Skill Inexistence and Knowledge Requirements of Technology Marketing and Management Programs in Emerging Thailand and Vietnam

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Abstract

Higher education institutions constantly explore the teaching approaches, and adequate theoretical and cognitive contents designed for training practitioners. We gathered the practitioners' perceptions of the existence and importance of skills and knowledge, and understand how technological intensity influences the importance of skill and knowledge requirements in technology management educational programs. The future curriculum development of technology marketing, management and innovation studies for graduate program requires the integration of industrial inexistence gaps at both national and international contexts.

Keywords: Technology, Education, Skill, Knowledge, Developing Country.

1. Introduction

The technological metamorphosis shapes the competitiveness and capital creation at national, industrial and corporate levels. Human resource development and technology development currently are the key indicators for Thailand's and Vietnam's competitiveness. However, the ineptitude collaboration among government bodies, academic institutions and private corporations is one of the reasons causing limited opportunity to develop and handle the rapid technological change (TDRI, 1998).

Thailand ranks and positions in the world landscape competitively (Garelli, 2006). Despite the fact that the efficiency of government and infrastructure has reduced, the contributed factors for the improvement are economic and business sector performances. In view of the infrastructure sub-factors, human quality, science, technology and education are the critical factors that boost up the competitiveness in the past three years (NESDB, 2004). Based on CIA (2006a), the country's literacy population is 92.6%, with 94.9% of male and 90.5% of female being able to read and write.

Since January 11th 2007, Vietnam has become the 150th member of the World Trade Organization, a milestone expected to launch an era of radical changes as the communist nation enters the global economics mainstream. This country, Southeast Asia's second most populous country after Indonesia, expects their new status will accelerate economic growth. Vietnam has since seen its foreign investment, development and industry germinating vigorously to be a member of world trading partner. This country has a lower literacy rate of 90.3% of total population with 93.9% of male and 86.9% of female, but the industrial growth rate is 17.2% in 2005, which higher than Thailand of 9.1% (CIA, 2006a; 2006b). Consequently, quality of people, science, technology and education are vital to improve Thailand's and Vietnam's capabilities to compete.

The role of academic institutions for the development of technology managers plays a considerable role by providing the tools, practical skills and techniques required to strengthen the analytical capability for solving technological problems (Reisman, 1994; Brady, Rush, Hobday, Davies, Probert & Banerjee, 1997). Executives with minimal or no technical background usually manage the company's technology and hence disenchant the stakeholders' expectations (Mallick & Chaudhury, 2000). Further study on the importance of scientist and

technologist employment also revealed the demand for higher education to be more industrial-oriented and technology-focused (Laosirihongthong & Virasa, 2004).

The identification of knowledge and skill requirements for managing technology is essential, especially from practitioners with technology and innovation management experiences. Hence the overall research objective of this study was to identify, from the practitioners' perspectives, the skills and knowledge of technology and innovation managerial education provided by higher education institutions in Thailand and Vietnam. We developed two research questions for this study. Firstly, the research looked at the requirements and inexistence of contextual knowledge, technology-focus knowledge, and decision and preference knowledge differences between the two countries. Secondly, the study addressed the requirements and inexistence of technology-related skills, general management skills and communicable skills differences between the two countries.

The motivation of this research aimed to provide information for training prospective technology manager and to avoid the mismatch between managers' academic knowledge and their actual practical knowledge. Moreover practitioners' views provide a clearer picture for identifying the needs that are relevant to the challenges in everyday operation and practice (Mallick & Chaudhury, 2000). Hence, this study identified the firms' technological intensity to reflect the skill and knowledge required for technology and innovation management from practitioners' perspectives. The result of this study could assist universities worldwide with the curriculum design and development, particularly to universities that conduct offshore programs in these countries. Moreover this study also supports one of the recent initiatives proposed by the International Association for Management of Technology (Van Wyk, 2004).

