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Tripartite Education: a collaborative structure of learning venues conducive to the improvement of TVET system in Thailand

Abstract

Thailand Industry 4.0 aims to develop an economy that is driven by innovation to advance to the level of high-income countries. One factor that would help drive such growth is continuous labour development. The Thai government recognized the significant role of Technical and Vocational Education and Training (TVET) in developing a competitive workforce and encouraged its improvement through various strategic policies. This paper discusses a TVET model that seeks to enhance the implementation of a Dual TVET system that involves work-based learning in Thailand through a collaborative structure and the application of action research. The study employed two research methods: relevant document analysis and a semi-structured questionnaire. Seven Memorandum of Understanding (MOUs) signed among Tripartite system partners were examined to find out their roles and responsibilities. The semi-structured questionnaire comprised ten open-ended questions and was sent to nine representatives from TVET colleges, companies, and universities to identify their experiences and recommendations for further development. Different roles and responsibilities of partners in the Tripartite education system model (TVET colleges, university, private sector) which are based on participatory management will be discussed in this article. Learning venues of work-based learning, learning activity, learning processes, project evolution and assessment are part of this discussion. Better communication and a common understanding among partners can lead to the meaningful implementation of this project. The cooperative model of different learning venues with the application of action research strengthens the Thai TVET system, as well as contributing to systematic and societal innovation.

Keywords: *Tripartite Education, Learning venues cooperation, Thailand 4.0, Participatory action research in TVET*

1 Situation of TVET and perspectives in Thailand

The goal of Thailand Industry 4.0 is to develop an economy that is driven by innovation to advance the nation to the level of high-income countries. To achieve this goal, the Thai government announced the development of ten industries (S-Curve and new S-Curves). These ten industries will transform Thailand's comparative advantage into competitive advantage through knowledge, technology, and innovation. The first S-Curve industries are: agricultural and biotechnology, next generation automotive, smart electronics, affluent medical and Wellness tourism, and food for the future. The new S-Curve industries include robotics, aviation and logistics, biofuel and biochemical, digital economy, and medical hub. For the

first S-Curve, the government promoted innovative improvement and research to keep up with competitive global development and to enhance the five new industries' capacity to manage future competitiveness. The demand for a knowledgeable and highly skilled workforce in these ten industries cannot currently be supported by the Thai labour market. According to Chalamwong (2019), the Eastern Economic Corridor (EEC) development plan requires approximately 173,000 people with vocational qualifications but the country is still 32% short of this number. The shortage of high-quality technical and vocational graduates in the service and industrial fields extends to the areas of 1) machine shop mechanics, 2) electrical and electronic technology, 3) mechatronics, 4) mould engineering, and 5) welding (Mongkhonvanit 2017).

Thai's TVET faces challenges both in terms of quality and quantity. The biggest problems in Thai's TVET are the quality of vocational teachers and the lack of essential resources and training equipment at TVET Institutes (Chanwit 2014; Rukkiatwong 2016; Subcommittee on vocational education reform 2017). Other challenging issues are 1) learning content and curricula that are not consistent with employability skills, 2) lack of intermediary organization for the expansion of dual vocational training, and 3) ineffective quality assurance at TVET Institutes. One of the recommendations identified by Chanwit (2014) to cope with these problems is to strengthen cooperation between vocational schools and the enterprises.

TVET is a key element of the national agenda for development in Thailand. The following section outlines the structure of the Tripartite system. It employs a collaborative network of different learning venues, companies, university and TVET colleges to foster work-based learning in Thailand.

2 The Tripartite Education System

This section describes theoretical background on learning venue cooperation and explores the general structure of the Tripartite education system, which includes university, TVET colleges and the private sector.

2.1 Theoretical background on learning venue cooperation

Technical and Vocational Education and Training (TVET) in Thailand can play a significant role in developing a competitive workforce (Wattananarong 2012). One of the main supporting factors is the "link between the world of education and the world of work" that can increase the quality and attractiveness of TVET related training (Vroonhof et al. 2017, 3).

