

The Impact Of Knowledge Management Capability On New Product Development In Bamboo Painting Enterprises In Vietnam

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Abstract:

New product development (NPD) is both an opportunity and a great challenge for all enterprises, especially those in traditional industries. Enterprises must coordinate well with knowledge from both internal and external, such as marketing, sales, research and development. This study was conducted with the aim of clarifying the impact of knowledge management capability on new product development of bamboo painting enterprises in Vietnam. In addition, this study also explores the moderating role of green transformational leadership (GTL) styles on this relationship. Based on data obtained from 203 NPD teams at bamboo painting enterprises in Vietnam, this study conducted a quantitative analysis and obtained some new results. First, both internal KMC and external KMC have a positive impact on the NPD speed and success of bamboo painting enterprises, in which the impact of internal KMC is stronger. Besides, although it did not find a positive impact of GTL on NPD, this study found a moderating role of GTL on the impact of both internal KMC and external KMC on NPD. Based on these results, this study has made suitable recommendations for bamboo painting enterprises in Vietnam in improving NPD speed and success.

Keyword: knowledge management capability, new product development, bamboo painting enterprises

1. Introduction

The rapid development of science - technology and stronger economic integration have changed the business environment and pushed enterprises to seek new business opportunities (Massa et al., 2017). In this context, new product development (NPD) pressures have emerged from competitors, including start-ups and large enterprises. Therefore, enterprises today are forced to constantly change and develop their new products to satisfy customer needs and attract new customers. NPD can be understood as a logical process that meets goals, with an emphasis on bringing the next new product to market as quickly as feasible (Dhargalkar et al., 2016). NPD allows enterprises to create new products that differentiate themselves from existing products and create a sustainable competitive advantage for enterprises (Osiyevskyy & Dewald, 2015; Tallman et al., 2018).

Recently, scholars have begun to study the factors affecting the NPD of enterprises, including both large and small and medium enterprises (e.g. Hosseini et al., 2018; Hoyer et al., 2010; Pavlou & El Sawy, 2006). However, the current results are still controversial about whether it is possible to improve NPD based on promoting activities in the enterprise. Among the mentioned factors, knowledge management capacity (KMC) is considered an important factor that can positively promote NPD of enterprises (e.g. Yildirmaz et al., 2018; Abid & Gulzar, 2018). Based on the arguments of dynamic competence theory, enterprises need to possess special knowledge management capabilities to be able to grasp how to develop new products quickly and successfully (Swap et al., 2001). Firms need to have enough KMC to conduct the development of new products without creating too great a risk to the existing business (Karimi & Walter, 2016). Knowledge management including four determinants factors of knowledge sharing, knowledge collection, knowledge creation, knowledge application; in which knowledge application is the factor that has the greatest influence on knowledge management (Do Anh Duc & Le Anh Duc, 2022). However, studies on the impacts of KMC on NPD are still very limited, both in quantity and in diversity.

To reduce uncertainty in improving the speed and success of NPD, Enterprises must identify and address the risks that develop from the research and development of products by taking advantage of the existing knowledge of the business (Smith et al., 2005; Sanchez & Ricart, 2010). KMC is one of the most important activities for enterprises to limit risks when developing new products by providing a platform to exploit, transform, and apply both internal and external knowledge (Gold et al., 2001). For example, through KMC, enterprises can effectively use scientific and technical resources in business analysis, and effectively distribute new knowledge about product development among individuals in the organization. Besides, internal and external KMC have different meanings and roles for NPD

activities of enterprises (Teece & Leih, 2016). Therefore, dividing the boundary between Internal KMC and External KMC is essential when studying the impact of KMC on NPD in enterprises. However, most of the previous studies did not do well in this role and led to uncertain conclusions about the role of KMC.

Although previous scholars have often concluded that KMC is the driving factor for NPD (Abid & Gulzar, 2018; Liu & Tsai, 2007), in-depth research in different contexts is still limited. Usually the firms studied are mainly large enterprises and belong to important sectors for the economy. This has led to a huge lack of research on the impact of KMC on traditional industries. Previous studies have shown that different fields will require different knowledge (Snihur & Wiklund, 2019) and this difference is even more evident in the context of small-scale enterprises such as in Vietnam. Therefore, it is necessary to have more specific studies on the impact of KMC on NPD in traditional industries in Vietnam. However, this is still an open issue and has not been mentioned much in studies in Vietnam.

In the context of bamboo painting industry in Vietnam, this study was conducted with the goal of assessing the impact of KMC on the NPD of enterprises. From there, provide a specific and in-depth look at the role of KMC in the NPD of bamboo painting enterprises in Vietnam. Besides, this study also evaluates the moderating role of green transformational leadership (GTL) on the impact from KMC to NPD of enterprises. From these, this study can proceed to understand the role of leaders in the speed and success of enterprises' new product development.

