

The Psychology of Dual Vocational Education (DVE) Influencing Factors and Student Dropout Problem Identification: Guidelines from Thailand

Pariyaporn Tungkunan^{1*}, Kitti Rattanasri²

^{1*} King Mongkut's Institute of Technology Ladkrabang (KMITL),
School of Industrial Education and Technology,
Bangkok, 10520, Thailand

²Rajabhat Rajanagarindra University
Faculty of Education
Chachoengsao, 24000, Thailand

^{1*}pariyaporn.tu@kmitl.ac.th
<https://orcid.org/0000-0002-4143-0010>
² kitti_iso@hotmail.com
<https://orcid.org/0000-0003-2346-744X>

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Correspondence concerning this article should be addressed to Associate Professor Dr. Pariyaporn Tungkunan*, King Mongkut's Institute of Technology Ladkrabang (KMITL), School of Industrial Education and Technology, 1 Chalong Krung 1 Alley, Lat Krabang, Bangkok, 10520, Thailand. *E-mail address:* pariyaporn.tu@kmitl.ac.th

Abstract

Multiple studies have reported that in Thailand as elsewhere, Dual Vocational Education (DVE) programs are plagued with high student dropout rates. Therefore, this study investigated the causes and reported on the possible solutions. The research was divided into two phases. In the first phase, 40 DVE experts were interviewed, from which content analysis was undertaken to determine which factors contributed to Thai DVE dropout rates. After this, a 93-item questionnaire was developed, which was responded to by 350 individuals selected by multistage random sampling. The data was then analyzed using a second-order confirmatory factors analysis (CFA) with LISREL 9.10 software. Results revealed six main factors contributing to DVE student dropout rates. When ranked in importance, these were 1) *enterprise* factors (0.98), 2) *dual vocational student* factors (0.95), 3) *parental* factors (0.93), 4) *vocational schools* factors (0.92), 5) *workplace trainer* factors (0.85), and 6) *supervising teacher* factors (0.83), with all factors having statistical significance ≤ 0.05 . This study comprehensively analyzes a broad spectrum of educators within Thailand's dual-vocation education system. It represents a fundamental analysis of 93 factors and their importance in solving the costly and non-sustainable DVE student dropout rate, both domestically and internationally.

Keywords: DVE students, problem-solving guidelines, student dropouts, Thailand, well being

Introduction

The United Nations (UN) 2015 released a 15-year vision of Sustainable Development Goals (SDG) that included 17 main goals and 169 targets (Di Fabio, 2017; Rai et al., 2019; United Nations Environment Programme, 2015). Upon their publication, it was also stated that the goals and targets were essential for the planet and humanity's well-being. The fourth goal, quality education, is also essential because it can give people the tools they need to break away from a cycle of poverty, thus enabling upward socioeconomic mobility through a process of lifelong education promotion opportunities (Li et al., 2021). SDG 4 is also involved in ensuring inclusion, while Target 4.3 outlines how nations by 2030 should have equal access for all genders to affordable and quality vocational, technical, and tertiary/university education (Unterhalter, 2019).

Worldwide, 61% of workers participated in informal employment in 2016 (Dawson, 2021). The UN added SDG 8, which discusses how nations need to establish both job opportunities and simultaneous economic growth (Rai et al., 2019). With 22% of the world's youth unemployed, not in school or training in 2019, this is a critical concern (Dawson, 2021).

Therefore, SDG 8 calls for high-quality educational investment and training and matching labor market skills (Frey, 2017), with various authors suggesting that governments should focus on technical and vocational education and training (TVET) skills and lifelong learning in international, bilateral, and multilateral organizations employment efforts (Comyn, 2018).

The message concerning TVET's global importance in youth education is loud and clear as it plays an integral part in the global agenda for sustainable development (Prasetyo et al., 2021). In the United Nations Educational, Scientific and Cultural Organization - UNESCO Vocational Education (2015) strategic plan for global TVET education, it is stated that their TVET outreach program has been coordinated with over 180 countries thus far, with extensive assistance from multiple German TVET related

agencies (Hollander & Mar, 2009).

The first of three missions concerns developing quality TVET programs that enable gainful youth employment, entrepreneurship, lifelong learning, and response to dynamic skill demands.

Moreover, the Organization for Economic Cooperation and Development (2010), in their discussion concerning TVET for young people, states that they should leave their institutions with skills for their first jobs and be empowered with lifelong learning skills both off and on their jobs. This is consistent with research in Kenya, in which it was determined that the quality of TVET training had a direct and significant impact on student innovation skills, their information communications technology (ICT) skills, and their entrepreneurial and practical development skills (Cheruiyot, 2022).

Overview

Globally, Dual Vocational Education (DVE) programs have been identified as essential in serving a country's need for economic competitiveness (Organization for Economic Cooperation and Development, 2010). A starting point for establishing the need for DVE training is that many countries face challenges in making their youth's transition from compulsory schooling into the employment system more effective. Moreover, DVE training offers a pathway for young people to acquire the skills and relevant qualifications they need to meet employer demands. It also offers a way to potentially lower high unemployment rates and help a nation's development and competitiveness (Bliem et al., 2014).

