

Confirmatory and Exploratory Factor Analysis for Validating the Academic Leadership Questionnaire for Indonesia's Private Higher Education

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Abstract

The aim of this research is to analyse the validated Academic Leadership Questionnaire for Indonesia's Private Higher Education. In this study, data analysis using the SmartPLS 4.0.9.6 approach is CB-SEM. This study is intended to confirm and explore the results of previous research from Vilkinas et al. (2009) entitled Predictors of Leadership Effectiveness for Chinese Managers to be implemented in Indonesia's Private Higher Education. Based on the results, the GFI was obtained at 0.967, the CFI value of 0.877 was smaller than supposed criteria of (>0.90) or slightly less than the good fit values, but still said to be appropriate, the RMSEA value was obtained at 0.064 in accordance with provisions that were ideally smaller than 0.08 (<0.08). Through the results from CFI, this study shows acceptable model fits and suggests the feasibility of applying the Academic Leadership Questionnaire for Indonesia's Private Higher Education with relatively good construct validity and internal consistency.

Keywords: *Academic Leadership, Validating Questionnaires, Confirmatory and Exploratory Factor Analysis, Indonesia's Private Higher Education, Lectures, Partial Least Square (PLS).*

Introduction

Pursuing a career as a lecturer requires a commitment to conducting research, community service, and education. An academic career is one of human resource management in higher education. Private higher education has a strategic role in shaping the nation's life and the advancement of science and technology by upholding and implementing human values and sustainable civilization as well as empowering the Indonesian nation. Similarly, Private higher education domiciled in Bali - Indonesia aim to prepare students to become members of society who have the ability, skills, and skills to develop or disseminate knowledge. Based on the preliminary study conducted, the number of private higher education domiciled in Bali - Indonesia is 57 (fifty-seven) private universities with details of 15 (fifteen) universities, 7 (seven) institutes, 23 (twenty-three) high schools, 7 (seven) academies, 4 (four) polytechnics and 1 (one) community academy with a total of 3,451 (three thousand four hundred and fifty-one) lecturers.

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Human capital theory is the main theory used in this study, human capital theory explores the importance of human resources as intangible assets in organizations, especially as intellectual capital. Human capital theory is a system to improve the performance of lecturers and Higher Education Institutions through improving their intellectual, ability, knowledge, and experience. This research uses survey methods, namely research methods to collect information from or about people to describe, compare, or explain their knowledge, attitudes, and behaviours. Survey methods allow researchers to collect quantitative and qualitative data on various types of research questions (Sekaran & Bougie, 2016). Questionnaires based on the survey methodology are convenient and useful for the measurement and evaluation of subjective concepts or personal feelings and are therefore broadly used throughout various research fields such as psychology, medicine, education, sociology, and marketing.

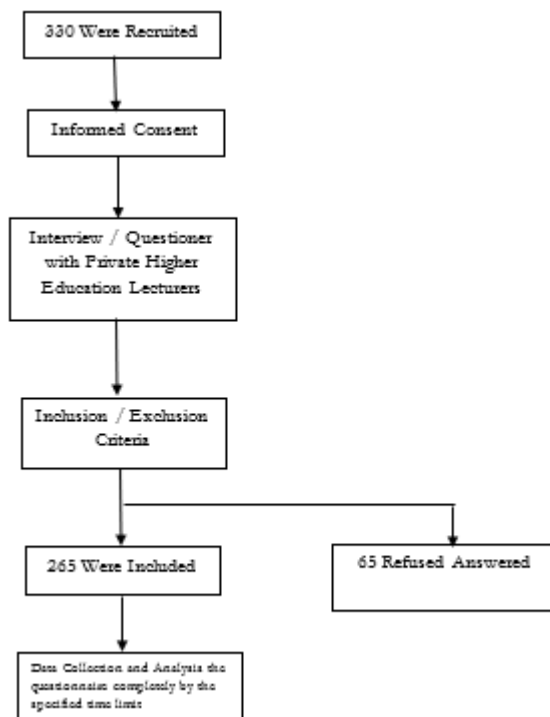


Figure 1. Academic Leadership Questionnaire for Indonesia's Private Higher Education Procedure

This research is quantitative research characterized by a deductive approach to the research process that aims to prove, refute, or give confidence to existing theories, this type of research involves measuring variables and testing relationships between variables to reveal patterns, correlations, or causal relationships. Researchers can use linear data collection and analysis methods that produce statistical data. The values underlying quantitative research include neutrality, objectivity, and the acquisition of a considerable scope of knowledge. This approach is generally appropriate if the main goal is to explain or evaluate (Leavy, 2017). This research was conducted in Indonesia precisely in the region of Bali Province, using the subject of lecturers who already have functional positions from Lecturer, Assistant Professor, and Associate Professor.