2. Theoretical background

2.1. New product development

Literature on new product development emphasizes the significance of releasing new items to the market for the long-term success of any organization. Numerous studies conducted over the last several decades demonstrate the importance of NPD as a crucial aspect in business planning, financial performance, and overall company success (Urban et al. 1993; Cooper, 2001). Product development is a logical process that meets predetermined goals, with an emphasis on bringing the next new product to market as quickly as feasible. The process consists of six linear phases: ideation, scoping, business case building, development, testing, and validation, and launch (Dhargalkar et al., 2016). The New Product Development Model suggested by Achrol & Kotler (1999) proposes the usage of a funnel through which new ideas and concepts travel. Numerous initial new product ideas and concepts are generated, which are subsequently processed via this funnel, and high-potential goods are introduced. This is not usually a linear process. There are eight steps in the creation of a new

product: (1) concept generating, (2) idea screening, (3) development and testing, (4) marketing strategy formulation, (5) business analysis, (6) product development, (7) market testing, and (8) commercialization. Ulrich & Eppinger's (1995) NPD process facilitates coordination between cross-functional teams and planning from concept to launch phase, which requires extensive documentation at each step.

This research combines these aspects into two primary constructs, new product success and NPD speed, which play distinct roles in the development of a business (Langerak & Hultink, 2006). NPD speed improves a company's competitiveness, cost reduction, and flexibility in response to a shorter product life cycle (Cooper, 2018). New product success has been widely studied as an important goal that contributes significantly to a company's future growth (Cooper, 2018), whereas NPD speed increases a company's competitiveness, cost reduction, and flexibility in response to a shorter product life cycle (McDonough & Barczak, 1991). First, new product success relates to how well a product satisfies its performance goals. It incorporates both financial and nonfinancial factors, such as product quality (Rodríguez-Pinto et al., 2011). Examples of financial criteria are profitability on investment, sales volume, and market share. Due of its quantifiability and impartiality, financial performance has been heavily used in the majority of prior studies on NPD (Page, 1993). In addition, both academics and business practitioners seek a financial viewpoint, particularly for new industries. Second, NPD speed refers to the extent to which a company can transfer an idea from inception to market launch (Chen et al., 2010). Since innovative product obsolescence happens more rapidly than in the past, it is essential for NPD managers to reduce the duration of each stage of product development (Cheng & Shiu, 2008). The pace of new product development gives various advantages to manufacturing companies. Not only can brand recognition for new goods discover their target market and be established more quickly, but it also boosts long-term competitive advantage. When NPD team members are tasked with increasing NPD speed, they must increase their individual skills and collaboration. Leaders must be able to manage team collaboration in order to reduce the NPD cycle time for new product development.

Today, bamboo paintings are the best presents for portraying the spiritual life and culture of Vietnam. Vietnam's bamboo painting is an ancient art style rich in cultural symbols. The environment and the animals in the paintings also represent the cultural splendors of East Asia, particularly Vietnam. There are three processes involved in the production of a bamboo painting: design, establishing the draft, and production. The artist must be patient, thorough, and enthusiastic at every level of the process. Without progress and creativity, however, this art form is very susceptible to extinction over time. Therefore, new product development in bamboo

painting requires additional consideration in terms of both process and speed.

2.2. Knowledge management capabilities and new product development

It is possible to say that knowledge is power. Knowledge management is a collection of procedures or techniques with clear definitions used to identify and manage the important knowledge for different activities crucial to verifying a new product or strategy and enhancing human resource management in order to achieve corporate objectives. The knowledge-based perspective posits that corporations exist because it is difficult to produce, transmit, and apply all forms of needed knowledge via markets. Thus, enterprises may be considered as systems designed for developing, storing, retrieving, transmitting, and using the necessary information for product creation and delivery. Sambamurthy & Subramani (2005), Takeishi (2001), and Teece et al (1997) regard the activities of knowledge production, storage and retrieval, transmission, and application to be essential and core organizational competencies. Liu & Tsai (2007) identify knowledge acquisition, knowledge generation, knowledge storage, and knowledge dissemination as the key knowledge management structures. Knowledge acquisition, according to Aronson (2003), is the extraction, structuring, and organization of information from one or more sources, as well as its transfer to the knowledge base and occasionally the inference engine. Numerous scholars and practitioners have recognized this procedure as a serious barrier. Acquisition occurs throughout the whole of the development process. Formally, knowledge is a set of specialized facts, techniques, and heuristics for making decisions. Knowledge creation refers to the acquisition of 'new' organizational expertise and capacity (Nonaka, 1994; Nonaka & Nishiguchi, 2001). There are two ways to the development of organizational knowledge: (1) the generation of new information inside the organization, and (2) the acquisition of knowledge from other sources. Persons or social systems (teams of individuals) are the source of knowledge (Alavi, 2000), and it might take the form of a cycle of socialization, externalization, combination, and internalization (Nonaka, 1994). Knowledge preservation refers to the creation of an organization's memory and the methods to retrieve its stored information. Internal and external organizational memory may be distinguished. Internal memory refers to the stores of information that dwell inside a person or team of people. As described above, internal organizational memory comprises of people' talents and the corporate culture (Walsh & Ungson, 1991). External memories include official rules and procedures, manuals, and computer files, as well as codified and explicit organizational knowledge. Knowledge diffusion may be interpreted as information transfer, which adopts a source-and-receiver perspective and is described as "the conveyance of knowledge from a source to a recipient in

order for the recipient to acquire and use it" (Ko et al 2005). Additionally, knowledge dispersion might include the collaborative nature of knowledge. It may entail trust and communal interest (Wasko & Faraj, 2000) in addition to politics and self-interest (Hayes, 2012) and be more socially oriented.

