff (e.g. recognizing their contribution to innovation). CEOs have the authority to promote the innovation (Ahn, 2020; Zuraik and Kelly, 2019; Sariol and Abebe, 2017), and also the opportunity to build a culture where staff can create and implement new ideas which, in turn, will be reflected in great benefit to the company.

Secondly, the results not only emphasize the individual contributions of SKM and ADM, PRC and PRD but also provide support for performance through the influence of complementarity between the innovative capabilities and SKM. CEOs and top management are advised to attempt a stable approach to managing the improvement of capabilities to realize ideal results in performance. The independent potential of SKM and ADM, PRC and PRD are becoming evident to management and academics alike. Furthermore, senior managers are reminded that knowledge management must be useful in the improvement of ADM, PRC and PRD capabilities and performance in their long- or short-term plans; any organization wanting to achieve superiority in performance should deploy ADM, PRC and SKM, investigating in their complementarity to transform knowledge and innovation capabilities into performance.

Thirdly, our work shows that it is not only preferable but also is necessary, that CEOs of Malaysian manufacturing firms search for distinct resources and assign them to create innovative ideas to reach superior performance. Therefore, they are encouraged to design their own recruitment policies to attract staff with appropriate skills and passion to achieve differentiation for their companies.

Fourthly, this study clarifies that CEOs in Malaysian manufacturing firms will not be able to compete with manufacturing firms from other countries, such as the USA, the UK and Europe unless they are fully competent in the use of SKM and innovation. Only in this way will they convince customers from advanced countries that Malaysian industrial products are no less efficient and are of as high quality as those of Europe and America.

Fifthly, we stress the need for policymakers in the Malaysian manufacturing sector to strengthen the position of this sector within the national economy, leading to an increase in the market share of Malaysian products in global markets. In addition to increased sales and profits, obtaining international monetary currency, such as the dollar or the euro, will contribute to the stability of the local Malaysian currency and the economy as a whole.

Finally, it is clear that innovation capabilities tangibly lead to the success of organizations, and that acquiring knowledge is a critical source of superior performance. As such, top management should invest in these contexts where they can benefit from the distinctive capabilities of innovation and knowledge that, in turn, lead to an increase in market share. In addition, manufacturing company managers in Malaysia should train their staff on a continuing basis. Although training appears to be costly and is therefore avoided by manufacturing companies, managers must understand that the benefit is greater than the cost. This study recommends that to reduce the cost of training, manufacturing companies come together to form cooperative associations. Currently, they try to undertake staff training using their individual efforts, which is prohibitively expensive. However,

when they form cooperative associations, they can organize joint training and share the cost among themselves. Training will eventually improve knowledge and this will improve innovation. Overall, this will improve business performance among manufacturing companies in Malaysia.

Managers of manufacturing companies should also reduce their emphasis on classical ways of managing organizational processes. For example, they need to adopt new creative ideas and technologies to enhance their products, service and operations. In addition, innovation needs to be adopted in operational activities to achieve a high level of performance. Managers must also increase their investment in SKM activities, to build good relationships with their customers and achieve trust locally and internationally. They have to improve innovation and SKM if they want to succeed in business, and training is a vital factor that determines high performance. In another scenario, manufacturing companies must also proactively explore external and internal human wealth, for instance, participation in technical workshops, forming strategic partnerships with institutes to exchange experience and knowledge.

8. Limitations

As in all research, there are limitations that offer opportunities for future studies. Our questionnaire was directed at CEOs; future research could, instead, focus on other populations, such as general managers, sales managers or human resource managers. Secondly, the study considers aspects of innovation as predictors of high levels of performance in LFM. However, there are other possible predictors; for instance, human capabilities enhanced by knowledge may have an influence on ADM, PRC and PRD. Therefore, future studies might identify other types of innovation and investigate their effect on performance. Thirdly, this study considers SKM as a moderator variable. Future research can explore the effect of other moderators such as strategic thinking and strategic intelligence. Fourthly, as this study is limited to LMFs in Malaysia, the results cannot be generalized to other sectors such as services, whose structure and vision differ from those of LMF. We recommend that other sectors of the Malaysian economy be investigated, for example, innovation among service businesses including hospitals, hotels and universities. Future studies might also investigate these relationships with smaller firms, that is SMEs. Finally, our work focused on Malaysia, which has a higher proportion of manufacturing industry than other countries in South Asia; nevertheless, those countries with a similar culture to Malaysia might find the study useful.

