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A MODEL OF THE TOTAL INNOVATION MANAGEMENT OF PRIVATE HIGHER EDUCATION INSTITUTIONS IN THAILAND

Ratchada Toopthong[1], Prompilai Buasuwan[2]
[1,2]School of Education, Kasetsart University
50 Ngam Wong Wan Rd., Ladyaow, Chatuchak, Bangkok 10900
[1]r.toopthong@gmail.com, [2]drprompilai@gmail.com

Abstract

This present study developed a model called a Model of the Total Innovation Management of Private Higher Education Institutions. The study starts with a critical literature review, following by the development of a conceptual framework as well as statistical examination through confirmatory factor analysis to determine construct validity and confirm the theoretical model. The findings revealed eight elements of innovation management, including strategic innovation, technological innovation, leadership, marketing innovation, cultural innovation, organizational innovation, resources, and management innovation. Last, this present study provides future research directions and managerial implication based upon the model.

Keywords: Total innovation management, Second order confirmatory factor analysis, Private higher education institutions

Introduction

Globalization has brought about limitless trading connections and new business wise. Innovation has been a key driver for both government and private sectors to maintain the long-term economic growth. This could be seen in many countries across the world, where strategic innovation has hastened economic growth, extended research bases, and developed and enhanced their capacity in global markets (Thailand Productivity Institute, 2015). However, Thailand still lacks many factors, especially products related to knowledge, technology and creativity. This can be reflected by the fact that innovative thought and intelligence has not been adequately developed in this country. Therefore, the government has given precedence on innovation which can be used to drive Thailand in 2015 – 2020 and develop the country's stability, prosperity and sustainability altogether (Office of the National Economic and Social Development Council, 2015) in agreement with Thailand 4.0 policy, a new engine of growth, which emphasizes innovation as a driver of value-based economy.

As part of the new economy development, higher education institutions are expected to develop innovative related knowledge in accordance with the demand of the labor markets (Office of the Higher Education Commission, 2007). As opposed to public higher education institutions, private higher education institutions are running with limited funds, it is quite typical for the management team to focus on the short-term profitability rather than long-term educational quality. Therefore, this research aims to develop a model of the total innovation management of private higher education institutions in Thailand that satisfies both profitability and the quality of education.

Literature review and theoretical model

According to Charas Suwanawel. (2008), the concept of private higher education administration at present does not focus only on the operations but also the enhancement of quality in order to survive. Therefore, the competition between these institutions has tremendously increased, resulting into more business-like services, for example, the increase of short courses and new postgraduate programs, counseling services for business enterprises, and researches as merchandise available in the market. According to the literature review, innovation has been involved in the management of private higher education institutions in five aspects, including general management, academic services management, research management, financial management, and human resources management.

According to Xu, et al. (2007), the total innovation management (TIM) is a new organizational development approach for creating new markets and opportunities, promoting creativity and

product invention, and developing new business strategies. It brings about better efficiency in innovation management and higher capacity in competition and employment (Phayat Wuttirong, 2014) This approach should be applied to the management of private higher education institutions since these institutions need to adapt themselves to the changes in society and produce graduates who can compete on the global stage. In other words, the institutions need to create their own identities and uniqueness, which can lead to individual excellence, team excellence and organization excellence, in order to increase their sustainability (Susan and Theodore, 2007).

Table 1 Literature reviewed summary of the characteristics of organization innovation

No.	Author	Year	Reviewed characteristics of organization innovation										
			1	2	3	4	5	6	7	8	9	10	11
1	Byrd.	2012							x	x			
2	Hussein Aljardali, Kaderi, Mazen and Levy-Tadjine, Thierry.	2012	x		x	x	x	x					
3	Robert A. Paton and Wagner, Richard.	2012	x		x	x	x	x					
4	Alina Filip.	2012			x	x		x					
5	Anita Crawley.	2012			x	x		x					
6	Loan-Constantin ENACHE.	2011			x	x		x					
7	Yvonne J. Moogan.	2011			x	x		x					
8	Brewer and Tierney.	2010							x	x			
9	Mario Yanez, Khalil, Tarek M., and Walsh, Steven T.	2010			x	x		x					
10	Hsuan-Fu Ho, and Hung, Chia-Chi.	2008			x	x		x					
11	Jonathan Ivy.	2008			x	x		x					
12	Holder and Matter.	2008	x	x	x		x			x		x	
13	Von Stamm,	2008	x	x	x					x			
14	Lars Engwall.	2007	x		x	x	x	x					
15	Demetris Vrontis, Thrassou, Alkis, and Melanthiou, Yioula.	2007			x	x		x					
16	Nattee Jitswang	2007	x		x					x			
17	Chai Na Pon Akrasuphachet, 2007	2007	x	x	x								

