EasyChair Preprint

№ 2947

The Mediator of Organizational Learning in Knowledge-Innovation Linkage: a Case of Travel Industry

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March 12, 2020

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Abstract

Tourism scholars pay attentions on the impact of market knowledge (MK) on innovations. However, past studies in the tourism or hospitality fields failed to thoroughly examine what is brought about by the specific aspects (depth and breadth) of MK and its effect on particular types of innovations. This is the first paper investigating the level of reliance in the relationships between different types of MK and innovation on different types of learning capabilities. The empirical results demonstrated the following: MK depth directly and positively impacts process innovation and product innovation.

This study collects data from 153 travel agencies and shows that travel agencys' MK depth has a significant positive effect on process and product innovations; Although the impact (parameter) for product innovation was greater than the parameter for process innovation, the difference of two impacts from MK depth is not significant. MK breadth indirectly and positively impacts process innovation and product innovation; there is no significant difference in the effects of the two types of knowledge on the two types of innovations. On the other hand, ambidextrous learning mediates the effect of MK breadth on process innovation and product innovation in addition to affect two innovations directly and positively. Moreover, exploitative learning has a larger mediating effect than exploratory learning on the relationship between MK breadth and innovations. Finally, ambidextrous organizational learning does not mediate the effect of market knowledge depth on both types of innovations.

Keywords: market knowledge depth/breadth, process/product innovation , ambidextrous learning

1. Introduction

Due to radical market changes, travel agenies and hotels need continuously updated market information so they can innovate and create sustainable competitive advantages (Hjalager, 2015; Martínez-Pérez, García-Villaverde, & Elche, 2016; Nieves, Quintana, & Osorio, 2014). Research has found that it is not market orientation but rather unique market knowledge and the capability to operationalize

such knowledge to innovate that enables tourism to maintain their long-term competitive advantages and to make service failure prevention and recovery (Chao, Chen, & Yeh, 2015; García, Varela, & Río, 2011). This is because, despite their market-oriented business operations, tourism firms possess different levels of market knowledge and those with higher levels of market knowledge are more likely to bring forth innovations (Chen & Lee, 2017; Martínez-Pérez et al., 2016). Hence, it is more important for tourism to examine the relationship between market knowledge and innovation rather than the relationship between market orientation and innovation (Weidenfeld, Williams, & Butler, 2010; Ferreras-Méndez, Newell, Fernández-Mesa, & Alegre, 2015). For example, an investigation has been conducted on how the hospitality industry creates dynamic competencies to performance through knowledge resources (Nieves & Haller, 2014).

The current study submits two research questions: (1) What effect do different market knowledge schemas have on different types of innovation? Essentially which schemas of market knowledge have a relatively significant effect on which particular types of innovation? (2) How to mediate the effects of different types of market knowledge on innovation with organizational learning capability? Answering these two questions can yield two contributions. Firstly, scholars who have studied related topics have mostly viewed market knowledge and innovation as singular constructs without examining the characteristics and differences of specific attributes of each construct, which has thus yielded inconsistent results. The current study further dissects market knowledge and innovation and includes the notion of ambidextrous learning within the discipline of organizational behavior, helping to delineate complicated causal relationships in order to understand the effects among variables and provide a solution to the inconclusiveness of study results reported in the past.

The current study delves into KBV from an information processing standpoint, and investigates exploratory and exploitative learning from the standpoint of organizational ambidextrous learning, and proposes examining the effect of market knowledge by delving in from the perspective of the effects of market knowledge on innovation – which is a more suitable perspective than market orientation – most especially the mediator. Thus, the current study starts from market knowledge and incorporates ambidextrous learning as the mediator to more thoroughly examine the effect of market knowledge on innovation while opening the black box in the process.

2. Literature

2.1. Market knowledge in the tourism and hospitality fields

The study and practice of knowledge topic have grown in most industries, with the exception of the tourism field (Hoarau & Kline, 2014). Chen and Lee (2017) drawing from the knowledge-based theory applied on tourism proposed the following four attributes of market knowledge: depth, breadth, tacitness, and specificity. In particular, information depth and breadth have been examined the most frequently by scholars in fields as wide and varied as science and technology and customer service. Some scholars also believe that it is necessary to investigate knowledge depth and breadth separately when examining the effect of market knowledge on tourism firm performance (Chen, Zhuang, & Fang, 2017; Ferreras-Méndez et al., 2015; Shaw & Williams, 2009). The current study focuses on investigating the sub-constructs of depth and breadth of market knowledge.

2.2. Depth of market knowledge

Market knowledge in tourism might include many dimensions, such as customers, competitors, suppliers, or other stakeholders on the market. Take, for example, the depth of market knowledge about the customer aspect, this knowledge may pertain to customer relationship management as well as customer's psychology and behaviors. However, firms are not necessarily able to extract and utilize the knowledge attained to understand customers or go on to incorporate such knowledge into their marketing activities. These examples all serve to demonstrate the depth of knowledge about customers.