Moreover, according to Hargadon & Fanelli (2002), research on KM may be subdivided into static KM and dynamic KM based on an analysis of prior research articles. Consequently, the static dimensions relate to the enterprise's internal KM capabilities; it provides the foundation for elements like as social interaction, information storage, and knowledge availability. The emphasis of internal KM capabilities is on preserving, replicating, and using existing information (Smith et al., 2005). Next to the dynamic KM, which refers to the company's external KM capabilities, highlighting the company's capacity to collect, convert, and use knowledge originating from outside the company's borders (Smith et al, 2005). Capturing external information to study rivals and consumers and detect market trends and changes is the emphasis of external KM capabilities (Roberts, 2015). Both internal and external KM skills are interconnected and accountable for the knowledge assets of the organization (Mehta & Bharadwaj, 2015). Appropriate for the research topic in this study, bamboo painting firms in Vietnam, this study investigates KMC from two key perspectives, namely internal and external knowledge management capacities.

First, internal KM capabilities are investigated in accordance with social technology theory (Bostrom & Heinen, 1977). It addresses the social and technical aspects that influence an organization's capacity to maintain and leverage internal knowledge (Gold et al., 2001). In which the social viewpoint refers to the connections between workers about knowledge transmission. This component is directly tied to the company's corporate culture and organizational structure; it is accountable for the transmission of tacit and informal knowledge (Swap et al., 2001). It refers to the company's information system utilized to preserve, store, and analyze knowledge (Lee & Choi, 2003). It may be claimed that a company's internal KM capabilities consist of its marketing culture, structure, and technology (Gold et al., 2001). According to Janz & Prasarnphanich (2003), a company's KM culture is a significant factor in determining the information that is valued, shared, and preserved inside the business in order to gain an innovative advantage (Alavi et al., 2005). Numerous prior research have also shown that the enterprise's knowledge culture influences its overall innovation (Nonaka & Takeuchi, 1995). KM structure is intrinsically tied to an organization's knowledge culture. It governs how and to whom information is transmitted and shared within the organization. In addition, the majority of an organization's knowledge is held in its information systems. The KM technology of these information systems supplies the organization's data and knowledge (Pan & Scarbrough, 1998). Intranets, internal search engines, and knowledge

engines are examples of these technological platforms. Technology systems help KM by offering a readily available knowledge base and a communication and data analysis platform (Alavi & Leidner, 2001).

Next, it is evident that organizations are continually confronted with environmental changes and competition; thus, enterprises must be constantly aware of their dynamic environment and the new chances coming from the synthesis of new information (Schumpeter, 1934). Numerous studies have shown that an organization's capacity to leverage information from external sources correlates positively with its innovativeness (Valentim et al, 2015). Consequently, enterprises must continually update their knowledge base and comprehend the alterations in the environment, generating new information from external knowledge sources. Consequently, the external KM capability differs significantly from the internal capability (Hansen, 1999). According to Gold et al. (2001), an organization's external KM skills are developed via three distinct stages. The first is acquisition-oriented procedures, which are primarily concerned with acquiring information from various sources (Roberts, 2015). Then, in order to really use external information to seize possibilities for business model innovation, enterprises must continue to convert and apply the obtained knowledge (Cohen & Levinthal, 1990). These activities combine the conversion-oriented processes of integrating and refining new external information and replacing outmoded knowledge (Gold et al., 2001). This conversion-oriented approach is dependent on the company's internal KM skills and its capacity to recognize the value of fresh external information (Lane & Lubatkin, 1998). In application-oriented procedures, newly produced knowledge must be successfully applied to the organization's strategic and operational endeavors (Gold et al., 2001).

In general, firms launch new goods in accordance with client expectations, using their talents and strengths to the development of useful items. Consequently, KM is the essential instrument that allows enterprises to use their obtained knowledge in the form of suitable effort (Haider & Kayani, 2020). It also facilitates the comparison of a company's capabilities with those of its competitors and the modification of its operations to achieve competitiveness (Cepeda-Carrion et al., 2012). By recognizing the significance of KM, firms may achieve greater competency in comparison to all of their rivals. Consequently, firms with effective knowledge management are continually on the lookout for high-quality products and technology required for the absorption of quality features. In reality, meeting the criterion for maintaining standards is a consumer need. Therefore, consistency in the relationship between information storage and customer value creation is a fundamental idea for any NPD firm seeking differentiation (Tzokas et al., 2015). Companies with strong knowledge management will be able to use information and collaborate more efficiently. Thus streamlining

the new product development process and increasing the manufacturing efficiency of enterprises. Thus, the following hypotheses of this study can be stated:

H1: Internal knowledge management capabilities positively impacts on new product development.

H2: External knowledge management capabilities positively impacts on new product development.

