

*Development International Professional Qualification Standards in Computer Field  
for Academic Personnel Rajamangala University of Technology*

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Abstract

The purpose of the research study is to develop international professional qualification standard in computer field for academic personnel of Rajamangala University of Technology (RMUT). The objectives of the research study are (1) to develop the international professional qualification standard, and (2) to evaluate the appropriateness of the standard. The samples are comprised eighteen experts from nine universities of Rajamangala University of Technology. The experts were selected by purposive sampling to evaluate the appropriateness of the international professional qualification standard in computer field for academic personnel of RMUT. The research methods are (1) conducting the document research and (2) conducting a focus group of experts from RMUT and industry sector.

The research results found that the international professional qualification standard in computer field is consisted of two parts: (1) the Certificate Level and (2) the Functional Competency. For the first part, the certificate level is consisted of three levels which are Basic Level (four certificates), Specialist Level (six certificates), and Professional Level (eight certificates). The opinions of the experts toward the appropriateness of all three levels were good. The second part is the functional competency consisted of five competencies which were: (1) Knowledge, (2) Training pass, (3) Certificate, (4) Instructors (5) Trainers. The experts' opinions toward competency (3), (4), and (5) high. ( $\bar{X} \geq 3.50$ ) However, their opinions toward competencies (1) and (2) moderate. ( $\bar{X} < 3.50$ )

**Keywords:** The International Professional Qualification Standard in Computer Field, The International Certificate in Computer Field, Functional Competency of international level in Computer Studies, Personnel Rajamangala University of Technology

## 1. Introduction

It is necessary for Thailand to promote the personnel in the field of computer for by enhancing their knowledge, skills, and capabilities in terms of international performance, especially the academic personnel in tertiary level. Personnel in this area of study also, personally, would like to develop themselves in order to get a world-class functional competency so that they will be ready for the changes and progresses in Information and Communication Technology (ICT). To develop computer personnel in order to reach the international standard, Thailand has specified the performance model which conforms to the Policy of Information and Communication Technology in Thailand during 2011-2020 (ICT 2020) (Ministry of Information and Communication Technology, 2011). The policy focuses on Thailand's smart development, the implementation of economic and social activities that are based on knowledge and intelligence, and the importance of ICT personnel development. It addresses the development of ICT personnel who has the standardized capability and specialization in the second strategic plan. Moreover, in Thailand's Second Model Scheme of Information and Communication Technology (ICT) (Ministry of Information and Communication Technology, 2009) during 2009-2013, there is a specification of the first strategic plan about the development of ICT personnel and general public to have the capabilities in creating, manufacturing and using information considerably and knowingly. In the ICT Model Scheme of ASEAN 2015 (ASEAN ICT MASTERPLAN 2015), the development of capital human resource, in which its main point is ICT skills training and the certification of ICT skills, is specified in the fifth strategic plan (Ministry of Information and Communication Technology, 2013). Moreover, the second model scheme of Information and Communication Technology (ICT) of the Ministry of Education during 2009-2013 (Ministry of Education, 2009) prescribes the development of personnel in the field of ICT that conforms to the strategies primarily related to the first strategy and focuses on how to create the man power who are able to use the Information and Communication Technology effectively. Nowadays, the requirement of personnel in computer engineering is relatively high as they are very important for state's development. However, the production of the personnel in field of computer engineering is very limited in the education sector, especially in the tertiary level. There are currently two standard for producing personnel in this field according to Thai Qualifications Framework for Higher Education (TQF: HEd) and the qualification framework for graduates in the area of computer 2009 (Ministry of Education, 2009).

Computer Certificate is an instrument for guaranteeing the level of the personnel competency in IT so that their customers and employers along with their colleagues are confident in personnel's quality to some extent (Pipat, 2013). In the international level, the Computer Certificate is accepted and is taken as a tool to show the individual capabilities in his/her profession, and specified as a means to computer vocation accepted by the international standard. The certificate is consisted of two parts:

1. Certificate that is not based on products, for example, ITPE Certificate (National Science and Technology Development Agency, 2013), CompTIA Certificate (The Computing Technology Industry Association, 2013), ECDL/ICDL Certificate (The International Computer Engineering Driving License: ICDL Thailand, 2013).
2. Certificate that is based on product, for example, IBM Certificate (IBM Thailand, 2013), Microsoft Certificate (Microsoft Thailand, 2013), Oracle Certificate (Oracle, 2013), CISCO Certificate (Suntorn, 2004).

