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The Comparison of Thai Qualification Framework for Higher Education and Capability Maturity Model Integration for Service

Paralee Maneerat[a]*, Kanchit Malaivongs[b] , Jintavee Khlaisang[a]

[a]*Chulalongkorn University, Bangkok,Thailand*
[b]*Sripatum University, Bangkok,Thailand*

Abstract

This paper present a comparative analysis of Thai Qualifications Framework for Higher Education (TQF: HEd) and Capability Maturity Model Integration for Service (CMMI-SVC) in order to compare the high level similarities between these two frameworks when they are both applied to improve the quality instruction and standardization of higher education instruction delivery, pedagogy, and learning outcomes. TQF is used to standardize the quality of education in Thailand with the expected learning outcomes of students in five domains, namely: ethical and moral development, cognitive skills, interpersonal skills and responsibility, analytical and communication skills, and numerical analysis, communication and information technology. Since CMMI-SVC targets towards the agencies that provides services, it contains 24 process areas each of which has specific goals and generic goals. This paper suggests the eight high level topics to be analysed including objectives, model characteristics, products, applications, dissemination, enhancement and enforcement, content, essence, and evaluation. The result shows that TQF would benefits from integrating the CMMI-SVC maturity level and key process areas with generic and specific goals and practices.

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Keywords: Thailand Qualification Framework, TQF, CMMI-SVC, Curriculum , Instruction, Pedagogy, Learning Outcomes

1. Introduction

Thailand Qualification Framework (TQF) is an education qualification system adapted from The National Qualification Framework adopted by United Kingdom and Australia (Sinlarat, Theerapijit & Chaodamrong, 2009).

* Paralee Maneerat Tel.: +6-695-560-2626 ; fax: +6-62-561-1721.
E-mail address: paralee.ma@spu.ac.th

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It is used to standardize the quality of education, so that it will enable credit transfer between institution more acceptable and to ensure the processes of education delivery can be improved systematically in five areas, namely; ethical and moral, knowledge, cognitive skills, interpersonal skills and responsibility, technical skills including numerical analysis, communication and information technology so that the graduates from very institutions would have a same conformance (Office of the Higher Education Commission ,2006).

CMMI is a process model used in software engineering and it was originally developed in the 1980s by the U.S Department of Defense Software Engineering Institute (SEI) at Carnegie Mellon University as a method for objective evaluation of contractors for military software projects (Software Engineering Institute, 1995). The key of CMMI Model is designed to provide good engineering and organizational management practices for any project in any environment (Haffeez, 1999). As for the CMMI standard, it is currently divided into three categories including CMMI for Development (CMMI-DEV) focused on product and service development, CMMI for Acquisition (CMMI-ACQ) centred on acquisitions and supply of goods and service from others, and CMMI for Services (CMMI-SVC) directed to the processes of service organizations (Duarte & Martins, 2013). The initial deployment of CMMI is designed for the process improvement of software firms. Organizations have experienced increased productivity and quality, improved cycle time, and more accurate and predictable schedules and budgets (Gibson, Goldenson, & Kost, 2006). With the current version of CMMI-SVC targeted towards the agencies that provide services, it is therefore possible to apply CMMI- SVC to improve the education delivery processes. However, it would be more interesting to explore to find out how to integrate the process improvement methods from CMMI-SVC within the framework of TQF.

Hence, this paper will study the similarities and differences between TQF and CMMI-SVC in eight topics as shown in Fig. 1 including: 1) objectives, 2) model characteristics, 3) products, 4) applications, 5) dissemination, enhancement and enforcement, 6) essence, 7) content, and 8) evaluation. This high level understanding of both frameworks will lead to the formulation of strategies, measures and methods for integrating CMMI-SVC within the framework of TQF. It is expected that the new TQF would be more practical and manageable.

