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MATURITY LEVEL OF THAI QUALIFICATIONS FRAMEWORK FOR HIGHER EDUCATION BASED ON CAPABILITY MATURITY MODEL INTEGRATION

Abstract:

The purpose of this paper is to show the similarity between Thai Qualifications Framework for Higher Education (TQF: HEd) and maturity level of Capability Maturity Model Integration (CMMI) at Carnegie Mellon university. TQF is to put all universities to have standard curriculum in each field. At the same time, TQF emphasis necessary skill as well as long terms the improvement curriculum. In 2009, the Office of the Higher Education Commission announced that TQF is required for higher education in Thailand as guidelines for the education system in order to act like a framework for curriculum standard in Thailand. Universities are set to follow TQF 1 to TQF 7: TQF 1 is the standard curriculum for each field as defined by the Higher Education Commission, TQF 2 is used for the curriculum development, TQF 3 is used for the course syllabus, TQF 4 is used for the field experience syllabus, TQF 5 is used for the course report, TQF 6 is the field experience report, and TQF 7 is use for the improvement curriculum.

On the other hand, CMMI (Capability Maturity Model Integration) is the process model improvement. It is divided into three categories: CMMI for Development (CMMI-DEV), CMMI for Acquisition (CMMI-ACQ), and CMMI for Service (CMMI-SVC). CMMI has five maturity levels and 22 process areas. Each process area can be classified into specific goals and generic goals.

In summary, TQF has been developed along the concepts of process improvement which is the core principles of CMMI. The comparison of the TQF and the process of CMMI in the development curriculum, teaching and learning, and improve curriculum. It provides more insight to instructors and curriculum development committees to better manage and improve the program report.

Keywords:

Thailand Qualification Framework, TQF, Maturity Level, CMMI

JEL Classification: I29

1. Introduction

There are 172 institutions in Thailand including 150 the public universities, 71 the private universities and 20 other universities. Since all institutions in Thailand have similar curriculums but difference standard therefore it result the lack of graduate knowledge and skills. Accordingly, in order to solve this problem of the Ministry of Education announced TQF for undergraduate course in 2009. It provides university to have the standard of the method of development curriculum, pedagogy and learning.

The structure of curriculum is set by the Ministry of Education which can be explained as the following: Committees define TQF1 as standard curriculum for each field then each university applies and adapts it into their universities which become TQF2. TQF 3 and 4 are the course syllabus which is prepared before starting course. Then after finishing course, instructor is responsible for preparing the pedagogy and learning report which is called TQF5 and TQF6.

Annually, at the end of the semester TQF 5 and TQF 6 are considered by the committees to improve course which is defined as TQF7. It is considered that TQF is a process model that uses for curriculum management. However, it is seen that TQF do not explain the best practices for instructors which causes the instructors work incorrectly because they do not understand the principle of TQF.

Apparently, TQF is similar to CMMI which is developed by SEI (Software Engineering Institute) in 1993 (Software Engineering Institute, 1995). CMMI has become widely used in various industries around the world. The initial CMM Model is applied to software organizations that called S/W- CMM (Capability Maturity Model for Software). Subsequently, CMMI is updated in 2000. CMMI is a process improvement maturity model for the development of product and services. It consists of best practices that address development and maintenance activities that cover the product life cycle from conception through delivery and maintenance (CMMI Team, 2010).

This paper aims to compare the overview of TQF and CMMI into two areas: 1) the similarity between TQF and CMMI. 2) For instructors to study the process areas in CMMI to use in the curriculum management (development curriculum, teaching and learning, and improve curriculum).

In section 2 and 3 show overview of CMMI and TQF, then in section 4 show the development of curriculum and teaching based on TQF. The summary of this study is given in section 5.

