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POLITEKNIK MALAYSIA SEBERANG PERAI

PROCEEDING
INTERNATIONAL CONFERENCE ON GLOBAL EDUCATION VI (ICGE VI)

"The Fourth Industrial Revolution : Redesigning Education"

VOLUME 1

7 - 8 MAY 2018

Politeknik Seberang Perai, Penang, Malaysia

Organiser

FAKULTI PENDIDIKAN UKM & UNIVERSITAS EKASAKTI PADANG, INDONESIA
DENGAN KERJASAMA
POLITEKNIK SEBERANG PERAI, MALAYSIA

Universiti Kebangsaan Malaysia
The National University of Malaysia

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POLITEKNIK MALAYSIA
SEBERANG PERAI

INTERNATIONAL CONFERENCE ON GLOBAL EDUCATION VI

Theme

The Fourth Industrial Revolution: Redesigning Education

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Seberang Perai Polytechnic, Penang

Published by:
Faculty of Education
Universiti Kebangsaan Malaysia

ISBN 978-967-0829-90-6

Printed by

Universiti Kebangsaan Malaysia,
43600 Bangi,
Selangor Darul Ehsan.

Sub-Theme: Curriculum Development

Sub-Theme: 21st Century

Title **Page**

Sub Theme : Technical and Vocational Education Training

VOCATIONAL EDUCATION GRADUATE COMPETENCY INDICATORS: VALIDITY AND RELIABILITY ANALYSIS

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Abstract

This study aims to: (1) identify the validity and reliability of indicators of the competence of vocational education graduates; (2) modeling the variables and competency indicators of vocational education graduates. Data collection is done by using instruments that have been tested for validity and reliability. The research population is graduated from D3 of vocational education from Engineering Faculty of State University of Padang and State Polytechnic of Padang. Sampling technique using simple random sampling, with data source of research include 150 respondents graduated from D3 vocational education from Faculty of Engineering State University of Padang and D3 State Polytechnic of Padang. Data analysis using Lisrel 8.80 in the form of normality test and multicolonierity test. The data were estimated asymptotic covariance matrix with confirmatory factor analysis and structural model. The results of the research reveal the following: (1) there are six valid and reliable indicators in reflecting the competency variables of vocational education graduates, namely: (a) knowledge and understanding; (b) application knowledge and understanding; (c) making judgment; (d) communication skills; (e) learning skills; and (f) value. The most reliable and valid indicators followed by less reliable and reliable indicators are: making judgment; value; communication skills; application knowledge and understanding; knowledge and understanding; and learning skills. The six indicators proved to be valid and reliable in their performance measuring/reflecting the latent variables of graduate competence.

Keywords: *Vocational Education, Graduate Competence, Validity, Reliability*

PRELIMINARY

Vocational education according to the Law of the Republic of Indonesia Number 12 Year 2012, Article 16, paragraph (1) Vocational education is a higher education diploma program that prepares students for jobs with certain applied skills up to the applied degree program, paragraph (2) vocational education as referred to in paragraph (1) may be developed by the Government to an applied magister program or an applied doctoral program. Data / information of Central Bureau of Statistics (2017) states that open unemployment rate (TPT) is dominated by population of Vocational High School 13, 65%, Diploma 12,59% medium level 10,52%. The amount of unemployment rate among others can be caused by the mismatch between the need for the competence of the workforce with the competence of the graduates produced. The ability of graduates of higher education programs to create employment is also generally not encouraging.

Looking at these issues, the main problem is the competence of graduates who have not been satisfactory and need to find a way out, to minimize the wider impact, especially from the economic and social side. One common problem is the availability of an empirical data analysis model of indicators that reflect measurements on graduate competency factors. Assessment begins with searching for indicators and development of valid and reliable instruments which is a reflection of the measurement of the competence of vocational education graduation. The method of analysis is done through structural equation modeling.

The development of competence is obtained from learning. Learning is the development of new knowledge, skills or attitudes in which a person interacts with information and the environment. Increased competence of vocational education graduates will achieve maximum results, if the indicators of graduate competence in work need to be established. This research intends to develop and validate the indicators in measuring the competence of vocational education graduates. The results of this study are expected to be input for the formulation of policies in management / management of vocational education with regard to the improvement of graduate competence.

Competence of graduates

Competence is the ability to apply or use a single unity of knowledge, skills and abilities (talents) required to perform certain work functions or tasks defined in work procedures. Competencies often serve as the basis for skill standards at the level of knowledge, skills and abilities needed to be successful in the workplace as a measurement criterion to assess the achievement of competencies. Competence can be defined as a skill in the field of knowledge, attitudes and special abilities or high-level performance. This characteristic can not be easily observed but it does exist, in the form of behavior statements that can illustrate the example of competence (Sanghi, 2007).

There are various definitions of competence with little difference, but generally a behavior that can be observed in the workplace. This can be shown in the form of competency criteria through high performance and effective. Characteristic competence consists of: (1) motive, is a consistency of thinking or desire someone who produces an action, motive move directly and select or choose behavior toward certain that produce activity or purpose different from others; (2) character, ie physical characteristics and consistent response to a situation and information; (3) the concept of self, is the attitude, values or self-image of a person; (4) knowledge, ie information on a person about the content or meaning in a particular field; (5) skills, ie the ability to perform a task physically or mentally (Sanghi, 2007).

