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International Journal of Management Concepts and Philosophy

ISSN online: 1741-8135 - ISSN print: 1478-1484
https://www.inderscience.com/ijmcp

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DOI: 10.1504/IJMCP.2022.10049127

Article History:
Received: 25 June 2022
Accepted: 27 June 2022
Published online: 03 February 2023

Moderation of innovation capability on innovation performance relationship

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Abstract: The purpose of this research is to investigate the antecedents of innovation performance and the role demonstrated by innovation capability; whether strengthening or weakening the relationship within Malaysian manufacturers. This study implements quantitative approach with data collected from Malaysian manufacturing industry using structured questionnaires. The hypothesised relationships from 105 companies are further tested using Smart PLS software in measuring the framework's structural equation modelling. The results from this study support the proposed research objectives indicating the positive direct relationship between the influencers and innovation performance. The finding reflects on the partial moderating effect of innovation capability on the relationship. From the obtained results, the scholars provide several recommendations to assist decision-makers within manufacturing industries. This paper further confers on suggestions to improve firm's innovation performance through understanding and developing the constructs investigated.

Keywords: market orientation; total quality management; innovation capability; innovation performance; PLS-SEM; Malaysian manufacturers.

Reference to this paper should be made as follows: Aziz, H.A. (2023) 'Moderation of innovation capability on innovation performance relationship', *Int. J. Management Concepts and Philosophy*, Vol. 16, No. 1, pp.67–88.

Biographical notes: Haulah Abd Aziz is a Doctoral candidate of School of Business Innovation and Technopreneurship in UniMAP. Her research includes the broad areas of marketing, quality management, supply chain and innovation. She received scholarship from JPA for her diploma and degrees in UiTM Perlis. She graduated with first class honour degree in Marketing and awarded Vice Chancellor's Award for her performance in the university.

1 Introduction

Manufacturing industries as one of the prominent sectors in Malaysia play an essential role in economic development due to its major contributions in economic growth as projected in Malaysian gross domestic product (GDP). Malaysian GDP for the year 2020 indicated an increase of 3.3% compare to the previous year, 2019 that reflect its decline of 18.3% (Department of Statistic Malaysia, 2020). The severe decline of manufacturing industry results from the recent COVID-19 outbreak and demonstrates the highest

recovery compare to Malaysian other sectors, prioritising electrical and food processing products. Furthermore, Malaysian's industrial production index (IPI) projected an increase of 4.6% in April 2022, as compared to the previous year (April 2021) with 6.2% growth from manufacturing sector primarily in electrical and electronic products (14.2%), wood products (10.1%), and metal products (5.1%), while other sectors indicate dismal growth from previous year (Department of Statistics Malaysia, 2022). This highlights on the significance of manufacturing sector in the present Malaysian economy and reflects the needs to be addressed regarding its performance and antecedents. The innovation factors, an emerging important concept in economy world following the introduction of global innovation index (GII) ranking, demonstrate its crucial role within industries. Malaysia, ranking 3rd in GII within upper middle-income group reflect its significance within Malaysian economies (World Intellectual Property Organization, 2021). Innovation issues are recognised as the performance's key facets that need to be researched from the firms' viewpoint, educational institutions and governments (Waheed et al., 2019). As such, the researcher has been motivated to revisit the long-standing issues through comprehending the driving forces of innovation factors within firms (i.e., innovation performance).

The link between market orientation and innovation performance dated years back (Ahmad and Kalyar, 2018; Putra et al., 2020; Shaher and Ali, 2020; Wahyuni and Astawa, 2020) emphasising on the vital role of market orientation. The relationship, however, proven to be inadequate to fully interpreted the notion of innovation performance due to different findings indicating the needs for additional factor; total quality management. The extensive research on quality management has been undergoing since decades ago (Petcharit et al., 2020; Sánchez et al., 2020; Valdez-de la Rosa et al., 2020; Yeng et al., 2018) with indication on the positive relationship between total quality management and innovation performance (Abu Salim et al., 2019; Farish et al., 2017; Zeng et al., 2017). The positive relationship between total quality management and innovation performance within Jordanian manufacturing organisations reflect its significance within the industry confirming its worthiness to be researched within Malaysian manufacturing industry (Alshourah, 2021). Furthermore, the integration of market orientation and total quality management coincided with Imran et al. (2020) study regarding furniture industry in Pakistan. Regardless, Sirisan et al. (2020) emphasis on additional mediating factor of innovation capability on the total quality management – innovation performance relationship on automobile and electrical industries in Thailand. Innovation capability discovered to demonstrate full mediating effects on the relationship, reflecting an interest on studying innovation capability as moderating facet for the framework's extension. Therefore, innovation capability is identified as another influencer on innovation performance subjected for investigation in the relationship.

Following the preceding discussion, the researcher contemplates on strategic resource-based view theory (SRBV), a trending theoretical support in improving innovation field of study since mid-1980s (Sahoo, 2019). The theory developed from the previous discussions on resource-based view theory, extending the model with conceptualisation of both resources and capabilities either tangible or intangible in explaining organisations' performance (Samson et al., 2017). The SRBV theory confers on convincing theoretical model discussing on the development of firms' competitive advantage with its influences on the organisations' overall performance. Furthermore, Zehir et al. (2015) interpreted SRBV theory as a basic management philosophy connecting the competitive advantages and higher average revenue with organisations'

resources and capabilities to create future strategies beneficial in taking them to the business' vanguard within their industries. As such, the researcher adopts SRBV theory in explaining the relationship between market orientation, total quality management and innovation performance with the moderating influences of innovation capability within Malaysian manufactures.

2 Theoretical background

2.1 Market orientation and innovation performance

Market orientation, a well-known marketing notion reflects on the firms' ability to create behaviour required in creating superior value for customers in effective and efficient way (Ali et al., 2020). The initial interpretation of market orientation classified the concept into two major perspectives; cultural and behavioural. Narver and Slater (1990) advocate market orientation as 'organisations' culture that exerts employees in continuously creating superior value to customers'. The proposed market orientation comprises of three dimensions; customer orientation, competitor orientation and inter-functional coordination. Kohli and Jaworski (1990), meanwhile elucidate market orientation from behavioural perspectives. The scholars defined market orientation as 'specific activities that translate the philosophy (marketing concept) into practice', highlighting the three dimensions of:

1 generation of market intelligence relevant to customers' needs

2 dissemination of intelligence across departments

3 responsiveness to intelligence.

The abundant researches of market orientation indicate its significance within academia and project an important need to be further investigated within economic field. The last few years have witnessed a surge of interest regarding innovation performance's area of research. Wahyuni and Sara (2020) confirm on the link between market orientation and innovation performance in Indonesian small and medium enterprises (SMEs). This coincides with Putra et al.'s (2020) discussion on the relationship with knowledge management as a mediating influencer. Market orientation's level further confirm to have significant influences on the organisations' ability to implement novel ideas, processes, policies, products and services in their operation and enhance the firms' sales volume, market share and profitability (Tajeddini and Ratten, 2020). Based on the above discussion, the following hypothesis is proposed:

H1 Market orientation positively influences innovation performance.