18	Felix Maringe.	2005			x	x		x						
19	Hay Group	2005	x	x	x				x	x	x			x
20	Pasu Dejcharin	2004	x	x					x					
21	National Innovation Agency, Thailand	2004	x		x				x	x				
22	S. F. Lee, and Lo, K. K.	2003	x		x	x	x	x						
23	Kuczmarshi	2003	x	x	x					x				
24	Harvard Business School	2003	x	x			x			x			x	
25	Borins	2002							x	x				
26	Dundon	2002	x	x	x	x			x	x				
27	Tidd, Bessant, Pavitt	2001	x	x	x		x				x		x	x
28	Sherwood	2001		x					x	x	x			x
29	Debasish N. Mallick, & Chaudhury, Abhijit.	2000			x	x		x						
30	Christiansen	2000	x	x	x		x						x	
31	Malcom Getz, Siegfried, John J., and Anderson, Kathryn H.	1997			x	x		x						
32	Richard Duggan.	1996			x	x		x						
33	Higgins	1996	x	x	x		x		x	x	x		x	x
34	Adair	1996		x	x		x		x	x			x	
35	Quinn	1991	x	x	x			x		x				
36	Vrakking	1990	x	x		x			x	x				
	Total		20	15	29	19	11	17	12	16	5		7	5

According to the table 1, elements reviewed of Wuttiphong Phakdeelao (2011) are as follow; 1) culture and climate, 2) strategy, 3) technology, 4) marketing, 5) leadership, 6) organizational structure, 7) resources, 8) management, 9) reward and recognition, 10) communication a pipeline idea, and 11) network. Pasu Decharintr (2003), Xu et al. (2007), Phayat Wuttirong (2014) and Hajikarimi et al. (2013) also support these characteristics in his research of the components of total innovation management which consisted of 1) directions and strategies for innovative organization development, 2) flexible organizational structure which supports creativity and innovation, 3) personnel with suitable roles and responsibilities, 4) teamwork, 5) innovative trainings, 6) creative working environments, 7) consistency with external factors, 8) tools and instruments supporting innovation development, and 9) effective communication.

Additionally, to develop a model of total innovation management of private higher education institutions, the researcher had studied two major

conceptual frameworks in the area of innovation management. Xu et al. (2007) formulated a conceptual framework for building up innovation culture to support total innovation management by which the main components consisted of strategic innovation, institutional innovation, management innovation, organizational innovation, marketing innovation and technological innovation. Hajikarimi et al. (2012) developed a comprehensive systemic model of total innovation management which emphasized innovative resources gained from innovative processes. According to the literature review, a proposed model of total innovation management of private higher education institutions is developed as shown figure 1.

Figure 1 A Model of total innovation management of private higher education institutions in Thailand's conceptual framework

Methodology

This research aims to investigate the consistency of the model of the total innovation management in private higher education institutions in Thailand with the empirical data, starting with critical literature review on private higher education institution management and innovation knowledge management. After that, all variables identified are synthesized to formulate a research framework and a measurement model. Given the nature of the research objective and the measurement model, the positivistic approach to research is

adopted for the proposed study. This section discusses the proposed data collection and analysis approaches used to answer the research questions by testing the measurement model as well as techniques to ensure the reliability and validity of the resulting findings.

A questionnaire was developed, containing measures of the eight constructs including strategic innovation, organizational structure innovation, culture innovation, management innovation, technological innovation, resource innovation, marketing innovation, and leadership. (Xu, et. al, 2003, Phayat Wuttirong, 2014, integrated from Wuttiphong Phakdeelao, 2011) Each construct consists of more than three measurement items, in total of 44 measurement items. Each measurement item was converted into a statement for respondents. The questionnaire was divided into two parts: Part 1 Status of Senior Advisors had questions regarding to gender, current position, affiliation / faculty /academic school/ institution/ Office, educational background, duration of work, duration of position, and age, and Part 2 Opinions regarding the suitability of elements and indicators of the Model of the Total Innovation Management of Private Higher Education Institutions in Thailand. A five-point Likert scale, ranging from (1) 'strongly disagree' to (5) 'strongly agree', was adopted to measure the eight domain constructs. The questionnaire was written in Thai because it was created for Thai respondents.