References

- Abdullah, S.N. and Ku Ismail, K.N.I. (2017), "Gender, ethnic and age diversity of the boards of large Malaysian firms and performance", *Jurnal Pengurusan*, Vol. 38 No No. 1, pp. 27-40.
- Abubakar, A.M., Elrehail, H., Alatailat, M.A. and Elçi, A. (2019), "Knowledge management, decision-making style and organizational performance", *Journal of Innovation and Knowledge*, Vol. 4 No. 2, pp., pp. 104-114.
- Ahmad, K. and Zabri, S.M. (2016), "The application of non-financial performance measurement in Malaysian manufacturing firms", *Procedia Economics and Finance*, Vol. 35, pp. 476-484.
- Ahn, J.M. (2020), "The hierarchical relationships between CEO characteristics, innovation strategy and firm performance in open innovation", *International Journal of Entrepreneurship and Innovation Management*, Vol. 24 No. 1, pp. 31-52.

- Aksoy, H. (2017), "How do innovation culture, marketing innovation and product innovation affect the market performance of small and medium-sized enterprises (SMEs)", *Technology in Society*, Vol. 51 No. 4, pp. 133-141.
- Alqershi, N., Mokhtar, S.S.M. and Abas, Z. (2021), "The relationship between strategic innovations, human capital and performance: an empirical investigation", *Sustainable Futures*, Vol. 3.
- Alqershi, N.A., Diah, M.L.B.M., Latiffi, A.B.A. and Ahmad, W.N.K.W. (2020), "Strategic innovation and competitive advantage of manufacturing SMEs: the mediating role of human capital", *Quality Innovation Prosperity*, Vol. 24 No. 3, pp. 70-89.
- Alqershi, N.A., Wan Yusoff, W.F., Bin Masrom, M.A.N., Abdul Hamid, N.B., Mokhtar, S.S.M. and AlDaghan, M. (2021), "Intellectual capital and performance of automotive manufacturers: the role of strategic thinking", *International Journal of Productivity and Performance Management*, Vol. ahead-of-print No. ahead-of-print, available at: <https://doi.org/10.1108/IJPPM-02-2021-0067>.
- Aragon-Correa, J.A., Garcia-Morales, V.J. and Cordón-Pozo, E. (2007), "Leadership and organizational learning's role on innovation and performance: lessons from Spain", *Industrial Marketing Management*, Vol. 36 No. 3, pp. 349-359.
- Arranz, N., Arroyabe, M.F., Li, J. and de Arroyabe, J.F. (2019), "An integrated model of organisational innovation and firm performance: generation, persistence and complementarity", *Journal of Business Research*, Vol. 105, pp. 270-282.
- Arshi, T. and Burns, P. (2018), "Entrepreneurial architecture: a framework to promote innovation in large firms", *The Journal of Entrepreneurship*, Vol. 27 No. 2, pp. 151-179.
- Azmi, N.A., Zakaria, N.B., Abd Sata, F.H. and Sanusi, Z.M. (2020), "Political connection and firm's performance among Malaysian firms", *International Journal of Financial Research*, Vol. 11 No. 3.
- Berman, C.H. (2000), *"The Cistercian Evolution: The Invention of a Religious Order in Twelfth-Century Europe"*, University of PA Press. PA.
- Berry, L.L. (2019), "Service innovation is urgent in healthcare", *AMS Review*, Vol. 9 Nos 1/2, pp. 78-92.
- Berthet, E.T. Hickey, G.M. and Klerkx, L. (2018), "Opening design and innovation processes in agriculture: Insights from design and management sciences and future directions".
- Brunswick, S. and Chesbrough, H. (2018), "The adoption of open innovation in large firms: practices, measures, and risks a survey of large firms examines how firms approach open innovation strategically and manage knowledge flows at the project level", *Research-Technology Management*, Vol. 61 No. 1, pp. 35-45.
- Cabrilo, S. and Dahms, S. (2018), "How strategic knowledge management drives intellectual capital to superior innovation and market performance", *Journal of Knowledge Management*, Vol. 22 No. 3.
- Cappelleri, J.C., Bushmakin, A.G., Baker, C.L., Merikle, E., Olufade, A.O. and Gilbert, D.G. (2007), "Confirmatory factor analyses and reliability of the modified cigarette evaluation questionnaire", *Addictive Behaviors*, Vol. 32 No. 5, pp. 912-923.
- Chan, H.K., Yee, R.W., Dai, J. and Lim, M.K. (2016), "The moderating effect of environmental dynamism on green product innovation and performance", *International Journal of Production Economics*, Vol. 181, pp. 384-391.
- Chan, S.W., Ang, S.F., Andleeb, N., Ahmad, M.F. and Zaman, I. (2019), "The influence of transformational leadership on organization innovation in Malaysian manufacturing industry", *International Journal of Supply Chain Management*, Vol. 8 No. 2, pp. 971-976.
- Chin, W.W. (1998), "The partial least squares approach to structural equation modeling", *Modern methods for business research*, Vol. 295 No. 2, pp. 295-336.
- Claver-Cortés, E., Zaragoza-Sáez, P., Úbeda-García, M., Marco-Lajara, B. and García-Lillo, F. (2018), "Strategic knowledge management in subsidiaries and MNC performance. The role of the relational context", *Journal of Knowledge Management*, Vol. 22 No. 5.