2.3. Green transformational leadership (GTL)

Transformational leadership is a complex concept with connotations pertaining to objectives, culture, vision, structure, personal support, and performance standards (Luyten & Bazo, 2019). Robertson (2018) described green transformational leadership as the conduct of leaders who engage staff to accomplish organizational environmental objectives and inspire them to surpass environmental performance standards. In addition, the definition of green transformational leadership is to give clarity, motivation, and support for workers' development requirements in relation to the organization's environmental objectives (Mittal & Dhar, 2016; Chen & Chang, 2013). According to studies, the contact between leaders and their staff accounts for the success of enterprises (Caplan, 1987). Green transformational leadership encourages workers to gain new information (Le & Lei, 2018; Han et al., 2016) and involves them in activities linked to green processes, product innovation, or market introduction of green goods or services (Andriopoulos & Lewis, 2010). In addition, Bass (1985) said that transformative leaders must possess four characteristics: intellectual stimulation, personalized concern, charisma, and inspiring motivation. Intellectual stimulation facilitates the development of cognitive processes pertinent to the inventiveness of issue formulation, information searching, solution generation, and problem resolution among workers (Reiter-Palmon & Illies, 2004). Research (Gong et al., 2009) indicates that transformational leaders may stimulate collective creativity by assessing the needs of people and giving coaching and mentoring. For charismatic transformational leaders, they provide a crystal-clear vision for the team, invigorate and motivate creative generation (Avolio et al., 1999). Finally, highly motivated transformational leaders encourage their followers to think creatively by encouraging them to share their thoughts (Gong et al., 2009). Consequently, green transformational leadership may improve the performance of new product development by establishing expectations, articulating a vision for high performance, motivating and inspiring team members with clear objectives, and supporting people in green product development activities (Podsakoff et al., 1990; Sarros et al., 2008). Moreover, bamboo painting is a product made from bamboo, which is environmentally friendly and does not cause adverse impacts on nature. In enterprises, green transformational

leadership will help them have conditions and orientation to develop bamboo products. Thus, the following hypothesis of this study can be stated:

H3: Green transformational leadership positively impacts on new product development.

Transformational leaders may affect workers' learning orientation by serving as role models, demonstrating personalised care, encouraging intellectual stimulation, and offering inspiring motivation (Coad & Berry, 1998). Transformational leaders motivate followers to be more imaginative and creative. This is a crucial element in the creation of corporate goods and services, since it facilitates the transformation of information into outcomes. Transformational leaders envisage an enticing future and set high standards for their followers via the use of motivation that is derived from inspiration. This conduct inspires followers to exert more effort to achieve this aim. Therefore, followers will strengthen their knowledge management skills. Aragón-Correa et al. (2007) contend that transformational leaders have a significant influence in molding a firm's capacity to produce innovations by fostering the production and application of knowledge and making choices that enhance the effectiveness of the new product development process. Transformational leaders provide an environment favorable to organizational learning (Bryant, 2003), which magnifies the impact of knowledge management skills on new product development. From that, it can be argued that in the context of researching bamboo painting enterprises, green transformational leadership can greatly support the positive relationship from knowledge management capabilities to new product development. If the enterprise has a higher level of green transformation leadership practice, the more effectively the impact of knowledge management capabilities can be improved on the development of new products, and the opposite is also true. Thus, the following hypotheses of this study can be stated:

H4: Green transformational leadership moderates the impact of internal knowledge management capabilities on new product development.

H5: Green transformational leadership moderates the impact of external knowledge management capabilities on new product development.

