

Capability Determinants of Information & Communications Technology Services (ICTS) Sector: A Malaysian Policy Perspective

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ABSTRACT

This paper adopted the H-Model Framework to assess the organizational capability of the contemporary information and communications technology services (ICTS) sector. The ICTS sector needs to not only cope with new age forces that come in different technological shapes and shades, but also has to build up capabilities to provide efficient and effective ICT services that user communities demand today. Capability models like CMMI, PCMM, ITIL, ISO, eSCM-SP and Six Sigma provide a measurement framework together with accreditations and certifications for gauging capabilities at the organizational level. The proposed H-model provides a generic framework for measuring the sector capability pertaining to the provision of ICT Services. Under the eight broad categories entailing 40 study variables, the model investigated the capabilities of 271 ICTS companies in Malaysia. Factor Analysis was used in data reduction to four latent constructs, namely Government relations, Competency and Standards, Business Development Efficacy and Human Capital and Talents. The study revealed that Government relations was the weakest link, with the industry lacking awareness and knowledge about the incentives and facilities offered by mainstream Government agencies pertaining to innovation, R&D, commercialization and export services.

Categories and Subject Descriptors

K.4.1 [Public Policy Issues]; K.4.3 [Organizational Impacts]; K.4.5 [Government Issues]; K.4.2 [Social Issues]

General Terms

Management, Measurement, Performance and Economics

Keywords

Information communications technology services, capability models, H-Capability Model Framework.

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1. INTRODUCTION

This paper attempts to measure the capabilities of the Malaysian Information and Communications Technology Services (ICTS) Sector using the H-Model framework. The H-Model Framework, as shown in Figure 1, represents eight broad-based factors under three dimensions, namely Institutional Dimension, People Dimension and Environmental Dimension. The institutional dimension entails three factors, which are organizational dynamics, innovation process capability portfolios, and business and market efficacy; the people dimension entails human capital, working environment and team motivational elements; and the environmental dimension - which is central to both the institution and people dimensions - consists of visionary leadership and knowledge, awareness and perception (KAP) on business relevant incentives and facilities offered by mainstream public sector agencies. Essentially, the H-Model Framework provided the conceptual framework for designing the survey questionnaire, data analysis and interpretation of results. Besides probing the basic demographic characteristics and features of selected firms, the questionnaire probed a total of 40 items gauging firm level capability, with five questions under each factor. The study successfully netted a total of 271 responses from 377 ICTS companies targeted in The National ICT Association of Malaysia (PIKOM) Membership Database, in particular knowledge and innovation type of activities.

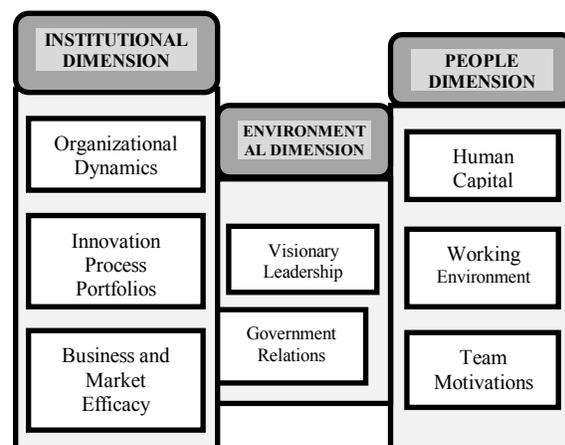


Figure 1: H-Model Framework for Assessing Capabilities of ICTS Companies

2. CAPABILITY MODELS

The study is aimed at gauging sector level capability, which is a culmination of organizational or firm level capability. Sectors are seen as complex systems of organisations involving a wide range of stakeholders from the public, private and civil society as well as international institutions. However, the paper has no intention of assessing all the dimensions, but focuses only on gauging the business capability of ICTS firms in Malaysia.