2. Theoretical Framework

2.1 Management of Technology and Innovation Education

The United States National Research Council described the management of technology as a link to engineering, science and management disciplines, and plans, develops and implements technological capabilities to shape and accomplish the strategic and operational objectives of an organization (NRC, 1987). Badawy (1998) discussed technology management and marketing as a field of study and a practice concerned with exploring and understanding technology. It is also a corporate resource that determines both the strategic and operational capabilities of the firm in designing and developing products and services for maximum customer satisfaction, corporate productivity, profitability, and competitiveness. Hosni (2003) provided more creative and futuristic aspects and described it as art of maintaining mature, nurturing the new and forecasting the future of technology.

The management of technology is multidisciplinary and has an effect on competitiveness of organization. Hence the evolution of understanding technology marketing is playing a vital role in managing technology. Managing technology includes managing the phenomena of technological breakthrough in addition to the technological resource in the organization, in order to maximize profits and to compete with the dominant competitors. The demand of technology management educational program has increased since 1997, particularly at the postgraduates level (Santo, 2001). Thus the general approach to the content and curriculum development embraces "a creative balance" between professors and practitioners (Mallick & Chaudhury, 2000). The program is usually not a discipline at its own and is usually incorporated to the Master of Business Administration, Master of Management related studies or Master of Engineering programs. However, these programs mainly emphasize on general business administration or engineering management rather than management of technology (Nambisan, 2004). Moreover, there is no consensus on the content of a technology management curriculum.

2.2 Knowledge and Skills Requirements

Academics' and practitioners' perceived importance of knowledge and skill for management of technology graduate program in the United States suggested that strategic role of technology in business, implementation of new technology, transfer of technology within organization, new product development, and business strategy and competition are fundamental (Mallick & Chaudhury, 2000). The important skills required are the knowledge on integration of technology and business strategy, working across functional boundaries, effective written communication skills, achieving implementation and identification of new technological opportunity. The study has since enhanced the curriculum development for technology management education.

A later study by Nambisan & Wilemon (2003) focused on a global study of graduate management of technology programs in 53 countries. The study presented the industrial sector's role of supporting curriculum development. The factors included research trends, curriculum development, staffing, program implementation and program emphases. Majority of the students came with sciences and engineering backgrounds and attended the course on a part-time or full-time basis. The course consisted subjects on technology innovation, research and development together with information technology management. The study included information technology, as it might affect

the sustainable competitive advantage of organization and might stimulate the need of technology managers in industrial sector. The important issue is the implication of the dominant and the deficiency of management of technology to the academia, industrial sectors and the individuals who show great interests in the program.

Intarakumnerd, Chairatana & Tangchitpiboon (2002) studied the demand of technology training programs in Thailand. The study indicated the importance of technology to eco-industrial development, organization and national's competitive advantage. Moreover, information on technology training programs benefits the future social need for technology and innovation management. The study concluded with an implication on the necessity to develop a single discipline of technology management program for graduates, in order to support the rapid change of economic, social and education structure. Other studies indicated a mismatch between the delivery of management of technology programs by academia and the actual skill and knowledge required by practitioners or the industry (Mallick & Chaudhury, 2000; Nambisan & Wilemon, 2003). At the time of this research, we did not find any empirical study in Vietnam. Similar management of technology program is available in Vietnam institutions and some Thailand institutions deliver the program in Vietnam. Thus, we aimed to identify the required skill and knowledge for technology management graduate programs in Thailand and Vietnam and to identify the differences between these two countries.

3. Research Methodology

The survey consisted questions of respondent's profiles, the degree of technology intensity in respondents' organizations, and skills and knowledge importance vis-à-vis skills and knowledge inexistence. The questionnaire also included the content of skill and knowledge requirements adopted from the study by Mallick & Chaudhury (2000). The questionnaires used a 6-point Likert Scale with no neutral value. This was to ensure that the respondents must have at least some tendency opinion. The pilot questionnaire pre-tested by five students who were studying in technology and innovation graduate programs. The purpose of this pre-test was to find the reliability (with Cronbach alpha value higher than 0.70) and the consistency of the questions. The data was then collected in Thailand and followed in Vietnam.