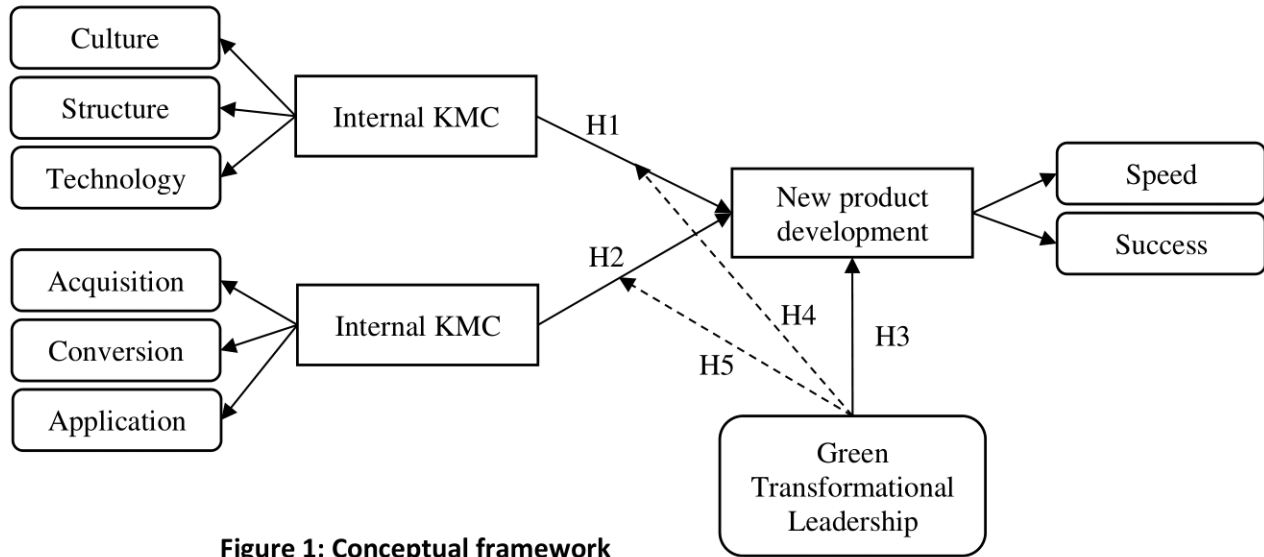


Figure 1: Conceptual framework

3. Methodology

Quantitative research was carried out with a sample of 500 NPD teams in bamboo painting enterprises in Vietnam. Through a questionnaire designed based on a Google form, this study sent the questionnaire and collected data within 3 months. The respondents to the questionnaire are the leaders of NPD teams working at bamboo painting enterprises in Vietnam. After 3 months, 232 survey questionnaires were collected, reaching a response rate of 46.4%. The selected teams are evenly distributed by region and have enough information including the address, phone number and email of the team leader, etc. Out of these surveys, 29 invalid questionnaires were discarded. Finally, this study obtained 203 valid observations that could be used in formal quantitative research.

The scales for the variables are inherited from many previous studies such as Singh et al. (2020), Chien & Chen (2010), etc. Besides, the Internal KMC, External KMC, and NPD variables are all 2nd order factors.

The Green transformational leadership is inherited and developed from the research of Singh et al. (2020); Zhao & Huang (2022) and measured by a 5-point Likert scale. There are 5 items used to measure Green transformational leadership: "I inspire subordinates with the sustainable business plan", "I provide subordinates a clear sustainable business vision", "I encourage my subordinates to work on the sustainable business plan", "I encourage employees to attain sustainable business goals", "I consider sustainable business beliefs of my subordinates", "I stimulate my subordinates to think & share their green ideas"

The Internal KMC variable is a 2nd order factor which is composed based on three smaller dimensions: technology, structure, and culture. The measurement is developed from the researches: Gold et al. (2001); Hock-Doepgen et al. (2021) and measured by a 5-point Likert scale. There are 3

items used to measure Knowledge management technology: “Uses technology that allows the company to search for new knowledge”, “Uses technology that allows the company to retrieve and use knowledge about its products and processes”, “Uses technology that allows the company to retrieve and use knowledge about its markets and competition”. There are 4 items used to measure Knowledge management structure: “The company’s structure facilitates the discovery of new knowledge”, “The company’s structure facilitates the creation of new knowledge”, “The company designs processes to facilitate knowledge exchange across functional boundaries”, “The company’s structure facilitates the transfer of new knowledge across structural boundaries”. There are 4 items used to measure Knowledge management culture: “Employees are valued for their individual expertise”, “Employees are encouraged to ask others for assistance when needed”, “Employees are encouraged to interact with other teams”, “Employees are encouraged to discuss their work with people in other workteams”.

The External KMC variable is a 2nd order factor which is composed based on three smaller dimensions: acquisition process, conversion process, and application process. The measurement is developed from the researches: Gold et al. (2001); Hock-Doepgen et al. (2021) and measured by a 5-point Likert scale. There are 5 items used to measure Knowledge management acquisition process: “The company has processes for benchmarking performance”, “The company has teams devoted to identifying best practices”, “The company has processes for exchanging knowledge with partners”, “The company has processes for acquiring knowledge about new products/services in the industry”, “The company has processes for acquiring knowledge about competitors”. There are 5 items used to measure Knowledge management conversion process: “The company has processes for filtering knowledge”, “The company has processes for absorbing knowledge from individuals into the organization”, “The company has processes for absorbing knowledge from business partners into the organization”, “The company has processes for integrating different sources and types of knowledge”, “The company has processes for replacing outdated knowledge”. There are 6 items used to measure Knowledge management application process: “The company has processes for using knowledge to solve new problems”, “The company matches sources of knowledge to problems and challenges”, “The company uses knowledge to improve efficiency”, “The company is able to locate and apply knowledge to changing competitive conditions”, “The company quickly applies knowledge to critical competitive needs”, “The company quickly links sources of knowledge in solving problems”.

The NPD variable is a 2nd order factor which is composed based on two smaller dimensions: NPD success and NPD speed. The measurement is developed from the researches: Chien & Chen (2010); Kam Sing Wong &

Tong (2012); Feng & Wang (2013); Darawong (2021) and measured by a 5-point Likert scale. There are 4 items used to measure New product development success: "This new product enhanced market share", "This new product was profitable", "This new product process improved team capability", "This new product had met its quality objectives". There are 4 items used to measure New product development speed: "NPD team has fast new product development processes", "NPD team was first in introducing the new product in the market", "NPD team delivered the new product to market quickly", "New product was the first in the market".

4. Results

Measurement model

Firstly, the study examines the convergent validity of the items through the Outer loading coefficient. As suggested by Henseler et al. (2009), Outer loading must be greater than or equal to 0.7 to ensure the convergent validity. Outer loading results shown in Table 1 show that two items GTL6 and NPD6 have Outer loading coefficients < 0.7, so these two items are excluded from the study as suggested by Henseler et al. (2009).