Methodology

Participants and Criteria

The population in this study is all Private Higher Education lecturers in Bali – Indonesia who served at the university level. These because the number of Private Higher Education lecturers in Bali – Indonesia is the most, compared to other education levels which is 60%

of all Private Higher Education lecturers in Bali – Indonesia with a minimum work period of two years as lectures, and already have a National Lecturer Master Number (NIDN) with a functional position of Lecturer, Assistant Professor, and Associate Professor amounting to 1,893 people. Consideration in determining a minimum working period of two years refers to Laws and Regulation Number 14 of 2005 concerning Teachers and Lecturers, Regulation of the Minister of State Apparatus Empowerment and Bureaucratic Reform Number 17 of 2013 as amended by Regulation of the Minister of State Apparatus Empowerment and Bureaucratic Reform Number 46 of 2013.

Determination of the lecturer's sample frame as much as 1.893, calculated using the Slovin's method is 330 lecturers. The sample was selected using the probability sample method, namely the proportionate stratified random sampling method.

Integrated Competing Values Framework (ICVF)

One of the important contemporary leadership concepts is the Integrated Competing Values Framework (ICVF) proposed by Vilkinas and Cartan (2001). This is a conceptual model that integrates different perspectives on organizational effectiveness and culture. It is based on two dimensions: flexibility-stability and external-internal focus. It identifies four types of organizational cultures: clan, adhocracy, hierarchy, and market. It also suggests four roles for managers: mentor, innovator, coordinator, and producer. ICVF is a modification of the Competing Values Framework (CVF) developed by Robert Quinn and associates (Quinn, 1988; Quinn and McGrath, 1982; Quinn and Rohrbaugh, 1983). The ICVF comprises five operational leadership roles namely the innovator, broker, deliverer, monitor, and developer and one learning role, i.e., the integrator. The validity of the modified framework has been empirically proven through its wide application in explaining not only the behaviour of managers and executives but also that of academic program directors (Vilkinas et al., 2007) and supervisors of doctoral students in universities (see, e.g., Vilkinas, 2008). Of particular interest in this paper is to further apply ICVF to Indonesia's Private Higher Education context, which is different from the environment in which CVF and ICVF were developed. The Integrated Competing Values Framework (ICVF) The ICVF has two dimensions: (1) a people-task dimension; and (2) an external-internal focus dimension (Vilkinas and Cartan, 2006).

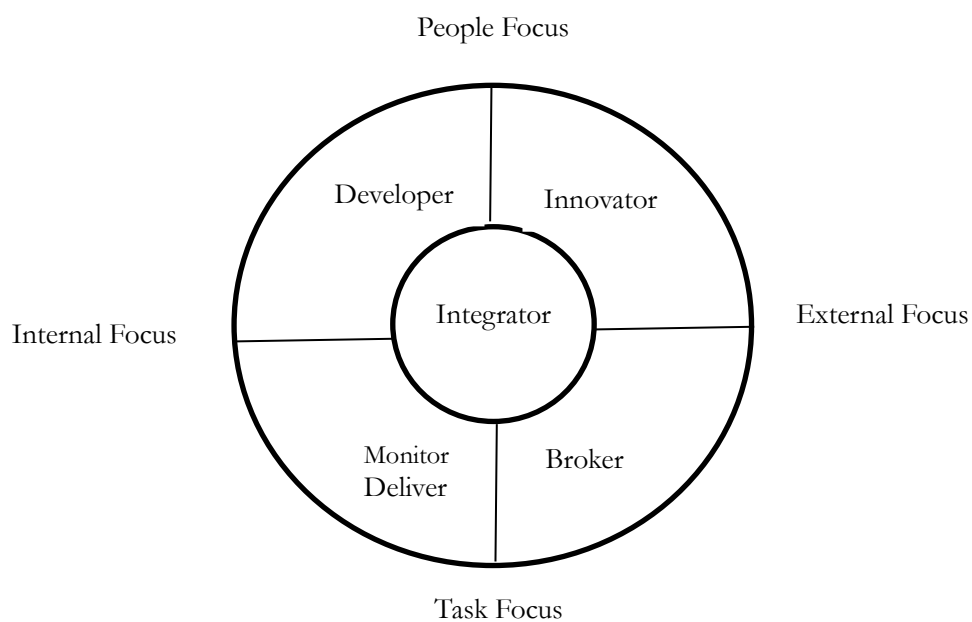


Figure 2. Integrated Competing Values Framework

These two dimensions create a four-quadrant model indicating five operational roles for lecturers, which are labelled innovator, broker, deliverer (monitor), and developer (see

