Structural Validity of the Career Decision-Making Self-Efficacy Scale for Thai Vocational Students: A Confirmatory Factor Analysis for Career Guidance Development

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Abstract
This study aims to develop a model for Career Decision-Making Self-Efficacy (CDMSE), within the context of Thai society and to examine the alignment of its confirmatory components with empirical data. The study employed Confirmatory Factor Analysis (CFA) with a sample of 508 vocational students from technical colleges in Thailand in 2024. The instrument used was an online questionnaire, Reviewed by experts in psychology. The analysis results indicate that the model demonstrates a high level of alignment with empirical data, as evidenced by the following fit indices: χ^2=258.01, df=232, P-value=0.11589, RMSEA=0.015, all of which fall within acceptable ranges. This study has both theoretical and practical implications, confirming the suitability of the CDMSE model within the context of Thai vocational students. It Serves as a crucial foundation for developing an effective career guidance system that enhances vocational students' confidence in making appropriate career choices, ultimately reducing unemployment and addressing the future shortage of skilled labor. It can be concluded that the Career Decision-Making Self-Efficacy Scale for Thai Vocational Students, this study plays a vital role in supporting the development of specialized programs to enhance vocational students' decision-making capabilities regarding career choices. It fosters a deeper understanding of career development within the context of the educational system and labor market demands. The findings from this study can be applied to the design of career guidance curricula, the formulation of education and labor policies, and national workforce planning.

Keywords: CDMSE (Career Decision-Making Self-Efficacy), CFA (Confirmatory Factor Analysis), Vocational Students, Career Guidance

Introduction

At present, all sectors are focusing on the development of human resources to drive the economy and society, especially in the field of vocational education, which plays an important role in producing skilled workers that meet the labor market's needs. Nonetheless, vocational education continues to encounter numerous obstacles and challenges, especially concerning students' career choices. Sukardi and colleagues (2019) Vocational Secondary Education plays a crucial role in preparing students with the essential skills to participate in the labor market, either through self-employment or as permanent employees. Yoto, Y. (2016). stated the importance of vocational education in terms of preparing students with the necessary skills and abilities before entering the labor market in the form of self-employment or working in various sectors. Maskey (2019) The research revealed that a significant obstacle to pursuing technical education is society's preference for general education over vocational training. Sakdapat (2024) The educational institutions are proposed to develop curricula that reduce the gap between student performance and the labor market's needs. It is the use of teaching methods in the current and future contexts; in addition, it also promotes learning from real experience. Regarding career decision-making, the concept of self-awareness (Self-efficacy) and Bandura (1977) explained that the more reliable the source of experience, the more reliable it was. This was in line with the research of Betz and Hackett (1981). He stated that the improvement of the method of assessing confidence in one's occupation ability was the development of a tool measuring one's ability to make career choices (Career Decision-Making Self-Efficacy (CDMSE), which was developed by the Career Decision-Making Self-Efficacy (CDMSE). Taylor and Betz (1983) It is a tool containing 50 questions to assess expectations of one's abilities or important behaviors in making career choices. Betz and colleagues (1996) developed a short tool (CDMSE-SF) with 25 items for simple usage. Repi and Kurniawati (2022) mentioned Career Decision Self-Efficiency, also known as Career Decision Self-Efficiency (CDMSE), which was an important factor for students in the final stages of their educational journey. Sukpanyium and colleagues (2023) said that if students explored and analyzed their achievements and used data from others' experiences, they would increase their awareness of the need for self-management and motivation to choose their careers, enhancing the confidence to lead to their career goals. Butsitarach and colleagues (2021) Moreover, the process of identifying an individual's ability to make an informed choice of a career path is linked to professional development; therefore, some elements can be customized to fit the specific context of the educational institution. Panphet & Somanandana (2023) The ability of self-awareness and the opportunity acceptance in the labor market and career landscape profoundly impact one's ability to participate in the career decision-making process. Purnama and Ernawati (2021) The empirical findings indicated a list of highly competent measures that could accurately assess various aspects of an individual's Career Decision-Making Self-Efficacy Scale (CDMSE). Gao and Wang (2024) The findings indicated that one's ability to make career decisions was important in influencing students' educational choices and willingness to apply to higher vocational colleges. These findings suggested that students' abilities and beliefs in their abilities in the field of career decision-making were the instruments determining their choice of education. Therefore, vocational institutions and enrollment management offices must use strategies that are designed to motivate, reinforce, and guide students' self-performance in career decisions. In addition, future research should take into account the multifaceted nature of the research topic, the selection of appropriate methods, or the integration of different approaches to provide a more holistic level of explanation of the fundamental mechanisms that govern the educational decisions of vocational students. Kamarudin and colleagues (2024) These findings affirmed the necessity of the integration of