Table 1: Outer loading

	EKMC_ ACQUISITI ON	EKMC_ APPLICATI ON	EKMC_ CONVERSI ON	GT L	IKMC_ CULTU RE	IKMC_ STRUCTU RE	IKMC_ TECHNOLO GY	NPD_ SPEE D	NPD_ SUCCES S
EKMC1	0.840								
EKMC2	0.904								
EKMC3	0.811								
EKMC4	0.927								
EKMC5	0.920								
EKMC6			0.763						
EKMC7			0.803						
EKMC8			0.765						
EKMC9			0.839						
EKMC10			0.873						
EKMC11		0.832							
EKMC12		0.808							
EKMC13		0.769							
EKMC14		0.822							

EKMC1 5		0.749							
EKMC1 6		0.814							
GTL1				0.8 14					
GTL2				0.7 92					
GTL3				0.8 48					
GTL4				0.7 86					
GTL5				0.8 58					
GTL6				0.5 82					
IKMC1							0.812		
IKMC2							0.914		
IKMC3							0.925		
IKMC4						0.886			
IKMC5						0.791			
IKMC6						0.734			
IKMC7						0.819			
IKMC8					0.775				
IKMC9					0.787				
IKMC1 0					0.829				
IKMC1 1					0.850				
NPD1									0.790
NPD2									0.719
NPD3									0.762
NPD4									0.788
NPD5								0.809	
NPD6								0.674	
NPD7								0.793	
NPD8								0.832	

After removing two items GTL6 and NPD6, the remaining items are all greater than 0.7, so Cronbach's alpha, Cronbach's Alpha, rho_A, Composite Reliability, and Average Variance Extracted (AVE) can be tested. The coefficients Cronbach's alpha, Cronbach's Alpha, rho_A, Composite

Reliability need to be between 0.7 and 0.95 to ensure the reliability and AVE needs to be greater than 0.5 to ensure convergent validity (Hair et al., 2019). The results in Table 2 show that the above conditions are satisfied in the measurement model and therefore the discriminant validity test can be carried out (Hair et al., 2019).

Table 2: Cronbach's alpha, Cronbach's Alpha, rho_A, Composite Reliability, and AVE

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
EKMC_ACQUISITION	0.928	0.932	0.946	0.777
EKMC_APPLICATION	0.887	0.889	0.914	0.639
EKMC_CONVERSION	0.868	0.871	0.905	0.655
GTL	0.885	0.899	0.914	0.681
IKMC_CULTURE	0.826	0.833	0.884	0.657
IKMC_STRUCTURE	0.823	0.833	0.883	0.655
IKMC_TECHNOLOGY	0.862	0.892	0.915	0.783
NPD_SPEED	0.789	0.790	0.877	0.704
NPD_SUCCESS	0.763	0.764	0.850	0.586

The discriminant validity was assessed through the HTMT coefficient as suggested by Henseler et al (2015). The HTMT values need to be less than 0.85 to ensure that the constructs will not have significant overlap leading to bias in the final result estimate. The results of HTMT coefficient estimation are shown in Table 3. HTMT values are all less than 0.85 with the largest value being 0.510, thus satisfying the discriminant validity of the structures (Henseler et al., 2015).

Table 3: HTMT

	EKMC	GTL	IKMC	Moderating EKMC	Moderating IKMC	NPD
EKMC						
GTL	0.374					
IKMC	0.230	0.313				
Moderating EKMC	0.101	0.249	0.289			
Moderating IKMC	0.303	0.358	0.126	0.110		
NPD	0.489	0.211	0.510	0.386	0.295	

Thus, two items GTL6 and NPD6 were removed when evaluating the measurement model. In the next section, this study conducts structural model evaluation

Structural model

Research results show that the volatility of NPD is explained by 41.2% by the model (R-square = 0.412). This is a relatively good result and is

consistent with the research context. Besides, the SRMR value of the model is $0.067 < 0.08$, satisfying the model fit criteria of Hu & Bentler (1999). After using Bootstrap technique, the study obtained the results of estimation and testing of the structural model as shown in Figure 2.

