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Developing the Tripartite Education System for the ASEAN Region: A comparative analysis of three variants of the School-in- Factory program at the Rajamangala University of Technology Lanna

Abstract

This study aims to further develop research on the Tripartite Education System (TES) for Thailand and the ASEAN region. The collaboration between governmental agencies, industries and education institutions (universities, technical colleges) in a Public-Private Partnership (PPP) has proven to be of benefit in achieving a workforce able to cope with the challenges of the labour market in an Industry 4.0 environment. However, there is still debate on how to organize the PPP specifically. This essay gives some insights into three variants of the Thai School-in-Factory (SiF) model implemented at the Rajamangala University of Technology Lanna, which will be called Collaboration A, Collaboration B and Collaboration C. The analyses are done by reviewing existing documents on the projects (such as Memorandums of Understanding), and the review will show similarities and differences in collaboration structure, elements and concepts, objectives, roles of educational institutes and industries, curriculum, and finally, criteria and processes for student selection. The three collaborations (A, B, and C) share similarities in collaboration structure, elements and objectives but differ in curriculum and student selection processes. Another difference lies in the process of selecting students to participate because Variant C does not include the participation responsibilities when the SiF was established. Despite these differences, all three collaborations involve the RMUTL acting as a facilitator between companies, educational institutions and the public. The findings of these comparative analyses will contribute to broadening the understanding of effective approaches while bridging the gap between academia and industry and preparing students for successful careers. Additionally, these analyses can be helpful as Thai best practices for the ASEAN region and especially the CLM countries.

Keywords: *Tripartite Education System, School-in-Factory, Public-Private Partnership, Collaboration, Comparative TVET Research*

1 Introduction

Vocational education encounters a challenge in how it traditionally readies people for jobs in the lower and middle skill levels. The specific problem arises from the decrease in medium-skilled jobs. While vocational education plays a role, it cannot solve this problem alone. This

issue requires economic and social strategies implemented by governments and social partners (Wheelahan & Moodie 2016). Developed within the framework of the tripartite system and involving technical and vocational institutes, employers, and the government, Thailand's dual education system aims to enhance its ability to cultivate a competitive workforce (Mongkhonvanit 2017).

Technical and Vocational Education and Training (TVET) in Thailand involves a collaborative effort among various stakeholders to ensure effective implementation and positive outcomes (OCED 2021, 108). Collaboration with TVET in Thailand typically involves the following three main partners. (1) The public sector: the Ministry of Education and relevant government bodies play a crucial role in setting policies, regulations, and standards for TVET. The collaboration among different public or government departments ensures a holistic approach to TVET, addressing various sectors and industries. (2) The educational sector: the collaboration between vocational schools, technical colleges, and universities helps create a seamless educational pathway for students. Establishing partnerships between educational institutions and industries is essential to aligning curriculum with industry needs. (3) The industry sector: collaboration with industry is vital for designing relevant and up-to-date curricula that meet the current demands of the job market. Moreover, industry-sponsored apprenticeships, internships and on-the-job training programs strengthen the connection between education and real-world applications (OCED 2021, 109).

However, the organizational structures and collaboration origin of the Tripartite Education System, within the Rajamangala University of Technology Lanna model (Moonpa et al. 2021), differ from (Mongkhonvanit 2017) in terms of partners. In the organizational structures and origin of the Tripartite Education System related to the the Rajamangala University of Technology Lanna model, collaboration is emphasized between the private and public sectors (partnership) and the education sectors (TVET College and University). This is achieved by establishing interconnected relationships, where the university, acting as the project manager and supporter, aligns the ideas and operations with the missions of each organization. This collaboration is evident through the Memoranda of Understanding (MoU) signed jointly from 2013 to 2018 and continues to the present. Challenges arising from the joint implementation include teaching and training learners to meet labour market demands, recruiting learners for employment in companies, aligning training with institutional regulations, establishing collaboration frameworks, communicating with partners, and other shared activities. Meanwhile, common problems include unclear communication and collaboration among partners, a lack of understanding of their roles and responsibilities, difficulties in supporting learners during training at companies with multiple locations, and a lack of social welfare. Despite these challenges, the government has opportunities to support the expansion of educational models, enhance mutual understanding and contribute to the country's workforce development in a unified direction.