Success in dual education training systems has been documented in Europe in such countries as Austria, Germany, and Switzerland (Bliem et al., 2014), with Germany becoming a leader in the export of DVE processes globally. With DVE programs being attributed to sharply lowering youth unemployment rates, the programs have thus awakened international interest and demand for DVE training (Euler, 2013; Jäger, 2016).

This is consistent with the *Donor Committee for*

Dual Vocational Education and Training (DCDVET), which has stated that in German-speaking countries, dual VET programs are a well-known and recognized component of each nation's culture, with dual VET programs commonly stated as being an apprenticeship with practical learning in the company and theory at school (Jäger, 2016). Kraemer (1995) has added that DVE is a partnership between the German government and industry and is an integral part of Germany's educational system. It provides hands-on training in private businesses and firms and specialized instruction in public vocational schools.

In 1982, the title *Dual System* was changed to *Dual Vocational Education* (DVE) in Thailand. Shortly afterward, in 1984, DVE was further organized through cooperation between colleges and workplaces when the *Office of the Vocational Education Commission* (OVEC) obtained academic assistance and in 1986, 3 million Deutschmark from the German government to start a dual system (Udomariyasap, 2016). Initially, the Siam Cement Group (SCG) Company Limited offered its own Siam Cement School to OVEC to establish the Thaluang Cementaianusorn Technical College, which was used as a trial model for the new Thai dual system.

From 1995 to 2013, OVEC developed a curriculum for certificates and diplomas for DVE graduates and organized public and private colleges and schools. The colleges and schools then designed learning plans to integrate vocational training into workplaces using three levels of curriculum (Udomariyasap, 2016). These were a Vocational Certification, a Vocational Diploma, and a Higher Diploma of Technology (a.k.a. Higher Vocational Certificate), with formal Thai TVET programs starting at the upper secondary education level in vocational institutions which last for three years (Pasawano, 2019).

In Thailand, three levels of technical vocational education are offered (Utakrit, 1999). These include the certificate in Vocational Education or *Bor Wor Saw*, which is obtained in upper secondary school. There is also the Technical Diploma or *Bor Wor Chor*, obtained after formal

school graduation age (Sumter, 2018), and the Higher Diploma can be used to obtain university admission for a Bachelor's degree program.

With the establishment 2008 of the Vocational Education Act B.E. 2551 (2008), the three channels of vocational training became more formalized (Udomariyasap, 2016). These included a formal education track, an informal education track, and the DVE track. Also, vocational schools were divided into two groups, with one group operating under the Vocational Education Commission (VEC) and the second group operating under the Office of the Basic Education Commission (OBEC).

In practical terms, DVE implementation is derived from various agreements between vocational colleges, institutes, workplaces, state enterprises, and government agencies (Pasawano, 2019). Various methods and forms of curricula, instruction, assessment, and evaluation are used in these agreements. It is usually expected that learners study theory in their vocational colleges or institutes and go 'hands-on' practice in workplaces, state enterprises, or government agencies (50% or more of their time).

Moreover, in the Thai TVET system, there is a track for students to take shorter, 225-hour programs which are aimed at the learner who has completed a minimum of a primary education whose goal is to obtain enough vocational skills to continue in higher education or transition directly into the labor market (Tarat & Sindecharak, 2020). If these learners obtain three to five years of short courses, they are awarded a certificate. Short TVET programs are sometimes used by other general academic students who have selected a vocational or technical course as their major, minor or elective.

Therefore, the basic concept of DVE as a system also facilitates the transition from learning to employment. It is also designed to achieve economic, social, and individual goals and respond to the labor market's skill needs (Euler, 2013; Dual Vet System, n.d.). Multiple studies have also given input concerning which factors were considered key to successful DVE management, including the European Centre for the Development of Vocational Training (2011),

which stated the importance of TVET factors, including social and demographic technological and occupational trends. These are especially important since an educated workforce plays a critical role in a nation's competitiveness.

From these reports and studies, six key takeaways were determined as essential. These were the vocational schools, their workplace instructors and trainers, the students, the business enterprises, the students who did their training, the DVE supervising teachers, and finally, the DVE students' parents. Thus, all six components are essential stakeholders in DVE student achievement.

In addition to the loss of critically needed skilled workers, dropouts from the Thai DVE programs cost the government money in lost student subsidies (Chalamwong, 2019). This is due to a long-standing program in which the MOE allocates from 4,240 baht per student per year for *Lower Vocational and Technical Education* students to as much as 11,900 baht per student per year for *Reformed Agriculture* students (Ministry of Education, 2010).

From the six critical success factors of DVE management and the dropout rate of DVE students, the central question becomes "*How to solve the problem of DVE student dropout?*" Therefore, the focus point or research objective for closing the research gap was to identify the factors of problem-solving of DVE students' dropout by using a second-order CFA for the analysis. The research results should help solve the dropout of DVE students, enhance DVE management, and serve Thailand's economic competitiveness.