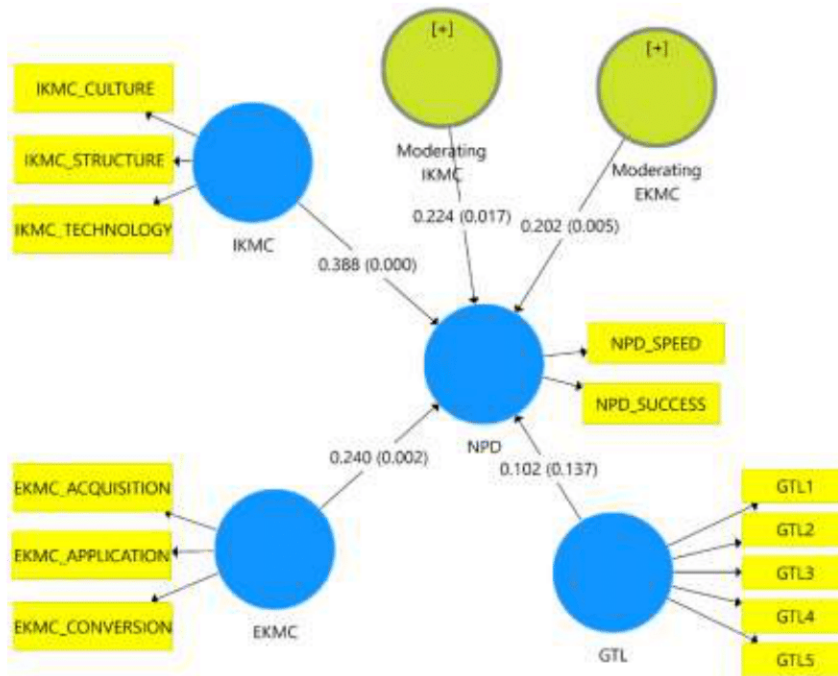


Figure 2: Structural model estimation and testing results

The results show that, at 5% significance level, both Internal KMC and External KMC have a positive impact on NPD (p -value < 0.05 and path-coefficient > 0). Therefore, the two hypotheses H1 and H2 are supported at the 5% significance level. Besides, the impact of Internal KMC on NPD (path-coefficient = 0.388) is stronger than that of External KMC (path-coefficient = 0.240). Thus, in the context of bamboo painting enterprises, the role of Internal KMC in improving NPD speed and success is more important than External KMC.

Regarding the role of GTL, this study did not find an impact of GTL on NPD at 5% significance level (p -value = 0.102 > 0.05). Therefore, hypothesis H3 is not supported. However, this study found a moderating role of GTL on the impact of both Internal KMC and External KMC on NPD. Both of these roles are positive moderators and hypothesis H4, H5 is supported in this study. Thus, all three variables Internal KMC, External KMC, and GTL all play a certain role in improving the NPD performance of bamboo painting enterprises in Vietnam. The specific roles of these factors will be discussed in more depth in the next section.

5. Discussion and conclusion

While scholars are increasingly interested in the role of KMC in innovation (Velu, 2015), the role of KMC in new product development has not received enough attention. To address this research gap, a structural model of the impact of KMC on NDP is proposed in this study. By using PLS - SEM method through Smart PLS software, this study has achieved the research objectives. The findings show that both Internal KMC and External KMC have a positive role in improving the NPD speed and success of bamboo painting enterprises. This result cleared the doubts of Yildirmaz et al (2018) about the role of KMC in NPD and supported the research results of Liu & Tsai (2007); Abid & Gulzar (2018). NPD teams use their ability to absorb external knowledge to collect, transform and apply new external knowledge to support the development of new bamboo painting products. Besides, the role of Internal KMC is even more prominent than that of External KMC. Through Internal KMC, NPP teams can emphasize on exploiting and replicating internal knowledge to accelerate NPD while ensuring the quality of new products. The development of new bamboo painting products always faces the risks of customer tastes. Bamboo painting products are products with the identity and tradition of Vietnamese people, so it is necessary to ensure that the new product will be suitable for the target audience. To achieve this result, enterprises need good knowledge management, especially the transmission of internal knowledge about the company's products.

Although this study did not find a role for GTL in improving NPD, it have found a moderating role for GTL. This is a special point to more accurately assess the impact mechanism of KMC on the NPD of Bamboo painting enterprises in Vietnam. The fact that leaders do not care about status but still try to develop green creativity in bamboo painting enterprises will play a very important role in promoting KMC effectiveness. The moderating role of GTL on the impact from Internal KMC to NPD is shown in detail in Figure 3. For NPD teams with leaders with green transformation leadership style, improving Internal KMC will significantly improve. But this level of improvement will gradually decrease as the team leader's GTL is reduced. However, in any context, promoting Internal KMC is still beneficial for bamboo painting product development teams in Vietnam.

