

How to Cite:

Pranee, S., Saeng-on, P., Klaywong, C., & Kerdpitak, N. (2022). Relationship between knowledge management and foreign tacit knowledge on multinational pharmaceutical product innovation. *International Journal of Health Sciences*, 6(S4), 174–190.
<https://doi.org/10.53730/ijhs.v6nS4.5461>

Relationship between knowledge management and Foreign Tacit Knowledge on Multinational Pharmaceutical Product Innovation

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Abstract---Multinational companies face various challenges regarding knowledge transfer, relationship harmony and environmental challenges which can diverse the operational performance of companies with globalized disturbed customers. This research paper applies a model with aims to find the impact of foreign tacit knowledge (FTK) on the product innovation of multinational pharmaceutical firms in Thailand. The model of this research also consists of knowledge exchange, ICT competence, and relationship harmony as mediating variables to evaluate the relationship between FTK and product innovation levels of multinational pharmaceutical firms. For data analysis and calculation, some significant techniques were used such as KMO, SEM and descriptive statistics. Furthermore, the results and discussions illustrate that the foreign tacit knowledge has a positive influence on pharmaceutical product innovation which further enhances the performance of the firms. Similarly, ICT competence, and relationship harmony have a positive mediating role in the relationship between tacit knowledge and product innovation while knowledge exchange has a insignificant mediating role. The findings of this research study have many managerial as well as practical implications. From a managerial point of view, this study helps

managers of multinational companies to identify the impact of FTK on overall and product performance.

Keywords---Foreign tacit knowledge, knowledge exchange, relationship harmony, ICT competence, multinational pharmaceutical firms, product innovation.

Introduction

Multinational enterprises have to face many more challenges regarding the technology and environmental issues and the competition in the market ICT competence on the relation between the foreign tacit knowledge and the multinational pharmaceutical product innovation (Claver-Cortés, Marco-Lajara, & Manresa-Marhuenda, 2020; Kumar & Dutta, 2017; Muthuveloo, Shanmugam, & Teoh, 2017; Roy & Mitra, 2018). Moreover, the global consumers also makes it challenging for the multinational companies to look for the demand of global customers (Cuvero, Evans, Granados, & Pilkington, 2018; Grillitsch, Hansen, Coenen, Miörner, & Moodysson, 2019; Grillitsch, Rekers, & Tödtling, 2019; Raj & Srivastava, 2016). Therefore, most of the resources of the multinational firms are spent on the innovativeness of products which will be more competitive. The development of innovative products to meet the demands of the global customers is done through the foreign tacit knowledge, which is not easy to get because of its presence in the subsidiaries (Cuvero et al., 2018; Grillitsch, Rekers, et al., 2019; Mariotti, 2017; Raj & Srivastava, 2016).

The barriers in the transfer of this foreign tacit knowledge can be overcome by the relationship harmony and efficient knowledge sharing (Bolívar-Ramos, 2019; Mariotti, 2017; Necochea-Mondragon, Pineda-Dominguez, Perez-Reveles, & Soto-Flores, 2017). This enables the enterprises to utilize their available information and utilize their resources for improving the development of innovative products (Bhimani, Mention, & Barlatier, 2019; Maksimov, Wang, & Yan, 2019; Roy & Mitra, 2018; Zhao, 2017). An effective information sharing ICT competence and relationship harmony between the main headquarter and the global subsidiaries will be utilized efficiently to gain better outcomes regarding the product innovativeness (Mukherjee, Lahiri, Ash, & Gaur, 2019; Nils, Piening, & Salge, 2019; Raj & Srivastava, 2016; Wentzler & Bolton, 2017).

