

Direction of Management of Research and Development Centers of Vocational Institutes in Thailand: Systematic Synthesis

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Received: 16/10/2019

Accepted: 31/10/2019

Abstract - The objective of this study is to synthesize the compositions of vocational research and development centers of vocational institutes in Thailand: systematic synthesis. This research work is a documentary one whereby related approaches, theories, journals and other research works are studied on with the implementation of 4-step data analysis technique that is adapted from the concept of Christen Erlingsson (2017), namely: 1) to familiarize oneself with the data and the hermeneutic spiral; 2) to divide up the text into meaning units and subsequently condensing these meaning units; 3) to formulate codes; and 4) to develop categories and themes. The findings from the study show that there are 9 compositions of vocational research and development centers of vocational institutes in Thailand, which are: 1) arrangement of organizational structure; 2) determination of policies, visions, commitments and strategies; 3) human resource management; 4) budget management; 5) information system; 6) research quality management; 7) monitoring and evaluation; 8) publication and public relations work; and 9) intellectual property management.

Keywords - Research and Development Center Management, Research and Development of Vocational Institute, Compositions of Research and Development Center

I. INTRODUCTION

Research is a tool for the development of the country, which is a process that drives the development of the life quality of human resource, which is a process of systematic knowledge pursuance. In all countries, research results are applied to solving the problems of the countries in order to strengthen and develop the countries. Therefore, research is a mechanism used for pursuing knowledge which leads to development of the development of the country (Phanit, 2013). In accordance with Article 67 of National Education Act B.E. 2542 (A.D. 1999), and the Amendment (2nd Revision) B.E. 2545 (A.D. 2002), an educational institute must promote research works in order to generate and develop technologies for education. In addition, Article 69 prescribes that an educational institute should establish a central unit to consider and recommend policies to promote, support and coordinate research works (Ministry of Education, 1999).

Research is a mission of a higher education institute because such an institute is a hub of modern knowledge and sciences that can be used for creating many research works the results from which can be applied to industries. Findings from research works are useful in both local and international scales, and enable institutes with capabilities to be in higher ranks in the system of World Class

Ranking (Office of the Higher Education Commission, 2013). This concurs with the commitment of the Research Centres of Faculty of Education, University of Cambridge, "Education and Learning to Participation in Society; International Learning and Research towards Excellence." (University of Cambridge, 2019).

The aforementioned idea is also concurrent with Article 15, Section 3 of Vocational Education Act B.E. 2551 (A.D. 2008), which prescribes that each vocational institute is a juristic person and governmental agency under the administration of Vocational Education Commission, and Article 16, which prescribes that each vocational institute is a vocational and technological institute with objective to provide education and supports in terms of academy and high vocational education with the expertise in teaching, researching, and dissemination of knowledge and technologies. In addition, there is the Ministerial Regulation on the Merger of Vocational Schools for the Establishment of Vocational Institutes, which consist of 19 vocational institutes and 4 agricultural vocational institutes, or 23 institutes in total (Royal Thai Government Gazette, 2008). Vocational institutes should administer learning and teaching in the levels of vocational diploma, high vocational diploma and bachelor's degrees in the fields of technologies or operations with each of lecturers of the curricula and lecturers in charge of the curricula in the level of bachelor's degrees in the fields of technologies or operations should have an academic work that is publicized which concurs with the predetermined criteria. There should be at least 1 official with the academic position in the past 5 years (Royal Thai Government Gazette, 2015, p. 16).

Vocational research and development center is a unit in the structure of a vocational institute, which is established in accordance with Vocational Education Act B.E. 2551 (A.D. 2008), with the responsibilities for promoting and supporting education, research and experiments by coordinating and collaborating with public and private sectors for developing the management for vocational

education (Vocational Education Act B.E. 2551 (A.D. 2008), 2008). However, each vocational research and development center is just a composition in the structure of a vocational institute but there is no concrete system for the administration of the center. Thus, the Research Team is interested in synthesizing the compositions of a vocational research and development centers of vocational institutes in order to improve the efficiency of the administration of the vocational research and development centers.