The definition of competence derived from Yuvaraj (2017), is as follows: (1) competence is a basic characteristic of a person who can be realized as a high performance on a job, role or situation; (2) competence consists of a group of knowledge, attitudes and skills that result in a person able to do something; (3) competence is the motive of general knowledge, character, social role or a person's skill connected with high performance on a job; (4) competence is a characteristic of a person who produces effective managerial performance; and (5) competence is a unity of skills associated with the knowledge, qualities one produces.

Key competencies must meet three criteria, namely: (1) must have an outcome value for the individual and the social; (2) helping individuals meet labor market demand in the context of wide variations; and (3) very important not only for specialists but for all individuals (Organization for Economic Development and Development / OECD, 2005). The classification of key competencies according to Organization for Economic Corporation and Developmen / OECD (2005), namely: (1) using tools interactively, in the form of individual needs to use tools widely to interact effectively with the physical environment in the form of information technology and social culture using language; (2) interactive in heterogeneous groups, ie enhancing the ability of the individual to include others and the ability to meet with people of different or multiple backgrounds; and (3) act autonomously, the ability to take responsibility for oneself and the life situation in a complex social context.

The interactive user interface consists of three competencies, OECD (2005), namely (1) using language, symbols and text interactively. This competency is a key competency that focuses on the effectiveness of speech, writing and mathematical skills and other diverse mathematical abilities. These key competencies are termed communication competencies; (2) use knowledge and information interactively include four, that is, recognize and determine what is not known, identification and access to appropriate information resources, evaluation of the quality of accuracy and value of information used as sources, organize knowledge and information; (3) using technology interactively. In this competence individuals are expected to follow the development of technology in everyday life. Reasons that can be used as a benchmark is the transformation of information and communication technology resulting in access and interaction with others. The required competencies are basic technical skills such as being able to use internet, send email and other lan-lain.

Countries in the ASEAN region have qualified work for vocational education and training as well as higher education. ASEAN countries that have qualified work include: Malaysia, Philippines, Singapore and Thailand. While Australia has had a national employment qualification for more than 15 years. 2012 is only set Indonesian National Work Qualification (KKNI) based on Presidential Regulation No. 8 of 2012. Indonesian National Work Qualification (KKNI) is a framework of competency qualification that can pair, equalize and integrate between the field of education and the field of job training and work experience in the provision of job competence recognition in accordance with the structure of work in various sectors. KKNI is intended as a description of outcomes that must be mastered by graduates of vocational education, higher education, training institutions and independent learning. KKNI divides the outcome of education, training or experience into nine levels of qualification. The first level is the lowest level and the nine is the highest level. Graduates of vocational education (SMK and MAK) are expected to have qualification level 2 and diploma graduates I / II / III / IV are expected to have the respective qualifications 3,4, 5 and 6.Uraian KKNI level above shows that the qualifications of vocational education graduates include skills , knowledge, communication skills and degrees of independence. However, parties related to accreditation, certification, competency knowledge, labor users seem not ready to respond to the existence of KKNI because it is relatively new.

From a combination of several references: Aitken, Appleby, Butler et.al. (2016); Allen & Ramaekers (2008); and BAN PT (2009), then in this study used variable observed / indicator for the competence of graduates are: (1) knowledge and understanding; (2) application of knowledgeand understanding; (3) making judgment; (4) communication skills; and (5) learning skills. (6) value. Where English skills, the use of information technology and value (integrity) are included in the indicators of communication skills.

Research conducted by Rifandi (2013), which examines the quality of learning and the competence of diploma III vocational education graduates. The research reveals that the indicators influencing the competency of the graduates are knowledge, application knowledge, judgment and communication. While Allen and Ramaekers (2008) stated that there are five valid indicators of graduate competence, namely knowledge, application knowledge, judgment and communication and learning skills.

RESEARCH RESULT AND DISCUSSION

Test Instruments

The instruments were tested before they did the actual research, which aims to obtain reliable and valid instruments, through respondents consisting of graduates of Vocational Education D3 of State University of Padang amounting to 75 and D3 State Polytechnic graduates of 70 graduates. Guidelines for determining sample size for testing to test the validity of the constructs are required at least 5-10 times the number of question items used (Nunnally, 1994) and depending on many items / indicators, in this study used 145 samples (Meyers, Garmst & Guarino, 2006). The quality of the instrument was analyzed through validity test and reliability test, using SPSS 24.

Test Instrument Validity

From the output view of SPSS it can be seen that the correlation between each questionnaire (except T6, T7, T13, and T16) to the total construct score of competent latent competence of graduates, showed significant results. Significance is determined by the Sig line. (2-tailed). Sig value. (2-tailed) for each of the questionnaires except for T6, T7, T13 and T16 of the total competency score of graduates is < 0.05, while the values for T6, T7, T13 and T16 are> 0.05, can be declared insignificant. Thus the relation in r for all questionnaires except T6, T7, T13 and T16 is considered significant. Then it can be concluded that each questionnaire / question is valid, except for the questionnaire / questions T6, T7, T13, and T16 are invalid.