Table 1: Tools of knowledge sharing in large agile organization (Kuusinen et al., 2017)

Source: (SpringerLink)

Method of sharing knowledge	Sometimes	Often
Informally	✓	✓
Meetings	✓	X
Through lead	✓	X
Email	✓	X
Phone/ video link	✓	X
Presentations	✓	✓

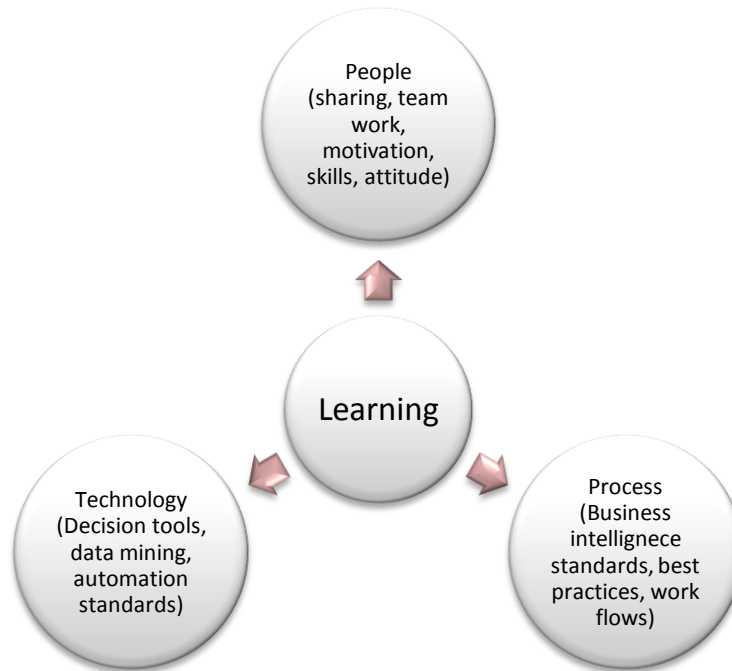


Figure 1: Components of knowledge management (Shannak, Masa'deh, & Akour, 2012)
Source: (ResearchGate)

The research objectives for the study are mentioned in the following section:

1. To analyze the impact of foreign tacit knowledge on the multi-national pharmaceutical product innovation.
2. To analyze the mediating role of knowledge exchange on the relationship of foreign tacit knowledge and the multi-national pharmaceutical product innovation.
3. To analyze the mediating role of relationship harmony on the relation between foreign tacit knowledge and the multi-national pharmaceutical product innovation.
4. To analyze the mediating role of ICT competence on the relation between the foreign tacit knowledge and the multi-national pharmaceutical product innovation.

The present study will contribute in providing evident information for the understanding of development of new and innovative products through the use of foreign tacit knowledge. Previous research studies have shown contradicting results regarding the effective use of foreign tacit knowledge for the development of new innovative products (Mukherjee et al., 2019; Nils et al., 2019; Raj & Srivastava, 2016; Wentzler & Bolton, 2017). Therefore, this study will be an attempt to confirm the significant relation between the global information sharing and product development. Moreover, the study will also analyze the role of information sharing, relationship harmony and ICT competence on the relationship between the foreign tacit knowledge and innovativeness capability of

the firms. Thus, the research study will have theoretical, practical and managerial significance as it will contribute in the literature and also provide empirical evidence for the use of provided knowledge in the practical field. The next sections will cover the review of the literature and the methodology used for carrying out the research, afterwards the results obtained and the discussion of the results will be explained.

Review of literature

Theoretical background

The upper echelon theory is used for the understanding of the relation between the use of knowledge of global customers and the development of innovative products (Dubey et al., 2018; Frankl & Roberts, 2018; Lee, Sun, & Moon, 2018; Kerdpitak, 2020). This theory is best used for the prediction and understanding of the outcomes of the organization through the understanding of the level of the management team and their capabilities. Through the understanding of the experience and abilities of the managerial team, the relationship harmony and the ICT competence can be enhanced and this ensures the best use of the available information obtained through the information sharing mechanism (Chen, Gorbunova, Masalimova, & Bírová, 2017; Cuvero et al., 2018; Mukherjee et al., 2019; Raj & Srivastava, 2016).

The impact of foreign tacit knowledge on the multi-national pharmaceutical product innovation

According to the research studies (Claver-Cortés et al., 2020; Kumar & Dutta, 2017; Muthuveloo et al., 2017; Roy & Mitra, 2018), the tacit differences of the various countries must be focused to understand the unique insights of the firms and this helps in the development of innovative ideas and products. Researchers (Cuvero et al., 2018; Grillitsch, Rekers, et al., 2019; Kerdpitak, 2021; Mariotti, 2017; Necoechea-Mondragon et al., 2017; Raj & Srivastava, 2016) have observed that the firms that more actively involved in the utilization of the tacit knowledge and the differences are more likely to enhance their capabilities to develop innovative products. Therefore, the following hypothesis has been generated from the literature:

H1: There is a significant relation between the foreign tacit knowledge and the multinational pharmaceutical product innovation.