II. LITERATURE REVIEWS

The synthesis on compositions of the administration of research and development center is based on the knowledge from theories and documents related to the compositions of administration of research and development centers of higher education institutes and vocational institutes, as well as relevant research works from Thailand and foreign countries, as follows.

King Mongkut's Institute of Technology Ladkrabang (2019) has the KMITL Research and Development Center that is composed of 1) Research Management Unit, 2) Intellectual Property Unit, and 3) Academic Administration Unit, and Industrial Unit.

Kasetsart University (2019) has the structure of the administration for KU Research and Development Institute that is composed of 1) Secretary Office, 2) Research Publication Unit, 3) Information Unit, 4) Research and Evaluation Coordination Unit, and 5) Equipment and Scientific Research Unit.

King Mongkut's University of Technology North Bangkok (2019) has set the vision, mission, identity and policy with the structure of the Bureau of Research on Sciences and Technology that is composed of 1) Director Office, 2) Research Administration Unit, 3) Information and Research Publicity Unit, 4) Specific Research and Industrial Relations Unit, and 5) Intellectual Property Management and Enterprise Incubation Unit.

King Mongkut's University of Technology Thonburi (2019) has set the vision, main mission and structure of the Office of Director of Bureau of Research and Development of Sciences and Technologies to be composed of the Administration Group, which includes: 1) Office Unit with: 1.1) Personnel and Administrative Team; 1.2) Accounting, Finance and Treasury Team; and 1.3) Budget Team, 2) Policy and Strategy Unit, 3) Quality Assurance Unit, and 4) Information System Unit and Complete Academic Service Group, which includes: (1) Research and Development Unit, (2) Business, Commercial and Industrial Unit with: (2.1) Academic Service Team and (2.2) Industrial Service Team, (3) Public Relations Unit, and (4) Business Development Team.

Rajamangala University of Technology Krungthep (2019) has set the philosophy, vision, missions and structure of the management for the Research and Development Center to be composed of 1) Administration Unit, 2) Research Unit, 3) Training Unit, 4) Incubation Unit for Enterprise in University, 5) Technology Clinic, and 6) Labor Standard Examination Center.

Rajamangala University of Technology Thanyaburi (2019) has set the philosophy, vision, missions and structure of the Research and Development Institute to be composed of 1) Budget and Project Unit of the Center, 2) Document Unit, 3) Secretary Unit, 4) Administrative Unit, 5) Personnel Unit, 6) Premises Unit, 7) Public Relations Unit, 8) Research Policy and Plan Unit, 9) Training for Researcher Development Unit, 10) Quality Assurance Unit, 11) Research Information Unit, 12) Evaluation Unit, 13) Research Journal Unit, 14) Research Project Coordination Unit, 15) Finding Coordination Unit, 16) Commercial Innovation Support Unit, 17) Intellectual Property Management Unit, 18) Technology Publicity and Dissemination Unit, 19) Technology Clinic, 20) Research Publicity Media Unit, 21) Art and Culture Support Unit, 22) Art and Culture Conservation Unit, and 23) Art and Culture Museum Unit.

Bureau of Vocational Education Research and Development (2014) has the structure of the administration for Research Center that is composed of 1) Administrative Unit, 2) Policy and Strategy Research Unit, 3) Intellectual Property Research Development and Management Service Unit, 4) Innovation Research and Development Unit, and 5) Vocational Education Management Research Unit.

Phonphanthin (2004) suggested that compositions of research management includes: 1) Arrangement of Organization Pattern, 2) Personnel Management, 3) Budget Management, 4) Research Quality Management, 5) Assessment and Evaluation, and 6) Research Publicity.

Duangduean (2010) proposed that research administration is composed of 1) Organizational Structure, Philosophy, Visions and Missions, 2) Budget and Sources of Research Finds, 3) Assessment and Evaluation, 4) Research Information, Public Relations and Research Publicity, 5) Intellectual Property, and 6) Determination of Research Policy and Strategy.