Survey questionnaires were distributed to 600 officers of 41 private higher education institutions which were members of Association of Higher Education Institutions of Thailand. In total, 257 questionnaires were returned, producing a response rate of 41.79% (see Table 1).

Table 2 Demographic Characteristics of the Respondents (N = 257)

	Frequency	Percentage (%)
Gender		
male	96	37.40
female	161	62.60
Current Position		
Administrators	82	31.90
Lecturer	64	24.90
Staff	109	42.40
Administrators / Lecturer	1	0.40
Staff / Administrators	1	0.40
Affiliation/ faculty/ academic school/ institution/ office		
Faculty	137	53.30
Department	118	45.90
Unknown	2	0.80
University		
Bangkok University	7	2.7
Western University	3	1.2
Sri Pathum University	12	4.7
University of the Thai Chamber of Commerce	11	4.3
Assumption University	11	4.3
Hadyai University	13	5.1
Rattanabandit University	12	4.7
Siam University	14	5.4
Eastern Asia University	18	7.0
North Chiangmai University	10	3.9
Payap University	8	3.1
Krirk University	5	1.9
Fatoni University	10	3.9
North Bangkok University	7	2.7
Christian University	7	2.7
Rangsit University	5	1.9
Prantumthani University	9	3.5
Pitsanulok University	9	3.5
Asia-Pacific International university	10	3.9
Bangkok thonburi University	12	4.7
The Eastern University of Management and Technology	10	3.9
Rajapruk University	10	3.9
North Eastern University	7	2.7
Nation Univerity	9	3.5
Thonburi University	2	0.8
Southeast Bangkok University	1	0.4
Huachiew Chalermprakiet University	11	4.3
Shinawatra University	10	3.9
Unknown	1	0.4

Education background		
Bachelor's degree	36	14.00
Master's degree	138	53.70
Doctoral Degree	82	31.90
Unknown	1	0.40
Duration of work		
Lower 3 years	19	7.40
3-5 years	44	17.10
6-10 years	54	21.00
upper 10 years	140	54.50
Duration of position		
Lower 3 years	63	26.50
3-5 years	84	32.70
6-10 years	39	15.20
upper 10 years	66	25.70
Age		
Lower 31 years	29	11.30
31- 40 years	80	31.10
41 - 50 years	100	38.90
51 - 60 years	34	13.20
upper 60 years	14	5.40

Findings

Structural equation modeling (SEM) was used to test the proposed theoretical model where factor analysis and multiple regression are combined in a single statistical procedure (Hair et al., 2006). A two-step SEM approach was employed following the suggestions of Anderson and Gerbing (1988). First, confirmatory factor analysis (CFA) evaluates the validity of the measurement models and the discriminant validity of each construct. Second, a structural model is utilized to test the hypotheses.

Measurement model analyses

Confirmatory factor analysis (CFA) was conducted to evaluate the reliability, the convergent validity, and the discriminant validity of the constructs. Some items that have factor loading of lower than 0.50 were eliminated, so there are in total of 44 remaining items are that have factor loading of higher than 0.50. Then the reliability of each construct by Cronbach's alpha was assessed. All constructs exceed the suggested level of 0.70 (ranging from 0.86 to 0.92), indicating that the constructs have acceptable internal consistency as shown in Table 2. In addition, all factor loadings are statistically significant at $p < 0.05$ and range from a low of 0.57 to a high of 0.84, supporting convergent validity as shown in Table 3.

Table 3 The measurement model of the total innovation management of private higher education institution