Method

The research process for investigating and analyzing which factors played the most significant roles in Thai DVE student dropout rates was divided into two phases.

1st Phase: A Preliminary Study

In the first phase, the researcher sought to determine the reasons for Thailand's high DVE student dropout problem. The sample group consisted of 40 key participants comprising (1) heads of dual system vocational schools, (2) workplace trainers, (3) DVE students, and (4) parents of DVE students. The data were collected using structured interview forms for individual interviews, with data analysis undertaken using a three-part content analysis process (Grammes & Açıklım, 2016). The sample was taken from four Offices of the Vocational Education Commission (OVEC) regions across Thailand (North, East, South, and West).

The first step was to check the consistency between the interview information recorded in the document and the recorded audio by examining the interview information individually. The transcription was done word by word and required careful listening several times for precise wording. Then, another review of the individual's interview transcript was undertaken, from which it was checked for the consistency of the data and then grouped according to the study's primary and secondary factors. The last step consisted of sub-factor groupings from which content analysis and interpretation were accomplished. These results are shown in Table 1.

Table 1 Main and Sub-Factor Methods for DVE Student Dropout Problem-Solving

Main Factors	Sub-Factors
1(Factors related to vocational schools.	21
2(Factors related to supervising teachers at dual vocational schools.	13
3(Factors related to enterprises.	15
4(Factors related to workplace trainers.	14
5(Factors related to dual vocational students.	18
6(Factors related to parents.	12
Total	93

The results from the first phase were then used to create a questionnaire to create guidelines for future use in potentially lowering student DVE dropout rates.

2nd phase: 2nd-Order Confirmatory Factor Analysis (CFA)

In the second part of the study, the researcher used a second-order CFA to analyze the responses from a sample group of 350 individuals selected using multistage random sampling (Leekitchwatana & Pimdee, 2021). The targeted sample consisted of individuals who were DVE department supervisors, DVE teacher trainers, DVE students, and DVE student parents.

Determination of sample size relied on several scholars and their suggested sample sizes when conducting a CFA. A commonly accepted minimum number is 200 questionnaires in CFA/SEM research, depending on the complexity of the model (Hair et al., 2020; Schumacker & Lomax, 2016). However, the adequacy of response rates to paper surveys can be a factor (Nulty, 2008). Therefore, the target size was increased to 350, as the higher number assured greater reliability. The data were examined conclusively with the causal model using a second-order CFA (Jöreskog & Moustaki, 2001).

Results

From the second-order CFA factors analysis, the author developed a set of DVE student dropout problem-solving guidelines (PSG) and their representative characters from the 93 questionnaire items. The questionnaire confidence values were between 0.912-and 0.956 and were composed of six components and 93 items. The relationships and character depictions were as follows:

PSF=Problem-solving factors.

a= Factors related to vocational schools (variables a1 to a21).

b=Factors related to DVE supervising teachers (variables b22 to b34).

c=Factors related to the DVE student training enterprises (variables c35 to c49).

d=Factors related to the enterprise workplace trainers (variables d50 to d63).

e=Factors related to dual vocational students (variables e64 to e81).

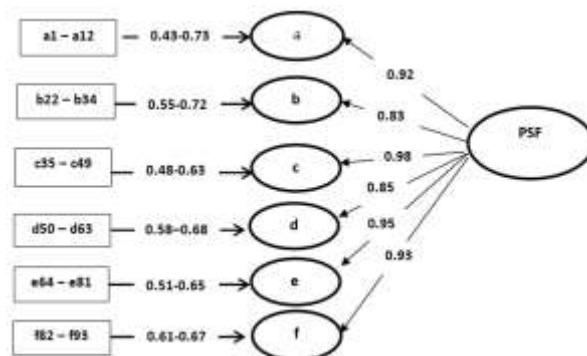
f= Factors related to DVE student parents (variables f82 to f93).

Investigation of the goodness-of-fit (GOF) of the causal model of the variables affecting DVE student dropout rates in Thailand was consistent with the empirical data and confirmed by χ^2

(Chi-square) = 2828.42, χ^2/df (Chi-square/degrees of freedom) = 1.00, $df = 2837$, p -value = 0.54, GFI (goodness of fit) = 0.86, AGFI (adjusted goodness of fit index) = .79, and RMSEA (root mean square error of

approximation) = 0.000, which are based on the specified criteria (Bollen, 1989; Byrne, 1994; Hair et al., 2020; Schumacker & Lomax, 2016), with Hu and Bentler (1999) recommending values for RMSEA, RMR, and SRMR ≤ 0.05 .

Figure 1 CFA of Causal Relationships of Thai DVE Student Dropouts



The data analysis from the second-order confirmatory factors analysis (CFA) revealed six main factors contributing to DVE student dropout rates. When ranked in importance, these were 1) enterprise factors ($a=0.98$), 2) dual vocational education student factors ($b=0.95$), 3) parental factors ($f=0.93$), 4) vocational schools factors ($a=0.92$), 5) workplace trainer factors ($d=0.85$), and 6) supervising teacher factors ($b=0.83$), with all factors having statistical significance at ≤ 0.05 . The following presents the expanded results for each variable and the related observed variables in order of their significance.