Test Reliability Instruments.

The output display of SPSS shows that questionnaires / questions from T1 to T15 (valid instruments) to Graduates' competencies, give Cronbach Alpha value of 0.750 or 75.0% which according to Nunnally (1994) criterion can be said to be reliably (> 0.70).

Screening Data

Normality test

The most fundamental assumption in multivariate analysis is normality, which is a form of data distribution on a single variable metric in generating a normal distribution (Hair, 1998). A distribution of data that does not form a normal distribution, meaning the data is not normal and vice versa. To test the violation / assumption of normality, it can be used statistical value z for skewness and kurtosis. If the z value, either zkurtosis or zskewness is significant (< 0.05) at the 5% level, then it can be said that the data is abnormal and vice versa. So before doing structural equation modeling analysis, it is necessary to do data screening to give description about descriptive data (normalitasserta multikolonieritas). Screening the data is useful to ensure whether or not the assumptions required in Structural Equation Modeling (SEM) such as normality and multicollinearity are included. The following 3 outputs are output from screning data using LISREL 8.8 to 145 responder graduate vocational education. The research data includes the latent variable of graduate competency. From the output in Table 1 for multivariate normality assumptions, the data show abnormalities simultaneously. It can be known from the significant p-value (less than 0.05) in the Skewness and Kurtosis multivariate column. A data is said to have a normal multivariate normality value, if it has no significant p-value of Skewness and Kurtosis (greater than 0.05), (Ghozali, 2012).

TABEL 1. Output Test Univariate dan Multivariate dariSampelLulusan D3 Vokasi

Test of Univariate Normality for Continuous Variables

	Skewness		Kurtosis		Skewness and Kurtosis	
Variable	Z-Score	P-Value	Z-Score	P-Value	Chi-Square	P-Value
X1	-2.102	0.036	0.065	0.948	4.421	0.110
X2	-1.508	0.131	-0.118	0.906	2.289	0.318
X3	-1.351	0.177	-1.600	0.110	4.387	0.112
X4	-2.306	0.021	0.032	0.976	5.319	0.070
X5	-1.441	0.149	0.137	0.891	2.096	0.351
X6	-1.024	0.306	-1.657	0.097	3.795	0.150

Relative Multivariate Kurtosis = 0.889

Test of Multivariate Normality for Continuous Variables

Skewness			Kurtosis			Skewness and Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
2.212	-0.004	0.996	42.658	-3.808	0.000	14.503	0.001

Histograms for Continuous Variables

Data normality needs to be known in order to set a solution to overcome it. If the assumption of normality is not met and the deviation of normality is large, then all statistical test results are invalid because the t test calculation and the other is calculated with the assumption of normal data. There are several ways that can be applied to abnormal data, such as using asymptotic covariance matrix estimation, weighted least square estimation method (WLS), data transformation and bootstrapping (Ghozali 2012). This study was conducted by adding an asymptotic covariance matrix estimation.

Multicollinearity Test

Just like other multivariate analysis, one of the assumptions that must be met by structural equation modeling is multicollinearity. Multicollonearity test aims to test whether the regression model found a correlation between independent variables (independent). The assumption of multicollinearity requires that there is no perfect or large correlation between independent variables. The correlation value between observed variables is not allowed is 0.90 or more (Ghozali, 2012). One way of detecting multicollinearity is by analyzing the correlation matrix between independent variables and the calculation of tolerance values and their counterparts and with variance inflation factor (VIF), as in the following analyst (using SPSS 24). Both of these measures show which of the independent variables are described by other independent variables, meaning that each independent variable becomes a dependent variable and is regressed against other independent variables. Tolerance measures the variability of selected independent variables that are not explained by other independent variables. So a low tolerance value equals a high VIP value (because VIF = 1 / Tolerance). Common cutoff values used to indicate the presence of multicolonierity are tolerance values ≤0.10 or equal to VIF value ≥10 (Ghozali, 2011). Furthermore, multicollonearity analysis is done by analyzing correlation matrix between independent variables and calculation of Tolerance and VIF values.

In Table 4, the correlation between independent variables shows that the highest correlation occurs between X1 and X3, ie -0.402 or about 40.2%. Since the correlation is still below 90%, it can be stated that there is no multicoloniarity between independent variables.

TABEL 2. Coeffisien Correlations danKoefisienVariabelIndependenpada DataLulusan

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-1,071E-013	,000		.	.		
	X1	1,000	,000	,192	.	.	,380	2,634
	X2	1,000	,000	,208	.	.	,375	2,670
	X3	1,000	,000	,190	.	.	,283	3,530
	X4	1,000	,000	,190	.	.	,355	2,814
	X5	1,000	,000	,196	.	.	,420	2,381
	X6	1,000	,000	,192	.	.	,321	3,114

a. Dependent Variable: Komplus

The result of calculation of tolerance as observed in Table 4 also shows that there is no independent variable that has tolerance value less than 0.10 (the lowest tolerance is 0.283), meaning that there is no correlation between independent variables whose value is more than 90%. The result of calculating the value of variance inflation factor (VIF) also shows the same thing that there is no one independent variable that has VIF value more than 10 (the highest value is 4.20). So it can be concluded that there is no multikolonieritas among independent variables on the competency of graduates competence.