-
- Cohen, J. (1988), *Statistical Power Analysis for the Behavioural Sciences*, 2nd ed., Erlbaum, Hillsdale, NJ.
- Dalkir, K. (2017), *Knowledge Management in Theory and Practice*, MIT Press, New York, NY.
- Darroch, J. (2005), "Knowledge management, innovation and firm performance", *Journal of Knowledge Management*, Vol. 9 No. 3, pp. 101-115.
- De Vasconcelos Gomes, L.A., Facin, A.L.F., Salerno, M.S. and Ikenami, R.K. (2018), "Unpacking the innovation ecosystem construct: evolution, gaps and trends", *Technological Forecasting and Social Change*, Vol. 136, pp. 30-48.
- de Zubielqui, G.C., Lindsay, N., Lindsay, W. and Jones, J. (2019), "Knowledge quality, innovation and firm performance: a study of knowledge transfer in SMEs", *Small Business Economics*, Vol. 53 No. 1, pp. 145-164.
- Dickel, D.G. and de Moura, G.L. (2016), "Organizational performance evaluation in intangible criteria: a model based on knowledge management and innovation management", *RAI Revista de Administração e Inovação*, Vol. 13 No. 3, pp. 211-220.
- Didenko, N.I., Skripnuk, D.F., Kikkas, K.N., Merkulov, V., Romashkin, G. and Kulik, S.V. (2018), "The analysis of convergence – divergence in the development of innovative and technological processes in the countries of the arctic council", *International Conference on Information Networking (ICOIN)*, IEEE, pp. 626-631.
- Doluca, H., Wagner, M. and Block, J. (2018), "Sustainability and environmental behaviour in family firms: a longitudinal analysis of environment-related activities, innovation and performance", *Business Strategy and the Environment*, Vol. 27 No. 1, pp. 152-172.
- Edmondson, A.C. (2012), *Teaming: How Organizations Learn, Innovate, and Compete in the Knowledge Economy*, John Wiley and Sons, London.
- Engels, F., Wentland, A. and Pfothenauer, S.M. (2019), "Testing future societies? Developing a framework for test beds and living labs as instruments of innovation governance", *Research Policy*, Vol. 48 No. 9.
- Etzkowitz, H. and Zhou, C. (2017), *The Triple Helix: University–Industry–Government Innovation and Entrepreneurship*, Routledge, New York, NY.
- Federation of Malaysian Manufacturers (2019), "FMM Directory 2017", *Federation of Malaysian Manufacturers*, Kuala Lumpur.
- Fagerberg, J., Fosaas, M. and Sapprasert, K. (2012), "Innovation: exploring the knowledge base", *Research Policy*, Vol. 41 No. 7, pp. 1132-1153.
- Falahat, M., Ramayah, T., Soto-Acosta, P. and Lee, Y.Y. (2020), "SMEs internationalization: the role of product innovation, market intelligence, pricing and marketing communication capabilities as drivers of SMEs' international performance", *Technological Forecasting and Social Change*, Vol. 152, pp. 119-132.
- Fernandez-Lopez, S., Rodeiro-Pazos, D., Calvo, N. and Rodríguez-Gulías, M.J. (2018), "The effect of strategic knowledge management on the universities' performance: an empirical approach", *Journal of Knowledge Management*, Vol. 22 No. 3.
- Ferreira, J., Mueller, J. and Papa, A. (2018), "Strategic knowledge management: theory, practice and future challenges", *Journal of Knowledge Management*, Vol. 24 No. 2.
- Fornell, C. and Larcker, D.F. (1981), "Structural equation models with unobservable variables and measurement error: Algebra and statistics".
- Garcia-Perez-de-Lema, D., Madrid-Guijarro, A. and Martin, D.P. (2017), "Influence of university–firm governance on SMEs innovation and performance levels", *Technological Forecasting and Social Change*, Vol. 123, pp. 250-261.
- Gentile-Lüdecke, S., de Oliveira, R.T. and Paul, J. (2020), "Does organizational structure facilitate inbound and outbound open innovation in SMEs?", *Small Business Economics*, Vol. 55 No. 4, pp. 1091-1112.
- Gliem, J.A. and Gliem, R.R. (2003), "Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales", *Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education*.

