

Development of Public Private Partnerships (PPPs) Guidelines for Vocational Education Provision Program in Industrial Trade

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Abstract

Collaboration in the provision of vocational education of state-private sectors is the key to success in building a quality workforce that can meet the demands of the labor market. This research examines the cooperation in the production of labor shortages in Thailand, especially in the field of industrial technicians. The researcher used a mixed-method research and divided the study into 3 phases in order to obtain the data from the relevant agencies. The results showed that there are 5 components of public-private partnership factors in the management of vocational education: 1) Management and Administration, the variance is explained by 12.948 percent; 2) Executive Roles, the variance can be explained by 11.988 percent. Component; 3) Policy to support cooperation, the variance is explained by 11.226 percent; 4) Coordination Links, the variance can be explained by 10.363%; and 5: Academic and Professional Cooperation, the variance can be explained by 10.266 percent. These components describe the factors of public-private cooperation in the management of vocational education; however, there are 3 approaches that can be drawn for the guidelines to promote the public-private partnership in the industrial technicians, namely 1) School-based Collaboration; 2) School and Enterprise Based Collaboration; and 3) Enterprise-based Cooperation.

Keywords: PPPs, Vocational Education , Program in Industrial Trade.

1. Introduction

The current economic and social development of Thailand places great emphasis on human resources development. The direction of the 12th National Economic and Social Development Plan (2017-2021) focuses on the development of labor productivity by creating cooperation between the public and private sectors to develop manpower and skilled workers in accordance with the needs of the labor market in the ASEAN Community. The cooperation aims at upgrading the competence of Thai workers in terms of technology to compete in the labor market and encouraging entrepreneurs in the industrial and service sectors to establish a framework for Professional qualifications and labor skill standards as well as to develop the potential of people of all ages, especially the working age to increase the productivity of the country (Department of Labor Development, 2017). In this regard, vocational education is a main tool used to develop the country production of quality workforce into the labor market, and it is an important mechanism in the growth of workers in the industrial sector through cooperation from the public and private sectors. The implementation of the public sector involvement in public service projects aims to increase the efficiency of services. The government encourages the private sectors to invest in education based on the World Bank's concept, which is defined as a contract between the public and private sectors to provide education in accordance with both the quantity and the quality. There are three types of education services and educational practice: education voucher or subsidies, private management of schools and private finance initiatives for school construction (Patrinos, Osorio & Guaqueta, 2009). Research on the development of public-

private partnerships in the management of vocational education in terms of industrial technicians is, therefore, a study that presents an appropriate approach for public-private cooperation for Thailand and other areas of the similar contexts. Thus, the cooperation between the public and private sectors will lead to the production of quality workforce into the labor market by using the resources available from both sectors to maximize the benefits as the goals set forth.

2.Literature Review

Concepts and Theory of Vocational Education

The meaning of vocational education as the author has compiled from the textbooks and academic documents can be summarized into two aspects as follows:

First, vocational education is as a means of preparing human resources to enter a job market or career world. It refers to the process of developing human resources in terms of knowledge, skills and attitudes to meet the needs of the labor market. In other words, it is the development of manpower at the semi-skill level, skill level, technical level and technology level both internally and externally in order to achieve equality according to the competency of each profession. (Royal Institute, 2012; Office of the National Education Commission, 2008; Ramwarangkoon, 2011).

Second, vocational education is as a means of career education. It refers to the application of knowledge gained from knowledge enhancement and short-term or long-term vocational skill training to engage in honest occupations as practitioners or independent professionals until one is able to live their lives happily. (Wattananarong, 1995; Ramwarangkoon, 2011; Calhoun and Finch, 1976; Sarkees-Wircenski and Scott, 1995).

In the beginning of the 18th and 19th centuries, the country's industrialization required a lot of manpower, the vocational education developed into the preparation of people for factories, and there has been an extensive public hearing until the establishment of the National Education Industry Promotion Commission, the establishment of the National Vocational Education Office. The 16 vocational theories proposed by Prosser (Prosser & Quigley, 1949) remain a key principle in vocational management today. The main content of the theory focuses on the Management of teaching and learning in vocational education in terms of environment, learners, instructors, resources, teaching and learning, budget, as well as effective management to lead to the production of quality manpower for the country. However, the provision of vocational education in Thailand according to the Vocational Education Act 2008 consists of 3 models as follows: (Office of the National Education Commission, 2008).

1. Formal education is the management of vocational education that focuses on education in educational institutions or vocational institutions. It is with the determination of aims, study methods, courses, durations, measurements and assessments which is a condition of certain graduation which can provide education in the form of classroom and set the course time that the students have to study regularly like high school education. When students graduate, they will receive a vocational certificate from the Office of Vocational Education Commission.

2. Non-formal education is to provide flexible vocational education by determining the aims, format, method of study, duration of measurement and evaluation as a condition of graduation. The content and curriculum must be appropriate and consistent with the conditions and needs of each individual group. At present, non-formal education is mostly a short-term training course and the framework of short-term curriculum standards is established to define competency according to the Professional qualifications framework in each profession.

3. Dual system is the management of vocational education arising from an agreement between an educational institution and workplace of the state enterprises or government agencies in the subject of curriculum, teaching, measurement and evaluation where students spend part of their time studying in the schools and take practical lessons in the workplace. In other words, it is the provision of vocational education and vocational training through cooperation between the vocational schools and enterprises which require theoretical classes or some basic practice in a vocational school and vocational training in an enterprise with a training supervisor who is a person assigned by the enterprise to coordinate with the school in the management of dual system and is responsible for the supervision of the student's Professional training.

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PublicPrivatePartnerships

PublicPrivatePartnerships – PPPs is a form of operation whereby the state allows the private sector to participate in the implementation of public service projects to increase the efficiency of services and operations. The goal of PPPs is to provide cost-effective services rather than government ownership or state implementation. For Thailand, the government has issued an Act to encourage the private sector to invest in state affairs, B.E. 2013 (Government Gazette, 2013). The framework of the Act stipulates principles for the private sector to invest in state affairs. By contracting a variety of formats which education management is one of the activities that the government encourages the private sector to participate in investment (Opt-in). The government encourages the private sector to participate in educational support in various projects, such as public-private partnerships in educational development strategy projects. The Strategic Project for Educational Development emphasizes 10 aspects: Transparency, Digital Infrastructure, Marketing Mechanism, Curriculum and Teaching Techniques, High Quality Principles, Health and Heart, Local and International, English Language, Educational Hub, and Young Leadership Development.