Confirmatory factor analysis (CFA)

The observed variable determination of 6 observed variables has been performed based on the substance of literature or reference studies. Furthermore, through the measurement model is attempted to confirm whether the observed variable is indeed a measure / reflection of a latent variable. So for that purpose, the measurement model analysis / Confimatory Factor Analysis (CFA) was performed. The simplest input is shown in Table 3 below, which is run using LISREL 8.8. The data used are respondents graduated from D3 vocational education State University of Padang and graduate of D3 politeknik Negeri Padang which amounted to 145 respondents.

TABLE 3. Simplified Input Model of Determinant Factor Determination

```
Observed Variables X1 X2 X3 X4 X5 X6
 Covariance Matrix from file D:\kompetensilulusan2017\olahdata2\datakov.cov
 Asymptotic Covariance Matrix from file
D:\kompetensilulusan2016\olahdata2\datasymp.acm
 Sample Size 145
 Latent Variables Komplus

 Relationships
 X1-X6=Komplus
 Options: SC EF ND=3
 LISREL OUTPUT

 Path Diagram
End of Problem
```

In this study, the data of covariance matrix and acymptotic covariance matrix stored into external files, named datakov.cov and datasymp.acm. Because using the same data, then on if the data / programming then continue to estimate the model by making corrections to the bias by using acymptotic covariance matrix. The simplest input for the confirmatory factor analysis program can be seen in Table 3. The output of the simplified program is a path diagram, shown in Figure 1 (Standardized solution) and the following 2 (t) values (standardized solution). Output of Goodness of fit displayed will result Chi-Square value which consists of Minimum Fit Function Chi-Square, Normal Theory Weighted Least Squares Chi-Square and Satorra-Bentler Scaled Chi-Square. According to Hu (1992), only Satorra-Bentler Scaled Chi-Square produces the most valid chi-square estimation regardless of the number of samples and on abnormal data usage.

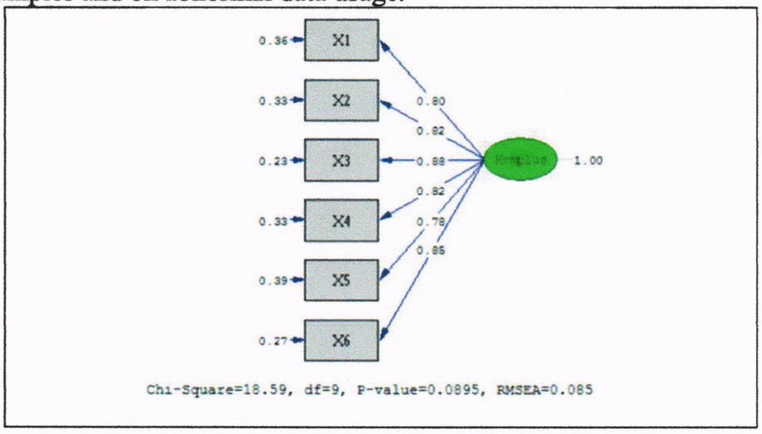

FIGURE 1. Model of Competency Factors Graduates Vocational education (standardized solution)

Preliminary Analysis of Estimated Results.

Analyzing the existence of offending estimate, namely the existence of negative error variance (Heywood cases) and standardized loading factor > 1.0, and the value of the standard error is very large. Standardized loading factor > 1.0 is generally caused by a negative error variance of the observed variable, while a large standard error can be caused by miss specification. To overcome the negative error variance is to make the variance error is small positive value through the addition of the statement: Set Error variance of (Variable Name) to 0.01 (or 0.005). If there is an offending estimate as described above then it is done respesifikasi model in accordance with the needs of respesifikasi (Wijanto, 2008). However, from the observations made there is no negative error variance or standardized loading factor > 1.0 (Table 4). The value of variance error can be observed in Table 5, and no negative variance error is found.

Table 4. Completely Standardized Solution of Measurement Models

Completely Standardized Solution	
LAMBDA-X	
	Komplus
X1	0.800
X2	0.818
X3	0.880
X4	0.819
X5	0.784
X6	0.852

TABLE 5. Error variance Measurement Model

THETA-DELTA					
X1	X2	X3	X4	X5	X6
0.361	0.331	0.226	0.329	0.385	0.274

Validity Measurement Model Analysis

The validity analysis of the measurement model is done through: (1) examination of the t-value of the loading factor of the observed variable. A variable is said to have good validity to the construct or latent variable, if the t-value of its loading factor is greater than the critical value (or ≥ 1.96 for the 5% significance level). (Rigson and Ferguson 1991) and Doll, Xia and Torkzadesh (1994). From the observations summarized in Table 8 or Figure 3, it turns out that from all observed variables, there is no t-value smaller than 1.96; (2) performing a Standardized loading factor (λ) check of the observed variables in the model. Whether the value is ≥0.70 (Rigdon & Fergusson, 1991), or ≥ 0.50 (Igbaria et.al., 1977), where the standardized loading factor values can be seen in the standardized solution in Figure 2 or in the printed output section completely standardized solution in Table 6. From the observation of the validity analysis, it turns out the standardized loading factor (λ) of the observed variable is all ≥ the cut-off value set, ie ≥ 0.70. The result of the t-value and completely standardized solution observations made to know the validity of the model measurement, are summarized in Table 6 below:

TABLE 6. Result of Validity Measurement Model Analysis

Variabel	***Standardized Loading Factor*(≥ 0,70)**	***t-values* (> 1,96)**	**Kesimpulan Validitas**
KompetensiLulusan (Komplus)			
X1	0,800	11,218	ValiditasBaik
X2	0,818	11,617	ValiditasBaik
X3	0,880	14,774	ValiditasBaik
X4	0,819	11,796	ValiditasBaik
X5	0,788	10,793	ValiditasBaik
X6	0,852	14,189	ValiditasBaik

In relation to the validity of the measurement model, the observed variable having t-value < 1.96 or standardized loading factor is smaller than the selected cut-off value of ≤0.70 or ≤ 0.50 is excluded (or not included in the model) , or in other words the observed variable is removed from the model. From the observation of the validity analysis it has been stated that everything ≥ of the cut off value is set. From both validity analyzes to output, it is initially concluded that the result of factor load estimation of the model is good or valid, so in relation to the validity of the measurement model, there is no need for model respesification.

Model overall fit *analysis.*

From the Goodness of Statistic analysis in Table 9, it was observed that the index of matches, Normed Fit Index (NFI) = 0.982, Comparative Fit Index (CFI) = 0.991, Incremental Fit Index (IFI) = 0.991 Relative Fit Index (RFI) = 0.970 (all ≥ 0.90, good model fit (Bentler, 1992 and Byrne, 1998) .RMSEA 0.0263 (≤0.05), this indicates a good fit model (Bentler, 1992 and Byrne 1998) Similarly, the value of the Standardized Root Mean Square Residual (SRMR) 0.0247 (≤ 0.05) indicates a good fit model, while the Goodness of Fit Index (GFI) value of 0.960 is good fit (Diamantopaulus and Sigua 2000), and the value of Adjusted Goodness of Fit Index (AGFI) 0.908, is also categorized as good fit, ≥ 0.90 (Diamantopaulus and Siguaw, 2000) .Chi-Square 16.59 and p-value 0.0895 is good -value≥0,05) (Diamantopaulus and Siguaw, 2000).

TABEL 7. Goodness of Fit

Goodness of Fit Statistics
Degrees of Freedom = 9
Minimum Fit Function Chi-Square = 18.748 (P = 0.0874)
Normal Theory Weighted Least Squares Chi-Square = 18.445 (P = 0.0895)
Satorra-Bentler Scaled Chi-Square = 18.587 (P = 0.0889)
Chi-Square Corrected for Non-Normality = 16.505 (P = 0.0871)
Estimated Non-centrality Parameter (NCP) = 9.587
90 Percent Confidence Interval for NCP = (0.910 ; 25.983)
Minimum Fit Function Value = 0.126
Population Discrepancy Function Value (F0) = 0.0643
90 Percent Confidence Interval for F0 = (0.00611 ; 0.174)
Root Mean Square Error of Approximation (RMSEA) = 0.0846
90 Percent Confidence Interval for RMSEA = (0.0260 ; 0.139)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.134
Expected Cross-Validation Index (ECVI) = 0.286
90 Percent Confidence Interval for ECVI = (0.228 ; 0.396)
ECVI for Saturated Model = 0.282
ECVI for Independence Model = 7.077
Chi-Square for Independence Model with 15 Degrees of Freedom = 1042.461
Independence AIC = 1054.461
Model AIC = 42.587
Saturated AIC = 42.000
Independence CAIC = 1078.525
Model CAIC = 90.714
Saturated CAIC = 126.223
Normed Fit Index (NFI) = 0.982
Non-Normed Fit Index (NNFI) = 0.984
Parsimony Normed Fit Index (PNFI) = 0.589
Comparative Fit Index (CFI) = 0.991
Incremental Fit Index (IFI) = 0.991
Relative Fit Index (RFI) = 0.970
Critical N (CN) = 174.690
Root Mean Square Residual (RMR) = 0.0179
Standardized RMR = 0.0247
Goodness of Fit Index (GFI) = 0.960
Adjusted Goodness of Fit Index (AGFI) = 0.908
Parsimony Goodness of Fit Index (PGFI) = 0.412

Model Reliability Analysis.

Individual indicator reliability can be evaluated from the Squared multiple correlation (R2) value of each indicator. R2 describes how big the proportion of variance indicator described by latent variable, in this research is competence of graduates and the rest explained by measurement error.