-
- Godin, B. and Vinck, D. (Eds) (2017), *Critical Studies of Innovation: Alternative Approaches to the Pro-Innovation Bias*, Edward Elgar Publishing, New York, NY.
- Gold, A.H., Malhotra, A. and Segars, A.H. (2001), "Knowledge management: an organizational capabilities perspective", *Journal of Management Information Systems*, Vol. 18 No. 1, pp. 185-214.
- Gomes, G. and Wojahn, R.M. (2017), "Organizational learning capability, innovation and performance: study in small and medium-sized enterprises (SMES)", *Revista de Administração (Administração)*, Vol. 52 No. 2, pp. 163-175.
- Gozman, D., Liebenau, J. and Mangan, J. (2018), "The innovation mechanisms of fintech start-ups: insights from SWIFT's innotribe competition", *Journal of Management Information Systems*, Vol. 35 No. 1, pp. 145-179.
- Groves, R.M. and Peytcheva, E. (2008), "The impact of nonresponse rates on nonresponse bias: a meta-analysis", *Public Opinion Quarterly*, Vol. 72 No. 2, pp. 167-189.
- Guo, Y., Wang, L., Wang, M. and Zhang, X. (2019), "The mediating role of environmental innovation on knowledge acquisition and corporate performance relationship – a study of SMEs in China", *Sustainability*, Vol. 11 No. 8, p. 2315.
- Gupta, A.K. and Govindarajan, V. (1984), "Business unit strategy, managerial characteristics, and business unit effectiveness at strategy implementation", *Academy of Management Journal*, Vol. 27 No. 1, pp. 25-41.
- Gupta, A.K. and Gupta, N. (2019), "Innovation and culture as a dynamic capability for firm performance: a study from emerging markets", *Global Journal of Flexible Systems Management*, Vol. 20 No. 4, pp. 323-336.
- Haas, E.B. (2018), *When Knowledge is Power: Three Models of Change in International Organizations*, University of CA Press, CA, Vol. 22.
- Hair, J.F., Hult, G.T.M., Ringle, C. and Sarstedt, M. (2016), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, Sage Publications, New York, NY.
- Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010), *Multivariate Data Analysis, a Global Perspective*, Pearson NJ, Vol. 7, p. 816.
- Hameed, W.U., Nisar, Q.A. and Wu, H.C. (2020), "Relationships between external knowledge, internal innovation, firms' open innovation performance, service innovation and business performance in the Pakistani hotel industry", *International Journal of Hospitality Management*, Vol. 92.
- Hameed, W.U., Nisar, Q.A. and Wu, H.C. (2021), "Relationships between external knowledge, internal innovation, firms' open innovation performance, service innovation and business performance in the Pakistani hotel industry", *International Journal of Hospitality Management*, Vol. 92.
- Hameed, W.U., Basheer, M.F., Iqbal, J., Anwar, A. and Ahmad, H.K. (2018), "Determinants of firm's open innovation performance and the role of R&D department: an empirical evidence from Malaysian SME's", *Journal of Global Entrepreneurship Research*, Vol. 1 No. 29.
- Head, B.W. and Alford, J. (2015), "Wicked problems: implications for public policy and management", *Administration and Society*, Vol. 47 No. 6, pp. 711-739.
- Heisig, P., Suraj, O.A., Kianto, A., Kemboi, C., Arrau, G.P. and Easa, N.F. (2016), "Knowledge management and business performance: global experts' views on future research needs", *Journal of Knowledge Management*, Vol. 20 No. 6.
- Heunks, F.J. (1998), "Innovation, creativity and success", *Small Business Economics*, Vol. 10 No. 3, pp. 263-272.
- Henseler, J., Hubona, G. and Ray, P.A. (2016), "Using PLS path modelling in new technology research: updated guidelines", *Industrial Management and Data Systems*, Vol. 1.
- Henseler, J., Ringle, C.M. and Sinkovics, R.R. (2009), "The use of partial least squares path modeling in international marketing", *New Challenges to International Marketing*, Emerald Publishing Limited, Bingley, pp. 277-319.