psychological paradigms in terms of the development of career readiness frameworks for students enrolled in higher education institutions in Malaysia. Omar and colleagues (2023) Increased intellectual ability has been identified as the most important predictor of a student's self-efficacy about professional development. Graduates remain committed to future aspirations by fostering critical skills, especially skills related to intellectual abilities. Khampirat (2024) Future inquiries may explore in deeper detail the complex interactions between socio-demographic variables and personal characteristics to yield a more comprehensive understanding of occupational adaptation in the Thai context. Liu et al. (2022) stated that a clearer comprehension of future skill requirements might indicate the necessity of graduate education to align with career aspirations. Dangol and colleagues (2023) There are two major indicators for choice of career—self-efficacy and career choices. Self-efficacy is such as finding information in the library about the interested occupation, managing the job interview process, and knowing the work field. Career choices are such as career advancement with a high profile and the status of the organization, that is, size, status, image, and location of the organization or company in the feasible and common places.

Regarding the importance of recognizing one's ability to make career choices, the researcher focused on self-awareness in Career Decision-Making Self-Efficacy (CDMSE) in the context of Thai society and checked the consistency of the model with empirical data. Confirmatory Factor Analysis (CFA) was used on a sample of vocational education students in Thailand. The results of this study will significantly enhance the confidence of vocational students in making the appropriate career decision by contributing to the development of an effective career guidance system. This will result in a decrease in unemployment and a future shortage of skilled workers.

Research Methodology

Research Design

This study uses quantitative research using Confirmatory Factor Analysis (CFA) to examine the consistency of Career Decision-Making Self-Efficacy Scale (CDMSE) with empirical data in the context of Thai vocational education. This approach was chosen to confirm the component structure of the CDMSE measurement form and to assess the suitability of the tool for Thai vocational education students.

Population and Sample

The population in this study is vocational education students from technical colleges in Thailand. In the 2024 academic year, the sample selection was conducted using a multi-stage random sampling method to obtain a comprehensive representation of the vocational education student population nationwide. Taking into account the proportion of students in each region, major, and grade level. The tool used in the research is the CDMSE-SF (Career Decision-Making Self-Efficacy Scale-Short Form) developed by Betz and colleagues (1996) and adapted to the context of Thai vocational education students. The measurement consists of 25 questions, divided into 5 components: 1) Self-appraisal 2) Occupational Information 3) Goal Selection 4) Career Planning 5) Problem-Solving Each question uses a five-point scale ranging from "no confidence at all" (1 Score) to "Most confident" (5 Score).

Instrument Quality Inspection

1. Content Validity: Five psychology experts assessed the consistency between the questions and the operational definition using the Index of Item-Objective Congruence (IOC).
2. Construct Validity: Use confirmatory element analysis (CFA) to verify the conformity of the measurement model with the empirical data.
3. Reliability: Cronbach's Alpha Coefficient and Composite Reliability (CR) are analyzed.

Data Collection

Data collection for the 2024 academic year will be done by coordinating with the academic department of the technical college as a sample group. The questionnaire was distributed and collected through an online system.

Data Analysis

1. Analyze the basic data with descriptive statistics, including frequency, percentage, mean, and standard deviation.
2. Review the preliminary agreement of the confirmatory element analysis: Multivariate Normality, Linearity, Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) to measure the suitability of the data., Bartlett's Test of Sphericity to check the relationship between variables.
3. Analyze the confirmatory elements with the LISREL program to verify the conformity of the measurement model with the empirical data. Based on the Conformance Index values, they include Chi-square (χ^2) and χ^2/df, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), P-value.