Proposing to enhance collaboration among vocational schools, businesses, and government agencies within the Tripartite system structure is crucial for establishing a resilient model for

the Thai TVET learning system. However, in practice, this cooperative network is not implemented effectively (Permpoonwiwat & Chantith 2023).

The research on implemented collaboration between partnerships in Tripartite Education System provides insights into the perspectives, goals, responsibilities and relationships among organizations, particularly in developing the workforce to meet the specific needs of each partner. This study aims to find out the similarities and differences in three variants of School-in-Factory (SiF) in terms of collaboration structures, elements, concept and collaboration objectives, roles and responsibilities of each partner, curriculum, as well as the criteria /processes for student selection and participation. The following section will present some insights into collaboration. The first gives theoretical considerations and then the concrete collaboration in Thai's TVET system. Section 3 describes the methodology used in analyzing the three variants of SiF, while Section 4 presents the research findings. From these results recommendations are derived for a cooperative TVET in Thailand and the wider ASEAN region.

2 Literature review

2.1 Collaboration theoretical

According to Chrislip and Larson (1994), Collaboration extends beyond communication, cooperation, and coordination. Its roots in Latin, "com" and "laborare," signify "to work together." It represents a mutually beneficial relationship among two or more parties, sharing responsibility, authority and accountability to achieve common goals. Collaboration goes beyond just sharing knowledge and information (communication) or assisting each party in reaching its own goals (cooperation and coordination). The primary purpose of collaboration is to create a shared vision and collaborative strategies to address concerns that surpass the scope of any individual party (Chrislip & Larson 1994, 5).

The character of collaboration differs in cooperation and coordination according to the 3C's continuum. Collaboration is defined by strong and closely interconnected relationships. Participants understand that to achieve results, they must be willing to significantly change how they think, behave, and operate. Collaboration involves more than just making small adjustments; it requires transforming systems. This means participants are engaged in a challenging, high-risk and unpredictable environment that can produce outcomes quite different from the original intentions. Successful collaboration demands a high level of trust and extensive communication among participants. Although it involves risks, those willing to take them may find it highly rewarding. In a collaboration, the usual way of doing things ("business as usual") is no longer sufficient. Participants must establish new connections and adopt new approaches to interact with each other (Keast & Mandell 2013; Gray 1989).

Collaboration is a challenging process, and its likelihood of success relies on several prerequisites: purpose, basic requirements, process and environment, as well as resources, rewards, commitments and responsibilities (Wolff 2005). The driving force is the anticipation

of achieving outcomes that would be unattainable if the parties worked independently (Luis & Hamideh 2008).

2.2 TVET Education Collaboration in Thailand

The dual education system in Thailand was initiated in 1984 with support from the German government. The Siam Cement Group collaborated on the initial project for the Department of Vocational Education. In 1989, the Ministry of Education authorized a pilot curriculum in factory maintenance supported by Gesellschaft für Technische Zusammenarbeit (today GIZ). In 1991, dual systems were implemented at Minburi Technical College, Samut Songkhram Technical College, and Rayong Technical College. In 1992, the name of the educational management system, "School-Factory (Dual System)", was changed to a system where students received a Skilled Worker Certificate upon graduation and were allowed to work in companies. Between 1995 and 1998, the context shifted towards the Dual Vocational System. The focus was on public relations to build understanding as well as the development of teachers, instructors in enterprises, and experts. In 2002, the Ministry of Education permitted apprenticeships for half of the students in the educational program. From 2008 until the present, Dual Vocational Education has been a form of technical and vocational education and training agreements between educational institutions and the private sector. In 2014, dual education was integrated into the national agenda to enhance the quality and quantity of technical and vocational education (Mongkhonvanit 2017; Dual Vocational Education Center 2017).

In 2014, a survey conducted by the SCB Economic Intelligence Centre among 222 companies in six key sectors in Thailand revealed that 53% of employers encountered difficulties filling job vacancies within three months (OECD 2020). The challenge is most pronounced when seeking workers with vocational degrees, with a shortfall of 23% of the total workers required. This hiring gap exceeds that of university graduates (14%) and individuals with a high school education or less (11%). Various factors contribute to employers' difficulties filling vacancies, including high labour demand (56%) and a mismatch between available and required skills (47%) among Thai firms. An analysis of Thailand's skills system by Chalapati and Chalapati (2020) confirms the shortage of vocationally skilled workers, resulting in labour market shortages. Interviews conducted by the OECD team with Thai government representatives further confirmed the lack of relevant vocational skills, particularly the shortage of skilled technicians and operators in the industrial sector, partly due to impractical VET programs despite attempts to update them (OECD 2021).