Table 1 shows the respondents' years of work experience, their position in the organization, the size of the organization and the number of employees in the organization. To circumvent any misunderstanding and any result error, the population targeted must have sufficient understanding on the managerial aspects of technology and innovation. Thus this study approached schools that offer technology management programs and in the manufacturing industry. All respondents were full-time technology practitioners from technology-based organizations and were part-time postgraduate students reading managerial programs in technology and innovation in Thailand and Vietnam. The response rates of 49% in Thailand and 50% in Vietnam were higher than the response rate of Mallick & Chaudhury (2000) study of 16%.

Majority of the respondents' organizations have more than 200 employees. About 50% of the respondents in Thailand have at least six years of experience in their industries and hold a position of department manager or head within their organizations. In Vietnam, nearly 90% of the respondents have similar years of experience and position in their organizations.

4. Findings and Discussion

Table 2 and 3 present the factor analysis of the knowledge requirements and the skill requirements respectively. The factor analysis tests used principal component analysis extraction method and the rotation method was Varimax with Kaiser Normalization. The rotation converged in five iterations. The reliability of the constructs for skill requirements ranges between 75% and 87%, and for knowledge requirements between 84% and 92%.

Table 4 and 5 show the analysis of skills and knowledge required for technology and innovation management. We asked the respondents to rate the importance level and the personal inexistence of skills and knowledge contents. We used two-sample paired test to find the significant relationship between the importance and inexistence of required skill and knowledge.

In Thailand, the skills to identify new technological opportunity and the ability to apply theoretical knowledge perceive as vital but still deficient in the required skills. As with the general management, the gap exists for skills on working across functional boundaries, facilitating humans' relations, handling data gaps and conflicts, and managing complex and ambiguous situation. With communication skills, the effective written communication and producing clearly actionable results are significant. In Vietnam, the gap exists is lesser as compared to Thailand in view of the ability to manage technical professions, working across functional boundaries, gaining users' support, handling data gaps and conflicts, and managing complex and ambiguous situation.

The knowledge content gaps are wider. In Thailand, nearly all contextual knowledge and technology-focus

knowledge, and decision and preference knowledge are significant, except for the social issues and the timing of technological choice. Again, in Vietnam, the gap for knowledge content is less significant than in Thailand. Knowledge on ethical issues, social issues, legal aspects, influence of government policy, transfer of technology within or between organization, internal use of information technology, management research and general engineering functions are significant.

Table 6 reports a comparison of the skills and knowledge requirements between the two countries using independent sample t-test. Technology related skills and contextual knowledge requirements are more important in Vietnam than in Thailand. However, communication skills requirements are more vital in Thailand than in Vietnam.

5. Conclusions and Recommendations

The needs for developing countries to prepare trained technological managers are imperative. The research findings show a relative importance to improve and further develop management of technological programs, in view of the ongoing advancement of technology. The results also correspond with the study of Mallick & Chaudry (2000) in the United States on the skills and knowledge requirements.

The statistical results indicate that there is a significant difference between degree of importance and inexistence on skills and knowledge. The reliabilities of the factored constructs for skill requirements and knowledge requirements are relatively high. Respondents in both countries perceived the gap exists in required skills on working across functional boundaries, handling data gaps and conflicts, and managing complex and ambiguous situation. As for the knowledge content gaps, many issues related to the contextual knowledge, technology-focus knowledge, and decision and preference knowledge need to be address in designing a management of technology educational program. Most of the ranking gaps exist in the general management skills and knowledge content, especially in Thailand.

