The study of readiness in graduates production of Faculty of Business Administration, Rajamangala University of Technology Phra Nakhon to support the entering into Thailand 4.0

Kreadtisak Lappanitchayakul

Division of Information System, Faculty of Business Administration
Rajamangala University of Technology Phra Nakhon
Bangkok, Thailand

Abstract: *This research studied the preparedness of graduate students from the Information Systems Program, Faculty of Business Administration, Rajamangala University of Technology Phra Nakhon to fulfill the demand of the labor market. The evaluation results of the graduates' preparedness was at a moderate level, so only 37.97% of them became employed in a position related to their field of study. This was possibly caused by the rapid changes of information technology, so the requirement of the University's curriculum to be revised every five years might not correspond with the ongoing changes.*

Index Terms*: Thailand 4.0, Producing graduates, the Faculty of Business Administration, Rajamangala University of Technology Phra Nakhon.*

I. INTRODUCTION

Thailand has been developing to initiate and implement Thailand 4.0 [1] that is based on the policy to elevate the Thai economy with the vision of "Stability, Prosperity, and Sustainability". The key mission is to steer the country's reform in various aspects, so to systematize, redirect, and orient Thailand's development toward resolving the rapid and intense changes of opportunities and threats in the 21st century.Thailand 4.0 is a resolution of the Royal Thai Government to transform the country's economic structure to be a "Value-Based Economy" or an economy driven by innovation. The significant concept is to change from producing "commodities" to "innovative goods", or from being an industrial sector to a technological, creative, and innovative sector. The target is classified into five groups:

1. Food, Agriculture, and Biotechnology
2. Health, Wellness, and Biomedical
3. Smart Devices, Robotics, and Mechatronics
4. Digital, IoT (Internet of Things), Artificial Intelligence and Embedded Technology
5. Creative, Culture and High Value Services

From the above five groups, the Information Systems Program, Faculty of Business Administration, Rajamangala University of Technology Phra Nakhon is related to the third and fourth groups. Therefore, such program promotes Thailand to be upgraded from being a middle-income country to a high-income country.

II. OBJECTIVES

1. To study the preparedness of graduates in the field of information technology to fulfill the demand of the labor market.

2. To enhance the graduates to have self-adjustment and self-development to correspond with the Thailand 4.0 policy.

III. SCOPE OF THE RESEARCH

The scope of the research was as follows: the sample comprised fourth year students of the Information Systems Program, Faculty of Business Administration, Rajamangala University of Technology Phra Nakhon who participated in co-operative education (co-op) at 20 organizations.
Definition : Cooperative education (co-op)_focuses on the systematic practical work at an organization. It is a combination of classroom-based teaching and practical work for people in society to gain direct experience from an organization as temporary employees. Co-op is considered as Work Integrated Learning (WIL) that constructs skills for students [2].

IV. CONCEPT

"Digital 4.0" or "Digital Thailand" is to transform the country to follow the technological world by changing the presently used technologies and human behavior. Nowadays, Thai people use the Internet to search for information, perform e-commerce, process transactions through applications, and communicate [3]. Moreover, Thailand has already experienced the Thailand 1.0, 2.0, and 3.0 eras, respectively as shown in Fig1. Therefore, the changes of the technological world have resulted in the adjustment and development of the software and technology industry in Thailand.
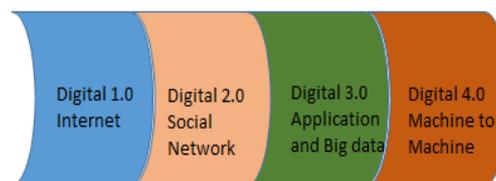

Fig1. Digital Age

V. RELEVANT RESEARCH

In 2016, Rajamangala University of Technology Phra Nakhon revised its strategic plan in accordance with Thailand 4.0 by organizing a seminar to review the strategies to update the University's policies to correspond with the mega trends and Thailand 4.0 policy [4]. The University invited members of the University Council and Academic Council, and experts to participate in the seminar focusing on education and learning reform. Then, Rajamangala University of Technology Phra Nakhon divided the development into two major groups, academia and support, to systematically facilitate the revision and support the changes to allow the four centers, nine faculties, and 23 divisions to express opinions, analyze the potential, and acknowledge the guidelines for development for the next 15 years.