Enterprises (c)

The CFA results related to *enterprises* (c) consisted of 15 observable variables (c35-c49). These were (c35) establish policies, plan, and define an organization and responsible person continuously, and develop curriculum for dual education systems by continuously engaging personnel in the enterprise and vocational schools to participate in establishing policies and planning, (c36) develop continuous DVE curriculum and teaching and learning methods with vocational schools, (c37) define roles and duties, as well as provide knowledge to workplace trainers regarding DVE management, (c38) provide a responsible person with reliable communication channels and processes to coordinate with students, parents, vocational

schools, enterprise administrators, and workplace trainers, (c39) select workplace trainers who have DVE training skills and attitude towards the DVE program and its youth, (c40) organize an orientation to clarify and give students, parents, workplace trainers, and teacher supervisors better understanding of basic information about the enterprises, content scope, training and evaluation of student education, and rules and practice of DVE students, (c41) organize meetings to coordinate between schools, students, parents, and enterprises about ongoing DVE programs, (c42) systematically and continuously coordinate with each enterprise trainer the enterprise's expectations for their DVE students. Elements should include their training, supervision, follow-up evaluations of the level of knowledge and skills expected upon completion of their DVE training program, (c43) analyze and organize suitable DVE training program workloads from easy to difficult, (c44) provide planned opportunities for DVE students to practice in accordance with the scope of the course content, (c45) organize training activities that enhance desirable characteristics for DVE students, (c46) continuously cooperate with parents and supervisors in making a system to monitor and examine students who may encounter problems while studying and practicing in the workplace, (c47) provide advice, help, and solve problems for DVE students in

terms of knowledge, skills, and individual characteristics, (c48) provide compensation and benefits, such as dormitories and lunches for DVE students, and (c49) provide appropriate compensation for workplace trainers.

The weights of the 15 observed variables (c35-c49) had standard factor weights of c35=0.59, c36=0.55, c37=0.55, c38=0.51, c39=0.59, c40=0.51, c41=0.63, c42=0.53, c43=0.53, c44=0.59, c45=0.50, c46=0.55, c47=0.52, c48=0.48, and c49=0.56 (Table 2). Statistical significance was ≤ 0.05 .

DVE students (e)

The CFA results related to *DVE students* (e) consisted of 18 observable variables (e64-e81). These were (e64) students should obtain as much knowledge and information about DVE before deciding to enter DVE, (e65) students should prepare themselves as best as possible with employer related knowledge and skills before going out to study and practice in the workplace, (e66) students should attend orientation to clarify and understand the format, methods of teaching and learning, as well as the practice of DVE organized by schools and establishments, (e67) students should regularly ask for advice and suggestions from supervising teachers, workplace trainers, and those involved in dual education, (e68) students should establish DVE success goals, (e69) students should have positive attitudes towards DVE, (e70) students should regularly provide collaboration and coordination with vocational schools, their teachers, and workplace trainers, (e71) students should comply with the rules and regulations of DVE schools and enterprises, (e72) students should be self-disciplined and responsible for school assignments and training assignments, (e73) students should avoid vices and drugs, (e74) students should gain emotional maturity needed for the labor market, (e75) students should intelligently socialize and adapt to society appropriately, (e76) students should be intelligent in solving problems and overcoming obstacles in both learning and work, (e77) students should commit to learning and developing their studies and work, (e78) students should coordinate with others, (e79) students should develop critical thinking skills (CTS) and analytical thinking

skills (ATS) and apply them in both their studies and the workplace, (e80) students should develop both their service and civic attitudes, and (e81) students should advise and help friends who also study in DVE.

The weights of standard factors (e64-e81) were e64=0.65, e65=0.62, e66=0.51, e67=0.58, e68=0.65, e69=0.63, e70=0.62, e71=0.59, e72=0.60, e73=0.57, e74=0.55, e75=0.62, e76=0.65, e77=0.57, e78=0.55, e79=0.61, e80=0.51, and e81=0.55 (Table 2). Statistical significance was ≤ 0.05 .

DVE Student Parents (f)

The CFA results related to DVE student parents consisted of 12 observable variables (f82-f93). These were (f82) the need to study for knowledge and information about DVE programs before deciding to encourage their children to enter a DVE program, (f83) participate in preparing their children with the necessary knowledge and skills before the student goes to practice and work in the workplace, (f84) join the school's orientation session and any enterprise given session with their children to better understand the format, methods of teaching, learning and hands-on expectations, (f85) student parents should regularly cooperate and coordinate with everyone involved in DVE education including the vocational schools, teachers, and workplace trainers, (f86) student parents need to provide accurate information and work jointly with other stakeholders in any solving problems in a timely manner should they arise, (f87) student parents should cultivate their children's self-discipline, responsibility, vice avoidance including drugs, their emotional maturity, adaptation, tolerance to problems, and human relations, (f88) student parents should motivate their children concerning the advantages

and benefits of DVE, (f89) student parents should closely monitor and encourage counseling when needed for their DVE students, (f90) student parents should monitor and identify any problems which should arise in their children's studying and training in the workplace and make these issues known to their teachers, (f91) student parents should regularly monitor children's grades and work performance, (f92) student

parents should be supportive of the DVE program, and (f93) student parents should make an effort to contribute to their children's educational financial needs.