The professional qualification is evidence that shows the level of competency of the personnel's performance for every profession. Personnel have to pass examinations in order to receive the certificate. To develop an international standard of professional computer engineering qualification, the researcher has studied the related literatures written by Sanchai Intapichai (Sanchai, 2003), Somkid Saivael (Somkid, 2003), Tongmoah Supaseup (Tongmoah, 2004), Rongroj Sileungsawad (Rongroj, 2004), and Monchai Manutaram (Monchai, 2007).

The development of international professional qualification's standard for academic personnel among nine branches of Rajamangala University of Technology (RMUT) is the specification of the instructor's competency standard that should reach the standard of teaching in order to promote the personnel of this country to the international competition. The mutual feature among the nine universities of Rajamangala University of Technology (RMUT) is the production of practical graduates (Rajamangala University of Technology, 2005). To operate according to the identified implementation, the major factor for graduates' production is the academic personnel like instructors and academic administrators. Hence, academic personnel who are accepted by their knowledge and skills in the international standard will be able to transfer their knowledge and skills to the students. In terms of the development of academic personnel in the field of computer to have the accepted performance's capabilities in the international level, not only the qualification received after graduating in computer, but also the examination for computer certificate is accepted internationally. The personnel's international computer certificate obviously shows their knowledge and skills in computer according to their internationally acknowledged certificates. However, the problem in achieving the development of the academic personnel in the field of computer of the nine branches of Rajamangala University of Technology (RMUT) is that there is still the lack of the unifying international professional qualification standard' requirements in the field of computer for the academic personnel among the branches of Rajamangala University of Technology, so there is no scope for the development of computer personnel that conforms to the demand of the country. This research has examined and operated the development the international professional qualification standard for academic personnel in Rajamangala University of Technology which is consisted of the identification of the international professional qualification standard in computer, international computer certificate in each level of professional qualification standard of the academic personnel, and functional competency certificate in each level of international professional qualification in computer of academic personnel in Rajamangala University of Technology.

## **2. Research Objectives**

2.1 To develop the international professional qualification standard in computer field for the academic personnel in Rajamangala University of Technology (RMUT).

2.2 To evaluate the appropriateness of professional qualification standard in computer field, international certificate in computer field in each level of professional qualification standard, functional competency in each level of international professional certificate for academic personnel in Rajamangala University of Technology (RMUT).

## **3. Hypothesis**

The international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology is developed appropriately.

## **4. Scope of the Research**

### **4.1 Independent variable and dependent variable**

Independent variable is the international professional qualification standard in the field of computer engineering for academic personnel in Rajamangala University of Technology.

Dependent variable is the examination result of the suitability of the international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology.

### **4.2 Population and Sampling**

Population is the specialist in examination, administration and instruction in the field of computer, professional competency development, computer programming development, and the examination for international computer certificate.

The representative sample is 18 specialists selected by purposive sampling they all have experiences in the related field for at least 3 years.

## **5. Research Methodology**

The process of the international professional qualification standard' development in computer field for academic personnel in Rajamangala University of Technology is divided into two stages as follows:

The first stage: the development of international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology has several steps as below:

Study and analyze the documents and researches that relate to the development of the

international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology.

Manage a sub-group meeting between representative instructors who teach the courses related to computer field, the representative of organization, and the representative whose roles or duties related to the examination of international certificate in computer field in order to listen to their comments about the implementation of the draft of the international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology.

Present the draft of the professional qualification standard in computer field for academic personnel in Rajamangala University of Technology to propose to the adviser for further examining and revising.

Create the instruments for estimating the suitability of the evaluation of international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology for specialists.

Bring up the evaluation of the international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology to propose to five specialists in order to evaluate the suitability of the evaluation of the international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology.

Take the result of the evaluation to analyze the information by categorizing the suitability in to three sections: (+1) proper, (0) not sure, and (-1) not proper, and then analyze the result by calculating the average; this is called the 'IOC' (Index of Item Objective Congruence) as the following formula:

$$IOC = \frac{\sum R}{N}$$

When IOC is the consistency of the specialists' opinions index

$\sum R$  is the total result of all specialists

N is the number of the specialists

Giving a mark for a technician's opinion

+1 Proper means the evaluation topic conforms to the standard that wants to be measured

0 Not sure means the respondent is not sure that the evaluation topic conforms to the standard that wants to be measured

-1 Not proper means the evaluation topic is not conformed to the standard that wants to be measured

The evaluation criterion is to find the consistency of specialist's opinion index (IOC). Any evaluation topic that has IOC less than 0.50 has to be adjusted.