2.2 Total quality management and innovation performance

The notion of total quality management represents a comprehensive and fundamental rule to lead and operate an organisation, under the reasons of continuously improving the firm's performance in long-term, prioritising on customers' needs and demands (Sotirelis and Grigoroudis, 2020). Following the definitions of total quality management by Mushtaq and Peng (2020), the concept refers to 'philosophy and a set of guiding

principles representing the foundation of continuously improving organisation'. It is widely documented in the literatures that the adoption of quality-oriented strategy contributes toward greater firms' performance (Abu Salim et al., 2019). The extensive researches in the field of study corroborate on the positive relationship between total quality management and innovation performance (Farish et al., 2017; Lim et al., 2019; Manzani et al., 2019; Zeng et al., 2017). In accordance to the body of knowledge, total quality management can promote innovation due to its influence in nurturing fertile environment and culture further supporting innovation through establishing efficient customers' needs detection, knowledge sharing, training, employee commitment and incessant development of work system (Segarra-Ciprés et al., 2020).

In a similar vein, Song et al. (2015) agreed on the similar enablers of innovation with quality management practices; employee involvement, teamwork and supplier participation. Zhou and Gu (2019) further deliberate on the integration between quality management and innovation performance within China manufacturing industries. However, the authors discover that quality management influence technological innovation, while describing the non-existent relationship on management innovation. The belief of quality, according to Zhou and Gu (2019), required conformity and extensionality, involved in satisfying the customers' needs and expectation that are changing with flow of time. To further satisfy these requirements, the organisations' quality management necessitates products and services' content development and innovations to exceed their customers' expectation and fulfil their basic needs. Despite that, several studies contradict on the findings through revelation on the negative effects of total quality management on innovation performance (Singh and Smith, 2004) and the absence of direct significant effect on the linkages (Escrig-Tena et al., 2018; Zhou et al., 2018). The incongruous view on the relationship debated in the previous literatures highlights the salient needs for extensive studies on the linkage within manufacturing study in Malaysia. Therefore, total quality management serves to improve the firms' innovation performance formalising the following hypothesis:

H2 Total quality management positively influence innovation performance.

2.3 Innovation capability and innovation performance

Innovation capability can be defined as "the ability to continuously convert knowledge and ideas into novel products, processes and systems for the benefit of the organisations and its stakeholders" (Lawson and Samson, 2001). Industries in the past decades rely on high-quality and value-added products to warrant their survival in global market, while the present economy required adoption of new technology and innovations, highlighting the significance of innovation capability in economy world (Shafi, 2020). Substantial papers discussing on the effect of innovation capability still demonstrated its inadequacies in fully interpreting innovation performance, relevant to the lack of studies on the link between innovation capability and innovation performance (Yuen and Ng, 2021). Puspita et al. (2020), in their studies regarding the relationship between strategic orientation, supply chain capability, innovation capability, competitive advantages and business performance indicate the absence of significant influences of innovation capability on business performance. The justification concern on the nature of traditional furniture retail industry, that is limited resources to adopt innovation and the organisations' structure itself affect the firms' abilities to innovate. In contrast, Dogbe

et al. (2019) clarified on the significant direct effect of innovation capability on innovation performance, (i.e., new product success) in their study within Ghana manufacturing industries. Industries, specifically, manufacturing industry with high innovation capability have potential to increase the speed and number of new products delivered to the market, while strengthening the prominent influence of the concept on innovation performance. From the preceding discussions, the researcher hypothesised that:

H3 Innovation capability positively influences innovation performance.

2.4 Moderating effects of innovation capability

Market orientation guides firms to acquire market knowledge with the lack of firms' ability to convert and implement the knowledge in its innovations. Innovation capability, meanwhile, relay the firms' ability to translate the knowledge into new functions, portraying the interrelationship between market orientation and innovation capability. Dogbe et al. (2021) deduced on innovation capability as a mediator in exploring market orientation – innovation performance relationship. The findings indicate full mediating effect on the relationship supporting the previous argument on the intermediary mechanism existence between market orientation and innovation performance (Wu et al., 2018). Paradoxically, Wang and Hu (2017)'s study on innovation performance relationship within Chinese firms, confirm on the moderating effect of innovation capability between collaborative innovation activities and innovation performance. Organisations adopting higher innovation capability within the outline of innovation ventures yield higher percentage turnover acquired from delivered products or services. Yusof et al. (2020) support the presence of innovation capability as a moderating role to strengthen the relationship between market orientation and innovation in their study on Malaysian manufacturing industries. Therefore, if all owners or managers in manufacturing industries utilise higher innovation capability in its operations, then the innovation performance of the firm will be higher than their competitors.

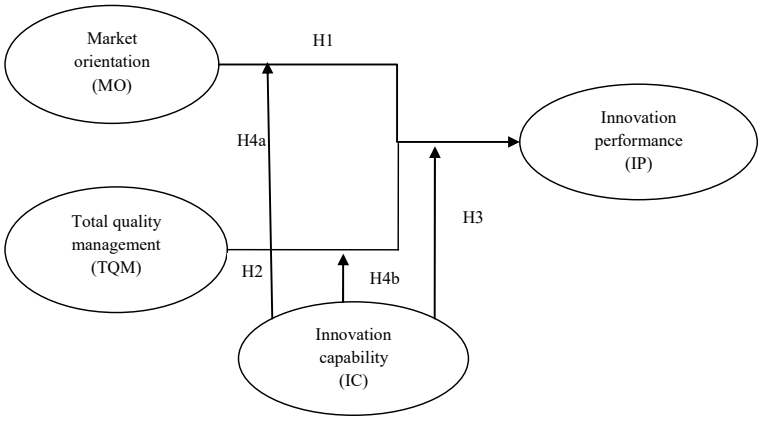
Furthermore, innovation capability debated to have mediating effect on the relationship between total quality management and innovation performance. Amalia and Isianadewi (2019) in their study regarding pottery craftsmen in Yogyakarta approve on the mediating effect of innovation capability between total quality management and innovation performance. Hussain et al. (2020) further confirm on the explaining power of innovation capability on total quality management – innovation performance relationship. As such, innovation concept can be utilised to increase the employees' morale and achieve competitive advantages with further impacts on firm's overall performance. Mushtaq and Peng's (2020) study on the relationship between total quality management, business innovation capability and innovation performance suggest on extending the framework with other constructs (e.g., market orientation) to further strengthen the results and research model. This coincides with Sciarelli et al.'s (2020) discussion on the connection between quality management and innovation performance. The results, however, demonstrated partial mediating effect within public universities in Italy. Despite the verified mediating role of innovation capability on the relationship from previous scholarly articles, the researcher debate on the possible moderating effect of the construct. Onamusi et al. (2019) in their study contemplating on environment munificence and firm performance highlight innovation capability as a moderating

influencer, projecting the feasible moderating function of innovation capability on the relationship. Following this line of thinking, the researcher proposed on the moderating effect of innovation capability to extend the previous literatures' framework and proposed these hypotheses:

H4a Innovation capability positively moderates the relationship between market orientation and innovation performance.

H4b Innovation capability positively moderates the relationship between total quality management and innovation performance.

Figure 1 Theoretical framework



3 Research methodology

3.1 Sampling and data collection

The data collection method of this paper utilises questionnaires with five-point Likert scale, while regarding manufacturing firms as unit of analysis. The firms consist of eight major industries, listing:

1 electrical and electronic products

2 chemicals

3 chemicals and petroleum products

4 wood and wood products

5 textiles, apparel and footwear

6 construction-related materials

7 transport equipment

8 food and beverages and other domestic manufacturers.