Results

The researcher conducted a structural accuracy analysis by confirmatory factor analysis to verify the structural measurement characteristics of Career Decision-Making Self-Efficacy Scale (CDMSE) by examining the harmony of the research model with empirical data. Second-order confirmatory Factor Analysis Structural Consistency Analysis was performed by confirmatory factor analysis to verify the structural characteristics of the five components of Career Decision-Making Self-Efficacy Scale (CDMSE). To determine whether the observed variables are sufficiently correlated to analyze the elements, as well as to explore the KMO and Bartlett's Test of Sphericity, which is a statistical test of the hypothesis that this correlation matrix is an identity matrix, to determine whether this set of data is suitable for elemental analysis. The results of the correlation coefficient analysis between the observed variables were related to the 5 components of Career Decision-Making Self-Efficacy Scale (CDMSE), a total of 25 observable variables using the Pearson correlation. The correlation coefficient was found to be from .348 to .648, with the correlation coefficient between the variables differing significantly from zero at the level of .01. Considering Bartlett's Test of Sphericity, which is a statistical value that tests the hypothesis that this correlation matrix is an identity matrix. It was found that the value was 8148.034 (p=.000), indicating that the correlation matrix between the observed variables was statistically significantly different from the identity matrix at the level of .01. In line with the results of the analysis, the Kaiser-

Meyer-Olkin Measure of Sampling Adequacy (KMO) is .974. This shows that the various variables in this set of data, there are enough correlations and are suitable for the analysis of the elements. The details are shown in Table 1.

Table 1: Correlation of Observed Variables Component of Career Decision-Making Self-Efficacy (CDMSE)

Var.	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21	Y22	Y23	Y24	Y25
Y1	1																								
Y2	612*1																								
Y3	569*	628*1																							
Y4	531*	593*	584*1																						
Y5	543*	536*	554*	605*1																					
Y6	556*	527*	490*	525*	516*1																				
Y7	459*	402*	439*	422*	444*	502*1																			
Y8	487*	478*	502*	437*	510*	478*	503*1																		
Y9	522*	495*	515*	503*	533*	516*	511*	589*1																	
Y10	531*	511*	550*	526*	534*	546*	492*	572*	539*1																
Y11	600*	492*	532*	508*	562*	578*	447*	490*	515*	545*1															
Y12	471*	482*	457*	485*	503*	442*	406*	428*	471*	479*	583*1														
Y13	490*	569*	571*	588*	492*	479*	466*	447*	482*	547*	558*	538*1													
Y14	498*	458*	465*	488*	551*	457*	471*	443*	542*	538*	549*	458*	602*1												
Y15	502*	486*	529*	508*	513*	503*	442*	490*	512*	559*	569*	518*	585*	569*1											
Y16	475*	434*	473*	480*	488*	550*	400*	392*	492*	500*	551*	494*	519*	478*	493*1										
Y17	568*	509*	546*	554*	510*	559*	428*	451*	535*	550*	629*	481*	564*	528*	559*	495*1									
Y18	518*	555*	537*	569*	556*	540*	444*	554*	574*	608*	599*	493*	634*	577*	586*	519*	633*1								
Y19	549*	510*	528*	519*	558*	515*	469*	530*	577*	600*	589*	492*	561*	610*	577*	475*	586*	648*1							
Y20	482*	453*	510*	539*	502*	447*	424*	467*	504*	539*	500*	481*	490*	472*	541*	456*	584*	558*	594*1						
Y21	544*	460*	536*	518*	532*	565*	466*	528*	501*	538*	531*	439*	540*	486*	531*	530*	563*	600*	630*	594*1					
Y22	499*	452*	479*	472*	488*	499*	360*	369*	474*	507*	565*	512*	471*	499*	542*	544*	579*	483*	504*	424*	481*1				
Y23	468*	510*	485*	512*	479*	451*	422*	440*	465*	510*	506*	472*	515*	487*	533*	452*	506*	553*	519*	507*	486*	574*1			
Y24	472*	447*	507*	463*	474*	445*	451*	457*	446*	502*	505*	439*	545*	537*	544*	462*	517*	587*	524*	460*	495*	565*	587*1		
Y25	458*	427*	464*	485*	513*	421*	348*	368*	409*	492*	438*	458*	421*	465*	468*	474*	458*	512*	464*	458*	493*	601*	492*	600*1	
Mean	3.45	3.57	3.65	3.68	3.63	3.45	3.22	3.49	3.45	3.52	3.54	3.60	3.59	3.43	3.62	3.56	3.42	3.47	3.48	3.57	3.66	3.63	3.60	3.60	3.67
S.D.	1.06	1.04	1.04	1.03	1.07	1.08	1.06	1.00	0.99	1.02	1.05	1.02	1.00	1.04	1.04	1.08	1.02	1.04	1.00	0.99	1.01	1.05	1.05	1.05	1.03