This section explains the theoretical background of learning venue cooperation. According to Pätzold (2003), learning venue cooperation is a "technical-organizational and (...) pedagogically based interaction of the teaching and training staff of the learning venues involved in TVET" (Pätzold 2003, 72). The objective of this collaboration is to connect

theory and practice across learning venues in order to train qualified learners, and to contribute to the continued improvement of the training programme.

Pätzold (1991) identified four levels of learning venue cooperation: 1) pragmatic understanding of cooperation, 2) practical understanding of cooperation, 3) didactical and methodical aspects of cooperation, 4) educational-theoretical understanding of cooperation.

In 1) pragmatic understanding, cooperation is based on "formal" or administrative requirements on an essential level. This level is prominent in training practice among partners. In 2), practical understanding is based on personal experience derived from problems and challenges. The initially one-sided need for cooperation can always be expanded. This level of cooperation is also popular for training practice. 3) Didactically and methodically founded understanding is based on occupational learning contexts. Motivation is pedagogically guided. Finally, 4) educational-theoretical understanding of cooperation expands on didactic-methodological cooperation with central aspects (e.g., formation of action competence) of educational theories.

Successful training across different learning venues also depends on conditions such as the coordination of learning processes, agreements, and how different learning venues view and understand cooperation. The next section explains the structure of the Tripartite system and the roles of the partners involved.

2.2 The Structure of the Tripartite Education System

The structure of the Tripartite education system model of Rajamangala University of Technology Lanna (RMUTL) is shown in figure 1 below, developed from Moonpa et al. (2019, 11). It is divided into private and public (partnership) sectors and the education sector, which includes high schools and TVET colleges respectively. The relationship of the two sectors is primarily driven by university (RMUTL).

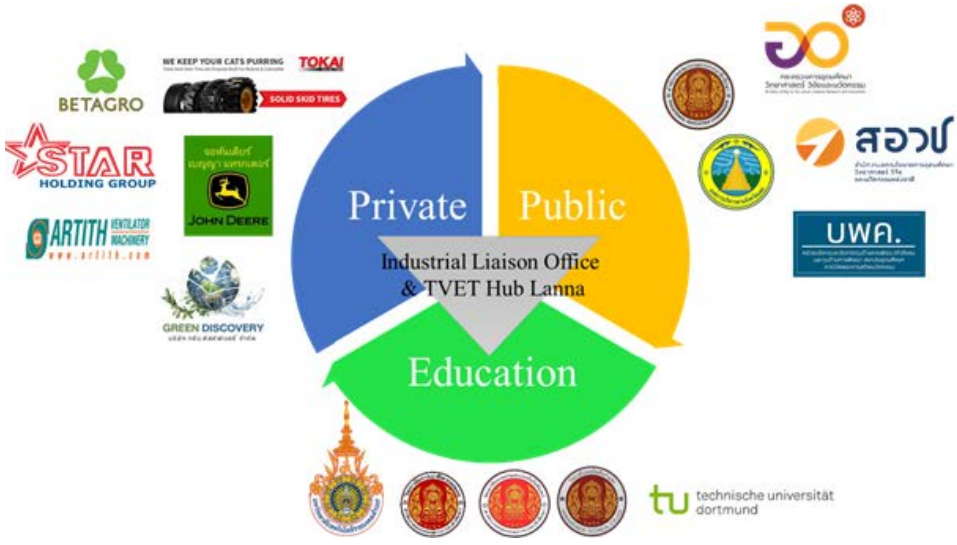

Figure 1: Tripartite Education System model (developed from Moonpa et al. 2019)

This Tripartite education system model brings together the roles of each responsible party. Close cooperation between the private sector and the educational sector (including vocational and higher education levels) seeks to develop scientific and technological resources, increase manpower, strengthen innovation and production models, and upgrade the level of technicians and technologists needed to meet demand in the private or industrial sector. So, this public sector should be encouraged to collaborate with each sector to enhance national or Thailand policy (THAILAND 4.0).