The key respondents of this study were department heads, operation managers, executives and employees from manufacturing firms. The self-administered questionnaire was utilised for data collection relevant to the respondents' understandings on the relationship between market orientations, total quality management and innovation performance with innovation capability as the moderating influencer. 200 questionnaires were distributed with 105 samples returned and deemed useful for data analysis, indicating 53% response rates. The obtained data from 105 manufacturers were analysed using SPSS statistical program for descriptive analysis and Smart PLS software for reliability, validity and hypotheses testing.

3.2 Measures

This research focuses on four major constructs; listing on market orientation and total quality management as the independent constructs, innovation capability as a moderating construct and innovation performance as the dependent construct. The market orientation comprises of three dimensions introduced by Narver and Slater (1990) in MKTOR scale, (i.e., customer orientation, competitor orientation and inter-functional coordination) adapted from Cheng and Krumwiede's (2012) study comprising of 13 items. Total quality management, meanwhile, adopt Kafetzopoulos et al.'s (2015) interpretation of five dimensions; top management support, employee training, information and learning, process management and customer focus. The uni-dimensional innovation capability scale was adapted from Huhtala et al. (2014) with nine items and finally, innovation performance adapted from Kafetzopoulos and Psomas's (2015) discussions indicating two major dimensions; product innovation and process innovation with 12 items. The measurement scales for this study utilise five-point Likert scale and experts' opinion are taken into account to ensure the questionnaire's content validity.

4 Results and discussion

4.1 Demographic analysis

The number of respondents amount to 105 owners or employers of manufacturing industry in Malaysia (Table 1). The results indicate the highest respondents' sector from electric and electronic sector (23%) next is chemical and petroleum products (19%), chemicals (13%) and transport equipment (13%). This is followed by other small sectors (10%), wood products (7%), the same percentage from textiles, apparel and footwear (6%) and construction-related materials (6%) and the least respondents from food and beverages sector (3%). The discrepancy in the sector is related to the population implemented in the study. The researcher conducts survey prioritising in the urban area and factories, thus, reflecting the highest percentage in electrical and chemicals products.

The majority of manufacturing organisation in Malaysia is multinational corporations (47%) and Malaysian organisation contributes to 44% of the respondents. Other type of organisations within the industry is joint venture organisation (6%) and local companies (3%). This confirms the significance of manufacturing organisations' position within global economy due to the substantial number of multinational corporations in the country. The company age of the respondents demonstrates the highest proportion of 34% for the year above 21. The second highest percentage is between 16–20 years (20%),

followed by those between 6–10 years (18%). The company age between 2–5 years (11%) and below one year (5%) indicate the lowest percentage. The company of age above ten years reveal the companies' stability in global market and implausible to fall through in contrast to the newly-established companies (Felisia et al., 2020). Manufacturers within the country (Malaysia) are recognised as stable and successful due to the largest distribution of respondents' companies aged above 21 years and between 16 to 20 years.

Table 1 Organisation profile of respondents

Variables	*Value*	*n = 105*	
		Frequency	*Percentage*
Business sector of organisation	Electrical and electronic	24	23%
	Chemicals	14	13%
	Chemical and petroleum products	20	19%
	Wood and wood products	8	7%
	Textiles, apparel and footwear	6	6%
	Construction-related materials	6	6%
	Transport equipment	14	13%
	Food and beverages	3	3%
	Others	10	10%
Type of organisation	Multinational corporation	50	47%
	Joint venture organisation	6	6%
	Malaysian organisation	46	44%
	Others	3	3%
Company age	< 1 years	5	5%
	2–5 years	11	11%
	6–10 years	19	18%
	11–15 years	13	12%
	16–20 years	21	20%
	> 21 years	36	34%

Furthermore, the almost equal distribution of respondents of female (55%) and male (45%) reflects on the absence of gender discrimination in working environment within the industry. Most respondents are of age between 31 to 40 years (58%), followed by between 21 to 30 years (28%). The age between 41 to 50 and 51 to 60, contribute to 8% and 6% respectively. This is relevant to the nature of industries, prioritising young adults in their workforce for better efficiencies in their operations. The respondents' answer further projects the highest number of responses from production engineers (35%) and operation managers (20%). Chief of executives and executives show similar percentage of 16% and the least responses from normal employees (8%) and directors (6%). Production engineers and operation managers possess depth knowledge regarding the constructs investigated, resulting in the highest responses compare to other positions.

Majority of the respondents graduates in bachelor's degree (72%), master's degree (15%), diploma or college (9%) and doctorate (4%). The manufacturing industries in Malaysia demand high knowledge requirements in their employees' personnel, with Bachelor's degree as the minimum education level. However, the contribution from Doctorate group is the lowest under reasons of higher income and job opportunities in different sector (e.g. education). The analysis pertinent to the respondents' years of experience in the sector indicates the highest between 1 to 5 years (45%). This is due to the term 'job skipping' experienced by fresh graduates in searching for jobs, leading to lower working experience in specific sector (i.e., manufacturing sector). Next, the respondents working between 6 to 10 years contribute to 25%, followed by between 11 to 15 years (17%). The least respondents' years of experiences are below one year (9%) and above 16 years (4%). The sparse newly-graduated students absorb into the companies' labour force on the grounds of internship and training expertise contributes to the 9% of the respondents. This corresponds on the interpretation that Malaysian manufacturing organisations' personnel have adequate experiences (Yusof et al., 2020) to operate in manufacturing industry.

Table 2 Profile of the respondents

Variable	*Value*	*n = 105*	
		Frequency	*Percentage*
Gender	Male	47	45%
	Female	58	55%
Age	21–30	30	28%
	31–40	61	58%
	41–50	8	8%
	51–60	6	6%
Position	Director	6	6%
	Chief of executives	17	16%
	Operation manager	21	20%
	Executive	17	16%
	Production engineer	36	35%
	Other	8	8%
Education	Diploma/college	10	9%
	Bachelor	75	72%
	Master	16	15%
	Doctorate	4	4%
Work experience	< 1 years	10	9%
	1–5 years	47	45%
	6–10 years	26	25%
	11–15 years	12	17%
	> 16 years	4	4%

Table 3 Reliability and convergent validity

Constructs	*Items*	*Outer loadings*	*Cronbach's alpha*	*CR*	*AVE*
		> 0.7	*α > 0.7*	*> 0.7*	*> 0.5*
Market orientation	MO1	0.745	0.907	0.926	0.642
	MO2	0.796			
	MO3	0.765			
	MO4	0.896			
	MO5	0.777			
	MO6	0.774			
	MO7	0.845			
Total quality management	TQM1	0.810	0.962	0.966	0.655
	TQM2	0.807			
	TQM3	0.747			
	TQM4	0.712			
	TQM5	0.789			
	TQM6	0.764			
	TQM7	0.871			
	TQM8	0.786			
	TQM9	0.825			
	TQM10	0.904			
	TQM11	0.801			
	TQM12	0.929			
	TQM13	0.857			
	TQM14	0.743			
	TQM15	0.767			
Innovation capability	IC1	0.872	0.916	0.937	0.748
	IC2	0.824			
	IC3	0.913			
	IC4	0.856			
	IC5	0.858			
Innovation performance	IP1	0.830	0.908	0.929	0.685
	IP2	0.874			
	IP3	0.812			
	IP4	0.785			
	IP5	0.797			
	IP6	0.863			

4.2 Reliability and validity analysis

This research utilises the confirmatory factor analysis to measure the reliability and validity of the measurement constructs with Smart PLS v2.0. The confirmatory factor analysis demonstrates the significance loadings of each construct, reflecting the acceptable unidimensionality for the instrument from the overall model fit and measurement items loadings (Cohen et al., 2011). Cronbach's alpha and composite reliability are used to assess the model's reliability. Table 3 indicate the value of Cronbach's alpha and composite reliability (CR) for all constructs are greater than 0.7; market orientation (α = 0.907, CR = 0.926), total quality management (α = 0.962, CR = 0.966), innovation capability (α = 0.916, CR = 0.937) and innovation performance (α = 0.908, CR = 0.929), thus, reflecting the model's adequate reliability (Fu et al., 2020).