-
- Hislop, D., Bosua, R. and Helms, R. (2018), *Knowledge Management in Organizations: A Critical Introduction*, Oxford university press. Oxford.
- Huang, F., Gardner, S. and Moayer, S. (2016), "Towards a framework for strategic knowledge management practice", *VINE Journal of Information and Knowledge Management Systems*, Vol. 46 No. 4.
- Jony, A.I. and Serradell-López, E. (2021), "A PLS-SEM approach in evaluating a virtual teamwork model in online higher education: why and how?", *Research and Innovation Forum 2020: Disruptive Technologies in Times of Change*, Springer International Publishing. New York, NY pp. 217-232.
- Jugend, D., Jabbour, C.J.C., Scaliza, J.A.A., Rocha, R.S., Junior, J.A.G., Latan, H. and Salgado, M.H. (2018), "Relationships among open innovation, innovative performance, government support and firm size: comparing Brazilian firms embracing different levels of radicalism in innovation", *Technovation*, Vol. 74-75, pp. 54-65.
- Kallmuenzer, A. and Scholl-Grissemann, U. (2017), "Disentangling antecedents and performance effects of family SME innovation: a knowledge-based perspective", *International Entrepreneurship and Management Journal*, Vol. 13 No. 4, pp. 1117-1138.
- Kianto, A., Sáenz, J. and Aramburu, N. (2017), "Knowledge-based human resource management practices, intellectual capital and innovation", *Journal of Business Research*, Vol. 81, pp. 11-20.
- Kleinknecht, A. (2016), *Innovation Patterns in Crisis and Prosperity: Schumpeter's Long Cycle Reconsidered*, Springer. New York, NY.
- Laihonen, H. and Mantyla, S. (2018), "Strategic knowledge management and evolving local government", *Journal of Knowledge Management*, Vol. 22 No. 1.
- Lee, V.H., Foo, A.T.L., Leong, L.Y. and Ooi, K.B. (2016), "Can competitive advantage be achieved through knowledge management? A case study on SME", *Expert Systems with Applications*, Vol. 65, pp. 136-151.
- Liao, S.H., Hu, D.C. and Ding, L.W. (2017), "Assessing the influence of supply chain collaboration value innovation, supply chain capability and competitive advantage in Taiwan's networking communication industry", *International Journal of Production Economics*, Vol. 191, pp. 143-153.
- Lockwood, T. and Papke, E. (2017), "Innovation by design: How any organization can leverage design thinking to produce change, drive new ideas, and deliver meaningful solutions", Red Wheel/Weiser.
- López-Nicolás, C. and Meroño-Cerdán, Á.L. (2011), "Strategic knowledge management, innovation and performance", *International Journal of Information Management*, Vol. 31 No. 6, pp. 502-509.
- McGee, E.O. (2021), *Black, Brown, Bruised: How Racialized STEM Education Stifles Innovation*, Harvard Education Press. New York, NY.
- Mardani, A., Nikoosokhan, S., Moradi, M. and Doustar, M. (2018), "The relationship between knowledge management and innovation performance", *The Journal of High Technology Management Research*, Vol. 29 No. 1, pp. 12-26.
- Marques, C.S., Leal, C., Marques, C.P. and Cardoso, A.R. (2016), "Strategic knowledge management, innovation and performance: a qualitative study of the footwear industry", *Journal of the Knowledge Economy*, Vol. 7 No. 3, pp. 659-675.
- Mazzarol, T. and Reboud, S. (2020), "Entrepreneurship and innovation in large firms", In *Entrepreneurship and Innovation*, Springer, Singapore, pp. 95-129.
- Mootee, I. (2013), *Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School*, John Wiley and Sons. New York, NY.
- Murphy, K.R., Myers, B. and Wolach, A. (2014), *Statistical Power Analysis: A Simple and General Model for Traditional and Modern Hypothesis Tests*, Routledge. New York, NY.
- Na, K. and Kang, Y.H. (2019), "Relations between innovation and firm performance of manufacturing firms in southeast Asian emerging markets: empirical evidence from Indonesia, Malaysia, and