Though technology related skills and contextual knowledge requirements are more important in Vietnam than in Thailand, communication skills requirements are more vital in Thailand than in Vietnam. The findings of this research have strategic implications in future technology and innovation management curriculum development, particularly the graduate programs. The interaction and co-operation among professional institutes (i.e. IAMOT, PICMET), academicians, and practitioners to design and develop effective technological educational programs are vastly needed. Academia is to consider the practitioners' perceptions in order to develop an effective program, predominantly for a developing country like Thailand and Vietnam, when the pressure to compete internationally escalates.

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Table 1. Respondents profile

Profile	Description	Country		%
		Thailand	*Vietnam*	
	Samples	89 (70.6%)	37 (29.4%)	100.0
Organization size	200 or less	27 (30.3%)	14 (37.8%)	32.5
(# of employees)	> 200	62 (69.7%)	23 (62.2%)	67.5
Years of experience	< 2 years	13 (14.6%)	1 (2.7%)	11.1
	2 to 5 years	31 (34.8%)	3 (8.1%)	27.0
	6 to 10 years	23 (25.8%)	15 (40.5%)	30.2
	> 10 years	22 (24.7%)	18 (48.7%)	31.7
Position in organization	Director	1 (1.1%)	0 (0.0%)	0.8
	General manager	12 (13.5%)	4 (1.1%)	12.7
	Department manager	37 (41.6%)	22 (59.5%)	46.8
	Department head	39 (43.8%)	11 (29.7%)	39.7

Table 2. Rotated component matrix on skill requirements

Skill requirements	Component		
	1	2	3
Technology-related Skills			
Identification of new technological opportunity	0.8182		
Perform technological assessment/evaluation	0.7883		
Ability to apply theoretical knowledge	0.6741		
Integration of technology and business strategy	0.6724		
Ability to apply analytical techniques	0.6621		
Ability to manage technical professionals	0.5912		
General Management Skills			
Working across functional boundaries		0.7945	
Gaining users' support		0.7429	
Facility in humans relations		0.6538	
Management of risk and uncertainty		0.6500	
Handling data gaps and conflicts		0.6195	
Managing complex and ambiguous situation		0.6076	
Solving problems on a timely basis		0.5245	
Communication Skills			
Effective written communication skills			0.7445
Effective oral communication skills			0.6886
Achieving implementation			0.6240
Producing clearly actionable results			0.5806
% of Variance	23.1700	21.5600	15.3600
Cumulative %	23.1700	44.7400	60.0100
Reliability coefficient	0.8647	0.8692	0.7527
Means	4.6331	4.48501	4.9435

Table 3. Rotated component matrix on knowledge requirements

Knowledge requirements	Component		
	1	2	3
Contextual Knowledge			
Ethical issues	0.8800		
Social issues	0.8427		
Legal aspects	0.8200		
Environmental issues	0.7583		
Financing technical projects	0.6820		
Business strategy and competition	0.6052		
Influence of government policy	0.5436		
Technology-focus Knowledge			
Process of technological innovation		0.7151	
General business functions		0.6856	
Transfer of technology within organization		0.6689	
Implementation of new technology		0.6161	
Transfer of technology between organizations		0.5835	
Internal use of information technology		0.5781	
Management of research		0.5282	
New product development		0.5277	
Decision and Preference Knowledge			
Timing of technological choice			0.7967
Technology acquisition			0.7711
Selection of technological projects			0.7441
General engineering functions			0.7148
% of Variance	24.2840	22.2880	19.1260
Cumulative %	24.2840	46.5720	65.6980
Reliability coefficient	0.9165	0.8967	0.8351
Means	4.4030	4.5447	4.6680