In addition, the government has initiated CONNEXT Ed (School Partner Leadership Program), Young Leadership Program, University of Research Excellence Program, Pracharath (Public) School Project and the Partnership School Project. All Project implementation is an opportunity for the private sector, local community, leaders and parents as well as universities in the area to provide flexibility in school management and jointly developed educational institutions to be a source of lifelong learning for the community.

The Current Status of Work Force in the Industrial Sector

From the analysis of the country's manpower trends as a whole, Thailand is lacking manpower in the industrial sector. This problem reflects the facts about the country's educational management structure that focuses on learners studying in the general education rather than vocational education which cannot meet the needs of the country's industrial growth. The more attractive wage factor in other sectors has made the workforce less interested in preparing to enter the industry. In addition, the problem of aging society in Thailand also affects the production of manpower into the industrial sector. Studies have shown that the most shortage of manpower in most industrial sectors is manufacturing. Labor problems in the Thai industrial sector are moving workers to factories in the same industry. This reflects the problem of higher wages but still unskilled workers including the problem of labor migration to businesses in the service sector. Solving the problem of unskilled workers can be developed by providing training to increase workers' skills. But such an approach is only a short-term solution measure. As for the long-term solution, it is necessary to increase the productivity of industrial workers to be ready in terms of knowledge, skills, abilities, characteristics and good attitudes at work to be able to respond to the demands of the labor market and create manpower to have quality and qualifications as the enterprise needs (Ministry of Industry, 2015).

3. Objectives Of The Study

- To study the nature of cooperation between the public and private sectors in the management of vocational education in Thailand and abroad.
- To investigate the status and conditions of the development of cooperation between the public and private sectors in organizing vocational education in the industrial technicians.
- To propose the guidelines for cooperation between the public and private sectors in organizing vocational education in the industrial technicians.

4. Methodology

This research is a mixed-method research between quantitative and qualitative research methods which consists of Factor Analysis, Content Analysis, and Focus Group. It is carried out as the following steps:

Phase 1: The researcher analyzed the nature of cooperation between the public and private sectors in organizing vocational education both in the country and abroad. The researcher studied preliminary documents from primary and secondary sources both domestically and internationally using the Content Analysis method, and applied the conclusions from the first phase to formulate a conceptual framework in drafting a questionnaire to be used to survey the status, factors and conditions of cooperation from the public and private sectors in organizing vocational education in Thailand.

Phase 2: The researcher studied the status and conditional factors of the cooperation between the public and private sectors in the provision of vocational education in the category of industrial technicians with a population of 2 groups. First, the researcher planned to survey the vocational school administrators, Deputy Directors for Planning and Cooperation and heads of related departments in the vocational schools under the Office of Vocational Education Commission of 122 schools. All the vocational schools surveyed provided instruction in the industrial technicians and majors related to the auto motive industry. The researcher randomly assigned 3 people to study in each population, a total of 366 people. Second, the researcher studied management group of the workplace which consists of personnel managers and head of automotive parts by using demographic data from the enterprises that are members of the Thai Automobile Industry Association in the category of car assemblers and importers and a total of 125 automotive parts manufacturers, 3 each, totalling 375 people. The sample size calculation should be at least 5 times the number of questions (Hair, Black, Babin& Anderson, 2010). Therefore, out of a total of 45 questions, the appropriate sample size is at least 225 people, but since the response rate of the questionnaire is about 80% (Wiratchai, 1999), the sample size should be at least 282 people. In this study, more than 300 subjects were used in each cohort, and at least 200 were appropriate for the research data (Hair, Black, Babin& Anderson, 2010). In this study, the researcher used a total sample of 741 people from both groups. The research tool used in Phase 2 was a Prototype Questionnaire developed from Phase 1.

The research instrument was a questionnaire, which its validity was reviewed by 3 experts. The researcher then used the questionnaire to experiment with a sample of 30 people and the results were calculated for Reliability, and the alpha coefficient of the questionnaire was .97. The data were analyzed using basic statistical values such as Mean, Percentage, Standard Deviation and Exploratory Factor Analysis (EFA) by means of extracting elements with “Principal Component Analysis” and rotating Varimax orthogonal axis to minimize the number of variables.

Phase 3: The researcher determined the guidelines for cooperation between the public and private sectors in organizing vocational education in the industrial technicians. Using purposive sampling, the qualitative data were obtained from Focus Groups Discussion which consisted of 1) representatives from the Vocational Education Commission, 2) vocational school administrators, 3) representatives from industry, and 4) Department of Skill Development, Ministry of Labor. Meanwhile, the issues raised in the group discussion included the cooperation guidelines of the public and private sectors in the management of vocational education in the category of industrial technicians suitable for Thailand and the possibility of developing cooperation and the conditions for the development of public-private partnerships in vocational education. Then, content analysis was with the qualitative data.

5.Conclusion

Characteristics of cooperation and components of cooperation between the public and private sectors in the provision of vocational education in the industrial technicians

From the study in foreign countries, it was found that the success of promoting cooperation from the public and private sectors, it is concerned with a policy factor in organizing vocational education, policy measures that facilitate cooperation awareness of local people, and relationship and coordination of local and educational institutions. Such factors can be applied in Thailand wherein the relevant sectors need to consider adjusting the curriculum to become more acceptable and in line with skill standards, professional qualifications as well as meet the needs of the labor market in Thailand. Policy formulation that facilitates public-private partnerships must focus on the interests of learners, workforce and the partners both from public and private sectors as such. In line with the theory of vocational education (Prosser and Quigley, 1949), vocational education must take into account the needs of the labor market and the actual condition of the present according to the needs of the learners or a group of people. In terms of learners, it is necessary to create as much as possible for them to learn from direct experience in the workplace. In addition, it was found that the components of public-private partnership cooperation can be divided into several factors as follows:

Environment of the organization / workplace consists of 2 sub-components as follows:

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1) Culture of organization/ workplace In fact, each organization has a collaborative culture of working together both internally and externally which will create mutual benefits for all parties. Collaboration must emphasize practice that is engaging, friendly, and flexible and adaptation to create concrete practices (Amornvuthivorn, 2016; Sukhararom, 2013; Mattessich, Murray and Monsey, 2001; London, 1995). Building synergies in collaboration also increases awareness of the action capabilities of both public and private policies (McGuire, Agranoff& Silvia, 2010).