2.3. Breadth of market knowledge

Schindehutte, Morris, and Kocak (2008) expands the definition of market knowledge to include not only customer knowledge but also suppliers' needs and the knowledge related to all the stakeholders. Knowledge breadth refers to the number of different knowledge domains with which the firm is familiar (De Luca & Atuahene-Gima, 2007). In other words, the types of knowledge possessed by a tourism firm characterize its breadth of knowledge. Therefore, the concept of knowledge breadth is used as the basis of investigation in the current study.

2.4. Innovation

Mihalache and Mihalache (2016) have noted that tourism firms can only achieve sustainable performance in an increasingly competitive advantage by being innovative. Innovation for tourism encompasses a broad range of topics. More importantly, the literature that investigates the effect of knowledge resources on market performance or sustained competitive advantages from the KBV or the perspective of marketing

strategy mostly centers on product or commercial process innovation (with some studies illustrating it as management innovation)(Chang, Bai, & Li, 2015).

2.5. Process innovation

Process innovation occurs when firms introduce new production technologies or processes to the market or re-examine/re-design cross-functional operational processes in order to deliver business performance, and is an important performance indicator (Mavondo, Chimhanzi, & Stewart, 2005; Weerawardena, O'Cass, & Julian, 2006). From the process perspective, process innovation is manifested in significant improvement and enhancement of processes through combined innovations of cost structure, quality, service, and speed (Damanpour & Gopalakrishnan, 2001), or even by lowering marginal production costs (Lambertini & Mantovani, 2009).

2.6. Product innovation

Product innovation refers to the creation of new products or services, namely, the so-called concept of new product development (Hjalager, 2015). Product innovation can be manifested in the use of new raw materials, the introduction or development of new ingredients, the combination of existing products, or the development of new product functions or features (Casadesus-Masanell & Zhu, 2013; Chang et al., 2015). In the case of service innovation, similar to product innovation, it refers to providing value-added services or improving service quality (Hu et al., 2009).

2.7. Hypothese

H1-1: Tourism firms' market knowledge depth positively affects process innovation

H1-2: Tourism firms' market knowledge depth positively affects product innovation

H1-3: Knowledge depth for Tourism has a larger effect on product innovation than on process innovation.

H2-1: Tourism firms' market knowledge breadth positively impacts process innovation

H2-2: Tourism firms' market knowledge breadth positively impacts product innovation

H2-3: Knowledge breadth for Tourism has a larger effect on process innovation than on product innovation.

H3-1: Organizational ambidextrous learning (exploratory and exploitative) positively impacts innovations (process and product) in Tourism.

H3-2: For tourism, ambidextrous learning (exploratory and exploitative) mediates the

positive relationship between market knowledge depth and innovations (process and product). In particular, exploratory learning has a larger mediating effect than exploitative learning on the relationship between market knowledge depth and innovations.

H3-3: For tourism, ambidextrous learning (exploitative and exploratory) mediates the positive relationship between market knowledge breadth and innovations (process and product). In particular, exploitative learning has a larger mediating effect than exploratory learning on the relationship between market knowledge breadth and innovations.

3. Method

3.1. Sample

The survey recipients in the present study consisted of high-level managers (e.g., CEOs or senior managers of travel agencies) in the capital city of Taipei, Taiwan, which is a well-established headquarters for global business in East Asia. According to the Tourism Bureau of Taiwan (2016), the majority of Taiwan's wholesale travel agencies are located in Taipei. To ensure that the respondents were the primary operators of their respective firms, this study followed a modified version of the data collection method used by Sivadas and Dwyer (2000), which included the following steps. First, this study mailed official letters for travel agencies to confirm that the targeted respondents were indeed these key executives, after which they were contacted and their cooperation was kindly requested. Second, a questionnaire was mailed to each respondent, with a cover letter explaining the purpose of the study (i.e., first wave of data collection). Approximately one month after the mailing, the current study sent a duplicate questionnaire for any nonrespondents and encouraged them to complete and return the questionnaire (i.e., second wave of data collection).

A total of 603 questionnaires were distributed to the majority of travel agencies (e.g., wholesalers) in Taipei. After removing the respondents that were unable to complete their questionnaires, this study received 153 responses (25.37%) from the two waves of data collection. Looking at previous studies, this response rate appears to be within the typical range for this type of study (Gatignon & Xuereb, 1997; Hooley, Greenley, Cadogan, & Fahy, 2005).

3.2. Measures

All of constructs measures were based on the relevant established research scales. Then, the present study translated and adapted these measurements for the travel industry context. This study focused on six primary constructs: the depth and breadth

of market knowledge (Zhou & Li, 2012), exploitative and explorative learnings (Jansen et al., 2005; Tzokas et al., 2015), and process and product innovations (Chang et al., 2015; Paladino, 2008; Wang & Ahmed, 2004). As shown in Table 1, each of the constructs included three items that were measured on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Because the measurement scales were drawn from English version and the surveys were administered in Chinese, back translation was performed to ensure the accuracy of the translation (Brislin, 1980). In addition, potential key informant bias was examined by performing *t*-tests on the constructs' mean differences between the informants in the first wave and those in the second wave (Vorhies, Orr, and Bush, 2011). Nonresponse bias was tested by analyzing the mean scores of the constructs for the early respondents (91 cases) compared with those of the late respondents (62 cases). No significant differences were found at the p-value < 0.05 level, thus the present study provided sufficient confidence that nonresponse bias was not an issue in the present study (Armstrong and Overton, 1977).