The mediating role of knowledge exchange on the relationship of foreign tacit knowledge and the multi-national pharmaceutical product innovation

The best possible use of the foreign tacit knowledge is made when there is the availability of that knowledge, which is done through the effective and active knowledge exchange practices between the main headquarter and the subsidiaries in different countries. Through the information sharing process the management team learns about the preferences of the global customers (Kerdpitak, 2022; Claver-Cortés et al., 2020; Kumar & Dutta, 2017; Muthuveloo et al., 2017; Roy & Mitra, 2018). Through the use of information sharing, the multinational companies become able to target a wide range of global customers. Without the availability of the foreign knowledge, the organizations could never be

able to design and develop products that will meet the demands of the global consumers (Bhimani et al., 2019; Bolívar-Ramos, 2019; Roy & Mitra, 2018; Zhao, 2017). Therefore, the following hypothesis has been generated from the literature:

H2: *The mediating role of knowledge exchange is significant between the relation of the foreign tacit knowledge and the multinational pharmaceutical product innovation.*

The mediating role of relationship harmony on the relation between foreign tacit knowledge and the multi-national pharmaceutical product innovation

Competence among the employees and the organization is not enough if there is a lack of harmony among the employees of the organization (Cuvero et al., 2018; Grillitsch, Rekers, et al., 2019; Mariotti, 2017; Necoechea-Mondragon et al., 2017; Raj & Srivastava, 2016). Especially in terms of the global companies that have their subsidiaries in a number of countries. According to the research studies, the relationship harmony builds trust and facilitate the easy sharing of the information which is helpful for the innovative idea generation and product development (Chen et al., 2017; Cuvero et al., 2018; Mukherjee et al., 2019; Raj & Srivastava, 2016). Therefore, the following hypothesis has been generated from the literature:

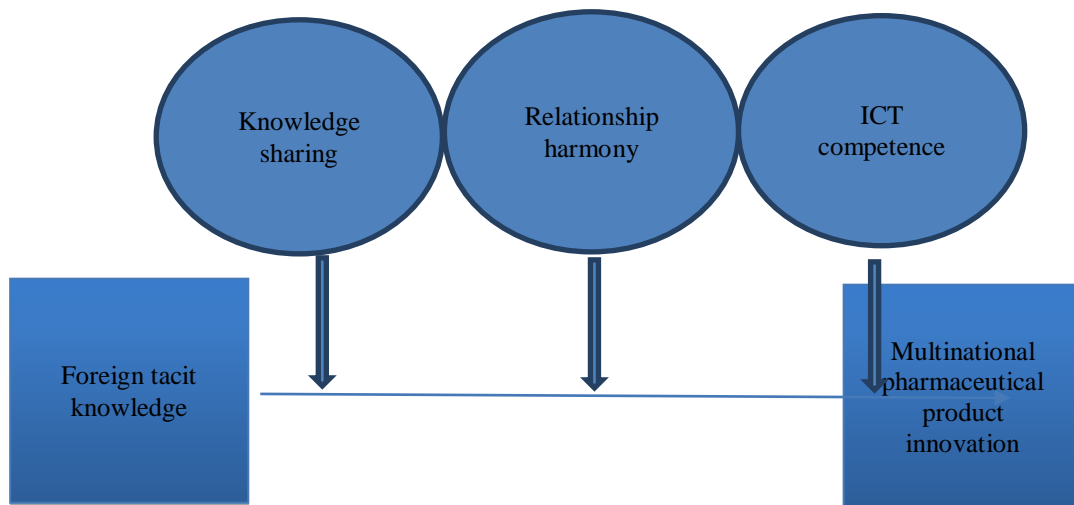
H3: *The mediating role of relationship harmony is significant between the relation of the foreign tacit knowledge and the multinational pharmaceutical product innovation.*

The mediating role of ICT competence on the relation between the foreign tacit knowledge and the multi-national pharmaceutical product innovation