Since 2014, the Thai Government has been working on reforming the vocational education and training (VET) system. This effort aims to meet industry needs, enhance productivity, improve graduates' employment prospects, and better match skills training with labour market demands. The Office of the Vocational Education Commission (OVEC) under the Ministry of Education is tasked with establishing standards and curriculum for VET teaching and learning (Australian Government 2020).

According to Chalapati and Chalapati, collaboration between vocational providers and industry is crucial to building a vocationally skilled workforce. They identify five key policies for these: (1) government commitment to expanding the vocationally skilled workforce, (2) fostering collaboration between vocational colleges and industries, (3) enhancing the involvement of private vocational providers, (4) promoting a favourable perception of vocational education, and (5) ensuring the ongoing implementation of policies (Chalapati & Chalapati 2020, 1-2).

2.3 School-in-Factory in the context of collaboration under Tripartite Education system

Due to its close connection with general and academic education and the workforce, vocational education requires collaboration and coordination with other sectors. Effective collaboration and coordination can be attained by involving vocational education in a social dialogue with social partners (Wheelahan & Moodie 2016).

The “School-in-Factory” (SiF) model was established in 2012 in collaboration and coordination between the private company Michelin Co. Ltd., a public agency National Science Technology and Innovation Policy Office (STI Office) and the Office of the Vocational Education Commission (OVEC) with the education sector as implementation actors namely Sattahip Technical College and Rajamangala University of Technology Lanna. The primary purpose of the collaboration was to solve the problem of the shortage of qualified technicians and research engineers, contributing to a decrease in employee turnover and an increase in the country's productivity (Phalagoon 2017). Meanwhile, the concept of collaboration in the Tripartite education system has been initiated (Moonpa et al. 2021). In other words, SiF is a dual system and Work-integrated Learning approach (Phalagoon 2017). According to the Secretariat of The Senate (2020), Work Integrated Learning is an educational approach that integrates academic learning with practical work experience.

Similar initiatives may exist in Thailand, such as cooperative education, apprenticeships, internships, and fieldwork (iSchool KKU 2019), although the specific details and implementation can vary. These programs aim to bridge the gap between academic learning and practical skills, ultimately better preparing students for the workforce.

At the higher education level, which includes TVET, work-integrated education is categorized into nine groups. These activities are divided based on the period before entering study, during study, the end of studies, and before graduation. This organization aligns with the guidelines for structuring education integrated with work, considering the relationship with the learning venue: pre-course experience, sandwich course, cooperative education, joint industry-university course, fieldwork, cognitive apprenticeship or job shadowing, placement or practicum, new traineeship or apprenticeship, and post-course internship (Higher Education Network: Upper Southern Division 2018; iSchool KKU 2019).

3 Methodology

This article employed pragmatic content analysis and relevant document analysis. Pragmatic content analysis is a qualitative research method that focuses on analysing textual data to identify patterns, themes, and meanings within the content. It is considered pragmatic because it involves a flexible and adaptable approach to data analysis, allowing researchers to tailor the analysis to the study's specific research questions and objectives (Ramanadhan et al. 2021).

Figure 1 below presents the results in the form of a summary analysis (Gläser & Laudel 2019; Gläser-Zikuda et al. 2020) by collecting data from field data collection on 7 Memoranda of Understanding (MoU) between the cooperation of RMUTL, private companies and TVET College between 2013 until present (see Fig.1 below). The content analyzed is divided into (1) Collaboration structure, elements, and concept; (2) Collaboration Objectives; (3) Role and responsibilities; (4) The curriculum (5) Criteria/processes for student selection and participation.