Figure 2). A brief description of the behaviours associated with each of these roles is provided in Table 1. According to Vilkinas and Cartan (2001, 2006), the five operational roles are inherently paradoxical in nature.

Table 1. Description of each of the ICVF's five operational roles

Role	Managerial Application
Innovator	Is creative Encourages, envisions, and facilitates change
Broker	Develops, scans and maintains networks Acquires needed resources
Deliverer	Is work-focused Motivates behaviour Sets goals Clarifies roles Does scheduling, coordination and problem solving
Monitor	Sees that rules and standards are met Collects and distributes information Checks performance
Developer	Is aware of individual needs and facilitates development Develops teams

Sources: Vilkinas and Cartan (2001, 2006)

Based on previous research conducted by Vilkinas, which stated that ICVF research can be applied in all levels including education (Vilkinas et al., 2007) and (see, e.g., Vilkinas, 2008), the indicators of Figure 2 will be included in the predetermined questionnaire model (attached).

Analysis Procedure

In this research data analysis used the Partial Least Square (PLS) approach. PLS (Chin et al., 2011) is a component or variant based Structural Equation Modelling (SEM) which are computer based and variant. PLS almost resembles regression but more than that, it simultaneously combines structural path models (theoretical relationships between latent variables) and measures those paths (relations between latent variables and indicators). The PLS method was chosen because it has various advantages (powerful) including (Hair et al., 2017, 2021, 2022):

- a) Free distributed, zero intercorrelation and model that has a closer fit to the observations.
- b) Using an algorithm consisting of the ordinary least square series so as to avoid model identification problems.
- c) PLS can be applied to all data scales, it doesn't require many assumptions, and the sample size doesn't have to be large.
- d) PLS is one of the SEM techniques that is able to analyse latent variables, indicator variables, and measurement errors directly.

Among the 330 samples determined, 265 samples were obtained that met the criteria and the others were not in accordance with the stipulated provisions. Some of them are not willing to answer and do not fill out the questionnaire completely by the specified time limit. Based on the indicators that have been determined and included in the questionnaire model, this research will try to check the validation of previous research conducted by Vilkinas about Predictors of Leadership Effectiveness for Chinese Managers (Vilkinas, 2008) and Leadership Provided by Non-Academic Middle Level Managers in The Australian Higher Education Sector: The Enablers (Vilkinas, 2014).

Findings

Model fit

In order to investigate whether the factor structure can be replicated in the new dataset from 265 lecturers, Confirmatory Factor Analysis (CFA) was conducted. Several model fit indices and their criteria were used to examine the goodness of fit of the model with the given dataset: Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). Later after evaluating the model fit, we calculated Construct Reliability (CR) for convergent validity and Average Variance Extracted (AVE) for discriminant validity. After performing the CFA, we extracted a more suitable factor structure from the new dataset. We then performed exploratory factor analysis (EFA) with maximum likelihood factoring. Maximum likelihood and principal axis (Kim, 2016).

The model fit test uses several statistical indicators including, Standardized Root Mean Square Residual (SRMR), Normed Fit Index (NFI), and RMS_theta. To obtain a qualified and fit model, the indicator must require a predetermined ideal value (adapted from Muwarni, 2007), namely Chi-Square larger than 0.05 (> 0.05), GFI value larger than 0.90 (> 0.90), AGFI greater than 0.90 (> 0.90), RMR smaller than 0.05 (< 0.05). The Chi-Square per df ratio must be less than or equal to 3.0 (≤ 3.0), NFI and TLI should be larger than 0.90 (> 0.90), CFI larger than 0.95 (> 0.95).