2) Organization members /leaders They are interested to see the importance of cooperation with confidence and good relationship, focusing on the practice of success which can create good feelings for each other. It fosters recognition and appreciation of cooperation (Huxham&Vangen, 2013; McGuire, Agranoff& Silvia, 2010; Argranoff& McGuire, 2003; Mattessich, Murray & Monsey, 2001; Maeroff, 1983). In addition, organizations should select partners who have a good relationship with each other and have experience in operation to get a real partner (Tucker 2012; Ansell & Gash, 2008; Thomson & Perry, 2006).

Management structure consists of 8 sub-components as follows:

1) Laws/regulations supporting laws or policies The public sector plays a role not only in state operations, but it also plays a role in the implementation of the private sector to participate for mutual benefits or solutions. This role requires the promotion of ongoing cooperation. (Amornvuthivorn, 2016; Chaisirithanya&Janaksorn, 2015; McGuire, Agranoff& Silvia, 2010; Argranoff& McGuire, 2003). The relevant departments must have policies and planning that are consistent with their joint actions, having coordination which can lead to problem solving and thorough development (Chum-Art & Kalayanamit, 2017; Tucker, 2012).

2) Flexible management It is an important component to cope with the changes in today's world where technology is developed together with a large amount of information that is rapidly spreading. Collaborative management, therefore, requires flexibility for effective decision-making and operations, as well as the acceptance of change and adaptation between the public and private sectors (Sukhararom, 2013; Argranoff& McGuire, 2003; Mattessich, Murray & Monsey, 2001; London, 1995; Maeroff, 1983)

3) Transitional Committee Such committee has administrative duties in making decisions or performing tasks related to the framework of cooperation between organizations in possible and timing manners. The establishment of a dedicated committee to oversee cooperative activities will lead to a working group responsible for the cooperation project, defining the role of decision-making power to make operations more streamlined (McGuire, Agranoff& Silvia, 2010).

4) Strong education system Stable education system standards and strengths will build confidence in the quality of education in the production of manpower which can operate effectively (Tucker, 2012).

5) Leadership It is the ability of a person to influence another person's behavior. This directs others to be active and successful in the direction of the group or organization (Koontz & Wehrich, 1988: 437; McFarland, 1979:303). Leaders should transform their roles into quality controllers and mentors having interest and cooperation. This will lead to achieve the goal set. (Amornvuthivorn, 2016; Sukhararom, 2013; Ansell & Gash, 2008; Mattessich, Murray & Monsey, 2001).

6) Political stability Without political stability, the operations of the public or private sectors are uncertain, becoming obstacles to long-term development planning and unable to build confidence in the country's administration policy. This will ultimately affect the cooperative operations of the organization (Tucker, 2012).

7) Policy implementation Policies should be concrete and can be put into practice. (Chum-Art & Kalayanamit, 2017; Tucker, 2012).

8) Good governance It is a management principle that promotes creative work, efficiency and supports the organization to have potential as well as create confidence in the organization, building trust in working together and continually developing. This is a key component of public-private partnerships (Chaisirithanya&Jenaksorn, 2015; Tucker, 2012; Thomson & Perry, 2006).

Cooperation contract Roles, responsibilities, and detailed agreements should be clearly defined by categorizing the roles and responsibilities of the working members, risks, income and others. The creation of a

cooperation contract must go through a process of participation of the members of the organization which is consistent and responsive to the vision of the organization (Chum-Art & Kalayanamit, 2017; Chaisirithanya & Jenaksorn, 2015; Sukhararom, 2013; McGuire, Agranoff & Silvia, 2010; Mattessich, Murray & Monsey, 2001; London, 1995; Maeroff, 1983).

Motivation for participation consists of 2 sub-components as follows:

1) Desirable benefits All parties involved in the operation need to consider the benefits or compensation in the form of wages which is the fundamental factor expected from work. As for working to achieve the objectives, it is the main objective that is expected. This also includes the value benefit of the feeling that arises in building cooperation as well as feelings of self-worth in a moral way for a public sacrifice which can encourage working together (Ansell & Gash, 2008; London, 1995; Maeroff, 1983).

2) Promotion measures from the government Government support plays an important role in making the private sector interested in working with the government, such as tax promotion measures. The private sector sees opportunities in terms of income or results that will be received in monetary terms. However, there should be public relations to inform the private sector about the benefits that will be received. (Chum-Art & Kalayanamit, 2017; Chaisirithanya & Jenaksorn, 2015; Argranoff & McGuire, 2003).

Coordination It is communication that makes time effective in carrying out activities or responsibility resulting in a commitment to work and building trust through communication that is both formal and informal (Mattessich, Murray & Monsey, 2001). Coordination is also an academic collaboration, sending information to each other and having problem solved together which enables cooperation in the agile operation (Chum-Art & Kalayanamit, 2017; Sukhararom, 2013; McGuire, Agranoff & Silvia, 2010; Maeroff, 1983).

Intent to work together consists of 8 sub-components as follows:

1) Common purpose Having a common purpose aligns the view of development, and there is certainty to lead the practice together towards the goal and problem solving together (Sukharam, 2013; Mattessich, Murray & Monsey, 2001; Maeroff, 1983).

2) Participation in decision making This can cause brainstorming from building cooperation, consensus and readiness to share potential risks (Huxham & Vangen, 2013; Sukhararom, 2013; Thomson & Perry, 2006; Mattessich, Murray & Monsey, 2001; London, 1995). Thus, participation in decision-making can begin at the planning, implementation and execution of the project or activities, as well as joint decision-making in collaborative evaluation.

3) Learning and accepting each other Learning can take place in organizations that operate in the same direction or have a common goal which learning will bring about exchange of knowledge between each other, integration and working as a team for the benefit of both knowledge and experience, collaborative learning and mutual acceptance (Huxham & Vangen, 2013; Mattessich, Murray & Monsey, 2001; London, 1995).

Resource It is an important aspect of vocational management principles (Prosser and Quigley, 1949). Resources are also meant to cover the areas, materials and tools used for learners to practice their skills, which can create a virtual working experience with real work in the workplace for them as well as supporting the budget for educational management. This is because vocational education has a high cost per individual (Chum-Art & Kalayanamit, 2017; Huxham & Vangen, 2013; Thomson & Perry, 2006; Argranoff & McGuire, 2003; Mattessich, Murray & Monsey, 2001). Resources also include factories or enterprises affiliated with the school (Factory School) (Tucker, 2012). Resources that provide work experience training will serve as a learning resource that empowers learners. Work experience training is to meet the standards of the establishment in the industry, and it is a challenge for students to experience the real world of working in a real workplace. The number of teachers and trainers must be sufficient, and they are able to access resources thoroughly (Huxham & Vangen, 2013).