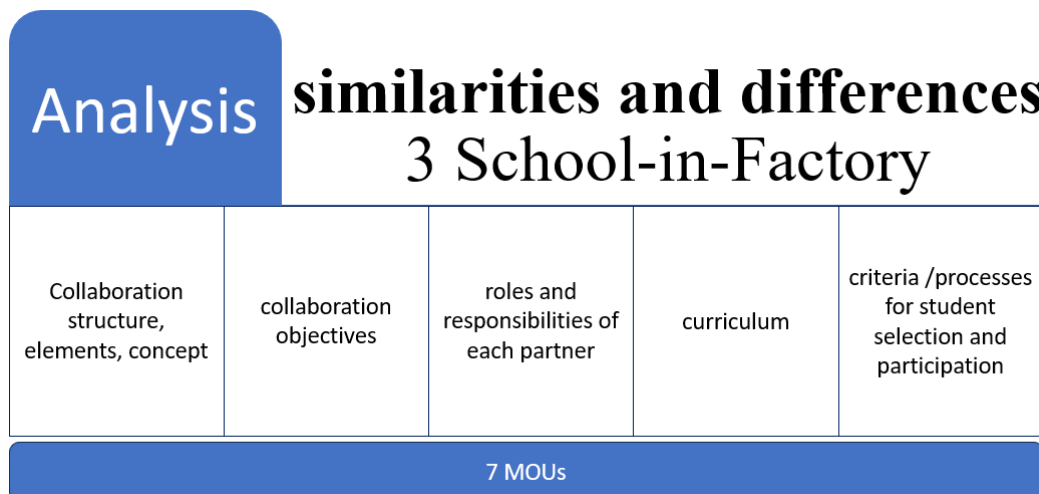


Figure 1: Analysis framework

Table 1: 7 Memorandum of Understanding

No	Partnership in MOU	Schedule time
1	- National Science Technology and Innovation Policy Office (STI office) - Office of Vocational Education Commission - Rajamangala University of Technology Lanna - Michelin Siam Co., Ltd.	21 May 2013 – 21 May 2018
2	- National Science Technology and Innovation Policy Office (STI office)	16 September 2017 – 16 September 2020

	- Rajamangala University of Technology Lanna - Michelin Siam Co., Ltd.	
3	- Rajamangala University of Technology Lanna - Michelin Siam Co., Ltd. LMC	14 September 2020 – 31 July 2022
4	- Rajamangala University of Technology Lanna - Michelin Siam Co., Ltd. LMC	5 October 2022 – 30 July 2023
5	- Rajamangala University of Technology Lanna - Michelin Siam Co., Ltd. LMC	25 July 2022 – 30 April 2024
6	- Rajamangala University of Technology Lanna - Nuovo Plus Co., Ltd. - WRENCHRE Special Tools and Services Co., Ltd.	23 May 2022 – 31 May 2025
7	- Rajamangala University of Technology Lanna - S.V.S Air Engineering Co., Ltd. - San Kamphaeng Technical College	1 June 2023 – 1 June 2028

We will not mention the government sector because the education and the private sector are the implementation agencies that follow government policy. This approach helped to explore insights into collaborations, partnerships, relationships, and industry linkages between training providers and employers.

4 Findings and discussion

These findings were documentation analysed from 7 Memoranda of Understanding during the period 2013 to 2028 and are divided into: (1) Collaboration structure, elements and concept; (2) Collaboration Objectives; (3) Role and responsibilities; (4) The curriculum; (5) Criteria/processes for student selection and participation.

This section refers to collaboration between Rajamangala University of Technology Lanna and Michelin Siam Co., Ltd. (hereinafter referred to as Collaboration A), Collaboration between Rajamangala University of Technology Lanna, Nuovo Plus Co., Ltd. and WRENCHRE Special Tools and Services Co., Ltd. (hereinafter referred to as Collaboration B), Collaboration between Rajamangala University of Technology Lanna, S.V.S Air Engineering Co., Ltd., and San Kamphaeng Technical College (hereinafter referred to as Collaboration C).

4.1 Collaboration structure, elements, and concept

The collaboration comprises private companies, the education sector represented by Rajamangala University of Technology Lanna (RMUTL), and TVET colleges. RMUTL serves as an intermediary liaison between companies, the education sector, and the public policy sector. The concept of collaboration in the "School-in-Factory" or "Tripartite Education System" was initiated in 2012 and implemented in the TVET system in 2013, and it continues to operate in various collaborative forms.