ICT knowledge, objects and operations are used for the proper management of the available information and this has been termed as ICT competence by the researchers (Altinay et al., 2016; Areepattamannil & Santos, 2019; Awal, Mishra, Joseph, Uku, & Mai, 2019; Juhaňák, Zounek, Záleská, Bárta, & Vlčková, 2019). Intellectual assets are accurately managed by the companies through the efficient performance of their ICT and it also overcome the spatial and temporal barriers in the way of tacit knowledge sharing. Thus, leads to the development of products that are innovative (Awal et al., 2019; Wang, Wong, & Yeh, 2016; Yang, 2016; Yi & Kwak, 2016). Therefore, the following hypothesis has been generated from the literature:

H4: *The mediating role of ICT competence is significant between the relation of the foreign tacit knowledge and the multinational pharmaceutical product innovation.*

Theoretical model



Methodology

This research survey was advanced in Thailand, and the target population for this research was pharmaceutical sector of this country. This sector is growing very quickly and many firms are operating at local and international level. Almost 180 firms are operating in this sector, so it is a highly competitive area that requires continuous innovation and knowledge. Therefore, this sector is very suitable for our study context those firms were main target that are highly innovative and are operating on any international level having subsidiary in other country, based on purposive sampling 371 respondents were included in final mostly were managers working in different department and to some extent were responsible for product innovativeness, then Data was gathered from pharmaceutical firms through questionnaires distributed through email and google forms. Thailand pharmaceutical association provided contact information of these firms. Four hundred survey copies were sent to the targeted firms. Out of which incomplete questionnaires were excluded and rest were retained for analysis. Demographics of sample shows that 215 were male (57.8%), and 156 were female (43.2%) means mostly. Most respondents were from age group of 31–40 years old (31.1%), and 42.3% had post-graduation qualification. Most of the respondents had approximately 5 years of work experience (44.8%).

Measurements

Multinational pharmaceutical 'Product Innovativeness:

The scale for Multinational pharmaceutical 'Product Innovativeness contained 11 items that were adapted from Subramaniam (2006) and Gruner (2014) scale. One sample item is "Being one of the pioneers in pharmaceutical sector for introducing new drug". Respondents rated the firm's ability to innovate in comparison to

international competitors on 5-point Likert scale indicating 1= strongly disagree and 5= strongly agree with Cronbach Alpha 0.925.

Foreign Tacit Knowledge:

Firm's Foreign Tacit Knowledge was assessed by Five items adapted from work on portfolio governance by Subramaniam and Venkatraman (2001). These items were modified after reviewing current research context. Sample question is "Difficult to comprehensively document in manuals and reports". Respondents reported the level of knowledge sharing of their firms with local subsidiaries. Results showed the composite reliability of this construct as 0.942 on 5 Point-Likert scale.

ICT Competence

ICT Competence is measured by 5 items drawn and altered from Tippins and Sohi (2003) scale. Four items including "We are skilled at collecting and analyzing market information about our customers via computer-based systems" to estimate the firm's competence with It. Responses ICT measured on 5 Point-Likert scale ranging from 1=very slow to 5= very fast. Results showed $\alpha = 0.95$ composite reliability for ICT competence.

Relationship Harmony

To validate, Relationship Harmony in a firm five items were selected from Zaheer (1995) scale . These items were utilized to determine the relationship between head-quarter and subsidiaries for example "Given the track record, there is no reason to doubt each other competence.". Responses were recorded on Five-point scale ranging from 1=strongly disagree to 5= strongly agree with $\alpha=0.915$.

knowledge exchange

5 items for evaluating Knowledge exchange were derived from Barnes and Vidgen (2003) scale to estimate the sharing and exchange of knowledge between firms. Respondents recorded their responses on 5-point scale ranging from 1= very low and 5= very strong with $\alpha = 0.930$.

Data analysis:

Data was analyzed by incorporating AMOS and SPSS statistical software. CFA and descriptive statistics were performed by using AMOS to test the validity of constructs. They tested hypotheses and variables impacts, to determine either purposed model is fit or not, impact of modifying questionnaire on results and to examine the validity of data. The model was evaluated by following indices: (NNFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA).

Results Interpretation

Demographics

A sample of 368 respondents was constructed for the research study, out of which 54.9% were male and the remaining 45.1% were female. The main purpose of this section is to give the properties of the selected population of the study and also provide information about the data of the study. The age of 24.5% of the participants was up to 36 and less than 45 and the experience of 34.2% population was between 5 to 8 years. The main reason behind this information is to provide a clear study of the population.