At the same time, Ngoensuea (2016) stated that research administration is composed of 1) Research Policy, 2) Research Personnel, 3) Research Budget, and 4) Sources of Learning and Research Database System.

III. RESEARCH OBJECTIVES

To study on the direction of the administration of vocational research and development centers of vocational institutes in Thailand: systematic synthesis.

IV. RESEARCH METHOD

This research work uses the content analysis technique to construe the data attained from the sources. As suggested by Erlingsson (2017), data analysis consists of 4 steps as follows: 1) familiarizing oneself with the data and the hermeneutic spiral, 2) dividing up the text into meaning units and subsequently condensing these meaning units, 3) formulating codes, and 4) developing categories and themes.

1) Familiarization with Data and Hermeneutic Spiral an important initial phase in the data analysis process is to read and re-read the attained data while focusing on the main objectives. Write down initial impressions: use intuition.

2) Division of Texts into Meaning Units for Condensation the condensation should be a shortened version of the same text that still conveys the essential message of the meaning unit. Sometimes, a meaning unit is already so compact that no further condensation is required. Some content analysis sources warn researchers against short meaning units, claiming that this can lead to fragmentation. However, experienced research supervisors have shown that a greater problem for the novice is basing analysis on meaning units that are too large and include many meanings which are then lost in the condensation process.

3) Formulation of Codes the next step is to develop codes that are descriptive labels for the condensed meaning units. Codes concisely describe the condensed meaning unit and are tools to help researchers reflect on the data in new ways. Codes make it easier to identify connections among meaning units. At this

stage of analysis, data subject to with very limited interpretation of content, and may need be adjusted, re-done, re-thought about, and re-encoded until the interpretation is accomplished.

4) Development of Categories and Themes the next step is to sort codes into categories that answer the questions who, what, when or where by comparing codes and appraising them to determine which codes seem to belong together, thereby forming a category. In other words, a category consists of codes that appear to deal with the same issue, i.e., manifest content visible in the data with limited interpretation on the part of researchers. Category names are most often short and factual sounding.

V. FINDINGS

In this step, the research team applies the concept of Erlingsson (2017) to analyzing the data by inputting the data into the following table in order to divide data in categories of compositions and frequencies. Essential issues or statements are marked with a star (*) symbol. The findings are shown in Table I.

TABLE I
ANALYSIS ON THE COMPOSITIONS OF RESEARCH AND DEVELOPMENT CENTER, SYNTHESIZED FROM DOCUMENTS

Order	Compositions of Research and Development Center	Sources of Data																
		KMITL	KU	KMUTNB	KMUTT	RMUTK	RMUTT	CMU	KKU	NIDA	NU	VER, VEC	Siroi Phomphanthin	Duangduean Phutayanon	Saisuda Tiacharoen	Busara Saraket	Arusi Ngoensuea	Total
1	Arrangement of Structure, Organization		*									*	*	*	*			6
2	Personnel Administration					*		*	*				*	*	*		*	7
3	Budget Management, Budget Allocation		*				*	*		*	*		*	*			*	8
4	Research Quality Administration, Research Administration	*	*			*	*	*	*	*	*	*	*	*		*		12

Order	Compositions of Research and Development Center	Sources of Data																
		KMITL	KU	KMUTNB	KMUTT	RMUTK	RMUTT	CMU	KKU	NIDA	NU	VER, VEC	Sirof Phomphanthin	Duangduean Phutayanon	Saisuda Tiacharoen	Busara Saraket	Arumsi Ngoensuea	Total
5	Connection of Research System											*	*					2
6	Research Collaboration											*	*					2
7	Administrative Unit		*								*							2
8	Information System, Information			*			*	*		*	*		*			*		7
9	Intellectual Property Management	*		*		*					*		*	*	*	*		7
10	Publicity, Public Relations			*		*	*	*	*			*	*	*				8
11	Policy		*			*	*				*		*		*	*		7
12	Visions, Missions		*								*	*			*			4
13	Strategies		*								*	*			*			4
14	Academic Management Unit					*	*		*									3
15	Equipment Center													*	*			2
16	Administration Office	*		*		*		*	*									5
17	Industry	*																1
18	Research Promotion and Service Unit				*													1
19	Strategy and Communication Unit				*													1
20	Research Administration Unit			*		*												2
21	Specific Research Unit			*														1
22	Assessment, Evaluation		*			*	*	*				*	*					6