The weights of standard factors (f82-f93) were f82=0.67, f83=0.66, f84=0.67, f85=0.67, f86=0.62, f87=0.62, f88=0.65, f89=0.62, f90=0.67, f91=0.61, f92=0.64, and f93=0.69 (Table 2). Statistical significance was ≤ 0.05 .

Vocational Schools (a)

The CFA results related to DVE *vocational schools* (a) consisted of 21 observable variables (a1-a21). These were (a1) vocational schools should determine the policy, plan the operation, establish responsible agencies, and allocate budgets for DVE by engaging institutional and enterprise personnel to participate in determining the policy and plan, (a2) vocational schools should engage their teacher staff and the enterprise trainers in assisting with the development of curriculum and methods for managing DVE teaching and learning, (a3) vocational schools should establish a DVE management manual for all stakeholders, (a4) vocational schools should establish teacher counselors to advise both parents and students about their DVE program, (a5) vocational schools should establish departments to provide DVE program information to enterprises and their trainers, (a6) vocational schools should publicize to all stakeholders and their communities the advantages and benefits of DVE training programs, (a7) vocational schools should provide easy-to-use social media communication channels to all of the stakeholders, (a8) vocational schools should provide feedback to teachers and management from an ongoing observation and knowledge exchange process, (a9) vocational schools should provide knowledge and news to both the enterprise management and their trainers related to DVE management, (a10) vocational schools should sessions for the both the enterprise management and their trainers by exchanging knowledge with schools and teachers related to DVE management, (a11) vocational schools should provide an information validations process for basic information obtained from interviewing students, their parents, and enterprises that want

to participate in DVE programs, (a12) vocational schools should organize a stakeholder orientation to clarify and better understand the DVE format, teaching methods, and DVE student performance expectations, (a13) vocational schools should organize an orientation with enterprises and their trainers to clarify the DVE format, teaching methods, and DVE student performance expectations, (a14) vocational schools should organize activities that better prepare students for the knowledge and skills expected before going out to study and practice in the workplace, (a15) vocational schools should organize activities to build relationships between vocational schools, parents, and workplace enterprises, such as visiting homes, organizing documents, and public relations and social media channels, (a16) vocational schools should look after, supervise, monitor, and evaluate students in terms of knowledge and skills, (a17) vocational schools should continuously supervise, follow-up, and evaluate agencies and those who are responsible for dual education in both vocational schools and enterprises, (a18) vocational schools should have a process which continuously analyzes, summarizes, and reports the results of the dual education system, (a19) vocational schools should analyze the evaluation results and use the data to set guidelines for the development of DVE programs, (a20) vocational schools should motivate DVE students, their parents, and the workplace enterprises by organizing contests, giving awards and certificates, and (a21) provide scholarships and free accommodation to help dual vocational students with financial needs.

The weights of standard factors (a1-a12) were a1=0.46, a2=0.61, a3=0.62, a4=0.47, a5=0.56, a6=0.47, a7=0.54, a8=0.55, a9=0.60, a10=0.58, a11=0.61, a12=0.45, a13=0.58, a14=0.54, a15=0.56, a16=0.43, a17=0.49, a18=0.56, a19=0.67, a20=0.64, and a21=0.73 (Table 2). Statistical significance was ≤ 0.05 .

Workplace Trainers (d)

The CFA results related to DVE *workplace trainers* (d) consisted of 14 observable variables (d50 - d63). These were (d50) workplace trainers should collaborate with their enterprise and vocational schools in policy formulation and operational planning, (d51) workplace trainers

should assist the vocational school with the development of their DVE programs, (d52) workplace trainers should coordinate with all stakeholders about ongoing DVE programs, (d53) workplace trainers should do their best to provide information and any clarifications necessary to all stakeholders concerning the scope of training, its content, the educational evaluation process, and rules and conduct of DVE students, (d54) workplace trainers should assign training workloads according to the scope of the planned course content, from easy to difficult, suitable for the students' ages, (d55) workplace trainers should teach DVE students both professional theory and hands-on practice to the best of their ability, (d56) workplace trainers should supervise their students and evaluate their knowledge and skills in an ongoing manner, (d57) workplace trainers should develop teaching techniques in theory and professional practice which follows the needs of students, (d58) workplace trainers should motivate students in the forms, advantages, and benefits of DVE, (d59) workplace trainers should quickly notify DVE parents of any problems and make an effort to jointly and quickly solve any outstanding problems, (d60) workplace trainers should work closely with their DVE students in assisting with advice, help, and problem resolution, (d61) workplace trainers should coordinate with teachers and parents in monitoring students who may encounter problems while studying and practicing in the workplace, (d62) workplace trainers should exchange knowledge with teachers while working to develop their own DVE education skills, and (d63) workplace trainers should act as a good role model for DVE students. Characteristics should include good work ethics, work efficiency, patience, and responsibility in compliance with regulations.