Descriptive statistics

The maximum and minimum values are mainly presented in table 1. Skewness and means coefficients are evaluated to find the information for the existence of outliers and also for the normality of data. The mean values of the descriptive table are just higher than 3 showing the agreement of participants with variable statements. The values of the skewness are also fallen in the category of -1 and +1, indicating the fitness of the information.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Std. Error
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
ForTacitKnow	368	1.00	5.00	3.2630	1.02148	-.162	.127
KnowExch	368	1.00	5.00	3.3505	.98049	-.421	.127
RelHarmony	368	1.00	5.00	3.5576	1.17213	-.573	.127
ICTComp	368	1.00	5.00	3.4554	1.13770	-.541	.127
ProdInn	368	1.00	5.00	3.5368	1.08332	-.621	.127
Valid N (listwise)	368						

KMO and Bartlett's Test

Finding the sampling adequacy of data and information is the main objective of the KMO test, on the other hand, Bartlett's test is another significant test and technique to find the equality of variances for the entire sample. These two tests play a crucial role in other tests as well.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.952
Bartlett's Test of Sphericity	Approx. Chi-Square	13749.211
	df	465
	Sig.	.000

Factor analysis

The main objective of the rotated component matrix technique is to estimate or calculate the correlations among each of the variables and it also shows the implication of each variable in the overall model. The table manifest that all most all items are positive except one and the loading are higher than 0.7%.

Rotated Component Matrix

	Component				
	1	2	3	4	5
FTK1				.808	
FTK2				.860	
FTK3				.812	
FTK4				.788	
FTK5				.798	
KE1					.819
KE2					.781
KE3					.768
KE4					.811
KE5					.824
RH1		.863			
RH2		.857			
RH3		.821			
RH4		.840			
RH5		.865			
IC1			.811		
IC2			.836		
IC3			.824		
IC4			.837		
IC5			.853		
PI1	.694				
PI2	.749				
PI3	.802				
PI4	.777				
PI5	.794				
PI6	.888				
PI7	.879				
PI8	.832				
PI9	.850				
PI10	.822				
PI11	.883				

Convergent and Discriminant validity

The result of the reliability of composite is greater than 0.9 and the AVE is higher than 0.7 for entire variables (Hassan, Hameed, Basheer, & Ali, 2020; Iqbal &

Hameed, 2020). The values of MSV are less than the AVE values, thus, convergent and discriminant validity is present.

Table 4: Convergent and discriminant validity

	CR	AVE	MSV	MaxR(H)	KE	RH	IC	PI	FTK
KE	0.936	0.747	0.334	0.943	0.864				
RH	0.929	0.904	0.392	0.989	0.508	0.951			
IC	0.960	0.826	0.392	0.991	0.536	0.626	0.909		
PI	0.917	0.727	0.275	0.993	0.499	0.524	0.463	0.853	
FTK	0.932	0.733	0.334	0.994	0.578	0.506	0.511	0.430	0.856