Data from table I are attained from the consent analysis on data from documents, journals, articles and other research works that are relevant to the research topic. From the reviewed literatures, it is discovered that there are 22 compositions of research and development centers if higher education institutes.

The research team implements the step of code formulation in accordance with Erlingsson (2017) by encoding essential issues or statements with a star (*) mark in order to categorize keywords in different groups on the bases of the meaning of phrases shown in step 2; and discovers that the data can be categorized in the following groups.

Phrases, Units in the Categories

- 1) Arrangement of Structure, Arrangement of Organization
- 2) Policies, Visions, Missions and Strategies
- 3) Human Resource Management, Personnel Management
- 4) Budget Management, Budget Allocation
- 5) Information System, Information
- 6) Research Quality Administration, Research Administration
- 7) Monitoring and Evaluation
- 8) Publicity, Public Relations
- 9) Intellectual Property Management

From the categorization of phrases and keywords, it is found out that the compositions can be divided into 9 categories which are the compositions of a vocational research and

development center of a vocational institute, namely: 1) Arrangement of Organizational Structure, 2) Policy, Vision, Mission and Strategy, 3) Personnel Administration, 4) Budget Administration, 5) Information System, 6)

Research Quality Administration, 7) Monitoring and Evaluation, 8) Publicity, and 9) Intellectual Property (IP) Management, which can be concluded as in Figure 1.



Figure 1. Model of the Compositions of R&D Center from the Review on Relevant Literatures

VI. DISCUSSION AND CONCLUSION

1) **Arrangement of Organizational Structure:** This is a process to formally allocate workloads or to separate work groups from one another in accordance with the appropriateness. Responsibilities and chain of command of each of all the work groups, as well as communication and coordination, should be set. In addition, resources need be allocated and power need be decentralized in the proper manner so that the R&D center can operate effectively. This idea concurs with the idea of Bartol and Martin (2003) who stated that the formation of an organization or a group should incorporate the determination of responsibilities and tasks, as well as chain of command, for each group in order that the R&D Center can work in the timely and effective manner.

2) **Determination of Policy, Vision, Mission, and Strategy:** This composition deals with principles or practice that have been set in order to guide an institute, group or individual to work towards the accomplishment of goals. This composition involves the determination of direction to which the organization moves

in the future to be agreeable to environs with the focus on intrinsic and extrinsic factors. This concept concurs with the idea of Carl (1963) who mentioned that the proposals or suggestions of direction for the work of personnel will lead to the accomplishment of the goals and make the operations by R&D center become systematic, navigated in a clear direction and leading to the accomplishment of the predetermined goals.

3) **Personnel Administration:** This topic involves the determination of Policy and plan to recruit, select and appoint researchers with capabilities, the development of research assistants with knowledge and capabilities that are related to research so that they can work with the highest capacity, the building of the culture that promotes the appreciation among researchers to one another's research work, and the building of morale in working in order that all personnel can work effectively to achieve goals. This idea concurs with the idea of Phonphanthin (2004) and Barnes (1995) who stated that personnel management is the support and development of researchers by making a plan to thoroughly develop researchers and to increase motives to motivate

lecturers or teachers to do more research works and to improve the efficiency of researchers in order to attain personnel with desirable attributes who work effectively to accomplish the goals.

4) **Budget Administration:** This composition is related to the planning and pursuance and management of funds and sources of funds in the systematic manner, with the revenue-expense balance statement that is concurrent with the activities or programs of the organization, a fund raising committee, regulations and guidelines for transparent and accountable fund allocation, and evaluation on the expense of research finds in order to ensure the highest possible benefits from the finds. This idea is similar to the concept suggested by Duangduean (2010) and Lau (2003) that Budget administration is the effective supply of budget and sources if funds by establishing a research fund raising committee, setting the method for the disbursement and expense of budget and the monitoring and assessment of research find expenses, as well as the personnel's participation in the administration of research budget.