2. Capability Maturity Model Integration (CMMI)

CMM was process model for improving software development process which originated at Carnegie Mellon University in 1993. The first CMMI model version 1.02 was designed for use by development organizations in their pursuit of enterprise-wide process improvement. It was released in 2000. Later, in 2006 the CMMI model version 1.2 was released and created the concept of constellations. Currently, the CMMI has three constellations: CMMI for Development (CMMI-DEV), focused on product and service development; CMMI for Acquisition (CMMI-ACQ), centered on acquisitions and supply of goods and service from others; CMMI for Services (CMMI-SVC), directed to process of service organizations (CMMI Product Team, 2010:5-7).

The structure of CMMI involves process areas, goals, and practices. It demonstrate in figure 1. Process area can be defined as a process that relates to the business area such as quality assurance, risk management etc. Each process has activities. Goals are defined as an objective to successful. The practical process have two targets: i.e. Specific goals can be describes as unique characteristics that must be present for proper implementation of a process area. Generic goals can be describes as characteristics necessary to institutionalize the process that implement a specific process area. Practice means the list of activity that make for the process area successful. The practice has two practice types. First, Specific Practices is the description of an activity that is expected to result in achievement of the specific goals of process area. Secondly, Generic practices is the description of an activity that is considered important in achieving the process associated with managed. The same generic practices applies to multiple process areas. (Gallagher, B. P., Phillips, M., Richer, K. J., Shrum, S., 2011 : 15-18)

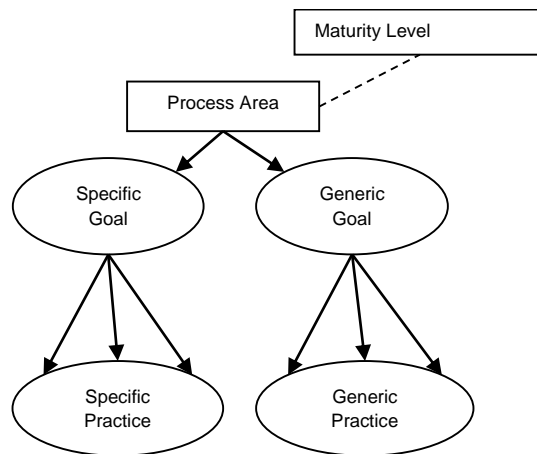


Figure 1. The structure of CMMI model
(Gallagher, B. P., Phillips, M., Richer, K. J., Shrum, S., 2011:27)

For a development software organizations have five maturity levels for classifying organization

At maturity level 1 (Initial), processes are usually ad hoc. Organization and project team at this level of maturity are characterized by tendency to commit beyond their capacity, abandon processes in time of crisis, and for being unable to repeat their own process.

At maturity level 2 (Managed), project team has to ensure that all process are planned and executed in accordance with policy. Each project team has the individual managed process.

At maturity level 3 (Defined), the organization standard process set, is established and improved continuously. These standard procedures are used to establish uniformity within the organization. The processes of project are adapting to the set of standard processes according to the environment or scenario and train people to understand the standard process.

At maturity level 4 (Quantitative Managed), organization and projects establish quantitative using them as a managing criterion. Quality and process performance are understood in statistical term and managed throughout process life. Some processes are selected for detailed performance measurements, statically analyzed and stored in an organization measurements database to support decision making.

At maturity level 5 (Optimizing), focuses on continuously improving process performance through incremental process improvement by search the detect (CMMI Team ,2010).

Maturity Level	Project and work Management	Engineering	Process Management	Support
5			Organizational Performance Management (OPM)	Casual Analysis and Resolution (CAR)
4	Quantitative Project Management (QPM)		Organization Process Performance (OPP)	
3	Integrated Project Management (IPM) Risk Management (RSKM)	Product Integration (PI) Validation (VAL) Verification (VER) Technical Solution (TS) Requirement Development (RD)	Organization Process Development (OPD) Organization Process Focus (OPF) Organizational Training (OT)	Decision Analysis and Resolution (DAR)
2	Requirement Management (REQM) Supplier Agreement Management (SAM) Project Monitoring and Control (PMC) Project Planning (PP)			Process and Product Quality Assurance (PPQA) Measurement and Analysis (MA) Configuration Management (CM)
1				

CMMI identifies 22 process areas and their associated categories and maturity level in figure 2.