Constructs and measures	Factor loading (λi)
Innovation Strategy Element[1] (α = 0.92)	
(si1) There is an Innovation Strategy formulation to be the core capability of the organization. (Organization Core Competency)	0.57
(si2) There is a good vision of change situation, that is the organization challenge to create innovation management.	0.62
(si4) There are a characteristic of strategies formulation (1) modifications (2) forms and (3) different methods but same direction.	0.58
(si6) There is an Innovation Strategy formulation that focus on fostering creativity for students (Student Oriented).	0.58
(si7) There is an Innovation Strategy formulation with ongoing plans and long-term.	0.64
(si9) There is an Innovation Strategy which is an open communication.	0.68
(si10) There is a vision, strategy and innovation goal towards the National level.	0.70
Organization Structure Element[1] (α = 0.87)	
(oi1) There is a structural innovation that can integrate innovations that are flexible to change.	0.65
(oi2) There is an organizational structure with decentralized management that empowerment the people to make decisions.	0.65
(oi3) There is a strategic business unit or department responsible for innovation, such as cross-functional teams, award-winning teams.	0.70
(oi4) There is a departments project that are responsible for research and innovation development.	0.62
(oi5) A cross functional team has been established (i.e., personnel with knowledge and expertise from various fields) to create innovation.	0.74
(oi6) There is a self-managed in faculties, department, etc.	0.59
(oi7) There are various committees to drive innovation.	0.66
Innovation Culture Element[1] (α = 0.88)	
(ci1) To encourages employees to be aware of and participate in responsibility in evaluating the organization's innovation performance	0.69
(ci2) There is a supports diverse knowledge, learns together, and accepts differences from ideas.	0.71
(ci3) To encourages employees to think courageously and accept mistakes or punishment from work without punishment.	0.67
(ci4) there are a cross-functional that promotes teamwork with a variety of knowledge and skills.	0.69
(ci7) To encouraged the Innovative Participation provides analysis of data from learners, service providers, competitive authorities and partners for the benefit of national development	0.66
(ci9) There are awards for personnel who create valuable for society or manage an efficient new service operating system.	0.61
Technology Innovation Element[1] (α = 0.86)	
(ti1) There are an innovation develops information technology systems that are appropriate and modern for the use of institutional missions.	0.69

(ti3) There is data analytics technology development to enhance the student performance and improve learning outcomes.	0.76
(ti5) The use of technology in management such as key strategic indicators, employee details, learner information performance information and knowledge base	0.75
(ti7) To development of computer network. (Web server) that facilitates both internal and external teaching and learning	0.72
(ti8) The results of data analysis are used for continuously improvement of the institution management system.	0.75
Innovation Management Element[1] (α = 0.92)	
(mi1) There are a flexible Value for Money and Property Management System	0.70
(mi6) There are an Innovation Management Channel for sharing knowledge and information to outsource.	0.71
(mi8) There are a training management system and development of creative and innovation skills.	0.70
(mi12) There is an activity to share information, knowledge, and experience to be used in responsible.	0.71
(mi13) There are a process management innovations allow researchers, teachers, and support staff to promote, create and improve their mission, provide new knowledge, produce new results that are beneficial to the organization and society.	0.72
(mi14) The key performance indicators of the overall organizational management innovation are defined and able to enter the marketplace	0.74
Resource Innovation Element[1] (α = 0.90)	
(ri2) There were technological facilities and modern tools to support innovative works of all personnel and all institutes.	0.84
(ri4) There are resources to facilitate the exchange of knowledge and external cooperation and networks	0.76
(ri5) There were resources to facilitate social network construct for cooperation in a whole system such as funding, Joint Research, and cooperation among educational institutions, etc.	0.81
Marketing Innovation Element (α = 0.82)	
(ki3) There are a new knowledge to sharing the knowledge learning for graduate students, faculty and general people.	0.64
(ki5) There are a behavioral response of the target group to improve the curriculum management process.	0.66
(ki6) There are a response behavior of employee groups in all institutes was used to improve institution development process to be effective and consistent with concept of behavioral markets.	0.84
Leadership Element[1] (α = 0.93)	
(L1) Top executive could define vision and strategy for innovation, including participation in innovation's workforce.	0.73
(L2) Top executives allow employee to involve in innovation projects.	0.79
(L4) Top executives have knowledge and ability to manage innovation.	0.75
(L5) Top executives have an ability to administrate the personnel who had creative and innovative ideas.	0.84

(L6) Top executive have a communication capacity to clarify regarding to innovation.	0.80
(L7) Top executive contributes the innovation planning to the personnel workforce.	0.72
(L8) Top executive dared to risk and accept any mistakes or failure at work of personnel.	0.81

Note: [1]Please indicate how much you agree and disagree with each of the following statement. Five-point scale with 1= "strongly disagree" to 5 = "strongly agree" as scale anchors.
α Item deleted during the scale validation process.