Good image of vocational education If the management of vocational education has the quality of creating manpower with knowledge and skills and ability to work, and they are able to come up with inventions to solve problems, it can help enhance the image of vocational education, leading to greater acceptance and appreciation (Tucker, 2012).

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Encouraging stakeholders to participate When considered in an educational context, stakeholders may be parents, communities and localities who will be able to participate at which some level to reduce the pressure that may arise from the operation of the collaborative partners (Amornvuthivorn, 2016). The stakeholder may not be a partner, but will be those having a direct effect by vocational education management. Therefore, when encouraging stakeholders to participate, there should be an attention to those involved in the surrounding as well. The nature of cooperation between the public and private sectors in the provision of vocational education may be in many forms depending on the context of the vocational schools and enterprises or based on mutual agreement (Tilak, 2016; Chaisirithanya&Janeaksorn, 2015). The characteristic of cooperation between the public and private sectors is, therefore, diverse in terms of investment, management and service as well as the development of inputs, processes and outputs. When a public or private investor is significant in a common context or objective, these characteristics may be appropriate in different contexts, too. In this article, the researcher has summarized the characteristics and the public-private partnership approach in managing vocational education in the industrial technicians in 3 types, namely education coupon cooperation, making a memorandum of understanding and long-term investment contracts with a framework for cooperation in the field of teachers, curriculum or method of teaching and learning, learners and management.

Components and factors of cooperation in the organization of vocational education in the industrial technicians between the vocational schools and enterprises

The above study led to the creation of a 45-question questionnaire with data from a sample of 628 people (84.75%). From the group of vocational schools and enterprises with different opinions on certain issues, t-test analysis was used to find consistency or differences in the sample for homogeneous. In the analysis, it was found that there were 15 questions of the clauses were significantly different at 0.05. Therefore, the question has been eliminated, and the remaining questions were taken for further analysis. When examined, the data were found to be suitable for the exploratory component analysis, Kaiser-Meyer-Olkin measure of sampling adequacy=.919 which is appropriate at the highest level. The researcher applied the Exploratory Factor Analysis (EFA) by using Principal Component Analysis (PCA) extraction method, which is in the Common Factor Analysis group. Using the method of rotation of the element axis that makes the factors rotate perpendicular to each other (Orthogonal) which is Varimax and each element weighs more than 0.3. Out of a total of 30 factor variables, a total of 5 factors can be grouped, and 56.792 percent of the variance of the combined data can be accounted for (Streiner, 1994).

Table.1. The statistical value of factor extraction as cooperating components of educational management of vocational education in the industrial technicians between vocational school and enterprises.

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.339	37.795	37.795	11.339	37.795	37.795	3.884	12.948	12.948
2	1.713	5.711	43.506	1.713	5.711	43.506	3.596	11.988	24.936
3	1.564	5.212	48.718	1.564	5.212	48.718	3.368	11.226	36.163
4	1.275	4.250	52.968	1.275	4.250	52.968	3.109	10.363	46.526
5	1.147	3.824	56.792	1.147	3.824	56.792	3.080	10.266	56.792

Table.2. Factor loading of the cooperative factor components of educational management of vocational education in the industrial technicians between vocational schools and enterprises

No.	Factors of cooperation in organizing vocational education in the Industrial Technicians	Factor Loading
Component 1: Management and Administration		
1	The school management has the ability to build cooperation with international networks in the production or development of the curriculum to support the ASEAN community.	0.603
2	The school has formed committees together with enterprises to determine the direction of educational management through cooperation in vocational education.	0.623
3	The government has a stable educational policy.	0.509
4	The school administrator has a good understanding of the context of administration and vocational education.	0.552

No.	Factors of cooperation in organizing vocational education in the Industrial Technicians	Factor Loading
5	There are political stability and government support policies.	0.575
6	The school has determined the learning outcomes according to the competencies that correspond to the needs and standards of the labor market/enterprises.	0.525
7	The school has created and developed courses with the enterprises.	0.428
Component 2: Management Roles		
1	The school administrator has knowledge of participation in educational management in terms of vocational education and enterprises.	0.662
2	The school administrator has realized the importance of joint education in the public and private sectors.	0.676
3	The school administrator has the ability to build networks of vocational education with enterprises.	0.653
4	The school administrator can work cooperatively with enterprises in vocational education.	0.607
5	The school has a concrete policy that can be put into practice and real cooperation.	0.589
Component 3: Policy Supporting Cooperation		
1	The school supports cooperation in curricula with the enterprises.	0.751
2	The school supports cooperation in training with the enterprises.	0.714
3	The school supports cooperation in teacher/educational personnel development with the enterprises.	0.490
4	The school supports cooperation in learning resources with the enterprises.	0.557
5	Government policies support cooperation in joint education arrangements between the public and private sectors.	0.547
6	The organization has laws or regulations that support public-private partnerships.	0.507
Component 4: Coordination Link		
1	The school joins with the enterprises for a cooperation agreement in the provision of vocational education.	0.457
2	The school works with the enterprises to determine the roles and duties, responsibility and agreement clearly.	0.456
3	The school and enterprises benefit from cooperation in vocational education.	0.543
4	There are measures to promote cooperation between the school and the private sector / enterprises such as tax reductions, etc.	0.617
5	The school and enterprises have both formal and informal communication channels.	0.742
6	The school and enterprises have the aim of producing and developing quality manpower together.	0.691
Component 5: Academic and Professional Cooperation		
1	The school has academic and professional cooperation to develop learners with the enterprises.	0.624
2	The school has academic and professional cooperation to develop personnel with enterprises.	0.660
3	The school has experience in creating cooperation with enterprises in organizing vocational education.	0.649
4	The school has received funding for teaching materials from the enterprises.	0.741
5	The school has cooperation with the enterprises in providing support of media and learning resources.	0.548
6	The school has encouraged local communities to participate in cooperation with the enterprises in organizing vocational education.	0.536

From the group discussion, the experts agreed on 5 components above, and further comments have been made in each component as follows:

Component 1: Management and Administration The vocational school administrators or directors should be united in policy and diversified in practice. Co-management and administration must be verifiable and can direct the operation which is in line with the requirements of the enterprises and the readiness of the school itself. In the process of cooperative administration, there must be an analysis of vocational education guidelines appropriate to the context and the implementation of the policy of the vocational schools in a concrete manner. In seeking networks and signing cooperation, there should be a focus on personnel preparation and budget planning. In addition, the planning must prepare courses, materials and facilities, including scheduling audits at various stages such as work preparation, operations, and results, etc. The principles of vocational education administration need to emphasize the importance of output rather than input and to allow relevant agencies to participate in vocational education between the public and private schools and enterprises.