Figure 2: 22 Process Areas for CMMI

3. Thai Qualification Framework for Higher Education (TQF: HEd)

The Thai Qualification Framework for Higher Education (TQF:HEd) was launched in 2008. According to the National Education Act B.E 2542, the TQF was a mechanism for higher education quality assurance and was intended to develop of the quality students in the higher education system. TQF is the quality standard of transfer credit between institution more acceptable in order to provide expectation of graduates in five levels such as knowledge ,ethics and moral development, cognitive skills, interpersonal skills and responsibility, and numerical, communication and information technology skills with efficiently. (Sinlarat P., Theerapijit S., and Chaodamrong W., 2009: 2)

Thus, TQF is seen to support the instructors to arrange the teaching and improvement teaching. It defined the main steps for instructors which consists of TQF 1 to TQF 7. First, TQF 1 is the standard qualification of field . Second, TQF 2 is program specification. Third, TQF 3 is course specification. Fourth, TQF 4 is field experience specification. Fifth, TQF 5 is course report. Sixth, TQF 6 is field experience report. Seventh, TQF 7 is program report.

The operation of TQF 1 - TQF 7 show in figure 3 which the instructors is responsible only TQF 2 to TQF 7 (Sinlarat P., Theerapijit S., and Chaodamrong W., 2009: 1-3).

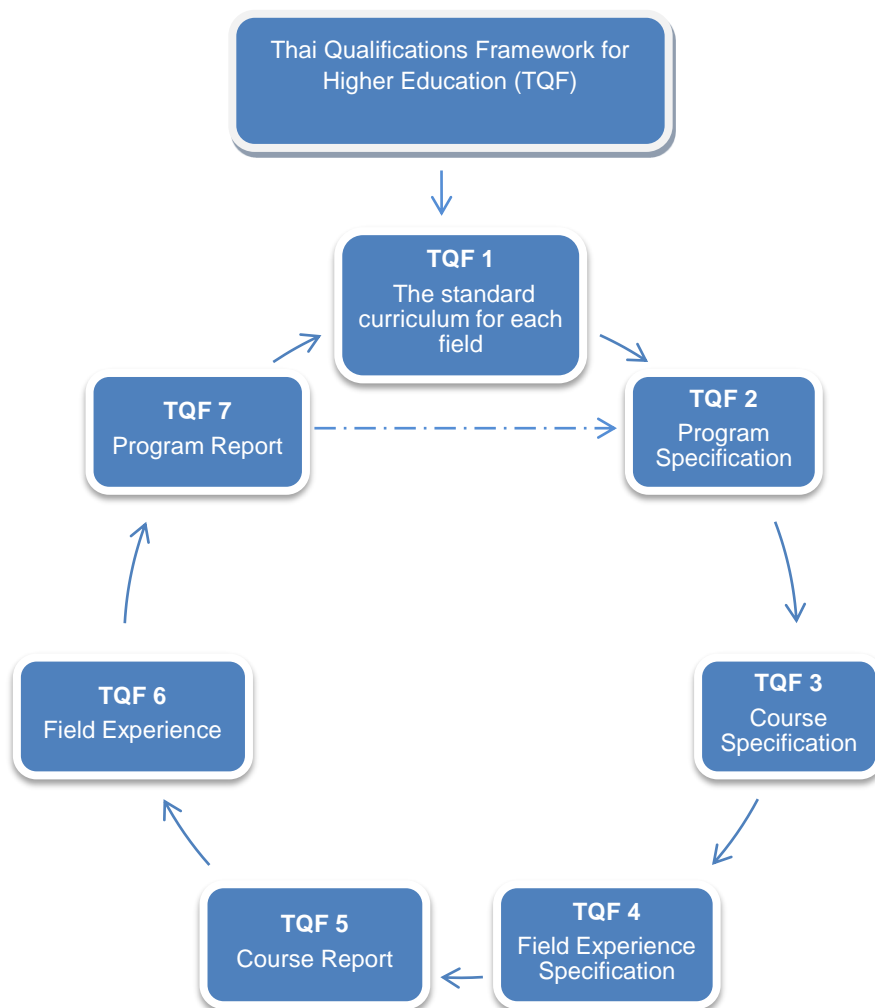


Figure 3: Implementation of TQF 1 – TQF 7
(Office of the Higher Education Commission, 2009)

The categories of TQF 1 to TQF 7 which it have the structure of operation show in figure 4.