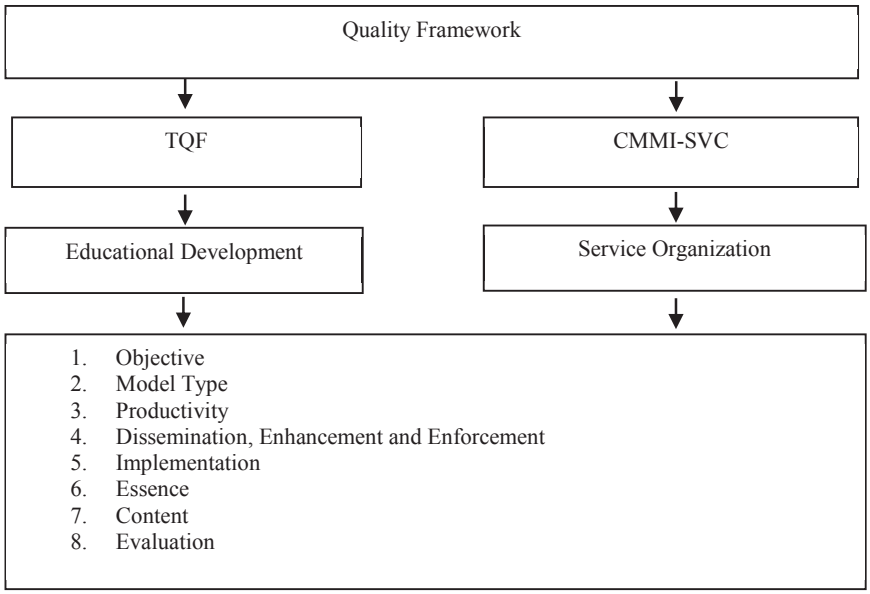


Fig. 1. The Comparison model for TQF and CMMI-SVC.

In section 2, an overview of TQF and CMMI-SVC will be provided, then in section 3, the comparisons between TQF and CMMI-SVC will be discussed and the salient features of each framework will be pointed out as related to the possible integration later. The summary of this study will be given in section 4.

2. Overview of Thailand Qualification Framework and Capability Maturity Model Integration for Service

2.1. Thailand Qualification Framework (TQF)

The Thailand Qualifications Framework is designed to support implementation of the higher educational guidelines set out in the National Education Act. Not only does it provide the standardization of quality of various degree , it also provide a means enabling a clear equivalence of academic degrees granted by oversea higher education institutions. As stated in the National Qualification Framework, " Framework will help to provide appropriate points of comparison in academic standards for institutions in their planning and internal quality assurance processes, for evaluators involved in external reviews, and for employers, in understanding the skills and capabilities of graduates they may employ" (Office of the Higher Education commission ,2006). The levels in the framework are entry completion of basic education that it shows level 1. Advanced Diploma, level 2. Bachelor, level 3. Graduate Diploma, level 4. Master, Level 5. Higher Graduate Diploma, and Level 6. Doctor. The framework groups the expected learning outcomes of students into five domains, each with a description. The domains are ethical and moral development, cognitive skills, interpersonal skills and responsibility, analytical and communication skills, and numerical analysis, communication and information technology.

TQF is a standard enforced by the Ministry of Education for every higher education institution in Thailand to follows the framework by producing seven self-assessment documents, TQF1 to TQF7. TQF1 is the standard curriculum as defined by Commissioner of Higher Education with subject matter subcommittee formulating the outline of curriculum conforming to the National Education Act B.E.2552. The educational institute must fill in the details of TQF2 to TQF 7. Each TQF is defined as follows: TQF 2 is program specification, TQF 3 is course specification, TQF 4 is field experience specification, TQF5 is course report, TQF 6 is field experience report and TQF7 is program report.

2.2. Capability Maturity Model Integration for Service (CMMI-SVC)

CMMI is a framework for improving software development process originated at Carnegie Mellon University. Its first release was known as Capability Maturity Model (CMM) (Chrissis, Konrad & Shrum, 2006).In 2006, the CMMI version 1.2 has defined three type of process improvement, one of which is the service process of CMMI-SVC (CMMI Product Team, 2010). The CMMI-SVC can be applied to improve the process of instructional delivery in an education institute. In this section, the CMMI-SVC will be briefly overviewed. CMMI-SVC as in the standard CMMI paradigm, it has five levels of maturity from level 1 (initial), progressing toward level 2 (managed), level 3 (defined), level 4 (quantitatively managed), and level 5 (optimizing) (CMMI Product Team ,2010). Maturity in CMMI relates to the organization and its institutionalization of the processes (Chrissis, Konrad, & Shrum, 2006).As for the processes defined to be improved, there are 24 process areas (PA) defined in Fig. 2.