Testing the theoretical model

Following the establishment of measurement models, a second order confirmatory factor analysis model was then evaluated to investigate the consistency of a model's elements of the Total Innovation Management of Private Higher Education Institution in Thailand. The findings indicated that it does not fit the data, $\chi 2$ (894) = 2127.39, p = 0.000, *RMSEA* = 0.07, *CFI* = 0.99. An assessment of the modification indices based on theory validation proposes were used to adjust to improve model, $\chi 2$ (776) = 992, p = 0.000, RMSEA = 0.03, CFI = 0.99. Thus, the adjusted model presented in Figure 2 is considered acceptable.

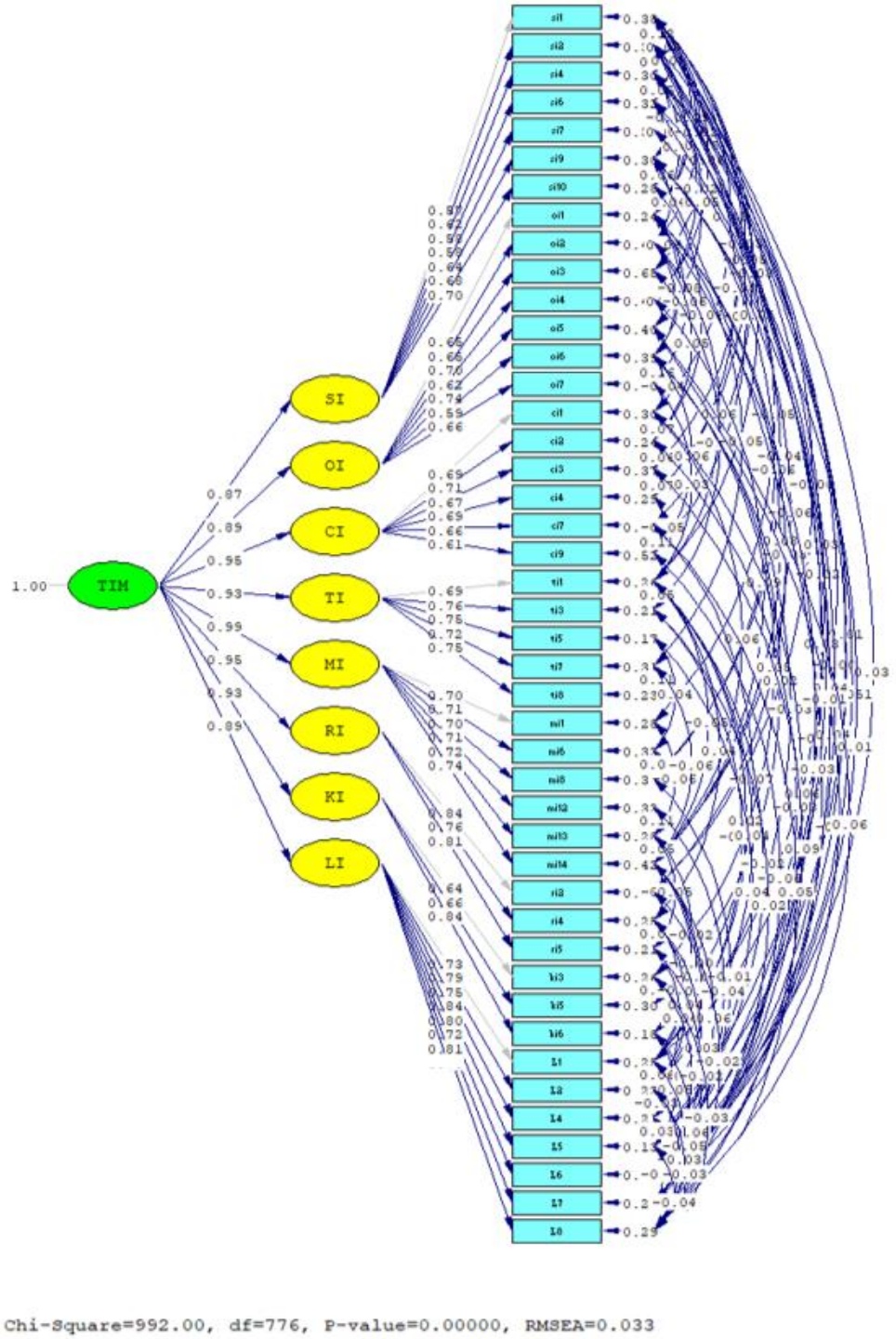

Figure 2 Final model of the total innovation management of private higher education institution

Discussion of the findings

According to the previous section, all construct in the measurement model is significant at the 95% confidence level. This means that the model of the total innovation management of private higher education institutions consists of eight major factors as initially purposed; the major factors are including, 1) strategic innovation, 2) technological innovation, 3) leadership, 4) marketing innovation, 5) cultural innovation, 6) organizational innovation, 7) resources, and 8) management innovation.