The weights of standard factors (d50 - d63) were d50=0.64, d51=0.58, d52=0.59, d53=0.66, d54=0.62, d55=0.64, d56=0.58, d57=0.62, d58=0.61, d59=0.63, d60=0.68, d61=0.66, d62=0.64, and d63=0.60 (Table 2). Statistical significance was ≤ 0.05 .

DVE Supervising Teachers (b)

The CFA results related to DVE *supervising teachers* (b) consisted of 13 observable variables

(b22-b34). These were (b22) supervising teachers should participate with vocational schools and enterprises in policy-making, action planning, establishing responsible agencies, allocating budgets, and developing courses for dual education, (b23) they should coordinate and plan teaching and learning, practice, and evaluation of dual education together with the enterprise trainers, (b24) they should systematically and continuously plan and monitor supervision and evaluation of each DVE student's knowledge and skills, (b25) supervising teachers should modify and provide modern content and methods of teaching and learning in line with the needs of the enterprise, (b26) supervising teachers should organize teaching and learning activities that enhance DVE student behaviors, (b27) supervising teachers should provide knowledge and motivation for students, parents, management and workplace trainers regarding the benefits of DVE programs, (b28) supervising teachers should interview students, parents, and enterprises participating DVE programs and verify the information provided is accurate, (b29) supervising teachers should maintain an open communications channel with parents and the student training enterprises to ensure clear and open communications, (b30) supervising teachers should provide individual advice, help, and problem resolution options for DVE students in terms of knowledge, skills, and characteristics, (b31) supervising teachers should coordinate between schools, students, parents, and workplace enterprises about DVE programs, (b32) supervising teachers should monitor and screen students who may encounter problems while studying and practicing in the workplace, and continuously cooperate with parents and teachers in the workplace, (b33) supervising teachers should continuously seek knowledge and self-development regarding dual education, and (b34) supervising teachers should exchange knowledge and professional experience with workplace trainers (b22-b34).

The weights of standard factors were b22=0.72, b23=0.63, b24=0.57, b25=0.69, b26=0.68, b27=0.70, b28=0.68, b29=0.70, b30=0.63, b31=0.61, b32=0.55, b33=0.64, and b34=0.55 (Table 2). Statistical significance was ≤ 0.05 .

Discussion

The 2nd-order CFA determined that six main factors could be used as potential guidelines in lowering Thai DVE student dropout rates. Focus and priority should be given first to the DVE student's workplace *enterprises* ($c = 0.98$), in which the students were sent to do their work/study program. Second was the factors

related to the *DVE students* ($e=0.95$), third was the working relationship and communication process with the *DVE student parents* ($f=0.93$), and fourth was factors related to the *vocational schools* ($a=0.92$). Fifth was the *enterprise workplace trainers* ($d=0.85$), and finally, the *DVE supervising teachers* ($b=0.83$) (Table 2). Therefore, the remaining discussion is presented in this order.

Table 2 *Factor Correlation Coefficients Results*

#	Enterprises ($c = 0.98$)	DVE students ($e=0.95$)	DVE Student parents ($f=0.93$)	Vocational Schools ($a=0.92$)	Enterprise Workplace Trainers ($d=0.85$)	DVE Supervising Teachers ($b=0.83$)
1	c35=0.59	e64=0.65	f82=0.67	a1=0.46	d50=0.64	b22=0.72
2	c36=0.55	e65=0.62	f83=0.66	a2=0.61	d51=0.58	b23=0.63
3	c37=0.55	e66=0.51	f84=0.67	a3=0.62	d52=0.59	b24=0.57
4	c38=0.51	e67=0.58	f85=0.67	a4=0.47	d53=0.66	b25=0.69
5	c39=0.59	e68=0.65	f86=0.62	a5=0.56	d54=0.62	b26=0.68
6	c40=0.51	e69=0.63	f87=0.62	a6=0.47	d55=0.64	b27=0.70
7	c41=0.63	e70=0.62	f88=0.65	a7=0.54	d56=0.58	b28=0.68
8	c42=0.53	e71=0.59	f89=0.62	a8=0.55	d57=0.62	b29=0.70
9	c43=0.53	e72=0.60	f90=0.67	a9=0.60	d58=0.61	b30=0.63
10	c44=0.59	e73=0.57	f91=0.61	a10=0.58	d59=0.63	b31=0.61
11	c45=0.50	e74=0.55	f92=0.64	a11=0.61	d60=0.68	b32=0.55
12	c46=0.55	e75=0.62	f93=0.69	a12=0.45	d61=0.66	b33=0.64
13	c47=0.52	e76=0.65		a13=0.58	d62=0.64	b34=0.55
14	c48=0.48	e77=0.57		a14=0.54	d63=0.60	
15	c49=0.56	e78=0.55		a15=0.56		
16		e79=0.61		a16=0.43		
17		e80=0.51		a17=0.49		
18		e81=0.55		a18=0.56		
19				a19=0.67		

20				a20=0.64		
21				a21=0.73		

Note. Table 2 shows all 93 items being analyzed at once in the final 2nd-order CFA, resulting in higher discrimination values for the six latent variables. This resulted in different values from the six latent variables analyzed with their 93 observed variables. Therefore, discrimination values were lower when analyzed separately

Enterprises

The study found that the organization of meetings with other schools, the students, their parents, and the enterprises in which they will do their practical training was considered most important in enterprise/DVE programs (c41=0.63). This was followed in importance by providing planned opportunities for DVE students to practice in accordance with the scope of the course content (c44=0.59). However, when input was calculated, providing compensation and benefits, such as dormitories and lunches for DVE students, was judged as a low priority by the enterprises (c48=0.48).