The role of scientific research for the development of TVET through the Tripartite education system can help to drive Thailand 4.0 policies forward. With participation from education, private and public sectors, knowledge of work-process based learning can be shared among partners. Information or challenges from the field or companies can be shared with education partners. The education sector can then create a model to solve those problems. Through participatory action, the education model can be implemented to evaluate the impact in actual working contexts.

Action research, according to Bradbury (2015), is a democratic and participative orientation to knowledge creation (Bradbury 2015). Moreover, participatory action research allows joint knowledge production and is therefore relevant to a specific community such as TVET in Thailand. This cycle of action can lead to knowledge innovation that meet the demands of all stakeholders. The figure below shows the interconnection between practice and action research within the Tripartite education system.

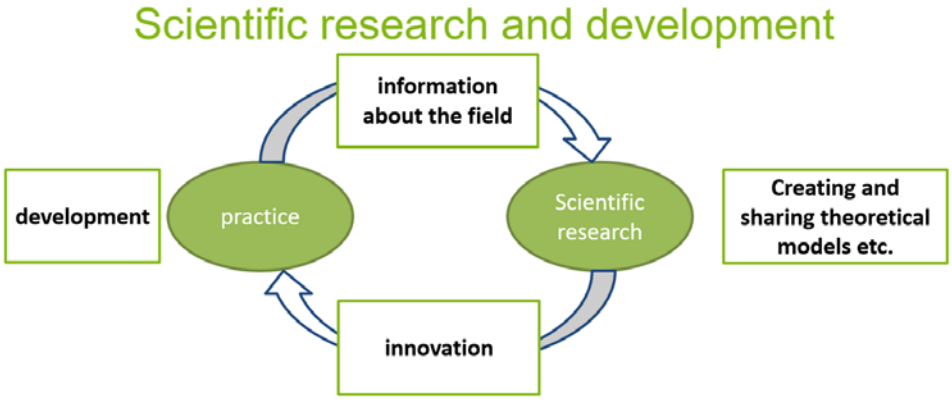

Figure 2: Scientific research and development (Kräenbring 2019)

The next chapter explains the research methodology included in this study.

3 Research Method

To understand the structure of the Tripartite education system model through the roles of different learning venues, this study employed a) document analysis and b) a qualitative questionnaire.

3.1 Document Analysis

This method was used to understand the objectives, roles and responsibilities of all stakeholders within the Tripartite education system model and to study the evolution of cooperation between partners, as well as the elements that contribute to this development.

Table 1: **List of the Memorandum Of Understanding (MOU) signed under the Tripartite education system.**

No.	Partners involved in the MOU	Date/month/year of MOU
1	- National Science Technology and Innovation Policy Office (STI office) - Michelin Siam Co., Ltd. - Rajamangala University of Technology Lanna (RMUTL) - Prince of Songkla University (PSU) - Kasetsart University (KU)	21 May 2013
2	- National Science Technology and Innovation Policy Office (STI office) - Office of Vocational Education Commission (OVEC) - Rajamangala University of Technology Lanna (RMUTL) - Michelin Siam Co., Ltd.	21 May 2013
3	- Rajamangala University of Technology Lanna (RMUTL) - Sankamphaeng Technical College (SKPTC)	23 April 2018
4	- Rajamangala University of Technology Lanna (RMUTL) - Betagro Public Company Limited	19 February 2018
5	- Rajamangala University of Technology Lanna (RMUTL) - WIRIYA ENERGY CORPORATION COMPANY LIMITED - Harvester Sales And Service (Thailand) Co., Ltd - Phrae Provincial Administrative Organization	23 April 2018

6	- Rajamangala University of Technology Lanna (RMUTL) - Chiangrai Industrial and Community Education College (CRIC)	26 October 2018
7	- Rajamangala University of Technology Lanna (RMUTL) - Phrae College of Agriculture and Technology (PCAT)	26 October 2018

3.2 Qualitative questionnaire

The questionnaire helps to better understand the roles and responsibilities, experiences, and recommendations of the stakeholders in the Tripartite education system project. The semi-structured questionnaire is sent to respondents who are representative of different learning venues: TVET colleges, companies and RMUTL. Specifically, there are five respondents from TVET colleges, two representatives from companies and two respondents from university. The semi-structured questionnaire contains 10 open-ended questions.