The indicators with the highest weight included: 1) Responding to the behaviors of the employees and different agencies in order to improve the organization effectively, 2) Providing technological facilities and modern tools to support the every personnel and every agency in terms of innovation, 3) The executives can manage the organization with creativity and innovation, 4) Resources are available for building social networks in order to support the collaboration throughout the entire system, 5) The executives can manage risks and accept mistakes or failures in the workplace, and 6) The executives are able to communicate with the employees in order to clarify policies related to innovation.

According to the analysis of the empirical data, there were 8 components and 44 indicators in the model of total innovation management of higher education institutions as listed below.

The first component, strategic innovation, consisted of the transmission of vision, strategies and goals regarding innovation to different agencies in the organization. It also includes open communication, continuous planning and long-term goals. It is challenging to develop the total innovation management without vision. Additionally, strategies should be implemented to develop student-oriented creativity and organizational core competency. In this case, the executives of higher education institutions should strategically identify the unique points of their institutions to produce graduates with high quality and distinctiveness while promoting creativity and innovation.

The second component, organizational structure innovation, composed of cross-functional team and strategic business unit. The cross functional team consisted of skillful and knowledgeable personnel from diverse fields needed for developing innovation, and the strategic business unit referred to the entity responsible for innovation development. Integrated organizational structure innovation could facilitate changes, decentralization of decision making, research and development, and independent performance.

The third component, cultural innovation, involved such qualities as open-mindedness, trust, diversity, interdependency, tolerance, cross-functional teamwork, participation in goal achievement and evaluation, risk-taking, mistake and failure acceptance, data analysis, rewarding, and effective

operational system. It should be noted that supporting behaviors and open attitudes were necessary for innovation development, since they allowed and motivated the employees to make changes.

The fourth component, technological innovation, comprised of a data analysis system developed for improving the performance of students, a web server network system for domestic and overseas instructions, an effective data storage system, and other managerial technologies. These technologies could contribute to new learning approaches.

The fifth component, management innovation, amounted to the development of the practical total innovation management indicators, procedures supporting the creation of new ideas and products, activities for transferring and exchanging knowledge and experiences, innovation trainings, and flexible financial management. A practical evaluation system could continuously increase the effectiveness of the organization.

The sixth component, innovation resources, was made up of technological facilities, social network development facilities, and knowledge transfer and external collaboration facilities. Technology-seeking activities and innovative projects related to social capital required the collaboration between both internal and external stakeholders.

The seventh component, marketing innovation, included the use of behavioral reactions of employees (i.e. instructors) and the target groups (i.e. students and outsiders) as the indicators for improving the organization and managerial processes. Having directions and goals benefited the total management system development as a whole.

The last component, leadership, referred to the executives who were able to manage creative and innovative personnel as well as willing to take risks and accepting mistakes or failures. These executives were expected to clearly communicate with and give opportunities to others. They were the key persons who specify vision, missions and strategies related to innovation. By having good leadership, it is possible to reduce unnecessary procedures and facilitate the innovative processes.

Managerial implication

This present study offers some important practical implication for organization leaders. First, the model of the total innovation management of private higher education institutions revealed that private higher education institution should pay attention to 8 aspects of innovation strategic innovation, technological innovation, leadership, marketing innovation, cultural innovation, organizational innovation, resources, and management innovation. Secondly, to successfully implement the model, private higher education institution should emphasize

the following practices: quality, personnel, leadership, organizational culture, academic potential, clear institutional philosophy, development process and strategies, and unique proactive organization planning and implementation. Last, to sustain the innovation knowledge management, private higher education institution should integrate the concept of innovation into the organization mission statement and consider permanent organizational communication channel to promote the value.

Limitation and future research

Since literature review has clearly distinguish the management conditions of public and private higher education institutions, future research should examine the model in different context settings. Moreover, future research should also develop tools to monitor the implementation process, explore potential change resistance, and developed strategies in implementing change. Last, future research should focus on developing more tools and approaches aiming to improve student knowledge and efficiency.

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