-
- Vietnam”, *Journal of Open Innovation: Technology, Market, and Complexity*, Vol. 5 No. 4, p. 98.
- Na, Y.K., Kang, S. and Jeong, H.Y. (2019), “The effect of market orientation on performance of sharing economy business: focusing on marketing innovation and sustainable competitive advantage”, *Sustainability*, Vol. 11 No. 3, p. 729.
- Naidoo, V. (2010), “Firm survival through a crisis: the influence of market orientation, marketing innovation and business strategy”, *Industrial Marketing Management*, Vol. 39 No. 8, pp. 1311-1320.
- Ndesaulwa, A.P. and Kikula, J. (2016), “The impact of innovation on performance of small and medium enterprises (SMEs) in Tanzania: a review of empirical evidence”, *Journal of Business and Management Sciences*, Vol. 4 No. 1, pp. 1-6.
- Obeidat, B.Y., Al-Suradi, M.M. and Tarhini, A. (2016), “The impact of knowledge management on innovation”, *Management Research Review*, Vol. 39 No. 10.
- Ortiz-Villajos, J.M. and Sotoca, S. (2018), “Innovation and business survival: a long-term approach”, *Research Policy*, Vol. 47 No. 8, pp. 1418-1436.
- O’Sullivan, K. (Ed.) (2007), *Strategic Knowledge Management in Multinational Organizations*, IGI Global, London.
- Pancholi, S., Yigitcanlar, T. and Guaralda, M. (2019), “Place making for innovation and knowledge-intensive activities: the Australian experience”, *Technological Forecasting and Social Change*, Vol. 146, pp. 616-625.
- Pavie, X. (2020), *Critical Philosophy of Innovation and the Innovator*, John Wiley and Sons, New York, NY.
- Pietrobelli, C., Marin, A. and Olivari, J. (2018), “Innovation in mining value chains: new evidence from Latin America”, *Resources Policy*, Vol. 58 No. 1.
- Rajapathirana, R.J. and Hui, Y. (2018), “Relationship between innovation capability, innovation type, and firm performance”, *Journal of Innovation and Knowledge*, Vol. 3 No. 1, pp. 44-55.
- Rao, Y., Yang, M. and Yang, Y. (2018), “Knowledge sharing, organizational learning and service innovation in tourism”, *Journal of Service Science and Management*, Vol. 11 No. 05, pp. 510-526.
- Ricceri, F. (2008), *Intellectual Capital and Knowledge Management: Strategic Management of Knowledge Resources*, Routledge, New York, NY.
- Rivera, J.D. and Landahl, M.R. (2019), “An environment conducive to bureaucratic innovation? Exploring the potential for public entrepreneurship within FEMA”, *Journal of Urban Management*, Vol. 8 No. 2, pp. 272-281.
- Roach, D.C., Ryman, J.A. and Makani, J. (2016), “Effectuation, innovation and performance in SMEs: an empirical study”, *European Journal of Innovation Management*, Vol. 19 No. 2.
- Rogers, E.M. (2010), *Diffusion of Innovations*, Simon and Schuster, New York, NY.
- Roper, S. and Love, J.H. (2002), “Innovation and export performance: evidence from the UK and German manufacturing plants”, *Research Policy*, Vol. 31 No. 7, pp. 1087-1102.
- Santoro, G., Vrontis, D., Thrassou, A. and Dezi, L. (2018), “The internet of things: Building a knowledge management system for open innovation and knowledge management capacity”, *Technological Forecasting and Social Change*, Vol. 136, pp. 347-354.
- Sanusi, Z.M., Iskandar, T.M., Monroe, G.S. and Saleh, N.M. (2018), “Effects of goal orientation, self-efficacy and task complexity on the audit judgement performance of Malaysian auditors”, *Accounting, Auditing and Accountability Journal*, Vol. 1.
- Sardi, A., Sorano, E., Garengo, P. and Ferraris, A. (2020), “The role of HRM in the innovation of performance measurement and management systems: a multiple case study in SMEs”, *Employee Relations: The International Journal*, Vol. 43 No. 2.