The University emphasized the revision of the curriculum to be modern in order to support future careers, students' quality rather than quantity, the founding of the Social Service Center and Center of Excellency in all faculties in accordance with becoming a digital university and the industrial policy by constructing a collaborative network with industry and private companies to steer the policy. Furthermore, this digital university policy would be consistent with the report of the software and software service industry 2016, which the market value in 2016 was surveyed by referring to the

population database classified by the industry groups in Thailand [5].

The Department of Business Development, who classified the business groups related to the software and software management industry under the Thailand Standard Industrial Classification (TSIC) 2009, showed that the retail, wholesale, and service sectors valued at 50.129 billion Baht had decreased from 2015 by 4.63%. This value was divided into software packages at 12.730 billion Baht, which decreased by 9.51%, and software services at 37.399 billion Baht, which decreased by 2.84%. The financial sector utilized the most expenditure on software and management followed by the government and tourism sectors [5]. The major factor that had reduced the value of the software and software services was the significant change in the software business pattern; it had changed to be a software enabled service that was the result of Cloud technology and Software as a Service (SaaS). Such changes affected the overall software production. In 2016, the export value of software and software services was 3.714 billion Baht whereas the import value was 31.158 billion Baht, which decreased from the previous year by 5.42%. It was predicted that the Thai software market would decline by 4-5% in 2017 and 2018. Moreover, though embedded software decreased by 12.62% in 2016, compared to 2015, the growth rate was likely to rise 5% each year. This accounted for 5.541 billion Baht and 5.818 billion Baht in 2017 and 2018, respectively [5-6]. The key factor was the IoT that alerted the investment and innovations creation from the government and private sector; such as, the Smart City Project.

VI. RESEARCH METHODOLOGY

This was the quantitative research applying survey research and qualitative research. The sample group was 20 organizations.

A. Research tool

Part 1 Information of the organization

Part 2 Evaluation of the students' personal information who participated in co-op at the organization, which consisted of six aspects [7]:
- Ethics and Morals
- Knowledge
- Cognitive Skills
- Interpersonal Skills and Responsibility
- Numerical Analysis, Communication and Information Technology Skills
- Psychomotor Domain

Part 3 Questionnaire for the subjects provided by the Information Systems Program that corresponded with the fundamental knowledge for an occupation in the digital era, which consisted of 21 subjects [7]:
- Computer and Information Technology Fundamentals
- Operating System
- Algorithm for programming
- Computer Programming
- Computer Graphics (Photoshop)
- Webpage Design and Development (Dreamweaver)
- Management Information System
- Data Structures
- Database Management Systems
- Web Programming
- System Analysis and Design

- Network
- Visual Programming (Visual Basic)
- Information system security
- E-commerce
- Computer Assisted Instruction Development
- C programming
- Java programming
- Software Engineering
- Object Oriented
- Mobile Programming

Part 4 Computer languages that are currently important to software production or in the future that students must learn, which consisted of 15 languages [8]:

- JAVA
- C#
- C++
- Python
- RUBY
- .NET
- R
- TypeScript
- JavaScript
- PHP
- C
- SQL
- Objective-C
- Visual Basic
- Swift

Part 5 The programs that were required for graphic work that the organization currently used or in the future that students must learn, which consisted of nine programs [9]:

- Photoshop
- InDesign
- PhostoScape
- SKETCHBOOK PRO
- BLENDER
- EASY PAINT TOOL SAI
- FL STUDIO
- PAINTER
- Flash
- GoogleSetchUp
- GOANIMATE
- MUDBOX
- FLIPBOOK
- PAINT
- ADOBE ANIMATE

B. Creating the questionnaire.

Regarding the questionnaire, the researcher followed the following step to obtain the quality questionnaire [10].

- Study relevant documents, text books, articles, and researches.
- Study, compile, and synthesize the information obtained from Step 1.
- A questionnaire was created to evaluate the preparedness of the graduates to answer to the demand of the labor market.
- Propose the questionnaire to the expert to validate content validity by finding Index of Item – Objective Congruence: IOC).There were three levels for scoring:

    +1: Confident that the questions were validated.

    0: Non-confident that the questions were validated.

    1-: Confident that the questions were not validated.

    Represent the value in the formula.

    $IOC = \sum R/N$

    IOC represented IOC

∑R represented total score of the expert's opinion.

N represented number of expert.

Score from 1-0.5 was applicable to the questionnaire

Score lower than 0.5 required the revision.