The second stage: The evaluation of suitability of the international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology is consisted of several steps as below:

Bring up the evaluation of international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology in order to propose it to the eighteen specialists to evaluate the international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology.

Take the result to analyze by using the criteria that categorizes the suitability. Analyze the result by using 5-level Likert which is comprised of statistics that use the average ( $\bar{X}$ ).

– 1.49 means the evaluation topic which is the least proper

1.50 – 2.49 means the evaluation topic which is less proper

2.50 – 3.49 means the evaluation topic which is moderately proper

3.50 – 4.49 means the evaluation topic which is very proper

4.50 – 5.00 means the evaluation topic which is the most proper

## **6. Research results**

The research process can present the research result into two stages as below:

First stage: the development of the international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology according to Figure 1 detailed as follows:

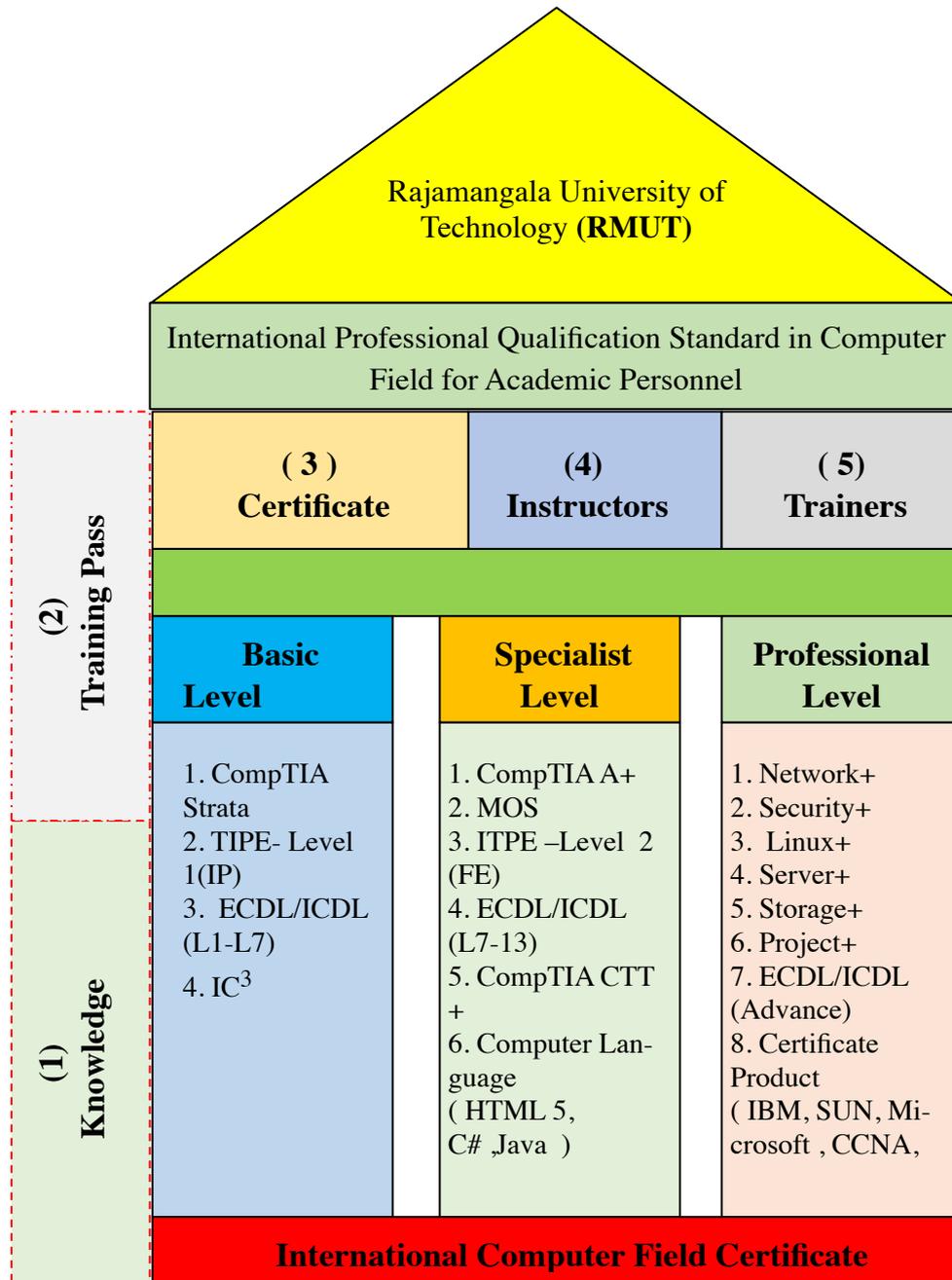


Figure 1: International Professional Qualification Standard in Computer Field for Academic Personnel in Rajamangala University of Technology

The developed international professional qualification standard in the field of computer filed for academic personnel in Rajamangala University of Technology are divided into three levels which are 1) Basic level, 2) Specialist level, and 3) Professional level. Each level is consisted of the international certificates in computer filed as below:

1. The basic level is consisted of 1) CompTIA Strata, 2) TIPE- Level 1 (IP), 3) ECDL/ICDL (L1-L7), and 4) IC<sup>3</sup>, the international certificates in computer field.

2. The specialist level is composed of 1) CompTIA A+, 2) MOS, 3) ITPE – Level 2 (FE), 4) ECDL/ICDL (L7-13), 5) CompTIA CTT+, and 6) Computer Language (HTML 5, C# Java), the international certificates in computer field.

3. The professional level is comprised of 1) Network+, 2) Security+, 3) Linux+, 4) Server+, 5) Storage+, 6) Project+, 7) ECDL/ICDL (Advance), and 8) Certificate Product (IBM, SUN, Microsoft, CCNA, Oracle), the international certificates in computer filed.