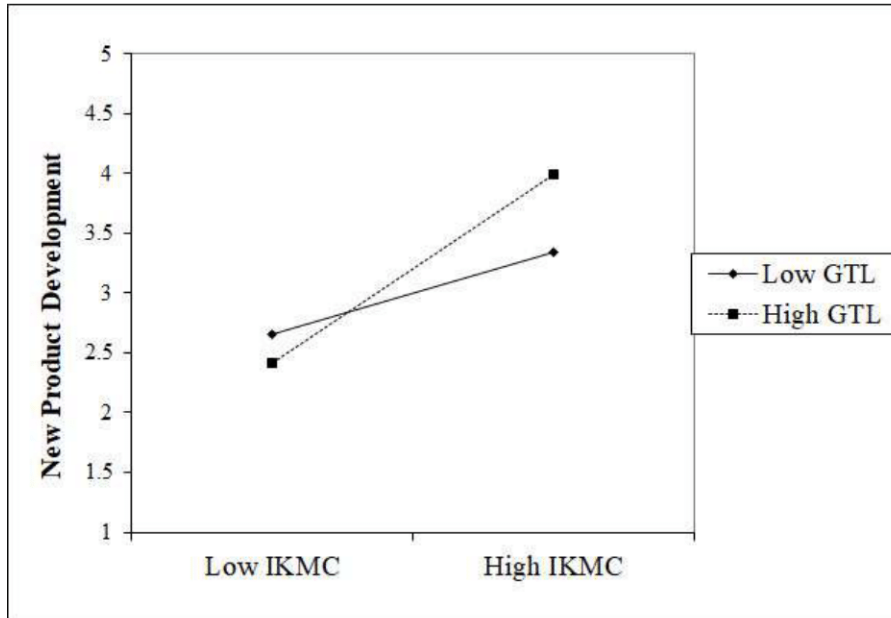


Figure 3: The moderating role of GTL on for the impact of Internal KMC on NPD

Besides the above results, the moderating role of GTL on the impact from External KMC to NPD is also shown in Figure 4. For NPD team leaders with high GTL, improving External KMC still brings positive results for NPD. However, the results for NPD team leaders with low GTL were different from the results in Figure 3. Specifically, when the GTL is low, the driving force for NPD from improving the external KMC is gone (because the low GTL line is almost horizontal). Thus, it can be seen that improving the External KMC does not always bring benefits to the NPD but also depends on the GTL level of the NPD team leader.

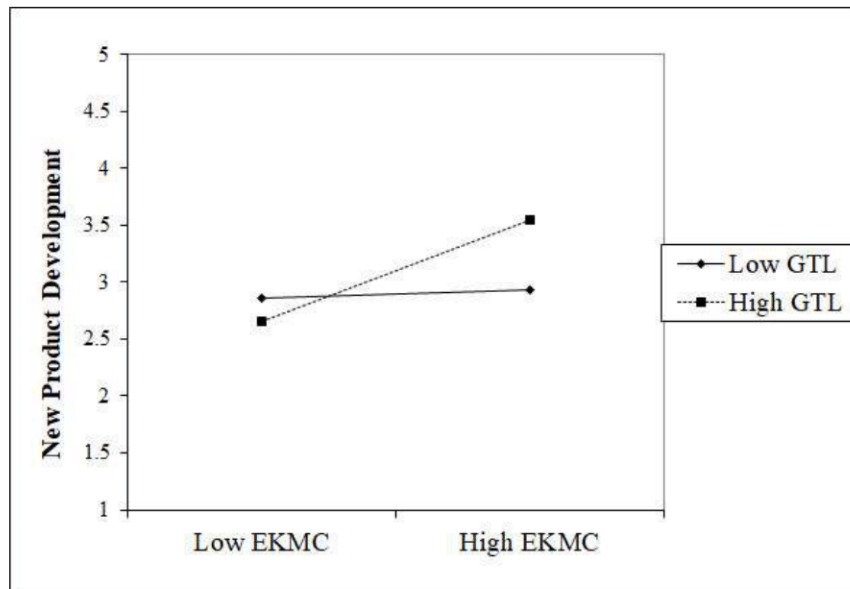


Figure 4: The moderating role of GTL on for the impact of Internal KMC on NPD

The results of this study have both theoretical and empirical significance for bamboo painting enterprises in Vietnam. This study also contributes excellent theoretical results to studies on the role of KMC in NPD speed and success. In addition to studying the direct impacts of Internal KMC and External KMC on NPD, this study also examines the role of GTL in the above relationship. Based on the research results obtained, this study makes the following recommendations for the development teams of new bamboo painting products in Vietnam:

1. For NPD teams whose leadership has a high level of green transformation, it is very important to improve both External and Internal KMC. Business managers should improve both Internal and External KMC for these NPD teams to enable them to better understand and interact more effectively with the bamboo painting product development ecosystem. To develop these capabilities, bamboo painting business managers facilitate NPD teams to acquire knowledge about the latest bamboo painting products. At the same time, there is an exchange of knowledge with business partners to get the best for the product development of the business. In addition, NPD team leaders also need to be proactive in understanding and applying processes to acquire knowledge from both individuals within the enterprise and business partners outside the enterprise. These processes will further integrate different knowledge sources and replace the outdated knowledge of the NPD team and thereby improve both the speed and success of the new bamboo painting product. Finally, to manage knowledge effectively, business managers need to come up with solutions that support the ability to integrate processes for rapidly linking new knowledge to NPD teams. From quickly solving problems during the development and testing of new bamboo painting products.

2. For NPD teams whose leadership has a low level of green transition, improvement of KMC should only focus on internal aspects. Especially when enterprises do not have a specific plan or have not adapted well to the market's trend of green product innovation. Accordingly, NPD team leaders should foster an appropriate internal environment to help strengthen knowledge transfer relationships among individuals in the NPD team. In addition, managers in the enterprise also need policies to promote the ability to integrate an information knowledge system to support these processes. Finally, NPD team leaders also need to actively grasp and understand the current trends in developing new bamboo painting products.

Although this study has made certain contributions to the academic field, there are still some limitations. Quantitative data of this study were collected at one point in time and carried out through a survey method. Therefore, it is inevitable that biases due to subjective emotional factors of respondents are unavoidable. Future studies should include other methods

of data collection and processing to limit this problem. In addition, focusing only on bamboo painting industry has made the results obtained only one-dimensional, there are no comparisons with other fields. Therefore, one potential direction for future research for scholars is cross-disciplinary research and cross-industry comparisons to gain a more multi-dimensional perspective.

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