The validity analysis of this study takes into account the convergent validity and discriminant validity. A good discriminant validity determined by average variance extracted (AVE) of value greater than 0.5. The results in Table 3 show the value of AVE for market orientation (0.642), total quality management (0.655), innovation capability (0.748) and innovation performance (0.685) above 0.5. Furthermore, the square root of AVE for each constructs need to be higher than its correlation coefficient with other constructs to illustrate the model's discriminant validity.

Table 4 Discriminant validity analysis

	IP	*MO*	*TQM*	*IC*
Innovation performance (IP)	*0.910*			
Market orientation (MO)	0.721	*0.895*		
Total quality management (TQM)	0.773	0.864	*0.900*	
Innovation capability (IC)	0.769	0.661	0.793	*0.930*

From Table 4, the value of AVE squared root for all constructs (italic diagonal number) are of higher values than its correspondence coefficient. The value of correlation coefficient for all constructs is greater than 0.7 projecting the high correlation between any two constructs (Dogbe et al., 2021). Therefore, given the preceding discussion, the data highlights the model's acceptable reliability, convergent and discriminant validity.

4.3 Hypotheses testing

Hypotheses testing involve assessing a claim or hypothesis concerning the population's parameter from the sample data. The analyses on hypothesised relationship utilised PLS Bootstrapping method within structural model to identify the accurate results (Appendix). Table 5 describes the path coefficient (β) estimates and t-value indicating the model's significance level. The path coefficient values range between +1 and –1, with values closer to +1 show strong positive relationship and the values closer to –1 indicate the strong negative relationship between the constructs (Hussain et al., 2020). The interpretation on t-value and p-value are relevant to the hypotheses testing with t-value > 1.96 and p-value < 0.05 to indicate its significance on the relationship investigated.

4.3.1 Relationship between market orientation and innovation performance

The findings indicated that market orientation have significant relationship with innovation performance (β = 0.245, p = 0.000), supporting H1. The results coincided with previous literatures on the influences of market orientation towards firms' superior innovation performance; (Ahmad and Kalyar, 2018; Mekhum and Rajabhat, 2020; Putra et al., 2020; Wahyuni and Astawa, 2020). This relationship inferred on the postulation that market-oriented organisation fulfils the customers' requirement efficiently, leading to higher innovation performance in contrast to the non-market-oriented firms. Market orientation involves the processes of gathering market knowledge on customers and competitors' information with further dissemination within the organisations (Yusof et al., 2020). The findings reflect on the positive contribution of market orientation on innovation performance through adoption of novel ideas, processes and products. The review of market orientation literatures by Savabieh et al. (2020) clarified on the linkages of market orientation, presenting comprehensive framework of market orientation for future examination by the scholars and academicians. Many scholars adhered to the view that market orientation promotes innovation performance either within momentous or valuable structure. This study also confirms on the significance of market orientation dimensions in influencing the firms' innovation performance, leading to higher competitive advantages.

Table 5 Path coefficients, standard error, t-values and p-values

Path	*Path coefficients (β)*			*SE*	*t-value*	*p-value*	*Decision*
	DE	*BI*	*AI*				
MO → IP	0.202	0.200	0.245	0.042	4.755	0.000***	Supported
TQM → IP	0.627	0.350	0.264	0.069	6.752	0.000***	Supported
Moderating variable							
IC → IP		0.348	0.388	0.049	8.005	0.000***	Supported
H2a: MO*IC → IP			0.123	0.182	2.028	0.045*	Supported
H2b: TQM*IC → IP			0.102	0.228	2.524	0.013*	Supported
R^2	0.647	0.688	0.702				

Note: *p < 0.05, **p < 0.01, ***p < 0.00.

4.3.2 Relationship between total quality management and innovation performance

Besides that, the findings demonstrated on the significant positive relationship between total quality management and innovation performance (β = 0.264, p = 0.000), supporting H2. The results correspond with previous scholarly articles discussing the influence of total quality management (Abu Salim et al., 2019; Li et al., 2018; Manzani et al., 2019; Sotirelis and Grigoroudis, 2020). Hussain et al. (2020) confirm on the effect of total quality management and innovation in empowering the firms' position in global and domestic market with further improvement in the firms' performance and competitive advantages. The analysis on the peer-reviewed journal literatures advocates on the prevailing effect of quality management on innovation performance (Segarra-Ciprés et al., 2020). The analysis, however, mention on the contradictory views on the relationship; promoting additional constructs, moderation and mediation influencers of

innovation performance. The approach by Alshourah (2021) reveal the six dimensions of total quality management towards innovation performance; leadership, people involvement, customer focus, processes management, supplier support and design of products. 5 out of the 6 dimensions are recognised as significant predictors of innovation performance while supplier support is discovered to have no significant impact on the dependent variable. The researcher, then, extend the proposed framework while removing the supplier support from total quality management dimensions and include other additional constructs to strengthen and validate the framework within manufacturing industries. In the lights of the previous discussion, this paper highlights on the importance of total quality management in influencing innovation performance ensuring excellent position in global market.

4.3.3 Relationship between innovation capability and innovation performance

The results report on the positive significant effect of innovation capability on innovation performance ($\beta = 0.388$, $p = 0.000$), that supported H3. This is in line with the previous scholarly articles on the effects of innovation capability toward innovation performance (Aljanabi, 2020; Lau et al., 2010; Oanh, 2019; Rajapathirana and Hui, 2018; Sirisan et al., 2020; Waheed et al., 2019; Yeşil and Doğan, 2019). Innovation capability enhances the organisations' internal deficiencies, fulfil customers' demands with their innovative products and finally improve the firms' innovation performance (Shafi, 2020). Jiménez-Jiménez et al. (2020) concur that organisations with efficient management innovation capabilities possess the aptitude to support product and process innovation in developing superior firm's performance. The implementation of management innovation capability within the firms' operations assists the firms in enhancing their productivity, responding to the market changes and delivering their innovative products and services to the market at higher speed, creating extensive competitive advantages. Najafi-Tavani et al. (2018) argued on the significance of product and process innovation capability in enhancing innovation performance. Product innovation capability involves delivering similar products or services but of superior quality compare to their competitors, while, process innovation capability refers to the firms' ability in improving their internal processes (effectiveness and efficiency of production), reduces the production cost and ultimately enhances the firms' innovation performance. Several previous academicians debated on the relationship between innovation capability and innovation performance, while deliberating on the constructs as the intervening constructs and indirectly influence innovation performance (Dogbe et al., 2021; Hussain et al., 2020; Mushtaq and Peng, 2020; Sahoo, 2019; Shafi, 2020; Taghizadeh et al., 2018). Taking into account the previous discussions with the analysis results, the researcher confirms on the direct relationship between innovation capability and innovation performance, supporting H3.