By developing the international professional qualification standard in the field of computer filed for academic personnel in Rajamangala University of Technology in which the academic personnel will be developed according to their self-efficiency during each level of standard; this is related to the subjects that the personnel are appointed to teach in the TQF program. The development of functional competency for academic personnel in international-level computer filed has been progressed during each level of standard level and there are five levels of it: the first level is knowledge (have knowledge about the international certificates in computer field), the second level is training pass (pass the training for international certificates in computer field), the third level is certificate (receive the international certificates in computer field), the fourth level is instructors (carry the knowledge that derive from international certificates for each standard in computer field and teach it in the appointed classes), and the fifth level is trainers (to be a trainer who gets the international certificate in computer field).

From the Table 1, the evaluation result of suitability of the international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology by the five specialists shows that the evaluation is separated into four sections. In the first section, the general information is suitable (IOC valued .98). In the second section, the overall international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology are suitable (IOC valued 1) and the standard level can be divided into three levels which are basic level, specialist level, and professional level that is suitable (IOC valued 1). In the third section, the international computer field certificates in each level of international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology are suitable in overall (IOC valued .96) and the international computer field certificates in the basic level are suitable (IOC valued 1) while the specialist level is also suitable (IOC valued .93) as well as the professional level is (IOC valued .95). In the fourth section, the level of functional competency along with the capability-based performance criteria for each level of international professional qualification standard in computer filed for academic personnel in Rajamangala University of Technology is classified into five competencies for each level of standard (basic level, specialist level and professional level) which are 1) knowledge, 2) training pass, 3) certificate, 4) instructors and 5) trainers, and it is also suitable (IOC valued 1).

**Table 1 Evaluation Result of the Suitability of International Professional Qualification Standard in Computer Field for Academic Personnel in Rajamangala University of Technology by Specialists**