The capability of the ICTS sector is critical not only in enhancing their own business growth, but also to offer requisite capabilities to serve the ICTS user communities efficiently and effectively. From the public policy and business perspectives, the sector's linkages between ICT producers and user communities are deemed critical for embracing a plethora of new business opportunities and innovations that are increasingly emerging with the convergence and reinforcement of information, cloud, mobile and social elements [4]. Indeed, many disruptive technological innovations in the ICT sector have emerged, changing the entire business landscape and market structure, including consumer behaviour and individual lifestyles [5], such as 'consumerization' of IT, depicting usage of consumer devices and services in the workplace [12], cloud computing models providing reduced infrastructure costs and low investment in maintenance especially for small and medium sized businesses [12], big data analytics providing business intelligence culled from customer and administrative databases; the advent of social businesses [7] deployed through social media networks; mobile commerce evolving as the next generation of e-commerce; buy your own device (BYOD) [7] and teleworking practices becoming more appealing to the technology savvy young generation entering the workforce but posing challenges to traditional human resource and inventory practices. Therefore, in such a fast moving environment, the capability of ICTS at firm or sector level is crucial for managing its resources efficiently and effectively [9]. There are many shades of capability models and methods that are implemented in organizations to develop collective competencies around organizational needs [3]. To name a few, in the Information and Communications Technology (ICT) sector, popular organizational capability models include Capability Maturity Model Integration (CMMI) for gauging software development maturity [13], Information Technology Infrastructure Library for gauging IT management practices; People Capability Maturity Model (PCMM) to gauge workforce competency at [13]; Green Computing Initiative (GCI) certifications accorded for capabilities in reducing, reusing, and recycling wastes [15] and e-Sourcing Capability Model for Service Providers (eSCM-SP) in outsourcing businesses (IAOP, 2013). Some capability measurements are subject matter-specific like R&D capability [14], acquisition capability [2] et cetera. Some certifications are specifically for gauging individual professional competencies like Six Sigma Black Belt or Green Belt on process and quality improvements. Most of these organizational or individual capabilities come with certifications, which determine competency, authority, credibility and service level quality pertaining to the implementing organization. However, the proposed H-Model Framework provides a generic measurement framework for gauging ICTS Sector capability.

3. DATA ANALYSIS

To understand the inner dynamics, factor analysis was used in reducing the original 40 study variables into four meaningful constructs, namely Government Relations, Competency and Standards, Business Development Efficacy and Human Capital & Talents, as shown in Table 1. Cronbach's measure of reliability of 0.968, Kaiser-Meyer-Olkin measure of 0.939 indicating sampling adequacy, significance of Bartlett's test of sphericity and significant correlation between the study variables and latent constructs provided the requisite validity and reliability in support of study analysis.

3.1 Government Relations

Like in many countries, the Malaysian Government has created a host of support institutions and facilities to provide risk capital, matching grants, business planning and marketing advice; attract foreign direct investment, R&D investment; set up incubator units, provide space and infrastructure for business beginners and innovative companies, quality programmes, export promotion; foster foreign partnerships; and disseminate information on regulations, standards, taxation and customs duties [16]. However, on probing Government Relations, the survey probed only five key items pertaining to incentives and facilities offered to spur grass-root innovations, commercialization of R&D outcomes and innovative ideas, accessing research and development Government grants, leveraging upon export promotion facilities, and small and medium sized business development supports. As shown in Table 1, of the four latent constructs arrived in the factor analysis, the Government Relations component secured the lowest mean score of 2.29. This may be partly due to lack of awareness and adequate knowledge on incentives and facilities offered by the Government and the other is the rigid bureaucratic environment that is most of the times cumbersome to deal with. Such problems can only be overcome provided the Government agencies play a proactive role in sharing and disseminating information with industry players. But, the challenge is that Government agencies typically tend to play a reactive role unless there is a change in mindset. However, reciprocity, willingness and the responsive participation of industry players are also deemed equally critical.

Table 1: Mean Square and Correlations between Latent Constructs and Study Variables

Latent Components	Variables	Mean Score	Component Mean Score	Correlation Between Variables and Latent Components under Rotated Matrix
Component 1 : Business Development Efficacy	Leadership and institutional support	3.46	3.32	.766
	Training & exposure	3.37		.737
	Voice of Employees	3.28		.706
	Voice of Customer	3.31		.700
	Networking for new opportunities	3.14		.672
	Web-based systems	3.11		.668
	Social Networking	3.03		.665
	Adequacy of resources	3.28		.642
	Recognition	3.28		.589
	Motivational incentives	3.34		.576

	Multi-skilled and Interdisciplinary	3.49		.576
	Empowered Work culture & Processes	3.52		.562
	Competitive remuneration	3.37		.478
	Staff loyalty to firm	3.54		.476
Component 2 : Human Capital & Talents	Organization Focus	3.63	3.56	.885
	Responsive to Change	3.67		.811
	Empowerment	3.54		.800
	Effective Communication	3.70		.778
	Risk Taking Culture	3.57		.739
	Managerial Capability	3.73		.630
	Communication & Writing Skills	3.58		.590
	Knowledge Seeking Culture	3.56		.570
	Business Development Skills	3.58		.548
	Networking Ability	3.41		.507
	Project Management Skills	3.47		.479
	Marketing Ability	3.31		.449
Component 3: Competency & Standards	Managing innovation portfolios	3.25	3.23	.787
	Creativity development	3.25		.764
	Research process	3.31		.751
	Ideation process	3.41		.721
	Rewards and Incentives	3.23		.566
	Financial rewards	3.00		.492
	ICT Technical Skills	3.36		.478
	Market & business development	3.00		.402
Component 4: Government Relations	Grass-roots innovation (by MIF)	2.24	2.29	.896
	R&D Government grants (by MOSTI)	2.28		.881
	SME facilities (by SME Corp)	2.38		.873
	Commercialization incentives (by AIM)	2.27		.855
	Export Promotion by MATRADE	2.30		.851