Component 2: Management Roles The administration of vocational schools in accordance with the laws and regulations under the policies and objectives of the Office of Vocational Education Commission is essential

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to the success of the development of the quality of vocational education. In particular, building a network to improve the quality of vocational education should encourage all parties to participate in the formulation of policies for community development, promoting education and development in teaching and learning management to create a network of cooperation domestically and internationally. In relation to vocational education under Section 8 of the Vocational Education Act, B.E. 2008 to produce manpower, the development must be carried out to meet the needs of the enterprises. In addition, the management of the vocational schools and enterprises must understand the importance of joint development in order to produce the quality manpower in related industries. School administrators can be regarded as important persons in setting the direction for successful management of vocational education cooperation according to the educational philosophy, and they should always look to the future of the need for higher vocational workforce due to business expansion and technological development as well as continuous information media to Thailand 4.0.

Component 3: Policy Supporting Cooperation The Ministry of Education has a clear policy for the private sector to play a role in cooperation from the policy level to the practical level by ordering the Ministry of Education No. 245/2020 on the appointment of a joint public and non-governmental subcommittee to produce quality work force and Vocational Education Development. Such cooperation will lead to the role of setting guidelines together with relevant agencies to develop professional standards in each occupation cluster and to develop vocational courses, setting guidelines to promote and support the expansion and upgrading the quality of vocational education management. The policy also focuses on supporting training for the development of teachers in schools and trainers in the workplace. The vocational schools and enterprises should continue to operate in accordance with the common mission framework. In addition, vocational education emphasizes the integration of courses in the vocational schools. This corresponds to the provision of professional experiences for learners and is implemented in accordance with the principles of cooperation in accordance with the framework of the Vocational Education Act 2551, especially in the development of manpower in accordance with the needs of enterprises. The framework also focuses on the development of manpower for enterprises by developing courses, practice plan, and evaluation of use of human resources and specialized tools as well as buildings for quality production. The vocational schools should formulate technology exchange policies, production or operation, especially in the field of Automation and IT, where the private sectors are more advanced than the vocational schools.

Component 4: Coordination Link As for the enterprises, there is a need for government support in organizing vocational education with clear promotion measures for the vocational schools and enterprises covering both public and private colleges. The government should study ways to amend laws or guidelines for budget allocation for school graduates to enter the professional labor market. In general, cooperation between the vocational schools and enterprises is a contract of cooperation or memorandum of understanding (MOU), which has a difference in duration. The issue of cooperation may be in terms of curriculum development, accepting students for career training internships, teaching management and budget support, etc. Each party has clearly defined roles and duties and is coordinated at all times.

Component 5: Academic and Professional Cooperation The vocational schools and enterprises should work together to formulate a learning plan and vocational training plans that correspond to the curriculum, taking into account the competency standards set forth in the curriculum and in accordance with the vocational education standards. The framework of the partnership also includes the sharing of resources for learning management and vocational training plans. Also, the enterprises can support tools, equipment and machines that are not used, but still in good condition, to the vocational schools for teaching and learning purposes. In this regard, the vocational schools need to prepare their students to gain skills in the workplace. The students will have the opportunity to use the tools and machines used in the actual operations used in the workplace, whereas graduates of all levels of vocational education must have the qualifications according to the Vocational Education Standards B.E. 2562 (2019) and have the expected competencies, resulting from the cooperation between vocational schools and enterprises.

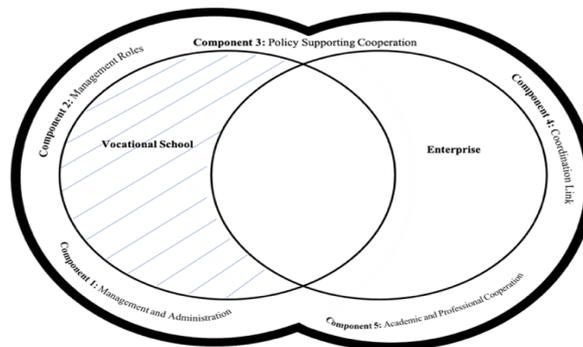
Guidelines for cooperation in the provision of vocational education in the industrial technicians of the vocational schools and enterprises

From the questionnaire, it was found that most of the respondents wished to have a cooperation between the public and private sectors or between vocational school and enterprises. In terms of the guideline, the cooperation should be in the form of a Memorandum of Understanding (MOU), which is an intention indicating the willingness to join the cooperation according to the agreed terms, but it is not a binding contract. The MOU will have to show details of cooperation in various fields with requirements and clearly explain the roles, duties and responsibilities of each party. The terms of duration of the MOU may not be equal to the length of the contract which requires flexibility.

In addition, from the group discussion of both representative from the vocational schools and enterprises, it was found that the cooperation between the public and private sectors in organizing vocational education is divided into 3 guidelines. These obtained from such recommendations are feasible and suitable for vocational education in the industrial technicians in automotive-related fields in Thailand. The details of the guidelines are as follows:

Guideline 1: School-based Collaboration is a guideline in which the vocational schools are getting the main roles in the cooperation, while the enterprises are supporters as illustrated in Figure 1.

Figure.1 The School-based Collaboration

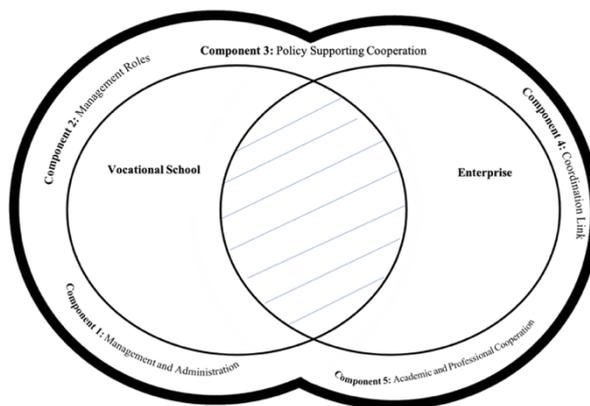


From Figure 1, it shows the cooperation that the vocational schools will be the principal in the educational management by which the enterprise will be participating in the budget support and resources necessary for teaching and learning in the automotive section. The enterprises can choose to make a donation, instead because there are limitations on a legal issue. When sharing the use of tools in the joint partnership project or the use of the land of the vocational schools that is not a juristic person, they do not have the absolute power in deciding whether the enterprises can invest in the vocational management. There is still a controversial in terms of Thai law. This, indeed, needs revising. In practice, most enterprises provide large, expensive machines or large equipment used for teaching and learning purposes. Such machines are tools that the enterprises actually use them, and they are a modern tool that can still keep up with the changes in technology. In the framework of School-based Cooperation, the enterprises support only the budget, but they do not participate in teaching and learning management or jointly develop the curriculum in any way; however, they may have an intention to create a corporate image demonstrating Corporate Social Responsibility (CSR). As for the vocational schools, the main role is to be ready for teacher management by providing enough teachers according to the field of study, and classrooms that can support both theoretical and practical lessons. This kind of cooperation can be made through discussions to build a network of projects which may not require any contracts or memorandums.