However, a crucial question for each enterprise is, “What are the short-, medium, and long-term benefits of DVE training, as corporate social responsibility (CSR) are not an adequate vehicle to engage the private sector in DVE.” Commonly cited factors for enterprises to invest time and money in DVE programs are the equity gained and inclusivity. DVE programs have also been stated as good for sustainable economies and societies, where the evidence of benefit for industries and enterprises is excellent when they invest in DVE.

However, enterprises will only stay committed to such programs over the long run if it is good for business (UNESCO-UNEVOC, 2020). Return on investment (ROI) motivators for enterprises to invest in DVE programs are productivity, the efficiency of employees, worker workplace literacy, employee skill gains, and business innovation (United Nations Educational, Scientific and Cultural Organization (UNESCO) and National Centre for Vocational Education

Research (NCVER), 2020). Moreover, enterprises should take ownership of the programs because private sector participation is essential.

The strategies to prevent the DVE student dropout consist of efforts to attain a higher level of fairness or balance inequities related to one convention by offering compensation or an investment in another convention (Leemann & Imdorf, 2015). The enterprises should be concerned with suitability as a training company, documents relevant to the DVE, training contracts, proof of the requisite personnel training, and intermediate and final examinations (Dual Vet System, n.d.).

DVE students

Results from the study also showed that the three most important factors for DVE students were that students should obtain as much knowledge and information about DVE before deciding to enter DVE programs (e64=0.65), students should have positive attitudes towards DVE (e68=0.65), and finally, students should be intelligent in solving problems and overcoming obstacles in both learning and work (e76=0.65).

Beyond these obvious and common sense factors, other factors can potentially be detrimental to a student’s success which thus ultimately leads to their leaving their DVE program. These include the level of mental potential of the personality of teenagers and the degree of its realization in activities, social motives and expectations related to work which does not coincide with their results, the high level of claims of outstanding achievements, and low psychological readiness for such activities, an adequate assessment of the situation and the inability of self-control, the need to predict the future course of activity and the lack of prospects for the ability, and the demands of modern times for intensive and hard work with fundamentally little to show for their efforts (Zholdasbekova et al., 2016).

Therefore, vocational schools must show DVE

students the economic benefits, help develop their personal and social skills and learn and motivate their students' situations (earning and learning). They must also enter the labor market with relevant training, and, after completion of training, they have a recognized qualification with good chances of fairly compensated employment (Dual Vet System, n.d.; Jäger, 2016; Mongkhonvanit, 2017).

DVE Student Parents

The study found that, most importantly, student parents should make an effort to contribute to their children's educational and financial needs ($f93=0.69$). Next, there were four equally weighted items in importance. These were the need for parents to study information about DVE programs before deciding to encourage their children to enter a DVE program ($f82=0.67$). Second, parents should join the school's orientation session and any enterprise session with their children to better understand the format, teaching methods, learning, and hands-on expectations ($f84=0.67$). Next, parents should regularly cooperate and coordinate with everyone involved in their children's DVE education ($f85=0.67$). Finally, parents should monitor and identify any problems which should arise in their children's studying and training in the workplace and make these issues known to their teachers ($f90=0.67$).

Although parents' involvement in their children's DVE programs is essential, DVE programs in Thailand and other countries suffer from a low social status from parents' perspectives (Makochekanwa & Mahuyu, 2021; Organization for Economic Co-operation and Development, 2021). Specifically, in Thailand, the entire TVET program, according to the Organization for Economic Co-operation and Development (2021), continues to remain an unattractive student option because of a poor image among students and parents, quality issues, a hard-to-navigate system, and limited progression pathways. However, it is possible to implement successful DVE models to enlighten, demonstrate, and raise awareness in the public domain (Jäger, 2016).

Moreover, according to Dos Santos (2018),

parents are essential in supporting and motivating students to learn and work, with parents playing a role in adolescent academic and career pathways. Therefore, vocational schools must communicate with parents concerning the guidelines for their children's pre-vocational orientation, training agreements, recognition of previous learning, apprenticeship pay, and systematic training under real-life working conditions (Dual Vet System, n.d.). Finally, parents should be concerned with the results of students lacking motivation ($b27=0.70$), as this can easily lead to conflicts, with declining performance causing flawed assessments and marks in vocational schools, failure in examinations, and, finally, dropping out from the DVE system.