4.3.4 Moderating effects of innovation capability

This research utilises the interpretation of t-test and p-values to investigate the moderation effect of the relationship. The interaction effect of innovation capability on the relationship between market orientations, total quality management and innovation performance are presented in Table 5. The scholar hypothesised that innovation capability moderates the linkages between market orientation and innovation performance and between total quality management and innovation performance. The R^2

value (coefficient of determination) for the direct effect between market orientation, total quality management and innovation performance is 0.647, explaining 64.7% of the variance. After the introduction of innovation capability to the relationship, R^2 indicates the value of 0.688, discussing the 68.8% of innovation performance variance. The final R^2 after the integration of innovation capability on the relationship between market orientation, total quality management and innovation performance projected the value of 0.702, reflecting the increases on variance explaining the dependent variable to 70.2%. Zikmund et al. (2010) discuss on the rule of thumb to explain the relationship's strength mentioning on $R^2 < 0.3$ as weak, $R^2 < 0.5$ as low, $R^2 < 0.7$ as moderate and $R^2 > 0.7$ as strong effect size. As such, the moderating construct, (i.e., innovation capability) improve the strength of association between variables from moderate to strong. Cohen et al. (2013), meanwhile, prioritised on f^2 effect size to measure the strength of moderating variable with recommendations on the following formula:

$$f^2 = \frac{R^2 \text{ model with moderator} - R^2 \text{ model without moderator}}{1 - R^2 \text{ model with moderator}}$$

$$f^2 = \frac{0.702 - 0.647}{1 - 0.702}$$

$$f^2 = 0.185$$

Moderating influences of effect size (f^2) value less than 0.02, is regarded as weak, above 0.15 as moderate and above 0.35 as strong moderating effect size (Hair et al., 2019). Since, the effect size for this research is 0.185, the effect size for the parameter estimation is considered moderate. However, Chin (2010) debate on the negligibility of low effect size under reasons that extreme moderating conditions still influence the interaction effect even if its effect size is low.

Hypothesis 4a indicates that innovation capability has positive moderating effect on the relationship between market orientation and innovation performance. The analysis findings show interaction coefficient value of 0.123, statistical *t*-value of 2.028 > 1.96 and *p*-value = 0.045 < 0.05 ($\beta = 0.123$, $p < 0.05$), highlighting the positive and significant moderating effect of innovation capability on the relationship. The structurally positive coefficient reflects its positive influence as a moderator on the effect of market orientation towards innovation performance. The low value of path coefficient, however, indicates the medium effect of innovation capability as a moderator on the relationship. Based on the reasons that both direct effect and interaction effects have significant positive influences on innovation performance, innovation capability is recognised as a partial moderator. The results confer that improving innovation capability will strengthen the market orientation-innovation performance linkages. Market-oriented organisations inclined to have higher innovation performance from the adoption of innovation capability in its operations. Zhang and Duan (2010) approve on the notion deliberating on the innovative contributions and high customers' value from market-oriented firm to support the firms in highly-competitive organisations. The scholar further discussed on the distinction of their products delivered from their competitors through the implementation of novel, innovative ideas. The improvement on the products and services regarding its innovation, leads to higher productivity on the firms' innovation performance. Highly-innovated organisations improve their profitability and growth in

market share through their ability to identify the strengths and weaknesses of their rivals and coordinate the information within their organisations (Udriyah et al., 2019).

The analysis results for the influence of innovation capability on the relationship between total quality management and innovation performance demonstrates positive and significant relationship (β = 0.102, t-value = 2.524, $p < 0.05$). From the findings, the researcher deduces that innovation capability has a positive and significant interaction effect on the relationship. Total quality management as a management philosophy demonstrates higher influence toward innovation performance with higher adoption of innovation capability within its processes. The low interaction coefficient, meanwhile, indicates the low moderating effect of innovation capability on the relationship. In the similar vein, the direct and interaction effect of total quality management on innovation performance shows positive and significant value, reflecting partial moderating effect of innovation capability on the relationship. Therefore, innovation capability identified as partial moderating constructs for both relationship (market orientation-innovation performance, total quality management-innovation performance).

5 Conclusions and recommendations

The main purpose of this study is to analyse the moderating effect of innovation capability on the relationship between market orientations, total quality management and innovation performance within Malaysian manufacturing industries. Following this field of interest, five hypotheses are proposed to clarify the relationship. The results of this study significantly fulfil the purpose of this study with innovation capability as its moderating influencer. Moreover, this study also discloses on the direct effect of all constructs, (i.e., market orientation, total quality management, innovation capability) on innovation performance. As such, the subjects conform and extend the previous scholarly articles on the relationship. The present study clarifies on the essential role of the implementation of market orientation and total quality management with the presence of innovation capability to improve the firm's innovation performance. Owners or managers should exert the significance of these constructs as strategies in their operations, specifically within manufacturing industry in Malaysia to enhance the innovation levels that is still at level below their countries of the similar middle income group such as China and Singapore. The encouragement from the government to employ the strategies of market orientation, total quality management and innovation capability will assist organisations in increasing their survival in global market and attain higher position within the global economies ranking. This research highlighted several limitations that need to be addressed for future research. This study is limited to small sample size due to the reasons of time constraints and wide population expanse. Therefore, future research is suggested to utilise larger samples size for data generalisation. Next, the type of this research is cross-sectional with further suggestion on adoption of longitudinal study for framework's improvement in terms of market changes. The study is conducted within manufacturing industries in Malaysia, thus, projecting further needs for investigation within other industries (e.g., service, agriculture, educations) from different countries. It is also interesting to combine and compare several industries based on the framework proposed. Furthermore, the extension of the framework with other variables such as entrepreneurial orientation and supply chain facet are recommended to strengthen and validate the research model.

References

Abu Salim, T., Sundarakani, B. and Lasrado, F. (2019) 'The relationship between TQM practices and organisational innovation outcomes: moderating and mediating the role of slack', *TQM Journal*, Vol. 31, No. 6, pp.874–907, https://doi.org/10.1108/TQM-11-2018-0160.

Ahmad, B. and Kalyar, M.N. (2018) 'Linking market orientation and innovation performance: the mediating role of intellectual capital', *Asian Finance Research Journal*, Vol. 1, No. 1, pp.9–16.

Ali, G.A., Hilman, H. and Gorondutse, A.H. (2020) 'Effect of entrepreneurial orientation, market orientation and total quality management on performance: evidence from Saudi SMEs', *Benchmarking*, Vol. 27, No. 4, pp.1503–1531, https://doi.org/10.1108/BIJ-08-2019-0391.

Aljanabi, A.R.A. (2020) 'The role of innovation capability in the relationship between marketing capability and new product development: evidence from telecommunication sector', *European Journal of Innovation Management*, pp.1460–1060, https://doi.org/10.1108/EJIM-04-2020-0146.

Alshourah, S. (2021) 'Assessing the influence of total quality management practices on innovation in Jordanian manufacturing organizations', *Uncertain Supply Chain Management*, Vol. 9, pp.57–68, https://doi.org/10.5267/j.uscm.2020.12.001.

Amalia, D.A. and Isianadewi, D. (2019) 'Implementation of total quality management and innovation capability in improving quality performance', *Journal of Economy and Management*, Vol. 13, No. 2, pp.114–123.

Cheng, C.C. and Krumwiede, D. (2012) 'The role of service innovation in the market orientation-new service performance linkage', *Technovation*, Vol. 32, Nos. 7–8, pp.487–497, https://doi.org/10.1016/j.technovation.2012.03.006.