The Tripartite Education System is a collaborative approach involving three primary stakeholders: educational institutions (universities or vocational colleges), companies, and government agencies or relevant public bodies. The SiF concept denotes an educational management system akin to a boarding school, where instructors assume multiple roles. These instructors are referred to as "Research Assistants/Teaching Assistants," and their primary responsibility is coaching and mentoring.

The collaboration structure is unique to each organization, with RMUTL serving as the central facilitator in coordinating the collaboration between companies and educational institutions. The collaboration management is divided into two main components: 1) collaboration management and 2) curriculum management according to educational regulations and laws. Figure 2 below illustrates the collaboration structure.

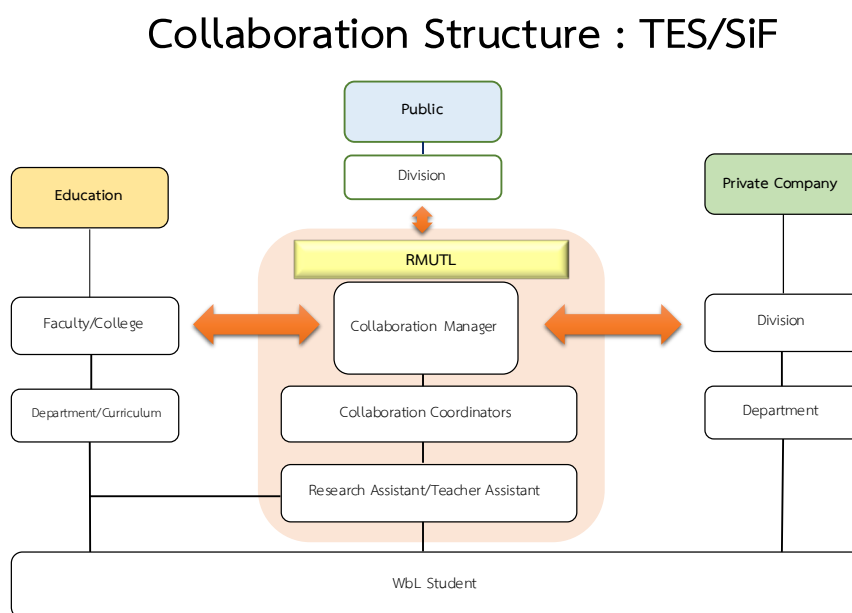


Figure 2: Collaboration structure of Tripartite Education System and School-in-Factory (Moonpa & Chaoyong 2021)

The elements of collaboration management comprise:

- Collaboration Managers, whose primary responsibilities involve communication, coordination, and facilitation of collaboration with relevant stakeholders (private companies, TVET colleges, universities, etc.).
- Collaboration Coordinators, who assist the Collaboration Managers.
- Research Assistants/Teaching Assistants, who are graduate students serving as dedicated instructors for the collaboration.
- Participating Students, who are TVET or undergraduate students enrolled in the collaboration.

In the curriculum management aspect, the Curriculum head takes the leadership role in managing teaching and learning processes in accordance with the regulations and laws of education. Consequently, the organizational structure of the three collaborative models employs a functional organizational structure and a matrix organizational structure.

4.2 Collaboration Objectives

Between 2013 and 2020, the primary objective was to promote deep cooperation between industry and educational institutions to jointly develop technical and technological human resources, including skilled technicians, technologists, and industrial researchers in science and technology fields. The collaboration aimed to strengthen the workforce by producing high-quality personnel who could meet industry demands. The goal was to create and develop models for integrated teaching and work practices in technical and technological workforce development, with the potential for broader implementation to enhance the quality of vocational education.

From 2020 to 2024, the emphasis shifted towards tripartite education management objectives through work-integrated learning approaches. The focus was on fostering research collaborations between companies and universities to develop human resources with learning outcomes and competencies aligned with industry needs.

Initially, the overarching objective was to promote deep cooperation involving public agencies, universities, and industry to create pilot project models for practical implementation in workforce development across all levels, catering to the demands of various industries.