Table 1
Measurement items and CFA for all variables

Construct / Item	Crobach's α	CFA				
		SFL	t value	SMC	AVE	CR
Market knowledge depth	0.91				0.78	0.92
We are highly familiar with this industry.		0.90	13.89	0.81		
We have acquired a great deal of experience about this industry.		0.91	14.12	0.82		
The knowledge of our firm in this industry is thorough.		0.85	12.72	0.72		
Market knowledge breadth	0.85				0.67	0.86
We possess market information from a diversified customer portfolio.		0.87	12.06	0.76		
We have accumulated knowledge of multiple market segments.		0.90	13.82	0.82		
Our R&D expertise consists of knowledge from a variety of background.		0.66	8.86	0.44		
Exploitative learning	0.93				0.82	0.93
We are proficient in transforming knowledge and technologies into new products.		0.84	12.62	0.70		
We regularly apply knowledge and technologies in new products.		0.94	15.26	0.89		
We constantly consider how to better exploit new knowledge and technologies.		0.93	14.89	0.86		
Explorative learning	0.94				0.83	0.94
We frequently scan the environment for new knowledge and technologies.		0.87	13.31	0.75		
We thoroughly observe knowledge and technological trends.		0.92	14.65	0.84		
We observe in detail external sources of new knowledge and technologies.		0.94	15.33	0.89		
Process innovation	0.92				0.80	0.92
We are constantly improving our business processes		0.91	14.36	0.83		
Our company changes production methods at a great speed in comparison with our competitors.		0.89	13.85	0.79		
During the past five years, our company has developed many new management approaches.		0.88	13.52	0.77		
Product innovation	0.94				0.84	0.94
The quality of this new product is superior to that of our competitors.		0.92	14.56	0.84		
This product design (in terms of functionality and features) is superior to that of our competitors.		0.92	14.80	0.85		
Overall, we have an advantage over our competitors in terms of this new product we offer our customers.		0.91	14.39	0.83		

Note: SFL= standard factor loading; 188.014/120= 1.567; RMSEA: 0.062, CFI: 0.989, NNFI:0.986, IF0.989, GFI: 0.876

4. Results

4.1. Descriptive statistics

Among the travel agencies that replied, 79.1% possessed capital of less than NTD$20 million. Furthermore, 90.8% reported having less than 50 employees or between 51 and 100 employees, and approximately 90% of the travel agencies reported turnover of less than NTD$10 billion. In addition, one-third of the travel agencies had been conducting their business operations for less than five years, while the others had been in their business between six and 10 years. Because there were early responses (91 cases) as well as late ones (62 cases), nonresponse bias was tested by analyzing the mean scores of the travel agencies' characteristics for the two sets of respondents (Armstrong & Overton, 1977). There were no significant differences between early and late responses, so nonresponse bias was not a concern in our study.

4.2. Reliability and validity

This study refined the measures and assessed construct validity following the two-stage procedures recommended by Anderson and Gerbing (1988). This study also used Cronbach's α coefficient to measure reliability. The results showed that all the construct reliability values were greater than 0.70 (Nunnally, 1978), indicating consistency and stability for all the constructs (see Table 1). In regard to validity, because the contents of the questionnaires were based on relevant literature and reviewed by experts and scholars, content validity was achieved. Furthermore, the current study assessed the convergent and discriminant validity of the focal constructs by using confirmatory factor analysis (CFA) and estimating a six-factor confirmatory measurement model.

Regarding the recommended values of the measurement model, this study used the factor loadings and significant *t*-values (factor loadings: 0.66~0.94; *t*-values: 8.86~15.33, $t > 1.96$, $p < 0.05$) to examine the items in the model (see Table 1). All the observed variables reached a level of significance, and the estimated parameters for the factor loadings conformed to the 0.5 criteria (Anderson & Gerbing, 1988). In addition, the average variance extracted (AVE) was near or met the recommendation value of 0.50 or greater, as proposed by Bagozzi and Yi (1988), while the composite reliability (CR) met the threshold value of 0.60 or greater. Thus, the measures demonstrated adequate convergent validity.

For the discriminant validity test, the AVE root mean square of all of the constructs was required to be greater than the correlation coefficients of the various constructs (Hair, Anderson, Tatham, & Black, 1998). The results showed that for each construct, the AVE root mean square of the various constucts was between 0.82 and 0.91, and it was much higher than their correlation coeffieients, which represents researable discriminant validity (see Table 2; the means and standard deviations are also shown in this Table). The measurement model test also produced the following

results: χ^2/df (193.761/120) = 1.615, the comparative-fit index (CFI) value was 0.988, the nonnormed fit index (NNFI) value was 0.985, the incremental fit index (IFI) value was 0.988, and the root mean square error of approximation (RMSEA) value was 0.064. Overall, these results showed that the measures possess adequate reliability, validity and goodness-of-fit of measurement model.