Chin, W.W. (2010) 'How to write up and report PLS analyses', in *Handbook of Partial Least Squares Concepts, Methods and Applications*, pp.650–690, Springer, New York.

Cohen, J., Cohen, P., West, S.G. and Aiken, L.S. (2013) *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*, 3rd ed., Routledge, London.

Cohen, L., Manion, L. and Morrison, K. (2011) *Research Methods in Education*, Routledge, London.

Department of Statistic Malaysia (2020) *Monthly Manufacturing Statistics*, Issue October.

Department of Statistics Malaysia (2022) *Index of Industrial Production* [online] https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=91&bul_id=alo1Sjd6bThGMU42a2s0K0w2VDdIQT09&menu_id=SjgwNXdiM0JlT3Q2TDBlWXdKdUVldz09 (accessed 22 June 1992).

Dogbe, C.S.K., Bamfo, B.A. and Pomegbe, W.W.K. (2021) 'Market orientation and new product success relationship: the role of innovation capability, absorptive capacity, green brand positioning', *International Journal of Innovation Management*, pp.1–30, https://doi.org/10.1142/S136391962150033X.

Dogbe, C.S.K., Tian, H-Y., Pomegbe, W.W.K., Sarsah, S.A. and Otoo, C.O.A. (2019) 'Market orientation and new product superiority among small and medium-sized enterprises (SMEs): the moderating role of innovation capability', *International Journal of Innovation Management*, pp.1–25, https://doi.org/10.1142/S1363919620500437.

Escrig-Tena, A.B., Segarra-Ciprés, M., García-Juan, B. and Beltrán-Martín, I. (2018) 'The impact of hard and soft quality management and proactive behaviour in determining innovation performance', *International Journal of Production Economics*, Vol. 200, pp.1–14, https://doi.org/10.1016/j.ijpe.2018.03.011.

Farish, K.A., Anil, A.P. and Satish, K.P. (2017) 'Effect of TQM practices on financial performance through innovation performance – in Indian manufacturing context', *International Research Journal of Engineering and Technology*, Vol. 4, No. 7, pp.2649–2655.

Felisia, C., Sidharta, H. and Yosia, I.B. (2020) 'The effect of entrepreneurship orientation and market orientation on marketing performance of furniture home industry in Sawahan district', *Review of Management and Entrepreneurship*, Vol. 4, No. 2, pp.95–116.

Fu, S., Zhan, Y., Ouyang, J., Ding, Y., Tan, K.H. and Fu, L. (2020) 'Power, supply chain integration and quality performance of agricultural products: evidence from contract farming in China', *Production Planning & Control*, Vol. 32, No. 13, pp.1–17.

Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M. (2019) 'When to use and how to report the results of PLS-SEM', *European Business Review*, Vol. 31, No. 1, pp.2–24, https://doi.org/10.1108/EBR-11-2018-0203.

Huhtala, J-P., Sihvonen, A., Frosen, J., Jaakkola, M. and Tikkanen, H. (2014) 'Market orientation, innovation capability and business performance: insights from the global financial crisis', *Baltic Journal of Management*, Vol. 9, No. 2, pp.134–152, https://doi.org/10.1108/BJM-03-2013-0044.

Hussain, A., Khan, M.A. and Khan, M.H. (2020) 'The effect of total quality management on firm performance with the mediating roles of innovation and knowledge management in small medium enterprises', *Journal of Accounting and Finance in Emerging Economies*, Vol. 6, No. 2, pp.415–425.

Imran, M., Raziq, A., Saleem, H.M.N. and Khaliq, M. (2020) 'The moderating effect of business network on the relationship between export market orientation, total quality management and company export performance: evidence from furniture industry of Pakistan', *South Asian Journal of Management Sciences*, Vol. 14, No. 1, pp.43–60, https://doi.org/10.21621/sajms.2020141.03.

Jiménez-Jiménez, D., Martínez-Costa, M. and Para-Gonzalez, L. (2020) 'Implications of TQM in firm's innovation capability', *International Journal of Quality and Reliability Management*, Vol. 37, No. 2, pp.279–304, https://doi.org/10.1108/IJQRM-09-2018-0233.

Kafetzopoulos, D. and Psomas, E. (2015) 'The impact of innovation capability on the performance of manufacturing companies: the Greek case', *Journal of Manufacturing Technology Management*, Vol. 26, No. 1, pp.104–130.

Kafetzopoulos, D., Gotzamani, K. and Gkana, V. (2015) 'Relationship between quality management, innovation and competitiveness: evidence from Greek companies', *Journal of Manufacturing Technology Management*, Vol. 26, No. 8, pp.1177–1200.

Kohli, A.K. and Jaworski, B.J. (1990) 'Market orientation: the construct, research propositions, and managerial implications', *Journal of Marketing*, April, Vol. 54, No. 2, pp.1–18.

Lau, A.K.W., Yam, R.C.M. and Tang, E.P.Y. (2010) 'The impact of technological innovation capabilities on innovation performance: an empirical study in Hong Kong', *Journal of Science and Technology Policy in China*, Vol. 1, pp.163–186, https://doi.org/10.1108/17585521011059893.

Lawson, B. and Samson, D. (2001) 'Developing innovation capability in organisations: a dynamic capabilities approach', in *International Journal of Innovation Management*, Vol. 5, pp.377–400, https://doi.org/10.1142/S1363919601000427.

Li, D., Zhao, Y., Zhang, L., Chen, X. and Cao, C. (2018) 'Impact of quality management on green innovation', *Journal of Cleaner Production*, Vol. 170, pp.462–470, https://doi.org/10.1016/j.jclepro.2017.09.158.

Lim, A.F., Nair, R.K. and Foo, P.Y. (2019) 'TQM and organisational innovation: a systematic review and research framework', *International Journal of Innovation and Learning*, Vol. 26, No. 3, pp.273–300, https://doi.org/10.1504/IJIL.2019.102099.

Manzani, Y., El Sidmou, M.L. and Cegarra, J. (2019) 'Does IS0 9001 quality management system support product innovation? An analysis from the sociotechnical systems theory', *International Journal of Quality and Reliability Management*, Vol. 36, No. 6, pp.951–982, https://doi.org/10.1108/IJQRM-09-2017-0174.

Mekhum, W. and Rajabhat, S. (2020) 'Relating technology-based CRM, market orientation and service innovation in Thai hotels', *International Journal of Innovation, Creativity and Change*, Vol. 11, No. 7, pp.596–614.

Mushtaq, N. and Peng, W.W. (2020) 'Can TQM act as stimulus to elevate firms' innovation performance?: An empirical evidence from the manufacturing sector of Pakistan', *SAGE Open*, Vol. 10, No. 4, pp.1–20, https://doi.org/10.1177/2158244020963669.

Najafi-Tavani, S., Najafi-Tavani, Z., Naude, 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*, August, Vol. 73, pp.193–205.

Narver, J.C. and Slater, S.F. (1990) 'The effect of market orientation on business profitability. *Journal of Marketing*, Vol. 54, No. 4, pp.20–35.

Oanh, N.T. (2019) 'The relationship between innovation capability, innovation type and innovation performance in FDI enterprises in Vietnam', *International Journal of Economics and Finance*, Vol. 11, No. 8, pp.28–34, https://doi.org/10.5539/ijef.v11n8p28.

Onamusi, A.B., Asihkia, O.U. and Makinde, G.O. (2019) 'Environmental munificence and service firm performance: the moderating role of management innovation capability', *Business Management Dynamics*, Vol. 9, No. 6, pp.13–25.