KMO : Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .974
Bartlett's Test of Sphericity = 8148.034, p = .000, df = 300

The results of the structural alignment analysis of Career Decision-Making Self-Efficacy Scale (CDMSE) showed that the model was harmonized with the empirical data.

The criteria for checking the consistency of the confirmatory elements from the statistics used in the test are considered according to Table 2.

Table 2: Criteria for Checking Consistency in the Analysis of Affirmative Elements and Results of the Structural Correctness Analysis of the Elements of Career Decision-Making Self-Efficacy (CDMSE)

Fit Statistics	Criterion	Computed values	Judgment result
1. Chi-Square χ^2	p>.05	.12	Passed
2. Relative Chi-Square χ^2/df	< 2	1.11	Passed
3. Goodness of Fit Index (GFI)	≥.95	.96	Passed
4. Adjusted Goodness of Fit Index (AGFI)	≥.95	.95	Passed
5. Normed Fit Index (NFI)	≥.95	.99	Passed
6. Non-Normed Fit Index (NNFI)	≥.95	1.00	Passed
7. Comparative Fit Index (CFI)	≥.95	1.00	Passed
8. Root Mean Square Error of Approximation (RMSEA)	<.05	.015	Passed
9. Root Mean Square Residual (RMR)	<.05	.022	Passed
10. Standardized Root Mean Square Residual (SRMR)	<.05	.022	Passed

From Table 2, it is found that the Chi-square value is 258.01, which has a probability value of .12 at 232 degrees of autonomy (df=232), with a chi-square to degrees of autonomy ratio of 1.11, which is less than 2. The Adjusted Harmonized Index (AGFI) is .96 and the Adjusted Harmonized Index (AGFI) is .95. The Comparative Harmonization Index (TLI) or (NNFI) is 1.00, the Comparative Harmonization Index (CFI) is 1.00, the Mean Square Root Index of Estimation Margin (RMSEA) is .015, the Root Index of the Mean Squared of Remainder (RMR) is .022, and the Root Index of the Square of Standard Remainder (SRMR) is .022.

Table 3: Results of the First-Order Confirmatory Factor Analysis Component of Career Decision-Making Self-Efficacy (CDMSE)

Variables	Factor loading		t	r^2
	b (SE)	β		
First-order confirmatory Factor Analysis				
Self-Appraisal				
Y1	1.00	.74	<------>	.55
Y2	.96 (.05)	.71	17.56**	.50
Y3	1.01 (.06)	.75	16.75**	.56
Y4	1.02 (.06)	.75	16.87**	.57
Y5	1.03 (.06)	.76	16.96**	.58
Occupational Information				
Y6	1.00	.72	<------>	.51
Y7	.91 (.06)	.65	14.15**	.43
Y8	.99 (.06)	.71	15.27**	.50
Y9	1.05 (.07)	.75	16.02**	.56
Y10	1.10 (.06)	.79	16.96**	.62
Goal Selection				
Y11	1.00	.76	<------>	.58
Y12	.90 (.05)	.68	16.89**	.47
Y13	.99 (.06)	.75	17.46**	.56
Y14	.96 (.06)	.73	16.90**	.53
Y15	1.00 (.06)	.76	17.85**	.58
Y16	.90 (.06)	.68	15.76**	.47
Career Planning				
Y17	1.00	.77	<------>	.59
Y18	1.07 (.05)	.82	19.85**	.68
Y19	1.03 (.05)	.79	18.85**	.62
Y20	.97 (.06)	.74	17.53**	.55
Y21	.97 (.06)	.75	17.68**	.56
Problem-Solving				
Y22	1.00	.77	<------>	.59
Y23	1.00 (.06)	.77	17.28**	.59
Y24	1.01 (.06)	.77	17.95**	.60
Y25	.99 (.06)	.76	17.10**	.58