4.3 Role and responsibilities

4.3.1 Public

Between 2013 and 2020, the role of the public sector, represented by the National Science Technology and Innovation Policy Office (STI office), was to initiate and support the development of technicians, technologists and industry researchers (mentors) to acquire competencies aligned with industry needs. This involved supporting and coordinating cooperation among relevant government agencies, industries and educational institutions. Policy-oriented studies and research were conducted to inform future project expansions. The Office of Vocational Education Commission managed teaching according to agreements,

collaborated in curriculum development, established assessment criteria, and evaluated the development of technical and technological personnel.

4.3.2 Private sector

The private sector's main responsibilities were preparing work training and learning venues for students, planning, and facilitating integrated learning-work management, collaborating in curriculum development, establishing assessment criteria, evaluating the development of technical personnel, conducting crucial skill development activities for students, such as practical skills training for work purposes, and evaluating work performance.

4.3.3 Education sector

The Tripartite education system model involved two educational partners: universities and TVET colleges, whose roles and responsibilities were mentioned in Section 4.1. Parties collaborated on curriculum development, assessment criteria, and personnel evaluation, and also planned teaching tools, selected students, developed teaching staff, appointed project leaders, managed teaching, supervised work experiences, and promoted academic, vocational, ethical and moral training. They ensured education quality, supported graduate employment, and evaluated overall performance.

4.4 The curriculum

The curriculum was divided into two levels: (1) at the vocational education level, initially, teaching was managed in the diploma in industrial technology program by a university in collaboration A during 2013 – 2020. In 2022, the dual education system was used in collaboration B and utilizing the diploma in mechatronics and robotics program of OVEC. However, education management was conducted by the university. Additionally, the dual-TVET education system was used in collaboration A also, employing the diploma in mechatronics and robotics program managed by a TVET College alongside education management at the undergraduate level with modern agricultural machinery by the university. This continued in the same manner in 2023. (2) Initially, the mechanical engineering program was used at the graduate level, and electrical engineering was added in 2023.

Creating and developing students to meet industry needs requires a partner well versed in TVET. As a university originating from TVET, RMUTL comprehends the TVET philosophy and maintains a robust connection with industry. Thus, RMUTL is a crucial player in project and curriculum management.

4.5 Criteria/processes for student selection and participation

In the initial phase, student selection follows agreements between both parties, but the specific number of students is primarily determined by the company. High school and/or vocational certificate students who are about to graduate are selected through written exams in mathematics, English, and general knowledge. They then undergo interview processes and

physical competency tests. This process is carried out in collaboration A and B, where companies and educational institutions work together. For collaboration C, the time for student recruitment and selection has passed, which means the company did not participate in the student selection process.

This shows that the university and company are mainly responsible for initial student selection processes. On the other hand, the company is mainly responsible for demand requirements. In summary, the key aspect is the implementation with industry partners who understand the sector and can focus on developing the entire system of the Tripartite education system or School-in-Factory (SiF). This approach promotes the advancement of TVET college teachers by involving them in collaboration and supporting their development through graduate programs. However, learning from the best practices of the tripartite education system or SiF extends beyond education. It requires understanding the management system, teaching management, teacher training systems, student training systems, student care, and measurement and evaluation. Additionally, it involves continuous improvement to meet the workforce development goals of Thailand 4.0.

5 Recommendations for further development of the Tripartite Education System in Thailand and the ASEAN

Based on a comprehensive analysis of the tripartite education systems implemented in the three distinct SiF collaborations, the three collaborations share similarities in the collaborative theoretical model. They represent a relationship with three partners who focus on a goal with different roles and responsibilities.

In conclusion, the tripartite education systems implemented in the SiF collaborations demonstrate innovative approaches to bridging the gap between education and industry. Despite challenges, these collaborations have contributed to workforce development, enhanced educational quality, and fostered closer ties between academia and the private sector. Moving forward, continuous evaluation, stakeholder engagement, and adaptation to evolving industry trends will be crucial for sustaining the success of these collaborative models. The following recommendations can be made for further development of the Tripartite Education System in Thailand and the ASEAN region. See Fig. 3 below for recommendations for TES/SiF.



Figure 3: Recommendations for further development of TES/SiF

However, in future, research work should present (a) a more methodological approach to measuring social impact on each sector; (b) an in-depth exploration of how to evaluate the outcome and impact of SiF; (c) an in-depth analysis of costs and benefits would be very useful to students, all partners and a sustainable education system; (d) the tangible benefits of adopting a collaborative working approach.

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