Data analysis includes 1) preparing the data by putting it into different themes according to the questions: motivation for joining the project, goals and objectives in joining the project, roles and responsibilities, challenges, problems, opportunities, recommendations, opinions on the Tripartite project, 2) comparison of data from each stakeholder, 3) identification of most common or expected answers, surprising elements or ideas, and 4) results presented in the form of quotes.

4 Research findings and outcomes

4.1 Findings from document analysis

Results from the analysis of seven MOUs signed under the Tripartite system from 2013 to 2018 found that the roles and responsibilities of each stakeholder had improved constantly. The findings below are separated into two main parts: roles and responsibilities of partners and the evolution of this partnership.

4.1.1 Roles and responsibilities of different parties involved in the Tripartite education system.

The following section explains the roles and responsibilities of education and private sectors.

Role of Education sector

The Tripartite education system model features two educational partners, namely university and TVET colleges. The university is responsible for learners at undergraduate and graduate

levels. TVET colleges take responsibility for teaching management on vocational certificate (Por-Wor-Chor) and high vocational certificate levels (Por-Wor-Sor). University will be discussed first, then the roles of the TVET colleges.

RMUTL university focuses on education management, research, academic service and resource development based on science and technology through participatory action research with other partners. Therefore, RMUTL is a key power agent collaborating between the private/public and education sectors. Active collaboration is coordinated by the Industrial Liaison Office and TVET Hub Lanna.

The Industrial Liaison Office (ILO) coordinates between public and private sectors which include state enterprises, public organizations, juristic bodies, partnerships, limited and public companies and the education sector. ILO is also responsible for project and activity management, such as the community of practice (CoP) committee and executive management meetings.

TVET Hub Lanna was established through the Thailand Partnership Initiative, known as Chevron's Enjoy Science Project. The five-year timeline of this project was to develop Science, Technology, Engineering, Mathematics (STEM) and vocational education at TVET colleges. TVET Hub Lanna is a coordination centre for TVET colleges and high schools in the northern region. Additionally, TVET Hub Lanna oversees administrative and academic work (Moonpa et al. 2019, 12), including a seminar project for the Tri-Curriculum Challenge: designing and creating FIRST Tech Challenge (STEM for Robotics) using Project Based Learning (PjBL) with a team of RMUTL lecturers. The aim of this seminar was to put high school teachers' skills to the test to prepare STEM for TVET classrooms at Prince's Royal College.

In addition to the Industrial Liaison Office (ILO) and TVET Hub Lanna, universities also play an important role in the development of teachers or facilitators who are expert in higher vocational technology and have extensive practical technical knowledge. Teachers/facilitators who come through this process can act as mentors for TVET colleges, helping to counterbalance TVET colleges' lack of industrial machinery and instruments or higher technology. They can also contribute to appropriate assessment for learning processes. The university thus plays an important role in the development of the Tripartite education system. RMUTL university has greater freedom and enjoys the flexibility to work with private industries, for example with regard to laws and regulations for educational staff working with private companies and also in conducting action research. (Moonpa et al. 2019, 12).

TVET colleges who grant educational degrees could offer appropriate curricula for the demand sector that align with professional standards of the Thailand Professional Qualification Institute (TPQI). Joint planning and organization of study plans would help to determine the criteria and qualifications of students, enrolling them according to the rules and declarations of vocational colleges and universities. Coordination of teaching/learning management and supervision of educational institutions in the project could also be

conducted on a joint basis. Full-time teachers or teachers from vocational colleges could teach in basic professions, specialized professions, field work, internships, and other projects through close collaboration with facilitators. Moreover, TVET colleges also provide experienced teachers to support facilitators in the field of professional education, from the curriculum to teaching and learning, and monitor educational quality in accordance with the standards of the Office of the Vocational Education Commission. TVET colleges have to ensure the adequate provision of qualified staff, not only teachers, trainers and supervisors but also career advisors and coordinators to support cooperation. In addition, TVET colleges have to prepare machines and instruments necessary for basic vocational skills training.