Table 2
Descriptive analysis and correlation ship for all variables

Construct	Mean	S.D	1	2	3	4	5	6	7	8	9
Market knowledge depth	6.013	0.861	***(.88)*** 1								
Market knowledge breadth	5.388	1.023	0.554*	***(.82)*** 1							
Explorative learning	5.190	1.191	0.469*	0.674*	***(.90)*** 1						
Exploitative learning	5.159	1.155	0.382*	0.547*	0.636*	***(.91)*** 1					
Process innovation	5.401	1.110	0.455*	0.555*	0.671*	0.738*	***(.89)*** 1				
Product innovation	5.547	1.077	0.443*	0.508*	0.630*	0.657*	0.732*	***(.91)*** 1			
Firm size	1.205	0.742	0.194*	0.139	0.104	0.053	0.186	0.134	1		
Firm capital	1.460	1.191	0.193*	0.113	0.059	0.047	0.183	0.138	0.846	1	
Firm age	3.707	2.045	0.043	0.018	-0.017	-0.090	-0.103	0.013	0.344	0.335	1

Note:
( ) reports the square root of AVE; * $p < .05$
Firm size:
1= 50 employees or below, 2=50– (under) 100 employees, 3= 100– (under) 500 employees, 4=500– (under) 1000 employees, 5= 1000– (under) 2000 employees, and 6= higher than 2,000 employees
Firm capital:
1= under NT 20 million dollars, 2= NT 20–(under) 40 million dollars, 3= NT 40– (under) 60 million dollars, 4= NT 60–(under) 80 million dollars, 5= NT 80– (under) 100 million dollars, and 6= over 100 million dollars
Firm age:
1= under 5 years, 2= 5– (under) 10 years, 3= 10– (under) 15 years, 4= 15– (under) 20 years, 5= 20– (under) 25 years, 6= 25– (under) 30 years, and 7=over 30 years

4.3. Common method variance

Because this study collected the information for the dependent and independent variables form the same respondent, a common method variance (CMV) may occur. Considering the validity of the self-reported questionnaires, this study tested for the possibility of CMV using Harman's one-factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Typically, in a single-factor test, all the items in a study are subject to exploratory factor analysis (EFA). As an alternative to EFA, it is possible to use CFA when implementing Harmon's single-factor test. In particular, CFA can model all the manifested items as indicators of a single factor that represents the methodology's effects (Malhotra, Kim, and Patil, 2006). In the single-factor model of the present study, one item failed the criterion for the measurement (t = 1.96, $p < 0.05$). In addition, the single-factor model in the CFA fitness indices (χ^2/df (1176.888/135) =

8.718, RMSEA = 0.228, CFI = 0.861, GFI = 0.531, and NNFI = 0.843) did not yield a more favorable result than the present model. Thus common method variance is unlikely to be a concern for our data.

4.4. Hypothesis tests

Based on the results, both H1-1 and H1-2 were supported ($\gamma = 0.174$, t = 2.319; $\gamma = 0.205$, t = 2.376), indicating that a travel agency's market knowledge depth has a significant positive effect on process and product innovations. For H1-3 of testing the different effects of market knowledge depth on two innovations, a chi-square difference test was conducted by comparing the chi-square ($\chi 2$) and the degree of freedom (df) of the constrained model (a model with two fixed paths of market knowledge depth to process innovation and to product innovation) with those of the unconstrained model (an original model) (Bollen & Long, 1992). The findings were as follows: $\chi 2$ (241.689 − 242.100) = 0.411 and df = 165 − 164 = 1 (criteria: $\Delta\chi^2_{0.05}$ (1) = 3.84, $p < 0.05$). Based on these results, there was no significant difference between the two models, even though the parameter for product innovation ($\gamma = 0.205$) was greater than that for process innovation ($\gamma = 0.174$). Hence, H1-3 was not confirmed.

For the H2-1 and H2-2 tests, market knowledge breadth did not have a significantly positive influence on process innovation ($\gamma = -0.076$, $t = -0.595$) and product innovation ($\gamma = -0.118$, $t = -0.802$), representing that the breadth of market knowledge is not positively and directly associated with the two types of innovation. Because these two hypotheses were not supported, testing and comparing the effects of market knowledge breadth on the two innovations was unnecessary. Accordingly, H2-3 was not confirmed. Notably, although no direct effect was found in the relationship between market knowledge breadth and the two innovations, a total effect was found. The consequences of H2-1 and H2-2 will be discussed later in the paragraph on the total effect and indirect analyses as well as in the robustness check and additional analysis sections.

Next, this study examined the relationships between the two ambidextrous learning capabilities and the two innovations. First, exploitative and explorative learnings had a directly positive effect on process innovation ($\beta = 0.359$, $t = 3.858$; $\beta = 0.575$, $t = 7.262$, respectively). This finding indicates that the importance of ambidextrous learning for business process management should be highly emphasized in process innovation in the travel industry. Meanwhile, exploitative and explorative learnings each had a significant positive influence on product innovation ($\beta = 0.340$, $t = 3.194$; $\beta = 0.509$, $t = 5.789$, respectively). This study suggests that product

development among travel agencies appears to be influenced by ambidextrous learning capability, especially explorative learning. This positive linkage was also verified in regard to explorative learning. Accordingly, H3-1 was confirmed.