-
- Sariol, A.M. and Abebe, M.A. (2017), "The influence of CEO power on explorative and exploitative organizational innovation", *Journal of Business Research*, Vol. 73, pp. 38-45.
- Sciarelli, M., Gheith, M.H. and Tani, M. (2020), "The relationship between soft and hard quality management practices, innovation and organizational performance in higher education", *The TQM Journal*, Vol. 32 No. 6.
- Silva, G.M., Styles, C. and Lages, L.F. (2017), "Breakthrough innovation in international business: the impact of tech-innovation and market-innovation on performance", *International Business Review*, Vol. 26 No. 2, pp. 391-404.
- Silva, R., Leal, C., Marques, C.S. and Ferreira, J. (2017), "The strategic knowledge management, innovation and competitiveness: a bibliometric analysis", *European Conference on Intellectual Capital*, Academic Conferences International Limited, Maribor, p. 303.
- Sjodin, D., Parida, V., Jovanovic, M. and Visnjic, I. (2020), "Value creation and value capture alignment in business model innovation: a process view on outcome-based business models", *Journal of Product Innovation Management*, Vol. 37 No. 2, pp. 158-183.
- Soto-Acosta, P., Popa, S. and Palacios-Marqués, D. (2016), "E-business, organizational innovation and firm performance in manufacturing SMEs: an empirical study in Spain", *Technological and Economic Development of Economy*, Vol. 22 No. 6, pp. 885-904.
- Stoekli, E., Dremel, C. and Uebernickel, F. (2018), "Exploring characteristics and transformational capabilities of InsurTech innovations to understand insurance value creation in a digital world", *Electronic Markets*, Vol. 28 No. 3, pp. 287-305.
- Swan, J., Scarbrough, H. and Robertson, M. (2002), "The construction of communities of practice in the management of innovation", *Management Learning*, Vol. 33 No. 4, pp. 477-496.
- Tajeddini, K., Martin, E. and Altinay, L. (2020), "The importance of human-related factors on service innovation and performance", *International Journal of Hospitality Management*, Vol. 85.
- Tariq, A., Badir, Y. and Chonglertham, S. (2019), "Green innovation and performance: moderation analyses from Thailand", *European Journal of Innovation Management*, Vol. 22 No. 3.
- Tidd, J. and Bessant, J.R. (2020), *Managing Innovation: Integrating Technological, Market and Organizational Change*, Wiley, New York, NY.
- Turulja, L. and Bajgoric, N. (2019), "Innovation, firms' performance and environmental turbulence: is there a moderator or mediator", *European Journal of Innovation Management*, Vol. 22 No. 1.
- Venkitachalam, K. and Willmott, H. (2017), "Strategic knowledge management – insights and pitfalls", *International Journal of Information Management*, Vol. 37 No. 4, pp. 313-316.
- Voinea, C.L., Roijakkers, N. and Ooms, W. (Eds) (2021), *Sustainable Innovation: Strategy, Process and Impact*, Routledge, New York, NY.
- Von Hippel, E. (2016), *Free Innovation*, The MIT Press, New York, NY.
- Von Krogh, G., Ichijo, K. and Nonaka, I. (2000), *Enabling Knowledge Creation: How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*, Oxford University Press.
- Webb, S.P. (2017), *Knowledge Management: Linchpin of Change*, Routledge, New York, NY.
- Weerakoon, C. and McMurray, A. (Eds) (2020), *Theoretical and Practical Approaches to Social Innovation*, IGI Global, New York, NY.
- Zaim, H., Muhammed, S. and Tarim, M. (2019), "Relationship between knowledge management processes and performance: critical role of knowledge utilization in organizations", *Knowledge Management Research and Practice*, Vol. 17 No. 1, pp. 24-38.
- Zaragoza-Sáez, P.C., Claver-Cortés, E., Marco-Lajara, B. and Úbeda-García, M. (2020), "Corporate social responsibility and strategic knowledge management as mediators between sustainable intangible capital and hotel performance", *Journal of Sustainable Tourism*, Vol. 1, pp. 1-23.