Guideline 2: School and Enterprise Based Collaboration is an approach in which the vocational schools and enterprises participate in equal roles as shown in Figure 2.

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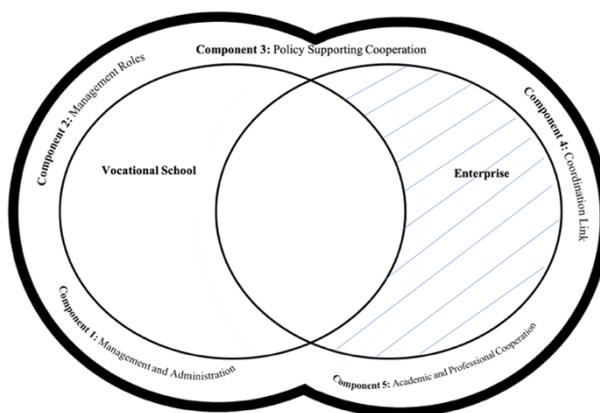
Figure.2 The School and Enterprise Based Collaboration



From figure 2, it shows the cooperation of vocational schools and enterprises that are clearly collaborative. In the aspect of management, the vocational schools and enterprises can cooperate based on the Partnership School Concept. That is- this type of cooperation aims to be responsible to learners with participation from all sectors in order to enhance the quality of education focusing on management, curriculum development and activities within the schools. The framework of cooperation will reflect the co-development of quality learners and will evaluate the success of the project together. In teaching and learning management, this can be operated based on the nature of vocational management in the form of a Dual System or Work Integrated Learning. Work integrated learning approach is similar to the dual system, but it doesn't have the same exact requirements as the dual system. This depends on the mutual agreement between the vocational schools and the enterprises. However, the dual system has clearly defined standards both in cooperation management of the practical part for learners in the workplace in which the enterprises will be involved in from the beginning to the evaluation process. Therefore, in the work integrated learning approach through partnership school cooperation, the vocational schools will receive support in terms of budget, specialized professional knowledge, teacher development and practical training for learners in the workplaces. The enterprises will benefit in terms of tax incentive, corporate publicity, image creation and corporate human resources development. This cooperation framework still requires government support in terms of policy and measures in many ways to attract the enterprises to participate in the project. However, this kind of cooperation can also require a memorandum of understanding (MOU) for incessant cooperation.

Guideline 3: Enterprise-based Cooperation is an approach in which the enterprises are having the main roles in cooperation, while the vocational schools are supporters as illustrated in Figure 3.

Figure.3The Enterprise-based Cooperation



From figure 3, it shows the cooperation at which the enterprises take the main role in the provision of vocational education. They will be fully assumed the role of teaching and learning management and have

readiness in terms of budget, location, tools, machinery, equipment and personnel. The enterprise administrators are having a policy to develop their human resources in the automotive industry and develop vocational education management in which they are ready to prepare the infrastructure of school buildings, actual working environment, machines, tools and various equipment used in the teaching and learning process in their premises. In this regard, the vocational schools can use the space for teaching and learning, and the enterprises will be cohorts of all educational management resources. Both parties will bind with a strong cooperative agreement, having a participation in curriculum-based competency analysis as well as joint recruitment in human resources to be used in the teaching and learning process. Therefore, teachers from the vocational schools, trainers in the enterprises and outsider-guest speakers will be those who have expertise to teach as well. In most cases, the teachers from the vocational schools may join to teach in general subjects or in the core courses only. Furthermore, the following reflections from the enterprises are worth considering, for some issues about law and regulation need to be formulated for better operations.

“...the enterprise can cooperate because the owner management sees the importance of developing manpower and human resources and great opportunities in this...”.

“...the enterprise made an MOU agreement together for 3 years, and had to choose it because the school administrator was changed and the new one focused on other fields more...”.

“...May be there will be cooperation or it will be difficult to attract the enterprises to join because we will do many things, but it is stuck in many regulations...”.

From the cooperation of the public and private sectors in organizing the vocational education in the industrial technicians, it was found that most of the vocational students in this field are in repair work, bodywork, engine inspection and automotive parts production. Most of the enterprises that come into cooperation, more than 90 percent, are the large enterprises that are ready and saw the importance of co-production of manpower. In seeking cooperation, the vocational schools must consider the potential enterprises with ability to create opportunities for students upon their future career in the labor market. The students will be recognized for their potential and standards of performance. Most importantly, the enterprises will also consider the importance of school administrators, especially in the field of automobiles.

6. Discussion

From the findings in the study of the factors of cooperation between the public and private sectors in the provision of vocational education in the industrial technicians, especially those related to automotive technicians, there are implications in the five components found. For component 1 Management and administration are more collaborative for quality development when all parties have a consistent policy and a joint committee set up to mutually determine the policy direction or guidelines for the implementation of cooperation (Methakunawut, 2003). In addition, policies from the government are the most important factors in promoting and motivating the enterprises to participate in vocational education (Thirasirikul, 2016). As for component 2, the role of the administrators is consistent with the research carried out by Homsuwan, Meejang, Jansila&Pupat (2013), it was found that the school administration committee must be involved in the operations, considering to engage all parties concerned, especially in participatory work between the vocational schools and enterprises. According to the study by Srikhamnuan, Thongnil& Boonsong (2017), it was found that one of the factors affecting the dual system is the school administrator. They will have to work to coordinate and create networks with the enterprises for smooth and constant cooperation. Regarding component 3, the policy to support cooperation, it convinces the result of the previous study by Srichhompoo (2014) and Nori (2013), suggesting that one of the success factors in managing the dual system is policy of the vocational schools in promoting the collaboration. Also, the government should enact laws, rules and regulations to encourage large vocational schools to provide a dual system in as many workplaces as possible, enacting a law to support those trained in the dual system to work in the workplace for each occupation (Preewan, Baongern, &Wongsirasawat, 2016).