Table 4: Factor Loadings From the Second-Order Confirmatory Factor Analysis of the Career Decision-Making Self-Efficacy (CDMSE)

Variables	Factor loading b (SE)	β	t	r^2
Second Order Confirmatory Factor Analysis				
Self-App	.71 (.04)	.95	18.04[**]	.91
Occu-In	.68 (.04)	.95	17.27[**]	.90
Goal-Sel	.73 (.04)	.96	19.16[**]	.93
Car-Plan	.74 (.04)	.97	19.42[**]	.94
Pro-Sol	.67 (.04)	.87	17.28[**]	.76

Chi-square=258.01 df=232 p-Value=.12 χ^2/df =1.11 GFI=.96 AGFI=.95 NFI=.99 TLI / NNFI=1.00
CFI=1.00 RMSEA=.015 RMR=.022 SRMR=.022

Table 5: The Correlation Matrix Between Latent Variables of the Career Decision-Making Self-Efficacy (CDMSE)

Correlation Matrix Between Latent Variables	Self-App	Occu-In	Goal-Sel	Car-Plan	Pro-Sol	CDMSE
Self-App	1.00					
Occu-In	.91	1.00				
Goal-Sel	.92	.92	1.00			
Car-Plan	.92	.92	.93	1.00		
Pro-Sol	.83	.83	.84	.85	1.00	
CDMSE	.95	.95	.96	.97	.87	1.00

[**] $p < .01$, The numbers in parentheses are the standard tolerances.
<------> SE and t values are not reported as they are mandatory parameters. (constrained parameter)

From Table 3, the results of the analysis of the second confirmatory component of Career Decision-Making Self-Efficacy Scale (CDMSE) are presented, which consists of the component weight value in the form of a raw score (b). Element weight in the form of a standard score (β) Standard Deviation (SE) and Prediction Coefficient (r^2).

Considering the results of the analysis of the first component, which is the result of a model analysis that shows the relationship between the perception of Career Decision-Making Self-Efficacy Scale (CDMSE) and the five components: 1) career self-survey, 2) career information, 3) career goal selection, 4) career planning, and 5) career problem-solving. It was found that the component weights of all variables were statistically significant at the level of .01, indicating that all 25 variables were characterized as structural indicators of Career Decision-Making Self-Efficacy Scale (CDMSE), with the variable having component weights in the form of standard scores ranging from .65 to .82.

In conclusion, Career Decision-Making Self-Efficacy Scale (CDMSE) component indicators developed in this study are statistically significant indicators at the .01 level. All indicators have positive component weight. This means that if students have high attributes according to these indicators, it will result in a higher awareness of their ability to make the Career Decision-Making Self-Efficacy Scale (CDMSE).

Considering the results of the analysis of the second confirmatory component, which is the result of model analysis, which shows the relationship between the second component of

Career Decision-Making Self-Efficacy Scale (CDMSE) and the five components: 1) Career self-survey, 2) Career information, 3) Career goal selection, 4) Career planning, and 5) Career problem-solving. The weights in the form of standard scores ranged from .87 to .97, indicating that these five components are statistically significant components of the Career Decision-Making Self-Efficacy Scale Choices (CDMSE). In the Cognitive Measure of Career Decision-Making Self-Efficacy Scale (CDMSE), there are elements of career planning, followed by career goal selection, career self-survey, and career self-exploration. Career information and career problem-solving. Each of these elements There were variations in the composition of the Perception of Vocational Career Decision-Making Self-Efficacy Scale (CDMSE) of 94.00%, 93.00, 91.00, 90.00, and 76.00 respectively. The correlation coefficient ranges from .83 to .97, indicating that the Cognitive Component of Career Decision-Making Self-Efficacy Scale (CDMSE) in Career Self-Survey Career information, career goal selection, career planning, and career problem-solving are not independently separated. The composition analysis confirms the second component of Career Decision-Making Self-Efficacy Scale (CDMSE) as shown in Figure 1.