- Zhang, D., Zheng, W. and Ning, L. (2018), "Does innovation facilitate firm survival? Evidence from Chinese high-tech firms", *Economic Modelling*, Vol. 75, pp. 458-468.
- Zhang, Y., Khan, U., Lee, S. and Salik, M. (2019), "The influence of management innovation and technological innovation on organization performance. A mediating role of sustainability", *Sustainability*, Vol. 11 No. 2, p. 495.
- Zuraik, A. and Kelly, L. (2019), "The role of CEO transformational leadership and innovation climate in exploration and exploitation", *European Journal of Innovation Management*, Vol. 22 No. 1.

Further reading

- Ferreira, J.J., Fernandes, C.I. and Ferreira, F.A. (2019), "To be or not to be digital, that is the question: firm innovation and performance", *Journal of Business Research*, Vol. 101, pp. 583-590.
- Ganzer, P.P., Chais, C. and Olea, P.M. (2017), "Product, process, marketing and organizational innovation in industries of the flat knitting sector", *RAI Revista de Administração e Inovação*, Vol. 14 No. 4, pp. 321-332.
- Najafi-Tavani, S., Najafi-Tavani, Z., Naudé, P., Oghazi, P. and Zeynaloo, E. (2018), "How collaborative innovation networks affect new product performance: product innovation capability, process innovation capability, and absorptive capacity", *Industrial Marketing Management*, Vol. 73, pp. 193-205.
- Tan, K.H. and Zhan, Y. (2017), "Improving new product development using big data: a case study of an electronics company", *R&D Management*, Vol. 47 No. 4, pp. 570-582.

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