As discussed earlier, learning capability might assume a mediating role in the relationship between market knowledge and innovation. This means that the explanation that market knowledge can sometimes have a nonsignificant impact on innovation might be a mechanism for learning capability. Hence, following the guidelines of Baron and Kenny (1986), the current study tested the mediators of learning capability. Schoalrs in business related domain suggest an alternative method—direct and indirect effect testing to examine the mediating effect. This approach has been encouraged and supported when implementing Baron and Kenny's test (Preacher & Hayes 2004; Shrout & Bolger, 2002). In regard to the total effect and indirect analyses, although market knowledge depth had a total direct and slightly positive association with process innovation ($\gamma = 0.165$, $t = 1.720$) and product innovation ($\gamma = 0.197$, $t = 1.911$), it did not have a significant indirect influence on the two innovations ($\gamma = -0.009$, $t = -0.130$; $\gamma = -0.008$, $t = -0.137$). From the one-single-path viewpoint, the two learning capabilities were not significantly influenced by market knowledge depth ($\gamma = -0.027$, $t = -0.303$; $\gamma = 0.001$, $t = 0.015$). By combining the previous empirical results between market knowledge depth and the two innovations, this finding indicates that ambidextrous learning capability does not mediate a positive relationship between market knowledge depth and innovation. Therefore, H3-2 was not confirmed.

For H3-3 analysis, market knowledge breadth was not found to have a positive impact on the two innovations based on the one-single-path viewpoint. However, market knowledge breadth was indirectly and positively associated with process innovation ($\gamma = 0.651$, $t = 5.424$) and product innovation ($\gamma = 0.594$, $t = 4.689$). The total effect of market knowledge breadth on process innovation ($\gamma = 0.575$, $t = 5.581$) and product innovation ($\gamma = 0.476$, $t = 4.464$) was confirmed, while the two innovations were directly influenced by learning capability. Moreover, market knowledge breadth had a significantly positive influence on both exploitative learning ($\gamma = 0.780$, $t = 7.303$) and explorative learning ($\gamma = 0.646$, $t = 5.940$). After comparing the magnitudes of these effects, it was found that the direct effect of market knowledge breadth on exploitative learning was significantly larger than the direct effect of market knowledge breadth on explorative learning. Next, the two fixed parameters were determined to be equivalent to the standardized parameters of the original model, after which the chi-square of the constrained model was compared with that of the unconstrained model (Bollen and Long, 1992). The results were as

follows: $\chi 2$ (241.689 − 245.345) = 3.656 and df (165 − 164) = 1 (checking the p-value is 0.056, http://www.statdistributions.com/chisquare?chi=3.66&df=1; criteria: $\Delta\chi^2_{0.05}$ (1) = 3.84, $p < 0.05$) and stated that mediating role of exploitative learning might be stronger than from exploitative learning and the effect is closely to $p < 0.05$ significant level.