5) **Information System:** This composition involves the collection of data used for processing and the analysis in order to turn data into information in various forms, which will be sent to personnel so that such information is used for supporting research works, administration, decision making, and stored in the systematic manner. This composition is allows related to the management of information through the connection of internet networks in order to access data in the country or any foreign country in order to support the research work, This remark is concurrent with the idea of Il (2010) and Gwaltney (2005) who stated that information system is the processing and development of system relating to data organization with computers and the systematic storage of data and multimedia files. At present, technologies have become advanced; thus, systematic data storage and retrieval are convenient.

6) **Research Quality Administration:** This composition includes the planing and determination of clear and systematic indicators of the research quality, with a committee to supervise the research work, and to support and encourage personnel to conduct research works that have quality and creativity, with the evaluation on each research work after the implementation and the publicity in nationwide and international scales. In addition, this composition includes the actions that enable the patent, copyright and other benefits from each research work to be registered and protected. Such ideas agree to the idea of Deming (1986) who suggested that quality control and publicity are tools for administration that incorporates 4 steps, namely, Planning, Doing or implementation of the plan, Checking the works done and find defeats or defaults from the check, and Action or to solve the detected defects or defaults in order to improve the work and system, which will in turn improve the quality of the research work to meet the predetermined goals.

7) **Monitoring and Evaluation:** This composition involves the consultancy, advice, monitoring and collect data on the progress of the research in time intervals. The assessment and monitoring are carried out before (pre-test), during and after (post-test) the research in order to facilitate the research to accomplish its objectives. This idea is agreeable to the idea of Stufflebeam (1990) who do the pre-test by assessing the environs, assessing during the research on research methodology and assessing the outcomes after the project ends. This will enable the researcher to accomplish the research objectives.

8) **Publicity:** This composition is a process that makes bodies of knowledge attained from the research accepted from target audiences through the public relations works on the composition of the research project and the presentation of research findings in academic fora, posters, printed media, websites, and newsletters inside and outside the country for publicizing the research findings. This concept concurs with the idea of Hall (1976) who stated that publicity is a process that leads to acceptance and denial of an innovative

research work.

9) **Intellectual Property (IP) Management:** is the composition that is the management of intellectual properties that emerge from research works and innovations, the support and the encouragement of the implementation of research findings for commercial purposes and the publicity of intellectual properties and the availability of IP database for the highest possible benefits from IP and the promotion of research works and innovations of the institute for the registration/patent of IP. This concurs with Feldman et al. (2002); Lee and Win. (2004) who stated that universities nowadays have offered more shares of benefits to researchers, which is a strategy for IP management and copyright registration. Universities use such an opportunity to do the commercial works and to promote more research works to be registered.

It was concluded from these studies was to Synthesize the compositions of vocational research and development institutes in Thailand: systematic synthesis. The findings from the study show that there are 9 compositions, which are: 1) arrangement of organizational structure; 2) determination of policies, visions, commitments and strategies; 3) human resource management; 4) budget management; 5) information system; 6) research quality management; 7) monitoring and evaluation; 8) publication and public relations work; and 9) intellectual property management.

VII. LIMITATION AND IMPLEMENTATIONS

From the study on relevant approaches, theories, documents and other research works, it is discovered that there are 9 compositions of the administration of vocational R&D centers of vocational institutes. Apart from the compositions, there should be the implementation of research findings, especially for commercial purposes. After the compositions of the administration of vocational R&D centers are studied on, there should be studies of integrated administration in order to generate bodies of

knowledge relevant to integrated research works. In addition, other variables, i.e., locations and environs of the vocational institutes in order to ensure effectiveness of operations.

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(Arranged in the order of citation in the same fashion as the case of Footnotes.)

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