As for component 4, coordination and linkage, there should be measures included in promoting collaboration, such as tax incentive for the provision of dual system or vocational education between the schools and enterprises (Preewan, Baongern, &Wongsirasawat, 2016). Cooperation in organizing the vocational education, all parties must understand their roles, yet they can proceed according to the cooperation contract as

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well as opening up for both formal and informal coordination (Srichompoo, 2014; Methakunawut, 2003). For component 5, academic and professional cooperation, it supports the previous study by Kaiser's (2000) that academic leadership, knowledge, understanding of vocational programs, support and promotion of academic excellence and teaching and learning management are factors to be taken into account. The vocational schools and enterprises can develop learners' competency together with supervision of teaching and learning in accordance with the established standards. Based on the study by Preewan, Baongern, & Wongsirasawat (2016), it was found that the success of building quality manpower came from the cooperation of the schools and enterprises in the field of supervision to manage teaching and learning to meet the standards set. The budgetary support for vocational education is consistent with Prosser's Sixteen Theorems which describe the availability of sufficient budget for vocational education due to the high cost of individual learners (Prosser & Quigley, 1949). All 5 components have conditional factors that are consistent with the results of the study by Srichompoo (2014). It was found that the precondition for success in the dual system management is the policy of educational management, participation of network partners, relationship between the vocational schools and enterprises, teaching and learning process and evaluation in which all require government policies that promote the cooperation. Meanwhile, building a network of collaboration between the public and private sectors is consistent with the study by Thirasirikul (2016). It was found that the key success factor of the provision of dual system in various countries depend on strong cooperation between the vocational schools and enterprises. Other important factors include creating a curriculum that meets the needs of the labor market, development of teachers in the vocational schools and trainers in the workplace, teaching and learning development and vocational trainings as well as promotion from the government in terms of policies and the role of relevant agencies, etc.

From the results of the study on the cooperation between the public and private sectors in organizing vocational education in the industrial technicians, especially in the automotive industry, there were 3 collaboration models proposed as guidelines and implications for the provision of the vocational education in Thailand: the School-based Collaboration, the School and Enterprise Based Collaboration and the Enterprise-based Cooperation. When considering the cooperation guidelines in each component, it is convinced that the models of vocational education management are deemed appropriate. Non-formal vocational education or dual system requires cooperation from all sectors. Likewise, organizing the vocational education that focuses on the production of manpower specialized in the industrial technicians related to automotive, requires cooperation and support from many parties, both from the government and the private sectors, because the automotive industry is a large industry, and the technology is developing rapidly. Currently, there are new automotive-related fields, such as electric vehicles, which are the result of technological developments and renewable energy. From the beginning of the automotive focus on engines that use different types of oil, but now the technology has been developed to use electricity. Therefore, in teaching and learning, teachers need to develop a whole new body of knowledge on electric vehicles. To create cooperation between the vocational schools and enterprises, there should be a multi-dimensional agreement covering cooperation in terms of investment, infrastructure, large machinery, budget support for teaching and learning activities that keep pace with the changing world, educational personnel development and wider academic cooperation. In relation to the government support, there should be a review of requirements about educational management and development of cooperation policies to keep up with the changes in the technology world as much as possible. For instance, in Singapore, it is a country that has achieved success in vocational education which can develop technical education institutions to encompass world-class standards and established the ITE (Institute of Technical Education) as an agency that is the most important mechanism of the state in developing manpower in the field. Singapore government will be the first major investor for vocational education to produce the country's workforce. But the high success rate depends on participation and supervision of the educational standards and fundraising as well as designing and planning courses jointly between the public and private sectors. In such operations, the government also has a policy to motivate the private sector or enterprises providing budget support for vocational education with tax abatement, measures, and publicity on the ITE web page and building relationships with networks with the enterprises on an ongoing basis (Amornvuthivorn, 2016).

7.Suggestions

Suggestions for utilizing the research findings

1. Suggestions for the vocational school administrators

The vocational school administrators should focus on building a network of cooperation with the private sectors and related agencies by developing the professional skills of teachers to upgrade the learners in line with the needs of the industry and the changing of the modern world. Thus, they should initiate a policy of exchanging knowledge or developing human resources together with the enterprises by defining a framework of cooperation in a clear, fair and flexible manner under the specified conditions and mutual benefits.

2. Suggestions for teachers

Teachers should be ready to enter into collaborative conditions, especially to co-work with the enterprises in their subject matters or work related to the field of their subjects in order that they can communicate with representatives from the enterprises to jointly design in teaching and learning process as well as supervising the learners in internships in the workplace.

3. Suggestions for the enterprises or the private sectors

The enterprise administrators should focus on the development of human resources both in their own organization and for the future manpower by exchanging knowledge and organizing the vocational training for learners at the vocational level and jointly develop personnel in the organization with short-term training or on-the-job training as well as to compare the transfer of knowledge and experience to upgrade the work force for higher educational qualifications.

4. Suggestions for the related agencies

The agencies involved in the provision of vocational education should have policies that promote cooperation from the enterprises or the private sectors. This is a mechanism for the development of vocational education by using the potential groups to provide assistance and information in the development, focusing on learners, teachers and human resources of the enterprises to respond to the needs of the relevant industrial enterprises in wider aspects.

Suggestions for further studies

In this research, the scope of study for specific types of the industrial technicians, especially those related to the field of automotive technicians, was determined. However, there are many types of vocational education that require cooperation between the vocational schools and enterprises. Each field of study has different contexts and needs. Therefore, further studies should be conducted in the different fields of industries. In addition, this research is a specific study of the vocational schools under the Office of the Vocational Education Commission (VEC), which has different contexts and legal requirements from the private vocational schools. Thus, further studies should be undertaken in this context in order to investigate the limitations, advantages, and ways to promote cooperation between the public and private sectors.

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References (APA)

- [1]. Amornvuthivorn, K. (2016). Public-Private Partnerships (PPPs) in Technical Vocational Education and Training (TVET): Lessons Learned from Singapore and U.S.A. and Implications for Public Management in Thailand. *Journal of Public and Private Management*, 23(1), 91-116.
- [2]. Ansell, C., & Gash, A. (2008). Collaborative Governance in Theory and Practice. *Journal of Public Administration Research and Theory*, 18(4), 543-571.
- [3]. Argranoff, R., & McGuire, M. (2003). *Collaborative Public Management: New Strategies for local government*. Washington, D.C.: Georgetown University Press.