TABLE 8. Squared Multiple Correlation

Squared Multiple Correlations for X - Variables					
X1	X2	X3	X4	X5	X6
0.639	0.669	0.774	0.671	0.615	0.726

From Output (Table 8), it can be seen that X3 has R2tertingi value that is 0.774. So it can be concluded that the competency of the graduates contribute to the X3 variance of 77.4%, while 22.6% is explained by the measurement error. The order of individual validity levels of the indicator is, starting from the highest validity to the lowest consecutive: making judgment, X3 (0.774); value, X6 (0,726); Communication skills, X4 (0.671); application knowledge and understanding, X2 (0.669);

The final step of the Confirmatory Factor Analysis is to analyze the reliability of the measurement model, which aims to determine the consistency of measuring indicators of a latent variable. Reliability analysis of measurement model is done by calculating construct reliability (CR) and variance extracted (VE) values of standardized loading factors and error variance values through the following formula (Fornel and Larcker, 1981):

$$\text{Construct Reliability} = \frac{(\sum \text{std. loading})^2}{(\sum \text{std. loading})^2 + \sum e_j}$$

$$\text{Variance Extracted} = \frac{\sum \text{std. loading}^2}{\sum \text{std. loading}^2 + \sum e_j} \quad ...(2)$$

The values of standardized loading factors and error variances (errors) are taken from the path diagram of Figure 2 or the printed output of the completely standardized solution title and LAMBDA-X subtitle (for standardized loading factors) and THETA DELTA (errors), (for error variance). From the calculation results seen all values of Construct Reliability (CR) > 0.70 and Variance Extracted Value > 0.50. This means that the reliability of the Complus variable is good. A construct has good reliability, if the value of Construct Reliability (CR) ≥ 0.70 and Variance Extracted value (VE) ≥ 0,50 (Hair, 1998). Reliability calculations and reliability analysis results are summarized in Table 9 below.

TABEL 9.Rekapitulasi Construct Reliability (CR) dan Variance Extracted (VE)

Konstruk	Indikator	SLF	R2	Error	Reliabilitas		Kesimpulan
					CR (>0,70)	VE (>0,50)	
Komplus	X1	0,800	0,640	0,360	0,928	0,682	ValiditasBaik
	X2	0,818	0,669	0,331			ValiditasBaik
	X3	0,880	0,774	0,226			ValiditasBaik
	X4	0,819	0,671	0,329			ValiditasBaik
	X5	0,784	0,615	0,385			ValiditasBaik
	X6	0,852	0,726	0,274			ValiditasBaik
		4,532	4,095	1,905			

The result of calculation and conclusion of reliability of each variable shows that all values of Construct Reliability (CR) ≥ 0.70 and Variance Extracted Value (VE) ≥ 0,50. Thus it can be stated that the reliability of competency variables of graduates is good, where all indicators are able to measure the variables of graduate competence consistently.

Relationship between indicators with latent variables Graduates Competency.

The first hypothesis in this study is suspected the relationship between the observed variable (indicator) with the latent variable that is reflective. This means that the observed variable is indeed a measure / reflection of the corresponding latent variable. Or the question raised in this research is whether a number of observed variables / indicators of the latent variable of graduate competency referred from several references / theoretical able to measure / reflect the latent variable.

Then the measurement model is expected to confirm whether the observed variable is indeed a measure / reflection of the latent variable, through a confirmatory factor analysis (CFA) measurement model, whose output analysis is as follows:

(1) fit analysis based on Goodness of Fit Statistic output. In the measurement model, the match index is apparent. The results of the analysis of the overall fit index of the model can be concluded that the overall fit of the model is good. So no change or respesification of the model such as path change is required to obtain a good match value (reinforced with no suggestion in Modification indices). Then it can be stated that the relationship of indicators and latent variables are reflective ie observed variable / indicator is a reflection of latent variables;

(2) validity analysis. As previously described, from the observation of t-values on the loading factor and the standardized loading factor, a summary of the validity test results of each indicator, as discussed in the previous section, is shown in Table 9. From the validity test it is shown that all indicators have standardized loading factor> 0 , 70 with a t-value loading factor of> 1.96, so it can be stated that all indicators have good validity.

The results of both analyzes show that all of these indicators have good validity, in other words can measure what should be measured. From the output it can also be known that the X3 is the most valid indicator (0.880), followed by X6 (0.852), X4 (0.819), X2 (0.818) and X1 (0,800), and X5 (0.784) which is least valid.

(3) reliability analysis

Individual indicator reliability can be done by observing the squared multiple correlation (R2) value of the indicator. The R2 explains how much the proportion of the indicator variance is explained by the latent variable (while the remainder is explained by the measurement error).

TABEL 11. Squared Multiple Correlations

Squared Multiple Correlations for X - Variables

X1	X2	X3	X4	X5	X6
0.639	0.669	0.774	0.671	0.615	0.726

From the above output, it can be seen that X3 has the highest R2 value of 0.774, followed by X6 (0.726); X4 (0.671); X2 (0.669); X1 (0.639); and lastly X5 (0.726). So it can be concluded that latent variables Competence of graduates contribute to X3 variance of 77.4 percent while the remaining 22.6 percent is explained by measurement error. Medium X3 is the most unreliable indicator of the latent variable of graduate competence, because the value of R2 has the smallest.