Figure 1: Results of the Analysis of the Second Affirmative Component of the Perception of Career Decision-Making Self-Efficacy Scale (CDMSE)
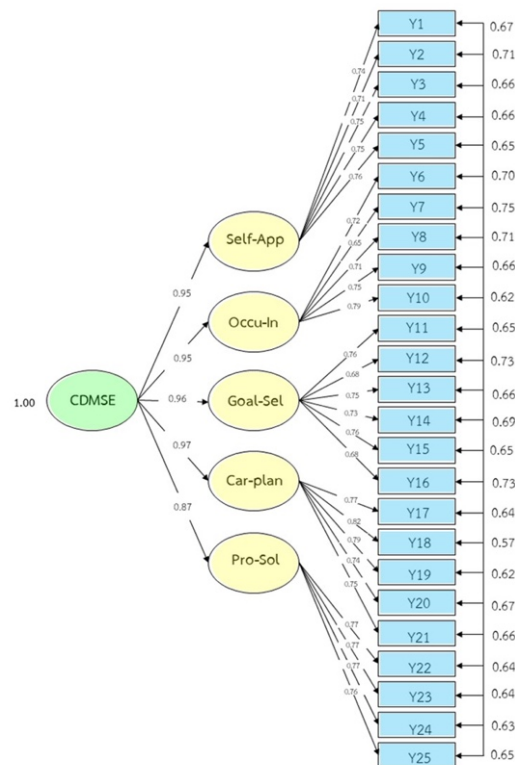
Chi-square=258.01 df=232   p-Value=.12 "χ" ^"2" "/df"=1.11 GFI=.96 AGFI=.95 NFI=.99
TLI / NNFI=1.00 CFI=1.00 RMSEA=.015 RMR=.022   SRMR=.022

Conclusion

The objective of this investigation was to examine the structural accuracy of Career Decision-Making Self-Efficacy Scale Perception Scale (CDMSE) in the context of vocational education students in Thailand. The first component's analysis, which was the result of model analysis, demonstrated the correlation between the perception of Career Decision-Making Self-Efficacy Scale (CDMSE) and 5 components, as follows: 1) Self-Appraisal, 2) Occupational Information, 3) Goal Selection, 4) Career Planning, and 5) Problem-Solving.

Regarding 25 observable variables using Pearson correlations, it was found that the correlation coefficient was significantly different from zero statistically at the level of .01, and all variables were sufficiently correlated and suitable for elemental analysis. The second confirmatory component analysis was the result of the structural correctness analysis of the components of Career Decision-Making Self-Efficacy Scale (CDMSE), consisting of the 5 components. It was very consistent with empirical data. In addition, other conformity indices held up in terms of reliability and accuracy. The results showed that the Career Decision-Making Self-Efficacy Scale (CDMSE) had good measurement properties, with the internal confidence value of each component at an acceptable level. The Affirmative Element Analysis (CFA) also supported the structural validity of Career Decision-Making Self-Efficacy Scale (CDMSE) in the context of vocational education students in Thailand. It showed that each question could measure the elements that were appropriately defined. This research's results were in line with the core concept of Bandura's (1977). The heightened reliability of experiential sources positively correlated with an increase in perceived self-efficacy. The Career Decision-Making Self-Efficacy Scale (CDMSE) in the context of vocational education students in Thailand was useful for career guidance teachers and counselors since it enabled a more precise determination of the strengths and areas for the advancement of each student. This resulted in the provision of suitable guidance and assistance. (Cui, 2024) Additionally, the inherent flexibility and adaptability of the framework enabled integration into educational and professional environments by addressing an array of diverse requirements and preferences to strengthen the confidence of vocational students in making the right career choice. Thus, it will lead to a reduction in unemployment and a shortage of skilled workers in the future. In addition, adaptability is crucial because technological advancements and shifting economic landscapes allow individuals to update their skills and knowledge continuously, especially when considering their upcoming careers in the future. While technology is constantly evolving, new imagined opportunities will emerge. Therefore, emphasizing these skills in education and training will be essential for Career Decision-Making Self-Efficacy.

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