Petcharit, A., Sornsaruht, P. and Pimdee, P. (2020) 'An analysis of total quality management (TQM) within the Thai auto parts sector', *International Journal of Online and Biomedical Engineering*, Vol. 16, No. 2, pp.131–145, https://doi.org/10.3991/ijoe.v16i02.11917.

Puspita, L.E., Christiananta, B. and Ellitan, L. (2020) 'The effect of strategic orientation, supply chain capability, innovation capability on competitive advantage and performance of furniture retails', *International Journal of Scientific & Technology Research*, Vol. 9, No. 3, pp.4521–4529.

Putra, A.A.G.A.P., Wahyuni, N.M., Yasa, P.N.S. and Giantari, I.G.A.K. (2020) 'Examining the linkage among market orientation, learning orientation and innovation performance: the mediation role of knowledge management', *International Research Journal of Management, IT & Social Sciences*, Vol. 7, No. 6, pp.131–145.

Rajapathirana, R.P.J. and Hui, Y. (2018) 'Relationship between innovation capability, innovation type and firm performance', *Journal of Innovation & Knowledge*, Vol. 3, pp.44–55, https://doi.org/10.1016/j.jik.2017.06.002.

Sahoo, S. (2019) 'Quality management, innovation capability and firm performance empirical insights from Indian manufacturing SMEs', *The TQM Journal*, Vol. 31, No. 6, pp.1003–1027, https://doi.org/10.1108/TQM-04-2019-0092.

Samson, D., Gloet, M. and Singh, P. (2017) 'Systematic innovation capability: evidence from case studies and a large survey', *International Journal of Innovation Management*, Vol. 21, No. 7, https://doi.org/10.1142/S136391961750058X.

Sánchez, L.A., Ríos, N.B.Y. and Zapata, Á.R.P. (2020) 'Relationship between total quality management (TQM) and technology R&D management (TM/R&D) in manufacturing companies in Mexico', *Contaduria y Administracion*, Vol. 65, No. 1, pp.1–22, https://doi.org/10.22201/FCA.24488410E.2019.1698.

Savabieh, S., Nayebzadeh, S., Abghari, R. and Hatami-Nasab, S.H. (2020) 'A systematic review and a synthesis research on market orientation studies', *International Journal of Information Science and Management*, Vol. 18, No. 2, pp.245–261.

Sciarelli, M., Gheith, M.H. and Tani, M. (2020) 'The relationship between quality management practices, organizational innovation, and technical innovation in higher education', *Quality Assurance in Education*, Vol. 28, No. 3, pp.137–150, https://doi.org/10.1108/QAE-10-2019-0102.

Segarra-Ciprés, M., Escrig-Tena, A.B. and García-Juan, B. (2020) 'The link between quality management and innovation performance: a content analysis of survey-based research', *Total Quality Management and Business Excellence*, Vol. 31, Nos. 1–2, pp.1–22, https://doi.org/10.1080/14783363.2017.1401460.

Shafi, M. (2020) 'Sustainable development of micro firms: examining the effects of cooperation on handicraft firm's performance through innovation capability', *International Journal of Emerging Markets*, https://doi.org/10.1108/IJOEM-11-2019-0989.

Shaher, A.T.Q. and Ali, K.A.M. (2020) 'The effect of entrepreneurial orientation and knowledge management on innovation performance: the mediation role of market orientation', *Management Science Letters*, Vol. 10, pp.3723–3734, https://doi.org/10.5267/j.msl.2020.6.020.

Singh, P.J. and Smith, A.J.R. (2004) 'Relationship between TQM and innovation: an empirical study', *Journal of Manufacturing Technology Management*, Vol. 15, No. 5, pp.394–401, https://doi.org/10.1108/17410380410540381.

Sirisan, S., Pianthong, N. and Olejnik, M.K. (2020) 'A structure equation model of total quality management and innovation capability affecting organisational performance', *Asia-Pacific Journal of Science and Technology*, Vol. 25, No. 4, pp.1–9.

Song, J., Wei, Y. and Wang, R. (2015) 'Market orientation and innovation performance: the moderating roles of firm ownership structures', *Intern. J. of Research in Marketing*, Vol. 32, No. 3, pp.319–331.

Sotirelis, P. and Grigoroudis, E. (2020) 'Total quality management and innovation: linkages and evidence from the agro-food industry', *Journal of the Knowledge Economy*, pp.1–21, https://doi.org/10.1007/s13132-020-00683-9.

Taghizadeh, S.K., Rahman, S.A. and Hossain, M.M. (2018) 'Knowledge from customer, for customer or about customer: which triggers innovation capability the most?', *Journal of Knowledge Management*, Vol. 22, No. 1, pp.162–182, https://doi.org/10.1108/JKM-12-2016-0548.

Tajeddini, K. and Ratten, V. (2020) 'The moderating effect of brand orientation on inter-firm market orientation and performance', *Journal of Strategic Marketing*, Vol. 28, No. 3, pp.194–224.

Udriyah, U., Tham, J. and Azam, S.M.F. (2019) 'The effects of market orientation and innovation on competitive advantage and business performance of textile SMEs', *Management Science Letters*, Vol. 9, pp.1419–1428, https://doi.org/10.5267/j.msl.2019.5.009.

Valdez-de la Rosa, L.M., Villarreal-Villarreal, L.A. and Alarcón-Martínez, G. (2020) 'Quality and innovation as drivers for manufacturing competitiveness of automotive parts suppliers', *The TQM Journal*, ahead-of-p(ahead-of-print), https://doi.org/10.1108/tqm-12-2018-0218.

Waheed, A., Miao, X., Waheed, S., Ahmad, N. and Majeed, A. (2019) 'How new HRM practices, organizational innovation, and innovative climate affect the innovation performance in the IT industry: a moderated-mediation analysis', *Sustainability*, Vol. 11, No. 621, pp.1–21, https://doi.org/10.3390/su11030621.

Wahyuni, N.M. and Astawa, I.P. (2020) 'An integrative model of market orientation on innovation performance', *Journal of Management and Marketing Review*, Vol. 5, No. 1, pp.51–63.

Wahyuni, N.M. and Sara, I.M. (2020) 'Market orientation and innovation performance : mediating effects of customer engagement in SMEs', *Journal of Economics, Business and Accountancy*, Vol. 23, No. 1, pp.28–37, https://doi.org/10.14414/jebav.v23i1.2040.ABSTRACT.

Wang, C. and Hu, Q. (2017) 'Knowledge sharing in supply chain networks: effects of collaborative innovation activities and capability on innovation performance', *Technovation*, https://doi.org/10.1016/j.technovation.2017.12.002.

World Intellectual Property Organization (2021) *Global Innovation Index 2021: Tracking Innovation through the COVID-19 Crisis*, World Intellectual Property Organization, Geneva.

Wu, J., Ma, Z. and Liu, Z. (2018) 'The moderated mediating effect of international diversification, technological capability, and market orientation on emerging market firms' new product performance', *Journal of Business Research*, Vol. 100, https://doi.org/10.1016/j.jbusres.2018.03.025.

Yeng, S.K., Jusoh, M.S. and Ishak, N.A. (2018) 'The impact of total quality management (TQM) on competitive advantage: a conceptual mixed method study in the Malaysia luxury hotel industries', *Academy of Strategic Management Journal*, Vol. 17, No. 2, pp.1–9.