(4) composite analysis of reliability.

The analysis of composite reliability is done through the calculation of Construct Reliability (CR) and Variance Extracted (VE), as explained before, the result shown in Table 11 shows that all values of Construct Reliability (CR) ≥ 0.70 and value of Variance Extracted (VE) ≥ 0,50. In accordance with Fornel & Larker (1981) and Hair (1998) statements a construct has good reliability, if the value of Construct Reliability (CR) ≥ 0.70 and Variance Extracted (VE) value ≥ 0.50. Thus it can be stated that the reliability of the competency variable of the graduate is good. This means that indicators have a high consistency in measuring their latent constructs. From the above analysis that is model fit analysis, and validity and reliability, it can be concluded that the proposed measurement model is reflective ie observed variable / indicator is the size of the latent variable related.

CONCLUDE

This research can be summarized as follows:

1. Competence of graduates has six indicators, namely: (a) knowledge and understanding; (b) application knowledge and understanding; (c) making judgment; (d) communication skills; (e) learning skills; and (f) value.

2. The most reliable and valid indicator followed by less reliable and valid indicators in a row are: making judgment; value; communication skills; application knowledge and understanding; knowledgeand understanding; and learning skills.

3. The six indicators proved valid and reliable in their performance measuring / reflecting the latent variables of graduate competence, shown in the following measurement model

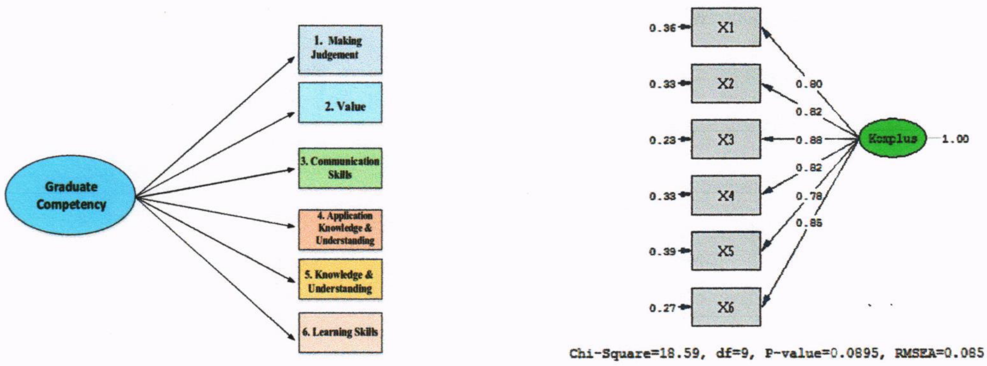

FIGURE 2. Model of Graduate Competency Measurement (from Lisrel Output)

Reference

Aitken, J. Appleby, W. Butler, S. et.al. (2016). *UK quality code for higher education: The framework for higher education qualifications of UK degree awarding bodies*. Glowcester: Southgate House.

Allen, J &Ramaekers. G. (2008).*Test of new instrument for measuring Dublindescriptors. Research centre for education and the labourmarket*.Netherlands: Maastricht University.

BadanPusatStatistik.(2017). *Beritaresmistatistik* (No.78/11/Th.XVI, 6 November 2017).

BadanAkreditasi Nasional Perguruan Tinggi. (2009). *Akreditasi program studidiploma III politeknik.*

Diamantopaulus, A. &Siguaw, J.,A. (2000).*Introducing LISREL: A guide for the unitiated*. New Delhi: Sage Publications.

Fornel, C. &Larcker, D.F. (1981). Evaluating structural equation models with unobserved variables and measuring errors. *Journal of Marketing Research*,18,39-50.

Ghozali, I.,(2011). *Aplikasianalisismultivariatdengan program IBM SPSS 19.*Semarang: BadanPenerbitUniversitasDiponegoro.

Ghozali, I. &Fuad (2012). *Structural equation modeling: Teori, konsepdanaplikasi:Lisrel 8.8, ed 3.*Semarang:BadanPenerbitUniversitasDiponegoro.

Hair, J.F.,Anderson,R.E., Tatham, R.,et. al. (1998). *Multivariate data analysis. 5th edition*. London: Prentice-Hall International.

Hu, L.,T., & Kano, Y. (1992). Can test statistics in covariance structure analysis be trusted?.*Psychological Buletin*, 11, 351-362

Igbaria, M.,N., Zinatelli, P., Cragg et.al. (1997). Personal computing acceptable factors in small firms: A Structural equation model. *MIS Quarterly*. September, 279-299.

Jöreskog, K. G. &Sörbom, D. (1999).*Interpretation of R^2 revisited*.http:/www.ssicentral.com/lisrel/advancedtopics.html.

Kearns, P. (2001). *Generic skills for the new economy*.Kensington: National Centrefor Vocational Education Research.

Kline, Rex.B. (1998). *Principle and practice of structural equation modeling*. TheNew York: Guilford Press.