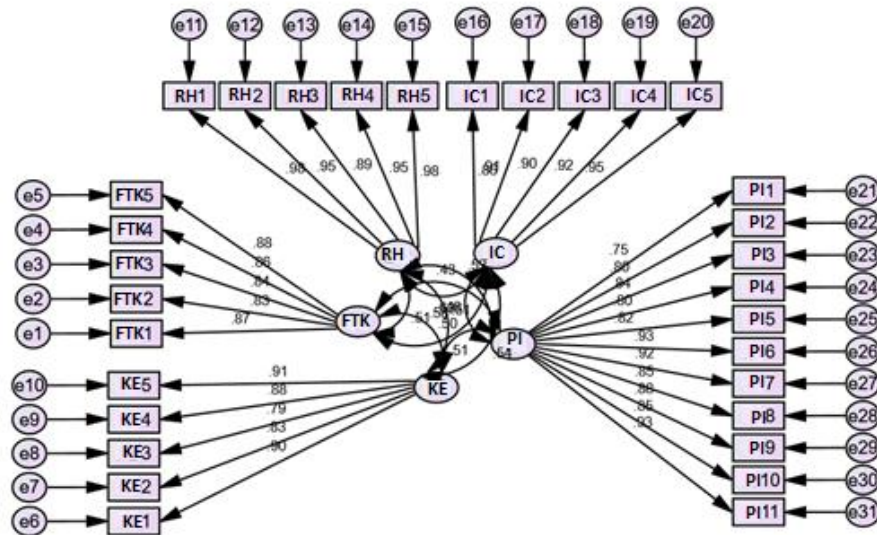
Model fitness

The results and outcomes of CFA tests are given in table 5. The CMIN value is 2.77 which is less than 3. GFI is higher than 0.8 such as 0.81 and CFI is higher than 0.9 such as 0.94 and the RMSEA value is less than 0.8 such as 0.7. Hence the model is fit due to fulfilled threshold ranges.

Table 5: Confirmatory Factors Analysis

Indicators	Threshold range	Current values
CMIN/DF	Less or equal 3	2.774
GFI	Equal or greater .80	.818
CFI	Equal or greater .90	.945
IFI	Equal or greater .90	.945
RMSEA	Less or equal .08	.070

Figure 1: CFA

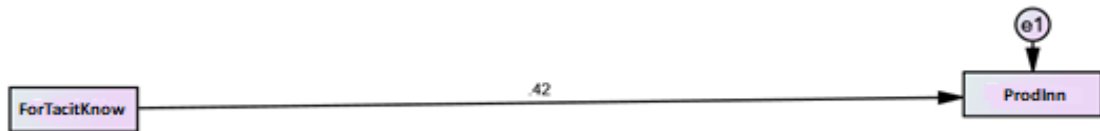


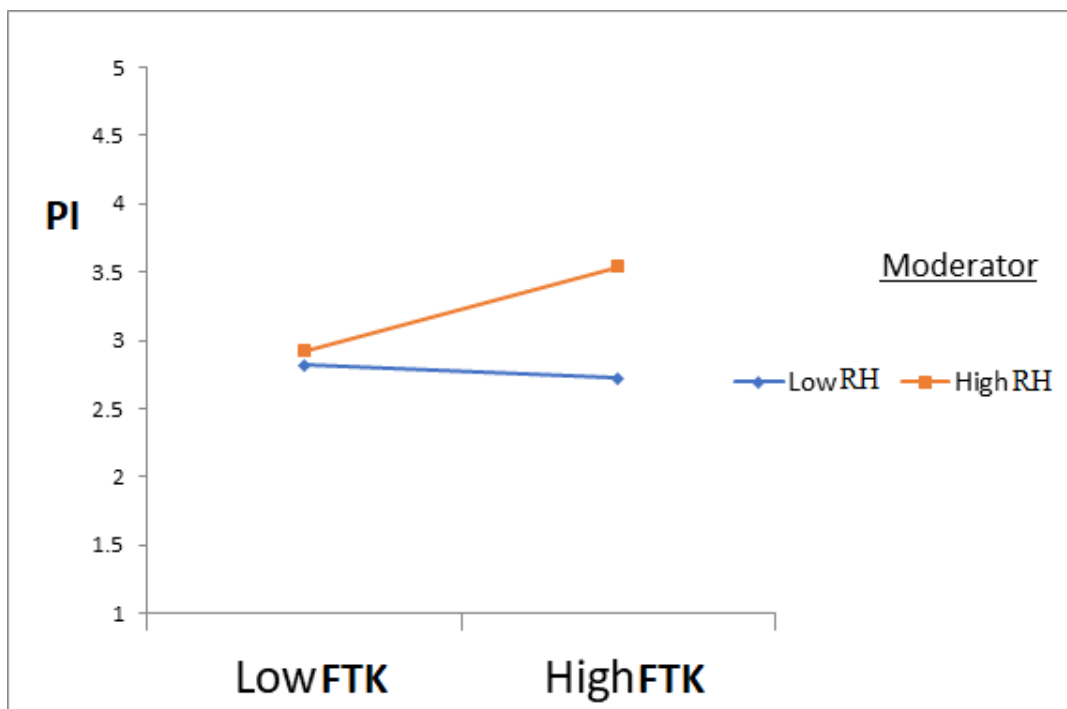
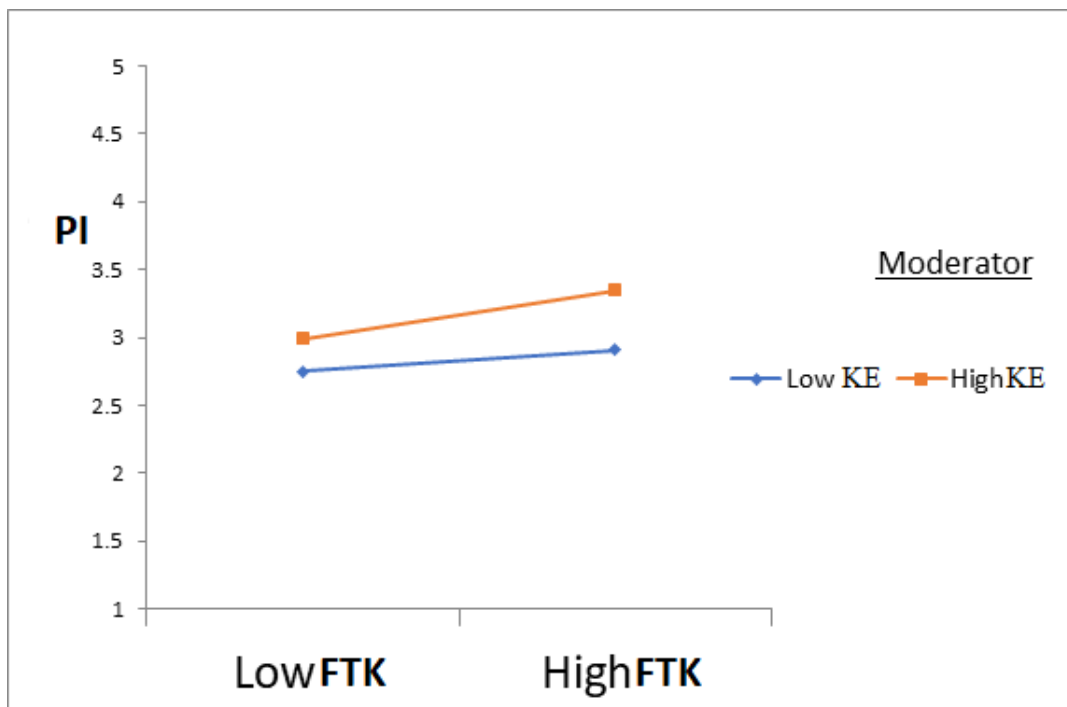
SEM