Role of Private sector

To develop new engines of growth, Thailand 4.0 is pivoting to a value-based economy. Industry needs to transform and prepare human resources for this shift. In the Tripartite education system, private companies prepare learning venues for students and teachers or facilitators from the education sector. It also accompanies in-company trainers with industrial experience in their development of competency, academic qualifications, coaching and mentoring skills. In order to produce qualified technicians to meet industrial demand, private companies provide the necessary tools for work based-learning.

Private sector demand has certain problems that need to be solved such as lack of the skilled workers and high turnover rate of the employees. A common goal would help to focus skills development for qualified workers. The private sector takes part in developing action plans to facilitate and prepare for work-based learning arrangements with the education sector. Private companies share the required criteria and levels of competency with vocational colleges and universities in the selection process for students. They evaluate the performance of students and facilitators on site and participate in overall project evaluation. They also create evaluation criteria, assess the skills development of technicians and technologists, and participate in curriculum development.

In addition, the private company provides a support team responsible for taking care of students' learning progress and their remunerations. They also provide project managers/administrators to coordinate related activities between company and university, resolve conflicts that may occur, and monitor cooperation.

To summarize, the Tripartite education system of RMUTL is at the level of educational-theoretical understanding of cooperation. University has an important role to play in enhancing the dual system of TVET education. Participatory action research has emphasized the dynamic nature of this structure.

4.1.2 Evolution of the Tripartite education system throughout its implementation.

The initial foundation of the Tripartite education system began in 2012 in the pilot project of the Office of the Vocational Education Commission (OVEC) by Sattahip Technical College (Thai-Austrian Technical College) together with STI office, Michelin Siam Co., Ltd to

implement the dual TVET system in Thailand. During this period, the two universities: KMUTNB and RMUTL were supporting the implementation process. However, the beginning of the Tripartite education system began when the two MOUs signed in May 2013, between 1) National Science Technology and Innovation Policy Office (STI office), Michelin Siam Co., Ltd., Rajamangala University of Technology Lanna (RMUTL), Prince of Songkla University (PSU), and Kasetsart University (KU) and 2) National Science Technology and Innovation Policy Office (STI office), Office of Vocational Education Commission (OVEC), Rajamangala University of Technology Lanna (RMUTL), and Michelin Siam Co., Ltd.,. These two MOUs were signed and agreed by all partners to support the Thai national policy in developing the competencies of human resources based on science, technology and innovation.

The first signed MOU referred to the undergraduate university students in the cooperative education for engineering programme organized at the private companies for at least 10 months. The university provides training courses before the students enter their respective companies. The interesting point for the Tripartite education system is in the second MOU when the School-in-Factory (SiF) project which was mainly established by RMUTL. In this project, the vocational students under the WiL project work at a private company. Thus, RMUTL has been acting as a hub for this cooperation. The contents and expectations with regard to the acquisition of skills in the job, practice, learning development, progress at work, and evaluation of the programme. Coordinators are put in place to work on a more intense level of detail between private companies and university. The private companies support travel budgets for university lecturers who are mentoring the students during training inside the company.

In 2018, RMUTL and Sankamphaeng Technical College conducted a joint educational programme for vocational training in mechatronics. This joint programme was implemented to address manpower demand as detailed in Thailand 4.0 policy. As a demonstration project with learners at vocational certificate level, there are many lessons to be learned for future development in terms of understanding management functions, teaching methods, and communication between organizations. The evolution of the Tripartite system is shown below.