Meyers, L.S.,G.,Gamst,A.J. & Guarino. (2013). *Applied multivariate research: Design and interpretation*. Washington, DC: American Psychological Association.

Nunnally, J.C.,&Berstein, I.H. (1994). *Psychometric theory. 3rd ed*. New York, NY:McGraw-Hill.

Organization for Economic Corporation and Development (OECD). (2005). *Defining and selected competencies*. dari http:\\www.oecd.org/edu/statistics/deseco.

Rifandi, A. (2013). Mutupembelajarandankompetensilulusan diploma III politeknik.*CakrawalaPendidikan*, Februari 2013, Tahun. XXXII, No. 1

Rigdon,E.E. & Fergusson C.E. (1991). The performance of the polychoriccorrelation coefficient and selected fitting function in confirmatory factor analysis with ordinal data.*Journal of Marketing Research*. 8 November, 491-497.

Sanghi, S. (2007). *Handbook of competency mapping*. Singapore: Sage Publications Asia-PasificPte Ltd.

Wijanto, S.,H. (2008). *Structural equation modeling dengan LISREL 8.8: Konsepdan tutorial*. Jakarta: GrahaIlmu.

Yuvaraj,A.R. (2017). Competency mapping. *International Journal of Science &Engineering Research*, 2 (8), 23-31.

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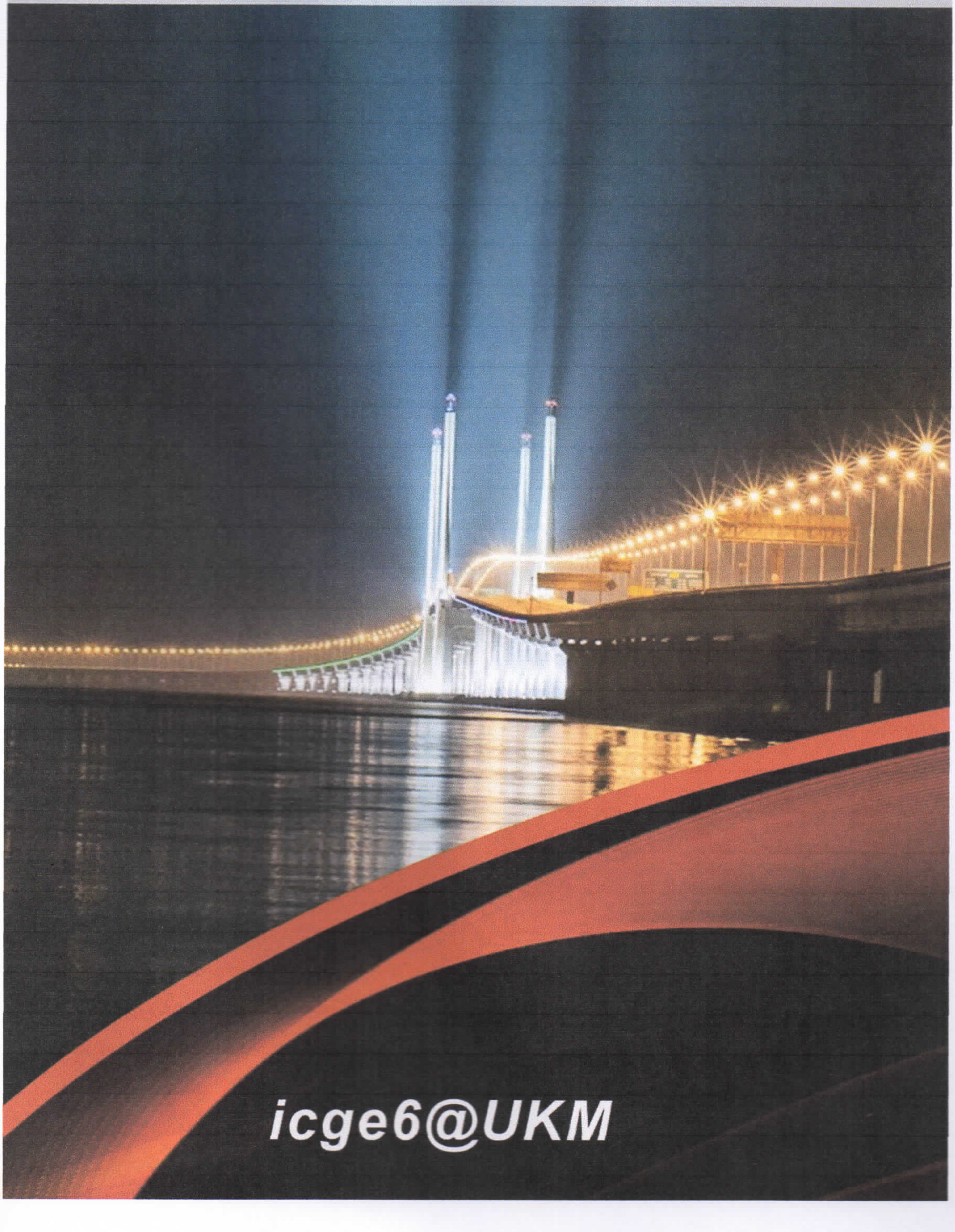

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