TQF 1 It is defined by the Ministry of Education	
TQF 2 <ol style="list-style-type: none"> 1. Fundamental information 2. Curriculum specific information 3. Education management, operation and curriculum structure 4. Learning outcomes, pedagogy and evaluation 5. Principles of student evaluation 6. Faculty development 7. Qualification of curriculum 8. Evaluation and continued improvement 	TQF 3 <ol style="list-style-type: none"> 1. Fundamental information 2. Goals and objectives 3. Methods of operations 4. Students learning outcomes development 5. Instructional plan and outcomes 6. Resources for learning 7. Evaluation and instructional improvement of each subject
TQF 4 <ol style="list-style-type: none"> 1. General information 2. Goals and objectives 3. Learning outcomes development 4. Methods of operations 5. Planning and preparation 6. Student evaluation 7. Evaluation and improvement of work-study program 	TQF 5 <ol style="list-style-type: none"> 1. General information 2. Instruction delivery versus instruction planning 3. Summary of instruction delivery for each subject 4. Problems and impacts on instruction 5. Evaluation of each subject 6. Improvement plan
TQF 6 <ol style="list-style-type: none"> 1. General information 2. Operations 3. Outcomes of operation 4. Impacts and management problems 5. Evaluation 6. Improvement 	TQF 7 <ol style="list-style-type: none"> 1. Statistical information 2. Changes impacting curriculum 3. Summary of subjects in a curriculum 4. Curriculum management 5. Summary of curriculum evaluation 6. Quality of instruction 7. Recommendation from assessor Curriculum development plan

Figure 4 : The categories of TQF 1 to TQF 7

4. The Development of Curriculum and Teaching based on CMMI

The concept of the development of teaching has been proposed by using the principle of CMMI. Apparently, there was some problem about best practice and

maturity levels. The detailed template of TQF did not explain the processes or activities of developing of the curriculum and teaching. In order to make the new concepts of TQF easier than traditional TQF, the process of rearrangement TQF2 to TQF 7 has been presented.

In this study, the comparison of TQF1 to TQF 7 and the key process areas of CMMI are demonstrated in order to understand the overview of both concepts.

CMMI consists of CMMI-DEV, CMMI-SVC, and CMMI-ACQ. CMMI-DEV was selected in this study because this model applied to curriculum management. For example, CMMI-DEV is used for created and develop product in software development. Accordingly, CMMI-DEV is used to create curriculum development. For example that shows the similarity between the process of TQF 1-7 and some process areas of CMMI.

First, TQF 1 is define by the committee of Office of the Higher Education Commission (OHEC) which is qualified each field area. TQF 1 can replace as requirement of CMMI-DEV.

Second, TQF 2 (Program Specification) was created by TQF 1 in order to develop curriculum in each university, as a result, university is accredited the maturity level 3 because the university have the standard process in managerial curriculum and teaching. It defined for the lecturers and staff to use in the same rule and can be improvement continually. The examples of the process of maturity level 3 are following:

- TQF1 was adding the detail by each university which becomes the program specification .Thus, TQF 1 is compared as requirement of CMMI.
- The planning and measurement in learning processes are defined in TQF2 is similar to the Measurement and Analysis (MA) of CMMI
- TQF 2 is to design, plan, and establish the set of standard of curriculum. Then it is collected in the system then it is used as teaching and learning guidelines standard for instructors and students. There is the Organization Process Focus (OPF) and the Organization Process Definition (OPD) of CMMI is same as this process.
- Each university adjust TQF 1 appropriately to their universities to create TQF 2 for develop their curriculum. Therefore, it is inevitably to adjust the processes of TQF 2 in order to follow the standard curriculum for each field which is similar to the Integrated Process Management (IPM) of CMMI.