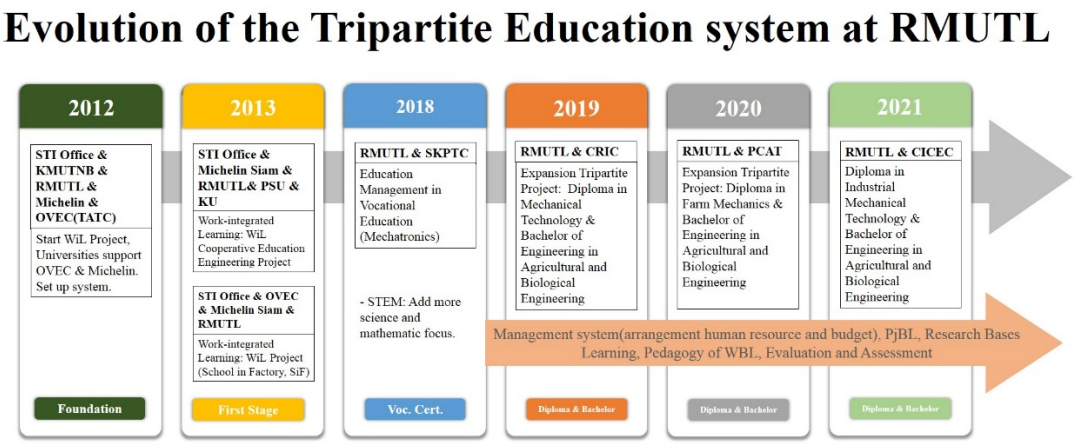

Figure 3: Evolution of the Tripartite Education system at RMUTL (Authors' own graphic)

The Tripartite education system at RMUTL has shown the improvement in the role and responsibility of each partner. During the first stage of collaboration, roles of individual partners are outlined in the MOU, with each element described in more detail: the arrangement of human resources in each sector, budget contributions from the private sector, budgetary management in the project, learning venues for student and teacher are all on the list. Knowledge of work-based learning and technology from enterprises are transferred to the education sector. Participatory problem-solving via a research-based approach comes to the fore among participants. Curriculum development, evaluation and assessment methods have been developed through the combined effort of partners.

4.2 Findings from the questionnaire

Findings from the questionnaire are categorized into common responses and new ideas. With regard to motivation for joining the project, most of the respondents are motivated to enhance the quality of education, improve the working skills of learners, to learn from the working process, and to establish a partnership with other organizations. One respondent, however, was included in the project on the basis of a policy level agreement.

The objectives of the partners in joining the project are: to create a network in vocational education for learners, to develop curriculum & teaching and learning activities, to share teaching and learning resources including personnel, facilities and training equipment, to support the improvement of education, and to recruit employees who match the field of work.

Respondents to the questionnaire see the roles and responsibilities of partners in the project as follows: to offer guidance and support to learners during their training, teach learners in cooperation with other partners, train basic technical skills, provide human resource support, and manage budgets according to Ministry of Education policy.

Challenges faced during implementation were reported by respondents as follows: 1) teaching and training learners to be qualified according to the demands of the labour market, 2) recruiting learners to work later in the company, 3) the alignment of training with institutional regulations, establishing frameworks for collaboration, communication with partners, and other common activities.

Meanwhile, the most common problems are: 1) unclear communication and collaboration among the partners, 2) partners do not understand their roles and responsibilities, 3) difficulties in supporting learners during their training at companies that are sometimes located across multiple sites, and 4) lack of social welfare.

Opportunities arising from participation in the programme are: 1) the ability to train learners according to specific needs and demands, 2) development of the required skills of the learners, and 3) strengthening positive relationships with private companies and TVET colleges.

Partners in the project recommended that 1) there should be more communication among partners (including parents) to create a common understanding, planning and shared goals, 2) the government should further expand such kind of education model, and 3) there should be more financial support, social welfare, and a secured job position.

Finally, opinions toward the Tripartite education project are: 1) the Tripartite education system can support the implementation of work-based learning that requires cooperation with TVET colleges and private companies, 2) it is a good project for learners and it can support the development of manpower according to labour market demand, and 3) through this collaboration, learners gain their competencies and partners can develop a competency-based curriculum.