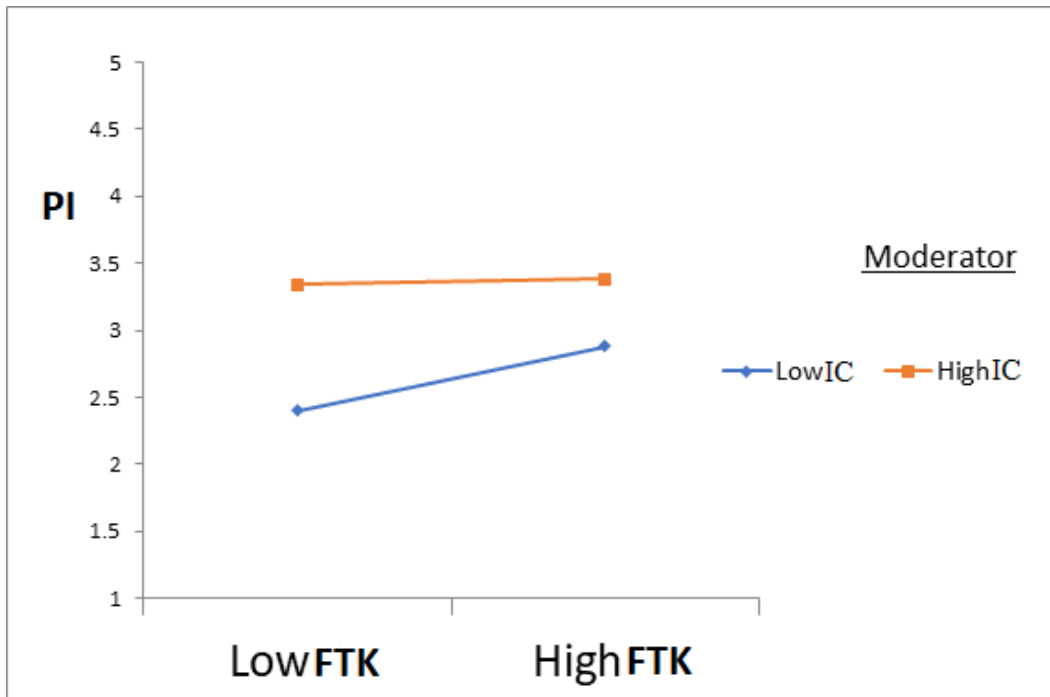
A unit change in ForTacitKnow develops a positive effect of 0.42% in ProdInn, the relationship is favorable thus the hypotheses are accepted and supported. A unit increase in RelHarmony that generate a significant effect of 0.209% in the ProdInn, the relationship is effective, so the hypotheses are accepted. A unit increase in ICTComp that generate a positive effect of 0.32% in the ProdInn, the relationship is favorable, so the hypotheses are accepted.