VII. DATA ANALYSIS

A software package was used to analyze the statistical data as follows:

1. Percentage was used to analyze the establishment's information.

2. Mean and Standard Deviation (SD) were used to analyze the evaluation of the students' personal information who participated in co-op in an organization.

3. Mean and Standard Deviation (SD) were used to analyze the subjects provided by the Information Systems Program that corresponded with the fundamental knowledge for an occupation in the digital era.

4. Percentage was used to analyze the computer languages that were currently important to software production or in the future that students must learn.

5. Percentage was used to analyze the programs that were required for graphic work that the organization currently used or in the future that students must learn.

VIII. RESULTS

The research results of the preparedness of the graduates of the Faculty of Business Administration, Rajamangala University of Technology Phra Nakhon to enter Thailand 4.0 were as follows:

A. The Participating Organizations

It was found that there were 11 private organizations, seven government organizations, and three state enterprises, which accounted for 52.4%, 33.3%, and 14.3% respectively.

B. IT group information

The results illustrated that many surveyed agencies had an IT division (61.90476%) followed by System Integrated, a software house, hardware vendors, software vendors, and distributors, respectively. Furthermore, some organizations cooperated with many IT groups; such as, distributors, System Integrated, hardware vendors, and CCTV and a network while some operated a software house and IT solutions as shown in table 1.

Table 1. IT group information

No.	IT type	Amount	Percentage
1	Distributor	1	4.761905
2	System Integrated	4	19.04762
3	Software House	3	14.28571
4	Hardware vendor	2	9.52381
5	Software vendor	1	4.761905
6	Training center	0	0
7	Hosting	0	0
8	Etc. - Media and Entertainment - Banking - Infrastructure	13	61.90476

No.	IT type	Amount	Percentage
	- Government - IT Solution - Financial institution - SW & HW Support -CCTV and Network		

C. Establishment of the organization

The results showed that eight organizations had been founded for 0-11 years (38.09524%), six organizations had been set up for 20-11years (28.57143%), one organization had been established for 30-21 years (4.761905%), two organizations had been operating for 31-40 years (9.52381%), one was 50-41 years old (4.761905%), two had been functioning for 60-51 years (9.52381%), and one government agency had been founded for more than 50 years, that was 128 years (4.761905%).

D. Evaluation of the preparedness of the students who participated in co-op at the organizations

The results indicated that the students had a moderate level of preparedness. From the evaluation of the 21 organizations, the average was 3.4762 (out of five) with a standard deviation of 0.87287.

E. The evaluation of the student's personal information who participated in co-op in the organization

Furthermore, from the evaluation of the student's personal information who participated in co-op in the organization, the analysis of the six aspects found that Ethics and Morals were at a good level (4.039683 out of five) followed by Psychomotor Domain (3.571433 out of five), Interpersonal Skills and Responsibility (3.47618%), Cognitive Skills (3.41665 out of five), Numerical Analysis, Communication and Information Technology Skills (3.33335 out of five), and Knowledge (3.29365 out of five), which were at a moderate level, respectively.

F. The subjects provided by the Information Systems Program that corresponded with the fundamental knowledge for an occupation in the digital era

The results showed that the subjects learning in the Program were at a low to moderate level (2.750581 out of five) compared to the required knowledge to work with an organization as shown in table 2.

Table 2. The subjects provided by the Information Systems Program

No.	Subject	Mean (out of five)	SD
1	Computer and Information Technology Fundamentals	3.2857	1.34695
2	Operating System	2.7143	1.38358
3	Algorithm for programming	2.9524	1.46548
4	Computer Programming	2.4286	1.43427
5	Computer Graphics (Photoshop)	2.6667	1.31656

No.	Subject	Mean (out of five)	SD
6	Webpage Design and Development (Dreamweaver)	2.9048	1.26114
7	Management Information System	3.0952	1.41084
8	Data Structures	3.1429	1.42428
9	Database Management Systems	3.1429	1.49284
10	Web Programming	3.0952	1.51343
11	System Analysis and Design	2.6667	1.68325
12	Network	3.3333	1.39044
13	Visual Programming (Visual Basic)	2.3810	1.35927
14	Information system security	3.1905	1.28915
15	E-commerce	2.3810	1.46548
16	Computer Assisted Instruction Development	2.5714	136277
17	C programming	1.9048	1.30018
18	Java programming	2.3333	1.42595
19	Software Engineering	2.4762	1.47034
20	Object Oriented	2.4286	1.43427
21	Mobile Programming	2.6667	1.55991
Mean (out of five)		2.750581	

G. The computer languages that were currently important to software production or those used in the future that the students must learn were analyzed using frequency and percentage

The most popular language was SQL (71.4%) followed by PHP and Javascript (61.9%), and Java (52.4%), respectively as shown in table 3.