- TQF 2 was the development of skill and knowledge of instructors who do not understand of TQF process (TQF1- TQF7) in order to work efficiently which can be compared to Organization Training (OT) of CMMI establishes an organizational training capability and provides training.

Third, TQF 3 and TQF 4 created following by TQF 2 and this can be compared to the maturity level 2. This example can be explained as following:

- The instructor will plan both the topics and contents every week in TQF 3. Moreover, they will plan the books and the document of teaching in their course. It is similar to Project Planning (PP) of CMMI that is establishes the scope of work and plans the resources.
- The problem of teaching and the change of the equipment for efficiently are considered to manage in TQF3. This can be compare to Requirement Management (REQM) which is to manage requirement change requirement of products and product components and to ensure alignment between those requirements and the work plans and work product manage requirement change.

Fourth, TQF 5 and TQF 6 are shown similar to CMMI Process and the instructor will report either TQF 5 or TQF 6 as the following:

- The instructors was recording and collecting of activity in every week such as the content, the work assignment, the homework assignment are similar to Configuration Management (CM) of CMMI is to establish and maintain the integrity of work product using configuration identification, configuration control, configuration status accounting and configuration audits.
- The defining of measureable learning in each activity every week can be compared to Measurement and Analysis (MA) of CMMI which is to establish and maintain plans that define work activities.
- The instructor managed and monitored each the teaching accordance by lesson plan. It is similar to Project Management Control (PMC) of CMMI which is to provide an understanding of the ongoing work so that appropriate corrective actions.
- The examination committees considered the examination results and the student assessment result which is called the quality of assurance of TQF. It is similar to the Process and Product Quality Assurance (PPQA) of

CMMI which is to provide staff and management with objective insight into processes and associated work product.

Finally, the university has to create the program (curriculum) report (TQF 7). TQF 7 is summarized and collected systematically as a guide for improving curriculum in TQF 2. Then, TQF 7 will be submitted to OHEC. The process of TQF 7 is also similar to the Organization Process Focus (OPF) and the Organization Process Definition (OPD) of CMMI.

From the comparison of TQF1 to TQF 7 and the key process areas of CMMI, it is summarized in Table 1.

Table 1. The summary of comparison of TQF1 to TQF 7 and the key process areas of CMMI

Development of Curriculum and Teaching	The process area of CMMI
TQF 1	Requirement
TQF 2 : Planning and measurement in learning processes	Measurement and Analysis (MA)
TQF 2: Design, plan, and establish the set of standard of curriculum.	Organization Process Focus (OPF) Organization Process Definition (OPD)
Adjust TQF 1 appropriately to universities to create TQF 2 for develop the curriculum.	Integrated Process Management (IPM)
TQF 2: the development of skill and knowledge of instructors.	Organization Training(OT)
TQF 3 and TQF 4: The instructor will plan both the topics and contents.	Project Planning (PP)
TQF 3 and TQF 4: The problem of teaching and the change of the equipment efficiently.	Requirement Management (REQM)
TQF 5 and TQF 6: The recording and collecting of activity in every week such as the content, the homework assignment.	Configuration Management (CM)
TQF 5 and TQF 6: The defining of measureable learning in each activity every week.	Measurement and Analysis (MA)
TQF 5 and TQF 6: The instructor managed and monitored each the teaching accordance by lesson plan.	Project Management Control (PMC)

The examination committees considered the examination results and the student assessment result.	Process and Product Quality Assurance (PPQA)
TQF 7: The summarized and collected systematically as a guide for improving curriculum.	Organization Process Focus (OPF) Organization Process Definition (OPD)

5. Conclusion

It can be seen that the instructors should study the process areas in CMMI to use in the development curriculum, teaching and learning, and improve curriculum. Therefore, using TQF should be targeted to work and create understanding for teachers. It is able to improve the curriculum to teach better. The universities have process areas of quality standard of CMMI and maturity levels.

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