Table 6: Structural Equation Modeling

Regression Analysis			Estimate	S.E.	C.R.	P
ProdInn	<---	ForTacitKnow	.420	.050	8.977	***
Moderation Analysis			Estimate	S.E.	C.R.	P
ZProdInn	<---	ZForTacitKnow	.134	.050	2.678	.007
ZProdInn	<---	ZKnowExch	.155	.041	3.730	***
ZProdInn	<---	FTKxKE_Int1	.043	.038	1.127	.260
ZProdInn	<---	ZRelHarmony	.209	.040	5.192	***
ZProdInn	<---	FTKxDS_Int2	.160	.038	4.151	***
ZProdInn	<---	ZICTComp	.324	.039	8.245	***
ZProdInn	<---	FTKxIC_Int3	-.100	.038	-2.592	.010

Figure 2: SEM**Moderating Effect of KE between FTK and TQMS**





Discussion and Conclusion

Discussion

A recent past study by Sheng (2019) indicates that the role of tacit knowledge has been significant in improving the product innovation because foreign tacit knowledge (FTK) is a type of knowledge and information about brand differences among foreign individuals and markets that is difficult to interpret systematically. The main results findings of the study indicate that FTK can positively enhance the product innovation of multinational pharmaceutical firms in Thailand. FTK is very important and favorable for the innovation of products because TK can manage all types of information and data with effective modes, with this advantage brand and product innovation can be improved. Therefore, the hypotheses of the direct impact of FTK on the product innovation of multinational pharmaceutical firms of Thailand have been accepted.

Knowledge exchange (KE) is an important mediating variable of this research that positively influences the relationship between FTK and product innovation of multinational pharmaceutical firms. Knowledge exchange makes the firm's best and effective problem-solving experiences that significantly enhance the process of product innovation (Najafi-Tavani, Najafi-Tavani, Naudé, Oghazi, & Zeinaloo, 2018). That's why the hypotheses related to the mediating role of KE have been accepted.

Conclusion

The results of the given study show that tacit knowledge has a pivotal role in the industries and indeed an undeniable requirement to get high standard results in

the competitive age. The firms with tacit knowledge can improve not only the individuals but also at the management level too by the means of a good relationship, harmony and the use of ICT competence. The given results indicate that the value of the knowledge tacit regarding product innovation is necessary and easy to implement.

Implications and Limitations

The brief study of the research indicates the process of catalyzing the relationship between foreign tacit Knowledge and Multinational Pharmaceutical Product Innovation through knowledge exchange and harmony and ICT competence. Such study provokes the future researchers to elaborate on the meanings and sources in the field of the pharmaceutical industry and also in the international market as well. This study shows that such innovativeness brings forth success and development.

This research paper has some limitations and restrictions that should be focused on future studies and researches. First, the study model was developed with the help of information collected from one country such as Thailand to reduce cultural variations. Therefore, it is recommended to future analysts that they should conduct this research in other countries and regions. Second, the model of this research study only focused on the role of tacit knowledge for pharmaceutical firm's innovation purposes. Thus, future research studies should focus on adding other variables for more accurate outcomes.

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