Yeşil, S. and Doğan, I.F. (2019) 'Exploring the relationship between social capital, innovation capability and innovation', *Innovation*, pp.1–27, https://doi.org/10.1080/14479338.2019.1585187.

Yuen, Y.Y. and Ng, X.P. (2021) 'Enhancing innovation performance of small and medium enterprises in Malaysia', *Management Science Letters*, Vol. 11, pp.887–894, https://doi.org/10.5267/j.msl.2020.10.010.

Yusof, S.W.M., Jabar, J., Majid, I.A., Qureshi, M.I. and Ortega, R.T. (2020) 'Market orientation and firm performance of manufacturing sector in Malaysia: the moderation of innovation', *PalArch's Journal of Archaeology of Egypt/Egyptology*, Vol. 17, No. 7, pp.4671–4695.

Zehir, C., Köle, M. and Yıldız, H. (2015) 'The mediating role of innovation capability on market orientation and export performance: an implementation on SMEs in Turkey', *11th International Strategic Management Conference 2015*, Vol. 207, pp.700–708, https://doi.org/10.1016/j.sbspro.2015.10.141.

Zeng, J., Zhang, W., Matsui, Y. and Zhao, X. (2017) 'The impact of organizational context on hard and soft quality management and innovation performance', *International Journal of Production Economics*, Vol. 185, pp.240–251, https://doi.org/10.1016/j.ijpe.2016.12.031.

Zhang, J. and Duan, Y. (2010) 'The impact of different types of market orientation on product innovation performance: evidence from Chinese manufacturers', *Management Decision*, Vol. 48, No. 6, pp.849–867, https://doi.org/10.1108/00251741011053433.

Zhou, F. and Gu, X. (2019) 'Fuzzy impact of quality management on organizational innovation performance', *Journal of Intelligent and Fuzzy Systems*, Vol. 37, No. 3, pp.3093–3101, https://doi.org/10.3233/JIFS-179112.

Zhou, F., Gu, X. and Zhao, Y. (2018) 'Effect and mechanism of total quality management on enterprise innovation performance based on cognitive behavior science', *NeuroQuantology*, Vol. 16, No. 6, pp.268–274, https://doi.org/10.14704/nq.2018.16.6.1552.

Zikmund, W., Babin, B., Carr, J. and Griffin, M. (2010) *Business Research's Methods*, 8th ed., South-Western Cengage Learning, USA.

Appendix

Table A1 Measurement items

	Measurement scale	*Mean*	*Std. dev.*
Market orientation			
1	Main objectives are driven by customer satisfaction	0.727	0.022
2	The level of commitment and orientation toward customers constantly	0.836	0.013
3	Market strategies driven by understanding on possibilities to create value for customers	0.733	0.024
4	Measurement on customer satisfaction systematically and frequently	0.870	0.010
5	Rapid responses to competitive action from competitors	0.821	0.015
6	All function are responsive to and integrated to serve market	0.810	0.017
7	All managers understand how the entire business contribute to customer value	0.869	0.007
Total quality management			
1	Organisation's top management emphasises pursuing knowledge to fit new environment	0.811	0.015
2	Organisation's top management is evaluated for quality performance	0.807	0.014

Table A1 Measurement items (continued)

Measurement scale		*Mean*	*Std. dev.*
3	Organisation's top management agrees that employees' ability to learn is the key to competitive advantages	0.747	0.018
4	Employee's training reach the quality standard of organisation	0.713	0.019
5	Employee's acceptance of changes required by organisation	0.790	0.017
6	The firm was a learning organisation	0.765	0.020
7	Organisation's capability to assess technologies and information relevant to the firm's business strategy	0.871	0.012
8	The organisation pay attention to tacit knowledge	0.787	0.027
9.	Inspection, review or checking of work in the organisation is automated	0.826	0.015
10	Quality techniques are used by organisation in order to reduce variance in process	0.904	0.010
11	The organisation's shop floors are well organised and clean	0.799	0.018
12	Extensive use of statistical techniques to reduce variance in processes	0.928	0.007
13	The organisation has high understanding on customer's perceived product value	0.855	0.014
14	The organisation focuses on customer requirements and expectations	0.740	0.016
15	The organisation's assurance of meeting customers' requirements	0.764	0.013
Innovation capability			
1	The organisation has the ability to develop new product/service ideas	0.886	0.009
2	The organisation has the ability to engage in cross-functional collaboration and information sharing	0.868	0.012
3	The organisation has rapid commercialisation of ideas	0.914	0.007
4	The organisation has a large number of product/service innovations	0.838	0.012
5	The organisation has the ability to successfully launch new products/services	0.834	0.012
Innovation performance			
1	The level of novelty (newness) of new product	0.885	0.007
2	Latest technology innovation in new product development	0.857	0.010
3	The speed of new product development	0.814	0.013
4	The number of new product that is first-to-market	0.777	0.018
5	Participation in the technological competitiveness	0.825	0.019
6	Revising and updating the novelty of technology used in the process	0.864	0.011

Figure A1 PLS algorithm with moderating interaction effect (see online version for colours)

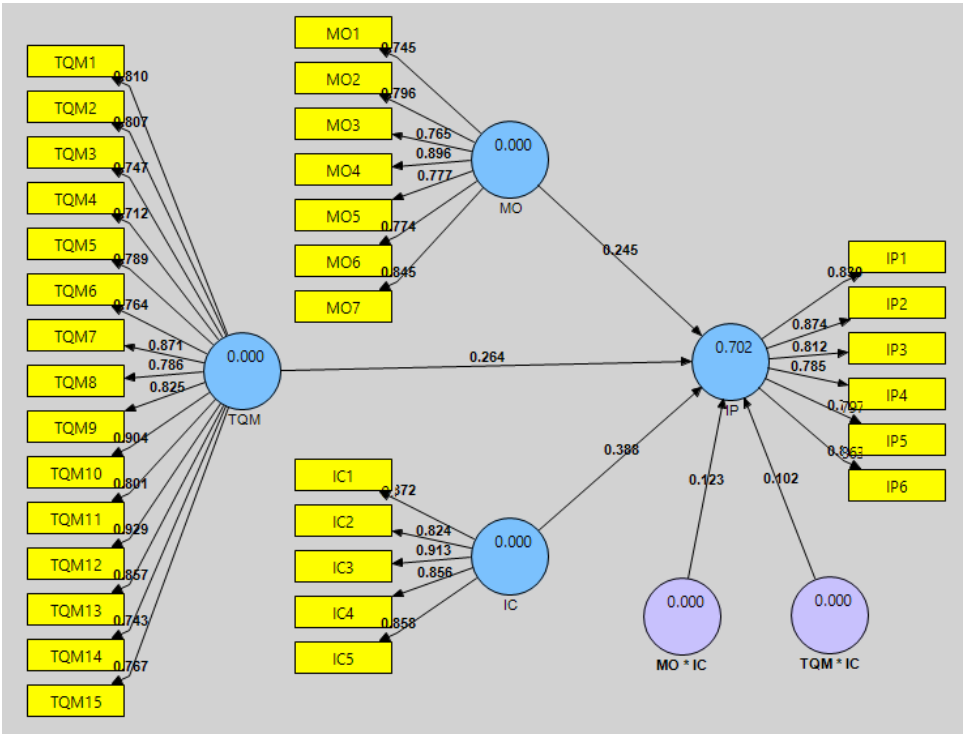


Figure A2 PLS bootstrapping with moderating interaction effect (see online version for colours)