Maturity Level	Project and Work Management	Service Establishment and Delivery	Process Management	Support
5			• Organization Performance Management (OPM)	• Casual Analysis and Resolution (CAR)
4	• Quantitative Work Management (QWM)		• Organization Process Performance (OPP)	
3	• Capacity Availability Management (CAM) • Integrated Work Management (IWM) • Risk Management (RSKM) • Service Continuity (SCON)	• Incident Resolution and Prevention (IPR) • Service System Development (SSD) • Service System Transition (SST) • Strategic Service Management (STSM)	• Organization Process Development (OPD) • Organization Process Focus (OPF) • Organizational Training (OT)	• Decision Analysis and Resolution (DAR)
2	• Requirement Management (REQM) • Supplier Agreement Management (SAM) • Work Monitoring and Control (WMC) • Work Planning (WP)	• Service Delivery (SD)		• Process and Product Quality Assurance (PPQA) • Measurement and Analysis (MA) • Configuration Management (CM)
1	N/A			

Fig. 2. The 24 key process areas for CMMI-SVC (CMMI Product Team, 2010).

3. The High Level Comparative Analysis Between TQF and CMMI-SVC

The comparative analysis will be carried out based on the eight topics as mentioned in first section. The high level analysis will provide a comprehensive understanding of these two frameworks on the issue of applying to education process improvement**.**

3.1. Objective

The objective of TQF is to provide a framework for standardizing instructional and learning activities for process improvement and credit transfer. The government's aims at using the TQF to improve the educational paradigm from diploma level to the doctoral level. For CMMI-SVC, it will be used to improve the services provided by the agencies. Both generic processes and specific processes can be defined to be the targets of improvement. CMMI-SVC is applicable to improving the educational pedagogic processes.

3.2. Model Type

The TQF is basically composed of curriculum design process, curriculum mapping instructional process, pedagogy process, learning process, and evaluation process. But, these processes are not explicitly defined and

presented in the framework as activities. Moreover, the framework provides the progression in different level education level, each with a definitive time frame. The framework requires the same documentation, for each level, the TQF1 to TQF7. It is not possible to improve the process within the same level of education for the same group of clients who receive the services at that level. On the other hand, the CMMI-SVC is a process model with 24 PAs and well defined stages of maturity from level 2 to level 5.

3.3. Productivity

The final outcome of TQF is the standardization of the quality education, making the transfer of credit between institutions justifiable. In addition, it also results in instructional, pedagogy and learning improvement for instructors and students in the five learning domains. The products from CMMI for service would be seen for each stage of maturity, may it be the repeatable, defined, managed, or optimized. Hence, in this regards, for each level of TQF, the CMMI-SVC can be applied to define the product of that level in stages of maturity.

3.4. Implementation

To deploy TQF, the ministry of education will provide basic training so that all the terminologies, concepts, forms, and documentation standards of TQF2 through TQF 7 would be understood by those involved in the TQF assessment. As for the CMMI -SVC, the agencies need to employ CMMI-SVC instructors to provide the basic knowledge, tools and methods in shaping the agency to achieve some level of CMMI-SVC maturity. A CMMI -SVC assessor is also needed to validate the achievement of the stated maturity level.