The Evaluation Result of the Suitability of International Professional Qualification Standard in Computer field for Academic Personnel in Rajamangala University of Technology									
Evaluation Topics			IOC		Results				
<b>Section 1</b> General Information			.98		Suitable				
<b>Section 2</b> The level of International Professional Qualification Standard in Computer filed for Academic Personnel in Rajamangala University of Technology									
1. The level of International Professional Qualification Standard in Computer Field			1		Suitable				
1.1 Basic Level			1		Suitable				
1.2 Specialist Level			1		Suitable				
1.3 Professional Level			1		Suitable				
<b>Section 3</b> The International Computer Engineering Certificates in Each International Professional Qualification Standard in Computer Filed for Academic Personnel in Rajamangala University of Technology									
1. International Field Computer Certificates			.96		Suitable				
1.1 Basic Level			1		Suitable				
1.2 Specialist Level			.93		Suitable				
1.3 Professional Level			.95		Suitable				
<b>Section 4</b> The Level of Functional Competency along with the Capability-Based Performance Criteria in Each Level of International Professional Qualification Standard in Computer Filed for Academic Personnel in Rajamangala University of Technology									
Level of Functional Competency		Basic		Specialist		Professional		Average	
		IOC	Results	IOC	Results	IOC	Results	IOC	Results

<u>First Functional Competency :</u> <b>Knowledge:</b> having enough knowledge about the international computer field certificates	1	Suitable	1	Suitable	1	Suitable	1	Suitable
<u>Second Functional Competency : Training Pass:</u> passing the training for international computer field certificates	1	Suitable	1	Suitable	1	Suitable	1	Suitable
<u>Third Functional Competency: Certificate:</u> receiving the international computer field certificates	1	Suitable	1	Suitable	1	Suitable	1	Suitable
<u>Fourth Function Competency: Instructors:</u> acquiring knowledge from the international computer field certificates and teach it in appointed course.	1	Suitable	1	Suitable	1	Suitable	1	Suitable

Table 1 Evaluation Result of the Suitability of International Professional Qualification Standard in Computer Field for Academic Personnel in Rajamangala University of Technology by Specialists (Continuous)

Level of Functional Competency	Basic		Specialist		Professional		Average	
	I O C	Results	I O C	Results	I O C	Results	I O C	Results
<u>Fifth Functional Competency: Trainers :</u> being a trainer who received the international field computer certificate	1	Suitable	1	Suitable	1	Suitable	1	Suitable

Section 2 Evaluation of the Suitability of International Professional Qualification Standard in Computer Field for Academic Personnel in Rajamangala University of Technology by Specialists

**Table 2 Evaluation Result of the Suitability of International Professional Qualification Standard in Computer Field for Academic Personnel in Rajamangala University of Technology by Specialists**

The Evaluation Result of the Suitability of International Professional Qualification Standard in Computer Field for Academic Personnel in Rajamangala University of Technology			
Evaluation topics		SD	Results
<b>Section 1</b> The Level of International Professional Qualification Standard in Computer Field for Academic Personnel in Rajamangala University of Technology			
1. Level of International Professional Qualification Standard in Computer Field	4.19	.51	High
1.1 Basic Level	4.28	.57	High
1.2 Specialist Level	4.17	.71	High
1.3 Professional Level	4.11	.58	High
<b>Section 2</b> The International Computer Engineering Certificates in Each Level of International Professional Qualification Standard in Computer field for Academic Personnel in Rajamangala University of Technology			
1. International Computer field Certificates	4.14	.30	Excellent
1.1 Basic Level	4.21	.54	Excellent
1.2 Specialist Level	4.13	.35	Excellent
1.3 Professional Level	4.07	.27	Excellent

Table 2 Evaluation Result of the Suitability of International Professional Qualification Standard in Computer Field for Academic Personnel in Rajamangala University of Technology by Specialists (Continuous)

<b>Section 3</b> The Level of Functional Competency along with the Capability-Based Performance Criteria in Each Level of International Professional Qualification Standard in Computer Field for Academic Personnel in Rajamangala University of Technology												
Functional Competency	Basic			Specialist			Professional			Average		
		SD	Result		SD	Result		SD	Result		SD	Result
<u>First Functional Competency :</u> <b>Knowledge:</b> having enough knowledge about the international computer field certificates	3.06	.94	moderate	3.22	.73	moderate	3.33	.84	moderate	3.20	.62	moderate
<u>Second Functional Competency :</u> <b>Training Pass:</b> passing the training for international computer field certificates	3.28	.75	moderate	3.33	.59	moderate	3.44	.78	moderate	3.35	.55	moderate
<u>Third Functional Competency:</u> <b>Certificate:</b> receiving the international computer field certificates	4.22	.55	high	4.00	.34	high	3.94	.42	high	4.06	.31	high
<u>Fourth Function Competency:</u> <b>Instructors:</b> acquiring knowledge from the international computer field certificates and teach it in appointed course.	4.11	.58	high	3.94	.24	high	3.94	.54	high	4.00	.26	high