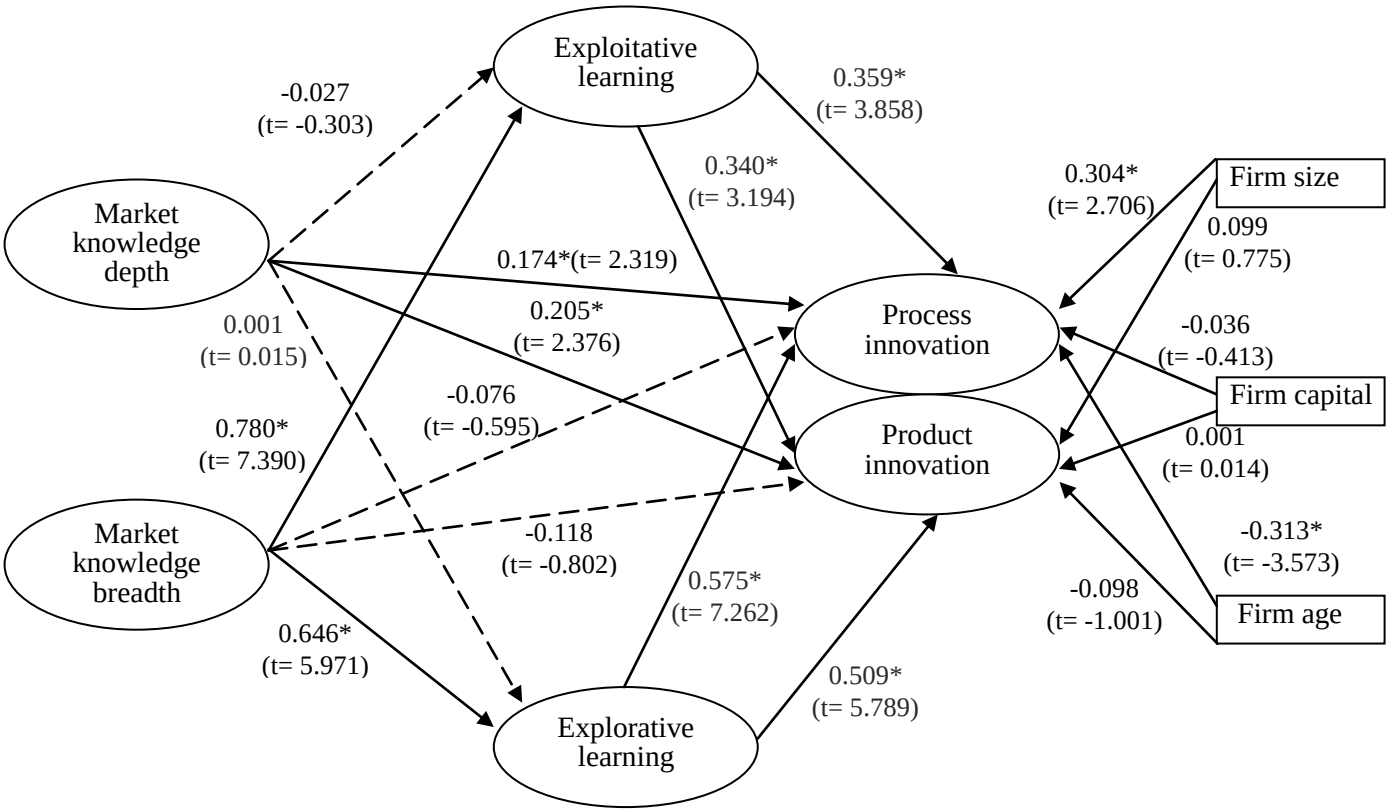
In this theoretical framework, the nonsignificant direct relationship between market knowledge breadth and the two innovations might be entirely mediated by ambidextrous learning. Moreover, the two innovations influenced by market knowledge breadth were mediated by exploitative learning more than explorative learning. Therefore, H3-3 was supported. In sum, under the significance level of $p < 0.05$ and the one-tailed *t*-test value of > 1.65, some of the hypotheses were confirmed, whereas others were not supported (see Table 3 and Figure 1).

Table 3

Results of empirical test and rival model comparison

Hypothesis	results	note
H1-1: the positive effect of market knowledge depth on product innovation	supported	
H1-2: the positive effect of market knowledge depth on process innovation	supported	
H1-3: the effect of market knowledge depth on product innovation should be more than the effect on process innovation	not supported	Effect difference exists but not significantly change
H2-1: the positive effect of market knowledge breadth on process innovation	mix supported	Direct effect does not exist, but total effect do because of learning capability
H2-2：the positive effect of market knowledge breadth on product innovation	mix supported	
H2-3: the effect of market knowledge breadth on process innovation should be more than the effect on product innovation	not supported	
H3-1: the positive effects of exploitative and explorative on process and product innovation	supported	
H3-2: Ambidextrous learning (exploratory and exploitative) mediates the positive relationship between market knowledge depth and innovation performance (process, product). In particular, exploratory learning has a larger mediating effect than exploitative learning on the relationship between market knowledge depth and innovation performance	not supported	Only direct effect between market knowledge depth and two innovation performances
H3-3: Ambidextrous learning (exploitative and exploratory) mediates the positive relationship between market knowledge breadth and innovation performance (process, product). In particular, exploitative learning has a larger mediating effect than exploratory learning on the relationship between market knowledge breadth and	supported	

innovation performance.



NOTE:
χ^2/df= 1.474 (241.689/164); RMSEA= 0.056; CFI= 0.987; NNFI= 0.983; IFI= 0.987; GFI= 0.868
The total effect of MKdp on PCin: 0.165* (t= 1.720); on PDin: 0.197* (t= 1.949)
The total effect of MKbr on PCin: 0.575* (t= 5.581); on PDin: 0.476* (t= 4.464)
The indirect effect of MKdp on PCin: -0.009* (t= -0.130); on PDin: -0.008* (t= -0.137)
The indirect effect of MKbr on PCin: 0.651* (t= 5.424); on PDin: 0.594* (t= 4.698)
MKdp as market knowledge depth
MKbr as market knowledge breadth
PDin as product innovation
PCin as process innovation
* p<0.05, t> 1.65 (one-tail)

Fig 1. Research model

4.5. Robustness check

To further assess the appropriateness of the present model and the mediators of the two learning capabilities, several alternative models were developed and tested, including testing a model with knowledge and learning constructs as antecedents of innovation. This approach was also based on Baron and Kenny's (1986) test and conducted for robustness in terms of total and indirect effect analyses.