Table 4. Skill as perceived by respondent

Skill requirements	Thailand			Vietnam		
	Importance	Inexistence	Gap	Importance	Inexistence	Gap
Technology-related Skills						
Identification of new technological opportunity	4.398	3.750	0.648*	4.939	3.939	1.000
Perform technological assessment/evaluation	4.416	3.730	0.685	4.970	3.909	1.061
Ability to apply theoretical knowledge	4.545	3.920	0.625*	4.333	4.212	0.121
Integration of technology and business strategy	4.416	3.562	0.854	5.182	3.848	1.333
Ability to apply analytical techniques	4.886	4.000	0.886	4.697	4.182	0.515
Ability to manage technical professionals	4.753	3.787	0.966	4.879	4.152	0.727*
General Management Skills						
Working across functional boundaries	5.011	4.663	0.348*	4.848	4.485	0.364*
Gaining users' support	5.011	4.562	0.449	4.818	4.212	0.606*
Facility in humans relations	4.955	4.551	0.404*	5.000	4.394	0.606
Management of risk and uncertainty	4.580	3.545	1.034	5.212	4.152	1.061
Handling data gaps and conflicts	4.506	3.742	0.764*	4.970	4.152	0.818*
Managing complex and ambiguous situation	4.364	3.511	0.852*	4.727	4.061	0.667*
Solving problems on a timely basis	5.124	4.236	0.888	5.273	4.030	1.242
Communication Skills						
Effective written communication skills	4.708	4.045	0.663*	4.879	4.273	0.606
Effective oral communication skills	4.978	4.326	0.652	5.000	4.394	0.606
Achieving implementation	5.333	4.552	0.782	4.909	4.333	0.576
Producing clearly actionable results	4.886	4.261	0.625*	4.697	4.212	0.485

*Statistically significant with $p < 0.05$

Table 5. Knowledge content as perceived by respondents

Skill requirements	Thailand			Vietnam		
	Importance	Inexistence	Gap	Importance	Inexistence	Gap
Contextual Knowledge						
Ethical issues	3.989	3.551	0.438*	4.424	4.030	0.394*
Social issues	4.135	3.393	0.742	4.455	3.848	0.606*
Legal aspects	4.157	2.955	1.202*	4.758	3.727	1.030*
Environmental issues	4.281	3.528	0.753*	4.727	3.848	0.879
Financing technical projects	4.191	3.101	1.090*	4.606	3.879	0.727
Business strategy and competition	4.517	3.539	0.978*	5.121	4.152	0.970
Influence of government policy	4.528	3.573	0.955*	5.242	4.091	1.152*
Technology-focus Knowledge						
Process of technological innovation	4.149	3.191	0.958*	4.727	3.788	0.939
General business functions	4.652	3.798	0.854*	4.636	4.152	0.485
Transfer of technology within organization	4.759	3.701	1.057*	4.758	4.121	0.636*
Implementation of new technology	4.659	3.625	1.034*	4.879	4.091	0.788
Transfer of technology between organizations	4.393	3.247	1.146*	4.576	3.939	0.636*
Internal use of information technology	4.557	3.966	0.591*	5.000	4.061	0.939*
Management of research	4.034	3.067	0.966*	4.576	3.697	0.879*
New product development	4.382	3.213	1.169*	5.061	3.879	1.182
Decision and Preference Knowledge						
Timing of technological choice	4.674	4.011	0.663	4.424	3.909	0.515
Technology acquisition	4.770	3.782	0.989*	4.636	3.970	0.667
Selection of technological projects	4.864	3.864	1.000*	4.727	4.000	0.727
General engineering functions	4.506	3.618	0.888*	4.485	4.273	0.212*

*Statistically significant with $p < 0.05$

Table 6. Independent sample t-test

Skill & Knowledge	Thailand	Vietnam	t-value	Mean Comparisons
Technology-related Skills	0.1123(1.0652)	0.2792(0.7593)	-2.2794	v > t
General Management Skills	0.0804(1.0461)	0.1998(0.8564)	-1.4056	n. s.
Communication Skills	0.1525(0.9219)	0.3791(1.0962)	2.7256	v < t
Contextual Knowledge	0.1345(1.0310)	0.3402(0.8379)	-2.3892	v > t
Technology-focus Knowledge	0.0801(1.0824)	0.2027(0.7275)	-1.4020	n. s.
Decision and Preference Knowledge	0.0749(1.0557)	0.1894(0.8271)	1.3088	n. s.

n. s.: not significant