Table 2 Evaluation Result of the Suitability of International Professional Qualification Standard in Computer Field for Academic Personnel in Rajamangala University of Technology by Specialists (Continuous)

Functional Competency	Basic			Specialist			Professional			Average		
		SD	Result		SD	Result		SD	Result		SD	Result
<u>Fifth Functional Competency:</u> <b>Trainers</b> : being a trainer who received the international field computer certificate	4.17	.62	high	4.00	.34	high	4.06	.54	high	4.07	.27	high

From Table 2, it is clear that the 18 specialists found out that 1) the overall international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology is highly suitable ( $\bar{X}=4.19$ ) in which there are three levels of international professional qualification standard in computer field which are basic level ( $\bar{X}=4.28$ ), specialist level ( $\bar{X}=4.17$ ), and professional level ( $\bar{X}=4.11$ ) that are also highly appropriate. 2) The international computer certificates in each level of international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology is suitable in overall ( $\bar{X}=4.14$ ). Moreover, the international computer field certificates in each level of international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology can be divided into 1) basic level consisted of the 4 international certificates in computer field which is highly suitable ( $\bar{X}=4.21$ ), 2) specialist level consisted of 6 international certificate in computer field which also is very suitable ( $\bar{X}=4.13$ ), and 3) professional level consisted of international certificates in computer field which is very appropriate as well ( $\bar{X}=4.07$ ). 3) The level of functional Competency along with the capability-based performance criteria in each level of international professional qualification standard in computer field for academic personnel in Rajamangala University of Technology can be grouped into five competencies comprised of 1) knowledge stage (having enough knowledge about the international certificates in computer field), 2) training pass stage (passing the training for international certificates in computer field), 3) certificates stage (receiving the international computer field certificates), 4) instructors stage (acquiring knowledge from the international computer field certificates and teach it in appointed course), and 5) trainers stage (being the trainers who receive the international computer field certificate). The whole picture of each level of certificate

consisted of 1) basic level, 2) specialist level, and 3) professional level, is suitable with the functional competency. From level 3 to level 5, there is a high suitability ( $\bar{X}=4.06$ ,  $\bar{X}=4.00$ ,  $\bar{X}=4.07$ ) and in level 1 and level 2, there is a moderate suitability ( $\bar{X}=3.20$ ,  $\bar{X}=3.35$ ). By considering each level of the certificates, it shows that 1) there is a suitability in functional competency in level 3 to level 5 in the basic level ( $\bar{X}=4.17$ ,  $\bar{X}=4.11$ ,  $\bar{X}=4.22$ ) while level 1 and level 2 is in the moderate level ( $\bar{X}=3.28$ ,  $\bar{X}=3.06$ ). 2) There is a suitability in functional competency in level 3 to level 5 in the specialist level ( $\bar{X}=4.00$ ,  $\bar{X}=3.94$ ,  $\bar{X}=4.00$ ) while level 1 and level 2 is in the moderate level ( $\bar{X}=3.22$ ,  $\bar{X}=3.33$ ). 3) There is a suitability in functional competency in level 3 to level 5 in the professional level ( $\bar{X}=3.94$ ,  $\bar{X}=3.94$ ,  $\bar{X}=4.06$ ) while level 1 and level 2 is in the moderate level ( $\bar{X}=3.33$ ,  $\bar{X}=3.44$ ) respectively.

## 7. Discussion

The evaluation result by the specialists shows that the suitability of international professional qualification standard in the field of computer for academic personnel in Rajamangala University of Technology is consisted of two sections: 1) international computer field certificate which can be separated into three levels---1.1) basic level comprised of 4 certificates, 1.2) specialist level comprised of 6 certificate, and 1.3) professional level comprised of 8 certificates. Every level is highly suitable ( $\bar{X} \geq 3.50$ ). And 2) functional competency can be categorized into five levels which are 2.1) knowledge, 2.2) Training pass, 2.3) Certificate, 2.4) Instructors, and 2.5) Trainers. All three levels of international computer certificates are highly suitable ( $\bar{X} \geq 3.50$ ) except the functional competency level in level 2.1) knowledge and 2.2) Training pass among the three levels of the certificates that are moderately suitable ( $\bar{X} < 3.50$ ).

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