Development of Public Private Partnerships (PPPs) Guidelines for Vocational Education Provision Program in Industrial Trade

- [4]. Calhoun, C.C., & Finch, A.V. (1976). *Vocational and Career Education*. California: Wadsworth Publish Inc.
- [5]. Chaisirithanya, K., & Janeakson, N. (2015). Education Administration in a Joint State-Private Form. *Veridian E-Journal, Silpakorn University*, 8(1), 95-108.
- [6]. Chum-art, K., & Kalayanamit, K. (2017). Cooperation between the public and private sectors in the development of labor, a case study of drawing and production with computer programs in production. *Journal of the National Defense Academy*, 8(3), 102-110.
- [7]. Government Gazette. (2013). *Private Investment in State Undertaking Act, B.E. 2556*. The Royal Gazette, Volume 130, Section 31 Kor (3 April 2013): 3-19.
- [8]. Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate Data Analysis* (7th ed). NJ: Pearson.
- [9]. Homsuwan, C., Meejang, S., Jansila, V. & Pupat, P. (2013). The Development of Participatory Management Model for Colleges in the Vocational Education Commission. *Journal of Education Naresuan University*, 15(5), 34-42.
- [10]. Huxham, C., & Vangen, S. (2013). *Managing to collaborate: The theory and practice of collaborative advantage*. London: Routledge.
- [11]. Kaiser, S.M. (2000). *Mapping the learning organization: Exporting a model of learning Organization* (Ph.D. Dissertation). U.S.A: Louisiana State University.
- [12]. Koontz, H., & Weihrich, H. (1988). *Management*. New York: McGraw-Hill.
- [13]. London, M. A. (1995). *Performance Excellence in University Administration: A team Approach to Organizational Change and Employee Development*. Westport, Connecticut: Praeger.
- [14]. Maeroff, G.I. (1983). *School and College: Partnerships in Education*. Princeton, N: The Carnegie Foundation for the Advancement of Teaching.
- [15]. Mattessich, P.W., Murray-Close, M. & Monsey, B. R. (2001). *Collaboration: What make it work*. Saint Paul, Minn.: Amherst H. Wilder Foundation.
- [16]. Methakunawut, P. (2003). *Developing a Model and Mechanism for Collaborative Educational Management between Private Agencies and Autonomous Universities*. Chulalongkorn University.
- [17]. McFarland. (1979). *Management: Foundation & Practices* (5th ed). New York: Macmillan Publishing Inc.
- [18]. McGuire M., Agranoff, R. & Silvia, C. (2010). *Putting the "Public" Back into Collaborative Public Management*. Retrieved 18 October 2019 from https://www.researchgate.net/profile/Michael_Mcguire8/publication/267835908_Putting_the_Public_Back_into_Collaborative_Public_Management/links/5570644408aee1eea7587019/Putting-the-Public-Back-into-Collaborative-Public-Management.pdf.
- [19]. Ministry of Industry. (2015). *Insights into Thai industrial workers and their needs in the next 5 years*. Retrieved 25 July 2019 from http://www.industry.go.th/center_mng/index.php/ 2016-04-24-18-06-24/2016-04-24-18-06-46/item/1162-5.
- [20]. Nori, P. (2013). *Development of Information Technology Management Models in Vocational Education Institutions Under the Office of Vocational Education Commission* (Doctoral Thesis in Educational Administration). Phitsanulok: Naresuan University.
- [21]. Office of the National Education Commission. (2008). *Vocational Education Act, B.E. 2008*. Retrieved 25 July 2019 from <http://psdg.vec.go.th./Portals/5/doc/vec%20law.pdf>
- [22]. Patrinos, H. A., Osorio, F. B., & Guaqueta, J. (2009). *The role and impact of public-private partnerships in education*. Washington DC: The World Bank.
- [23]. Preewan, P., Baongern, C., & Wongsirawat, C. (2016). Causal relationship model of components affecting the development of bilateral vocational education system. *Journal of Graduate Studies, Valaya Alongkorn Rajabhat University*, 10(2), 201-214.
- [24]. Prosser, C. A., & Quigley, T. H. (1949). *Vocational Education in a Democracy*. Illinois: American Technical Society.
- [25]. Ramwarangkun, A. (2011). *Information on Vocational Education*. Department of Vocational Education, Faculty of Education, Kasetsart University. (Mimeographed)
- [26]. Royal Institute. (2012). *Educational Terminology*. Bangkok: Arun printing.

- [27]. Sarkees-Wircenski, M., & Scott, J. L. (1995). *Vocational Special Needs*. 3rd ed. Illinois: American Technical Publishers, Inc.
- [28]. Srichompoo, T. (2014). *Development of a Dual System Administration Model in Educational Institutions under the Office of Vocational Education Commission* (Doctorate of Education Thesis in Educational Administration). Phitsanulok: Naresuan University.
- [29]. Srikhamnuan, B., Thongnil, P., & Boonsong, K. (2017). Factors Affecting Success in Dual System Management System of Educational Institutions in Lampang Province under the Office of Vocational Education Commission. *Veridian E-Journal, Silpakorn University*, 10(2), 1992-2005.
- [30]. Streiner, D.L. (1994). Figuring out factors: the use and misuse of factor analysis. *Canadian Journal of Psychiatry*, 39(3), 135-140.
- [31]. Sukhararom, W. (2013). Cooperation between organizations in the development of the Thai tourism industry. *Journal of Humanities Substances*, 14(1), 169-186.
- [32]. Thirasirikul, J. (2016). Management of Bilateral Vocational Education in Countries: Common Characteristics and Success Factors. *Association of Private Higher Education Institutions of Thailand under the Patronage of Her Royal Highness Princess Maha Chakri Sirindhorn*, 22(1), 51-60.
- [33]. Thomson, A.M., & Perry, J. (2006). Collaboration Process: Inside the black box. *Public Administration Review*, 66, 20-32.
- [34]. Tilak, J. B. G. (2016). *Public Private Partnership in Education*. New Delhi: The Head Foundation.
- [35]. Tucker, M. (2012). *The Phoenix: Vocational Education and Training in Singapore*. Washington, D.C.: National Center on Education and the Economy.
- [36]. Wattananarong, K. (1995). *Vocational Education, Philosophy, Principles and Theories*. Bangkok: Textbook Production Center, King Mongkut's Institute of Technology North Bangkok.
- [37]. Wiratchai, N. (1999). *Lisrell Model: Analytical Statistics for Research* (2nd ed). Bangkok: Printing House of Chulalongkorn University.