According to Model (b) in Table 4, both depth and breadth of market knowledge had a positive effect on the two innovations (t > 1.65, p-value < 0.05). In Model (c),

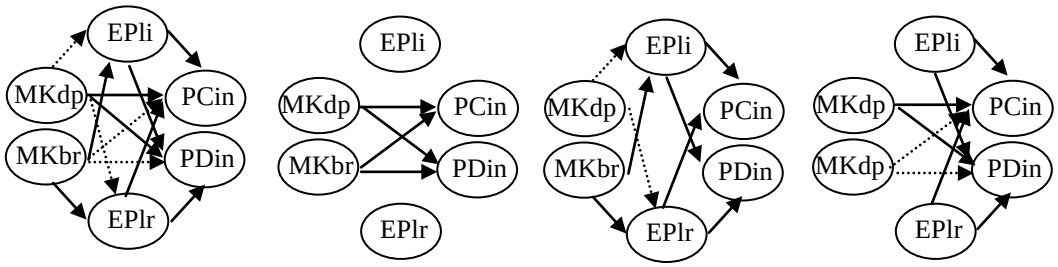
market knowledge breadth had a direct effect on the two learning capabilities, whereas market knowledge depth did not have such an effect. This result indicates that market knowledge breadth might depend on the mediating role of the two learning capabilities. Similar to the results of Models (b) and (c), market knowledge depth had a direct significant influence on the two innovations. Thus, H3-2 was not supported.

Based on extensive research of the two types of market knowledge and the two learning capabilities in business management literature, an alternative model could indicate the existence of four direct paths from the antecedent constructs (market knowledge depth and breadth; exploitative and explorative learnings) to the consequence constructs (product and process innovations). After comparing Models (d) and (b), market knowledge breadth was not found to have a direct effect on the two innovations. This result is consistent with the previous analyses of the total and indirect effects. This finding is also in line with the previous analyses of the total and indirect effects. Finally, following Bollen and Long (1992), the present study compared the hypothesized model with three rival models. The results showed that the original Model (a) was more favorable than the other models. In sum, the goodness-of-fit analysis of the proposal model provided a better results (χ^2/df = 1.474, CFI = 0.987, IFI = 0.987, NNFI = 0.983, GFI = 0.868, and RMSEA = 0.056), which means that the hypotheses in the current research model contained excellent goodness-of-fit.

5. **Table 4**
6. Results of empirical test and rival model comparison

Path	Proposal model(a)		Model(b)		Model(c)		Model(d)	
	Coefficient	t value	Coefficient	t value	Coefficient	t value	Coefficient	t value
MKdp → EPli	-0.027	-0.303	---	---	-0.008	-0.088	---	---
MKdp → EPlr	0.001	0.015	---	---	0.029	0.296	---	---
MKbr → EPli (◯)	**0.780***	**7.390**	---	---	**0.764***	**7.226**	---	---
MKbr → EPlr (◯)	**0.646***	**5.971**	---	---	**0.624***	**5.794**	---	---
MKdp → PCin (◯)	**0.174***	**2.319**	**0.169***	**1.776**	---	---	**0.184***	**2.168**
MKdp →PDin (◯)	**0.205***	**2.376**	**0.195***	**1.945**	---	---	**0.221***	**2.331**
MKbr→ PCin (△)	-0.076	-0.595	**0.547***	**5.359**	---	---	0.023	0.272
MKbr →PDin (△)	-0.118	-0.802	**0.469***	**4.443**	---	---	-0.032	-0.338
EPli → PCSin (◯)	**0.359***	**3.858**	---	---	**0.373***	**5.543**	**0.372***	**5.601**
EPli →PDin (◯)	**0.340***	**3.194**	---	---	**0.340***	**4.495**	**0.335***	**4.639**
EPlr → PCin (◯)	**0.575***	**7.262**	---	---	**0.593***	**8.311**	**0.645***	**8.890**
EPlr → PDin (◯)	**0.509***	**5.789**	---	---	**0.523***	**6.690**	**0.550***	**7.243**

Firm size → PCin	0.304*	2.706	0.406*	2.739	0.279*	2.414	0.357*	2.673
Firm size → PDin	0.099	0.775	0.196	1.277	0.069	0.525	0.113	0.772
Firm capital → PCin	-0.036	-0.413	-0.013	-0.111	-0.032	-0.356	-0.040	-0.393
Firm capital → PDin	0.001	0.014	0.025	0.205	0.005	0.049	0.002	0.017
Firm age → PCin	-0.313	-3.573	-0.416*	-3.593	-0.303*	-3.344	-0.371*	-3.547
Firm age → PDin	-0.098	-1.001	0.202*	-1.698	-0.087	-0.853	-0.116	-1.019
X^2/df	241.689/164 =1.474		127.810/73 =1.751		251.541/168 =1.497		374.111/168 =2.227	
RMSEA	0.056		0.071		0.058		0.091	
IFI	0.987		0.978		0.986		0.966	
CFI	0.987		0.977		0.986		0.966	
NNFI	0.983		0.967		0.983		0.957	
	(***dominating***)							



7. NOTE:
8. MKdp as market knowledge depth
9. MKbr as market knowledge breadth
10. EPli as exploitative learning
11. EPlr as explorative learning
12. PDin as product innovation
13. PCin as process innovation
14. (◯) as empirical support for hypothesis
15. (△) as mix support for hypothesis
16. * p<0.05, t> 1.65 (one-tail)