Vocational Schools

Respondents also believed that vocational schools providing scholarships and free accommodations to help dual vocational students with financial needs was most important ($a21=0.73$), with a close second in importance being the school's ability to motivate DVE students, their parents, and the workplace enterprises by organizing contests, giving awards and certificates ($a20=0.64$). Finally, third in importance were vocational schools' ability and desire to analyze student evaluation results and use the data to set guidelines for developing DVE programs ($a19=0.67$).

What is quite interesting in these results is the opposites in opinions between what the vocational schools considered *most important* ($a21=0.73$) and what the enterprises viewed as *least important* concerning financial support, free lunches, and accommodation support for the students ($c48=0.48$). However, other studies have reported that vocational schools should support DVE students. Items specifically mentioned include tripartite agreements, educational plans, syllabuses, student handbooks, registers of attendance of students, peopleware, the adaptation of classrooms, classes, workshops, and laboratories to the multi-functional load equipment minimum necessary, technical and technological equipment, and workplaces for students with partial pay (Zholdasbekova et al., 2016).

The conditions for DVE success are that vocational schools should communicate with all partners about DVE policy objectives, the systems of funding and financing of DVE, and the number of available apprenticeship places in businesses which determine the number of trainees the system can absorb (Jäger, 2016; UNESCO- NCVER, 2020). Systematic teaching at a vocational school is necessary to supplement process-oriented training in the company, which is based on specific in-house requirements (Dual Vet System, n.d.). Therefore, the readiness and willingness of vocational schools are critical factors in DVE student dropout rates.

Workplace Trainers

The study also determined that workplace trainers should work closely with their DVE students in assisting with advice, help, and problem resolution as very important (d60=0.68). Also, workplace trainers should coordinate with teachers and parents in monitoring students who may encounter problems while studying and practicing in the workplace (d61=0.66) and should do their best to provide information and clarifications necessary to all stakeholders concerning the scope of training, its content, the educational evaluation process, and rules and conduct of DVE students (d53=0.66).

Therefore, workplace trainers should be qualified to provide training and responsible for each student's training pathways, planning training content, specification of the syllabus, schedules, material resources, workplace training, classroom training, and examination standards to ensure that their trainees achieve their training goals within the specified period of DVE. It is also imperative that students acquire the vocational skills needed to pass the required examinations and are not put at moral or physical risk (Deissinger, 2015; Dual Vet System, n.d.). Moreover, the roles of trainers as advisors are to assign skill-work, motivate, build trust, and coach trainees for further advancement (Jäger, 2016).

DVE Supervising Teachers

The most crucial aspect concerning supervising teachers was the belief that they should participate with vocational schools and enterprises in policy-making, action planning,

establishing responsible agencies, allocating budgets, and developing dual-education courses (b22=0.72). Two items, including supervising teachers closely followed, should provide knowledge and motivation for students, parents, management, and workplace trainers regarding the benefits of DVE programs (b27=0.70). Supervising teachers should also maintain an open and transparent communications channel with parents and the student training enterprises (b29=0.70).

These factors are consistent with Sasmito et al. (2020), who indicated two significant factors affecting supervising teacher quality. These were their hard skills and soft skills, with hard skills being the initial expertise and teaching experience, while soft skills were their self-efficacy and transferable skills.

Additionally, the DVE program supervising teachers must be suitable for their profession and have pedagogical competencies in vocational and work education. The DVE system is based on the interrelation of theoretical and industrial training; therefore, the supervising teachers should use the competency approach for goal-setting and guiding pedagogical processes to the creation of student goals set on mastering the knowledge-ability-skill system and personal development (Zholdasbekova et al., 2016)

Conclusion

The DVE system links people with skills needed by a nation's enterprises. Moreover, success in international competition can be due partly to the DVE system. Therefore, solutions for preventing DVE student dropout are the responsibility of all parties.

Therefore, vocational schools should be ready and willing to be part of the DVE system. Secondly, DVE supervising teachers must change from teaching to coaching, which entails motivating, giving advice, and being friendly. Thirdly, enterprises should focus on the ROI to invest in DVE, participate with the DVE system, and give opportunities to learn to DVE students. Fourthly, workplace trainers should focus on self-development to be effective as workplace

trainers. Finally, DVE students should aim to benefit themselves economically.

Recommendations

Recommendations for future policymakers and school stakeholders can be made based on the research findings. First, Thailand's OVEC and other nations' similar vocational education agencies can use the findings to improve manuals for DVE management by specifying the roles and responsibilities of educational institutions, workplace trainers, students, and parents. Standardized practice guidelines should also be determined to prevent DVE students' from dropping out of their programs, along with indicators to assess the success of DVE management. Additionally, recommendations for further research can be made based on the research findings, such as assessing the success of DVE management, studying the cooperation model of DVE management between vocational schools and enterprises, and studying the factors to support teachers' participation in DVE management.

This study comprehensively analyzes a broad spectrum of educators within Thailand's dual-vocational education system. It represents a fundamental analysis of 93 factors and their importance in solving the costly and non-sustainable DVE student dropout rate, both domestically and internationally.

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