Table 3. The computer languages that were currently important to software production or those used in the future that the students must learn

No.	Information	Amount	Percentage
1	JAVA	11	52.4
2	JavaScript	13	61.9
3	C#	5	23.8
4	PHP	13	61.9
5	C++	4	19
6	C	0	0
7	Python	5	23.8
8	SQL	15	71.4

No.	Information	Amount	Percentage
9	RUBY	1	4.8
10	Objective-C	2	9.5
11	NET	7	33.3
12	Visual Basic	7	33.3
3	R	3	14.3
14	Swift	6	28.6
15	TypeScript	2	9.5
16	Etc. - Kotlin -yii framework - postgrese - oracle - MySQL	2	9.5

H. The results also indicated that many organizations used a computer program for graphic work were analyzed using frequency and percentage

The most popular program was Photoshop (90.5%) followed by PhotoScape, Flash, and Indesign (38.1%), respectively as shown in table 4.

Table 4. The results also indicated that many organizations used a computer program for graphic work

No.	Information	Amount	Percentage
1	Photoshop	19	90.5
2	Flash	8	38.1
3	InDesign	8	38.1
4	GoogleSetchUp	4	19
5	PhostoScape	8	38.1
6	GOANIMATE	1	4.8
7	SKETCHBOOK PRO	3	14.3
8	MUDBOX	1	4.8
9	BLENDER	3	14.3
10	FLIPBOOK	1	4.8
11	EASY PAINT TOOL SAI	2	9.5
12	PAINT	5	23.8
13	FL STUDIO	3	14.3
14	ADOBE ANIMATE	7	33.3
15	PAINTER	2	9.5
16	Etc. - Adobe Premier Pro - Sony Vegus - Illustrator - after effect	5	23.8

I.   The employment data of the graduates from the Information Systems Program 2017

To know about the students employment situation, Rajamangala University of Technology Phra Nakhon collected the employment data of 237 graduates from the Information Systems Program 2017 [11] as shown in table 5.

Table 5. The employment data of 237 graduates from the Information Systems Program 2017

No.	Information	Amount	Percentage
1	Number of employed graduates.	184	77.64
1.1	Number of graduates who were employed within one year after graduation (excluded the self-employed person(	142	77.18
1.1.1	Working in the related graduate field.	90	63.38
1.1.2	Working in an unrelated graduate field.	52	36.62
1.2	Number of graduates who were self-employed.	16	8.69
1.3	Number of graduates who found a job before graduation.	23	12.5
1.4	Number of graduates who had their own business and earned income.	3	1.63
2	Number of unemployed graduates.	53	22.36
2.1	Number of graduates who furthered their study in the Graduate Program.	2	3.77
2.2	Number of graduates who were ordained as monks.	1	1.88
2.3	Number of graduates who were conscripted into the military.	7	13.21
2.4	Unemployed.	43	81.14
	Total	237	100

IX. DISCUSSION

The research results of the 21 organizations indicated that 11 of them were private organizations (52.4%) followed by government and state enterprise organizations, respectively. The average level of the students' preparedness who participated in co-op at an organization was 3.4762, out of five, which was at a moderate level. The evaluation of the personal information from the six aspects had an average of 3.52 out of five.

Regarding the subjects, it was found that the students learning in the Information Systems Program was at a low-moderate level when compared to the knowledge required for working (2.750581 out of five). From the data about the employment of the graduates in 2017, it was revealed that only 90 out of 237 graduates (37.97%) were employed within a field related to their studies while another 52 graduates (21.94%) worked in an unrelated field.

CONCLUSION

The research results on the knowledge of students used in work with an organization showed that it was at a moderate level (2.750581 out of five). Consequently, only 37.97% of the graduates became employed in a related field of their studies. This was possibly a result of the rapid changes in information technology, so the requirement for Rajamangala University of Technology Phra Nakhon's curriculum to be revised every five years might not correspond with the changes.

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