17. Conclusion

17.1. Discussion

The study findings illustrate the following. First, while market knowledge depth has a significant effect on both types of innovation, market knowledge breadth does not. This finding also addresses the issue of inconsistent findings on the effects of market knowledge on innovation in past research, which was due to the fact that market knowledge and innovation were viewed as singular constructs, thus masking the true effects. Second, the inconsistency in the study findings about the effect of market knowledge on innovation could also be attributed to not examining innovation more thoroughly. The empirical results show that market knowledge depth impacts product innovation slightly more than process innovation, although the difference in effect did not reach a significant level. At least, such finding establishes for future research the evidence that different market knowledge types do affect different types of innovations differently and that the level of significance could vary. Finally, different learning capabilities do play a mediating role in the impact of market

knowledge on innovation. More interestingly, in terms of the effect of market knowledge breadth on innovation, exploitative learning has a more pronounced mediating effect than exploratory learning. This finding not only explains why market knowledge has not been found to positively impact innovation and why any such impact, when found, has been inconsistent, but also reveals that a particular type of learning capability could better mediate the effect of certain market knowledge type on innovation.

Drawn from past research, this article marks the first endeavor to adopt the KBV and the ambidextrous learning perspective, attempt to create a theoretical framework of knowledge-learning-innovation, and thoroughly examine related causal relationships between different dimensions of the constructs. The current study not only applies existing theories but also provides a research foundation based on empirical evidence for subsequent research.

17.2. Theoretical contributions

The current study discovers in the existing literature an inconsistency in the relationships between market knowledge and innovation, and, yet, no follow-up research has provided a complete answer to this question. First, the current study not only examines the necessity of the relationship between market knowledge types and different types of innovations (product and process), but also addresses the reasons why recent research has found an insignificant or negative relationship between market knowledge and innovation (Hoarau & Kline, 2014; Nieves et al., 2014). In recent years, although scholars have applied the KBV to examine the impact of different market knowledge types on firms' innovation, the inconsistent findings could also be attributed to not examining innovation more thoroughly in past research. Hence, the current study continues the past research thread that investigates the causal relationships between different types of market knowledge and different types of innovations.

Second, the current study extends the explanatory power of the KBV by elucidating the different effects of various knowledge dimensions on various types of innovation for tourism literature on knowledge management. The empirical results show that market knowledge depth impacts product innovation slightly more than process innovation. Although this effect is not statistically significant, these findings could inspire researchers studying this type of topics to consider a practical question, namely, how a tourism firm's market knowledge could have different effects on its innovation.

Third, the current study incorporates the ambidextrous learning standpoint and KBV discourse. Our investigation reveals that market knowledge breadth does impact innovation and such impact is mainly mediated by ambidextrous learning. Hence, investigating the relationship between knowledge breadth and innovation without taking into account ambidextrous learning (the mediator) would conclude with an insignificant relationship between knowledge breadth and innovation.

Overall, the current study demonstrates that despite the continued spread of tourism firm's market knowledge, if the employees cannot master such knowledge through a comprehensive study, learn, and put the knowledge to use, the ultimate performance still cannot be realized (Chen & Lee, 2017; Tzokas et al., 2015). This may also explain why some studies find no impact of market knowledge on innovation (Ferreras-Méndez et al., 2015; Jansen et al., 2005).

17.3. Management practices

Today, in the 21 century, the majority of service-based firms are already market-oriented. In order to deliver different performance, tourism firms will rely on their knowledge about the market of their respective industries. Based on the analysis results of the current study, the management implications are as follows. The empirical results show that market knowledge depth directly impacts innovation; market knowledge breadth impacts innovation through the mediating mechanism of organization's ambidextrous learning capabilities.

The empirical study results also show that ambidextrous organizational learning can help tourism firms to effectively improve innovation. Hence, this study also recommends that the management create a corporate culture of learning and a atmosphere that encourages trial-and-error to accumulate exploratory learning by encouraging employees to take risks, rewarding projects proposed by employees, and organizing bold brainstorming activities just to name a few. On the other hand, to accumulate exploitative learning, job rotation can be implemented for senior-level managers allowing them to accumulate greater experience and capability with which to apply what they have learned. For the general staff, tourism firms could organize cross-functional projects to allow employees from different departments to learn from another in order to maximize the potential value of market knowledge. Only through outside-in and inside-out learning capabilities can tourism firms adapt to environmental changes to facilitate innovation for them the firm (Zhou & Li, 2012).

17.4. Limitation and recommendation

Despite its obvious contributions and procedural preventions (CMV and robustness check), this study includes some inherent limitations. First, due to the cross-sectional nature of the data, additional research should adopt a longitudinal approach and the data should be collected at different times. Second, the empirical results of this study were only obtained in Asia. Thus, future research should test for nationality bias (e.g., in the United States or Europe) to overcome any context-specific issues. Finally, this study utilized the depth and breadth of knowledge to represent the antecedents of innovation. Although it was valid and meaningful, future research should develop multi-dimensional measures (De Luca & Atuahene-Gima, 2007) that consider more specific knowledge characteristics, and empirically test their effects on various innovation indices.

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