3.2 Competency and Standards

Table 1 showed that Malaysian ICTS companies were poor in acquiring adequate capabilities in developing their competencies and standards, with an overall mean score value of 3.23. Despite export promotion facilities offered by MATRADE, the exploratory analysis revealed that only 5.2% of ICTS companies in the survey were involved in export services while 3.0% were engaged in import services. Most of the trading activities are primarily with Singapore where Malaysia has established long term trade and cultural ties. Poor performance in trading could also be partly attributed to business complacency [1] and partly due to a lack of initiative on the part of Malaysian ICTS firms in pursuing globally reckoned and accreditations and certifications. The survey results showed that only 5.9% of the companies have attained Capability Maturity Model Integration (CMMI) Certification on software development maturity; 1.5% of

companies having the People Capability Model Integration (PCMM) certification on workforce competence maturity; 8.5% secured Information Technology Infrastructure Library (ITIL) certifications on IT project management and 15.5% have International Standard Organization (ISO) certification for standards. Disappointingly, less than 1% of those surveyed have obtained IAOP certifications despite the Government earmarking the outsourcing sector as one of the new sources of ICT growth. Worst still, none of the companies has certifications in green computing either at the organizational or individual level, despite the promulgation of The National Green Technology Policy since 2009. The results also showed only 2% of the PIKOM ICTS companies have employed Six Sigma certified professionals. Indeed, such weak capabilities pose critical challenges for ICTS firms to enter foreign developed markets where the stipulated standards for exports are high.

3.3 Business Development Efficacy

The analysis showed that Malaysian ICTS companies are also weak in business development efficacy, which achieved a mean score value of only 3.23, as reflected in Table 1. All variables under this category - except for leadership and institutional support, empowered work culture and processes, multi-skilled and inter-disciplinary knowledge and staff loyalty to work - recorded mean score values below 3.5; above this benchmark considered high capability. Specifically, the weaknesses are reflected in the areas pertaining to usage of social networking tools for business development; developing web-based systems for sharing and disseminating information and knowledge; networking in search of new business opportunities; gathering voice of customer and employees for process and quality improvements; giving due recognition on work performance; and appropriating adequate resources especially manpower expertise. One of the reasons for such weaknesses in business development efficacy could be due to the adequacy of organizational capability in developing dynamic business intelligence (BI) system or knowledge management system (KMS) that can help to detect changes in policy, market and business dynamics [11]. As the future unfolds, more business decisions will be supported by facts that only analytics especially Big Data Analytics (BDA) pertaining to text analytics, context analytics, speech analytics, predictive analytics, prescriptive analytics and embedded analytics can provide; and fewer business decisions will be made on the basis of instinct and guesswork.

3.4 Human Capital and Talents Development

The only component that secured a mean score above the threshold point of above 3.50 was human capital and talents that is, 3.56 as shown in Table 1. Detailed examination revealed that of the 12 variables listed under this latent construct, all except the networking and marketing ability secured mean score values well above the threshold limit. In other words the Malaysian ICTS firms generally have the capability and maturity in charting their own vision, mission and business strategies; have the managerial ability to strategize and implement new tasks and opportunities; possess the resilience to be responsive to a changing environment; endowed with adequate command of communication and writing skills; not short of knowledge seeking and instituting empowerment culture at work places. However, the weaknesses reflected in the networking or

marketing ability are considered innate quality of human capital. Such weaknesses may be attributed to: first, the lack of adequate exposure to knowledge forums, workshops and international conferences; second, the employees may not have adequate learning experiences from multinationals due to explicit mechanism for transfer of technology and knowledge as well as effective building global networks for R&D and innovation [17]; third, the employees do not get opportunities to acquire advance knowledge from universities due to weak industry and university linkages pertaining to R&D, innovation, patenting and commercialization endeavours [16]; fourth, employees generally lack interest and motivation in attaining global standards [16] despite Government support in pursuit of CMMI, PCMM, ITIL, ISO, Green Computing, IAOP Outsourcing, Six Sigma and Lean Six Sigma.

4. CONCLUSION

There is an urgent need on the part of the Government to play a proactive role in building an effective working relationship with the industry especially for mutually sharing and exchanging information and ideas that can help to formulate more effective policy and programme strategies. On its part, the industry needs to play a more aggressive and responsive role in beefing up its business intelligence and innovation and process capabilities as well as seeking globally-recognised certifications and accreditations. In this endeavour, the role of industry associations like PIKOM in Malaysia is critical in bridging the gap in the industry, government and academia relationships.

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