The table below shows the responses from the questionnaire under different themes.

Table 2: **Responses categorized into different themes**

Themes	Responses
Motivation for joining the project	To enhance the quality of education and improve the working skills of learners.
	To learn from the working process and to create partnerships with other organizations.
	It is a collaborative project agreed by policy makers
Goals and objectives in joining the	To create a network in vocational education for learners. To develop

project	curricula, teaching and learning activities
	To share teaching and learning resources, including personnel, facilities and training equipment.
	To support the improvement of education and to recruit employees who match the field of work.
Their roles and responsibilities in the project	Offering guidance and support to learners during training
	Teaching learners in cooperation with other partners
	Train basic technical skills, human resources support, budget according to Ministry of Education policy
Challenges	Teaching and training learners to be qualified according to labour market demands
	Recruiting learners to work later in the company
	Training according to institutional regulations, frameworks for collaboration, communication with partners, and other common activities.
Themes	Responses
Problems	Communication and collaboration unclear among partners
	Partners do not understand their roles and responsibilities
	Companies that offer training are located across multiple sites. It is difficult to give them support and advice in person.
	Lack of social welfare
Opportunities	Train learners according to specific needs

	and demands
	Development of required skills of the learners
	Strengthening positive relationships with private companies and TVET colleges
Recommendations	There should be more communication among partners (including parents) to create a common understanding, planning and shared goals.
	The government should expand this kind of education model further
	There should be more financial support, social welfare, and a secured job position.
Opinion on the Tripartite project	The Tripartite education system is a good project that supports learners through work-based learning.
	It is a good project for learners and it can support the development of manpower according to the demands of the labour market.
	This is a good project. Learners gain competencies and partners can develop a competency-based curriculum.

5 Experiences, conclusion, and recommendations

Based on the analysis of the seven MOUs signed under the Tripartite education system from 2013 to 2018, it can be concluded that practical collaboration and the implementation thereof are the defining principles to emerge. The objectives, roles and responsibilities of each sector to be managed in the collaborative process include learning activity, learning venues, timelines, regulation, modification and abrogation.

Based on the data gleaned from the questionnaire, all partners showed strong motivation to develop and intensify partnerships that can support learners' competencies through work-based learning processes. Clear communication and common understanding among partners still represent the main challenges facing the Tripartite education project. Nevertheless,

partners found that this collaborative programme can develop required skills for learners. In addition, it can bring partnerships closer together.

5.1 Experiences and lesson learned from implementing the Tripartite partnership

- Laws and regulations concerning the minimum age of learners to take part in the training at the private companies. In the Sankamphaeng model, partners support learners through their respective resources: for example, a university provides training at a mechatronics laboratory and teachers from different vocational colleges teach basic technical skills. However, the average age of the learners at vocational certificate level is 16-18 years. Below the age of 18, working in a company is not allowed.
- Some partnerships signed the MOU first and implemented cooperation later. This was the case with the MOU signed between 1) Rajamangala University of Technology Lanna (RMUTL) Chiangrai Industrial and Community Education College (CRIC) and 2) Rajamangala University of Technology Lanna (RMUTL) and Phrae College of Agriculture and Technology (PCAT). The two MOUs were both signed on 26 October 2018. However, CRIC activities were implemented before PCAT, due to the fact that the CRIC project team was already prepared to support learners in the programme.

In summary, it can be said that the collaborative structure of the Tripartite education system enhances the quality of TVET in Thailand. As one of the respondents stated: “it is a good project for learners and it can support the development of manpower according to the demands of the labour market”. Nevertheless, another respondent suggested that “the government should expand this kind of education model further.”

This study is based solely on findings from partners in the Tripartite education system, including TVET colleges, private companies and RMUTL university. Other important partners such as learners and their parents were not included. In future research work, the scope of respondents could be widened to include opinions from learners and parents.

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