3.5. Dissemination , enhancement , and enforcement

The TQF is a national standard for implementing education quality. It is announced as a directive by the Office of Higher Education, Ministry of Education in June 4, B.E.2552 to be used by all higher education institution in Thailand the day after it will be published in the Government Gazette (Office of the Higher Education commission, 2009). The Ministry of Education will disseminate the TQF with seminars, trainings, workshops and examples of TQF1 through TQF7 for all the universities. For the CMMI-SVC, more than 30 companies have achieved CMMI level 3 certification (CMMI Product Team, 2010). However, the CMMI-SVC is still new in Thailand. Hence, further efforts are required in providing training and workshops to get public attention on this new framework for the service industry. When an organization employs CMMI-SVC, it must have appraisal course and be accredited by Software Engineering Institute (SEI) (CMMI Product Team, 2010) and only then the organization can announce the policy to all the employees.

3.6. Content

The main content of the CMMI-SVC is the 24 process areas and the related processes and practices that define the goals to be achieved in a level of maturity. While the basic content of TQF are defined by TQF 2 through TQF 7 that it is to be completed by the institutions. However, the curriculum design and mapping, and other activities are not explicitly defined. Hence, each institution needs to determine the best practice to accomplish based on the experience of the instructor and guided by some of the examples provided by the Ministry of Education.

3.7. Essence

The essence of CMMI-SVC is the 24 PAs, and a well-defined structure of generic and specific goals, practices, and sub-practices. This essence illuminates the well thought-out, well defined framework that can be applied with minimum ambiguity. For the TQF, it is basically a template -based framework in which there is a number of forms that need to be filled based on a prior knowledge and some information collected from the outcomes of instructor pedagogic practice and student learning outcomes.

3.8. Evaluation

To evaluate CMMI-SVC, it means the appraisal to see if the agencies achieve the desired level of maturity. The appraisal method is a defined process called SCAMPI (Standard CMMI Appraisal Method for Process Improvement) (CMMI Product Team, 2010). As for the TQF, the evaluation process is not standardized in the framework. Hence, each institution defines the appropriate evaluation criteria which would result in non-comparable overall assessment or assessment between educational institutions.

From the eight high level comparative analyses of TQF and CMMI-SVC, it is summarized in Table 1.

Table 1. The summary of high level comparative analysis between TQF and CMMI-SVC

Comparative topics	TQF	CMMI-SVC
1.Objective	Instructional, pedagogy and learning services, and mandatory.	Process improvement and maturity for general services; applicable to education instruction, pedagogy and learning services.
2. Model type	Semi-process model with 6 punctuated level of education degrees, and 6 documentation to be completed	Process model with 5 maturity levels and 24 PAs and well-structured goals and practices
3. Product	Standardization of education degree for credit transfer and learning domain achievement.	Standardization of services and process improvement achievable at each maturity level
4. Implementation	Mandatory.	Optional. Need CMMI-SVC instructor and CMMI-SVC appraiser.
5. Dissemination, Enhancement and Enforcement	Regulatory required. Dissemination through seminars, workshops, and documentation examples of TQF2 to TQF7.	Not yet popular in Thailand.
6.Content	Documentation for TQF2, TQF3, TQF4, TQF5, TQF6, and TQF7.	Five maturity levels and 24 process areas, with goals and practices for generic processes and specific processes.
7. Essence	Template -based documentation without well-defined processes.	Well defined maturity level and the structure of both generic and specific processes.
8. Evaluation	No specific educational evaluation process and KPI.	Well defined goals and practices to achieve the goals.

4. Conclusions

This paper studied the TQF and CMMI-SVC and presented a comparative analysis based on eight high level topics to understand the similarity and differences of both frameworks, provided that TQF and CMMI-SVC were both applied to improve the quality of instructional design and delivery. The results show that TQF can benefit by integrating the maturity levels to each of the education degree, so that instructional and learning process improvement can be achieved at the degree level. Also, if the 24 key process areas were adapted and applied to TQF, it would provide TQF a sound extension with more well defined processes for instruction design, pedagogic planning, delivery, learning outcome improvements, and evaluation process at both subject level and curriculum level. For the future work, the actual remapping of CMM-SVC's 24 PAs and practices will be carried out in the

context of education qualification framework. Also, the maturity level of each degree level will be defined with specific and generic goal associations. This new TQF framework with CMMI process would expect to provide a finer improvement of the existing TQF process.

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