Table 2. Model Fit Indicator

No.	Fit Indices	Result	Recommended evaluation criteria	Status
1	χ^2 Chi Square	121.957	probability of > 0.05	fit
2	GFI Goodness of Fit Index	0.967	> 0.90	fit
3	AGFI Adjusted Goodness of Fit Index	0.956	> 0.90	fit
4	RMR Root Mean Square Residual	0.044	< 0.05	fit
5	χ^2 / df Chi Square per df ratio	2.348	≤ 3.0	fit
6	NFI Normed Fit Index	0.934	> 0.90	fit
7	TLI Tucker Lewis Index	1.212	> 0.90	fit
8	CFI Comparative Fit Index	0.877	> 0.95	margin
9	RMSEA Root Mean Square Error of Approximation	0.047	< 0.05	fit

Source: own exploratory survey.

Based on Table 2 above obtained from the results of data processing using PLS, Chi-Square is 121.97, GFI is 0.967 which is larger than the ideal threshold value of 0.90. AGFI values of 0.956, RMR of 0.044, Chi-square/df ratio of 2.348, NFI of 0.934, TLI of 1.212 and RMSEA about 0.047 smaller than 0.05. All of these results fit and match with the recommended evaluation criteria. While the CFI value is smaller than the applicable provisions about 0.877, the CFI value should be larger than 0.95. However, the results of CFI in the above are almost close to the recommended evaluation criteria. From these eight indicators, it can be concluded that the model formed already meets the suitability criteria so that the model can be used and is good at describing the relationship between variables.

Construct reliability and validity

We will test whether the indicators in this research are good or not in measuring a variable. Indicators commonly used in validity and reliability tests in SEM PLS are Composite Reliability, Cronbach Alpha, and Average Variance. A good and recommended indicator value above 0.6.

Table 3. Construct reliability and validity

	Cronbach's alpha (standardized)	Cronbach's alpha (unstandardized)	Composite reliability (rho_c)	Average variance extracted (AVE)
BROKER	0.707	0.704	0.704	0.553
DELIVERER	0.929	0.928	0.929	0.690
DEVELOPER	0.911	0.911	0.912	0.673
INNOVATOR	0.905	0.905	0.907	0.763
INTEGRATOR	0.929	0.927	0.928	0.621
MONITOR	0.880	0.880	0.880	0.596

Source: own exploratory survey.

From the output above, the AVE value for all variables is larger than 0.5, so it can be said that all valid indicators converge in forming their respective variables. In addition, Cronbach's Alpha and CR values are also obtained which have values larger than 0.6 for all variables. It can be concluded that all variables and items used in this study meet the validity and reliability in measuring variables.

Discriminant validity

Discriminant validity aims to determine whether a reflective indicator is indeed a good gauge of its construct based on the principle that each indicator should be highly correlated to its construct only. Different construct gauges should not be highly correlated (Ghozali and Latan, 2015). In the SmartPLS application, discriminant validity tests use cross loadings and Fornell-Larcker Criterion, and Heterotrait-Monotrait (HTMT) values (Henseler et al., 2015). For this research, only 2 tests will be taken, namely Fornell-Larcker Criterion, and Heterotrait-Monotrait.

A construct is said to be valid by comparing the root value of AVE (Fornell-Larcker Criterion) with the correlation value between latent variables. The root value of AVE must be greater than the correlation between latent variables. To assess the validity of discriminants is the Fornell Larcker Criterion, a traditional method that has been used for more than 30 years, which compares the square root value of the Average Variance Extracted (AVE) of each construct with correlations between other constructs in the model (Henseler et al., 2015).

Table 4. Fornell-Larcker criterion

	BROKER	DELIVERER	DEVELOPER	INNOVATOR	INTEGRATOR	MONITOR
BROKER	0.743					
DELIVERER	0.787	0.831				
DEVELOPER	0.832	0.903	0.820			
INNOVATOR	0.856	0.791	0.771	0.874		
INTEGRATOR	0.727	0.851	0.866	0.724	0.788	
MONITOR	0.860	0.921	0.789	0.737	0.773	0.772

Source: own exploratory survey.

Based on the table 4, all roots of the AVE (Fornell-Larcker Criterion) of each construct are greater than their correlation with other variables. Likewise with other latent variables, where the value of AKAR AVE > Correlation with other constructs. Because all latent variables of the AVE Root value > their correlation with other constructs, the discriminant validity requirements in this model have been met, as listed in the table above.

Table 5. Heterotrait-Monotrait Ratio (HTMT)

	BROKER	DELIVERE R	DEVELOPE R	INNOVATO R	INTEGRATO R	MONITOR
BROKER						
DELIVERER	0.815					
DEVELOPER	0.822	0.805				
INNOVATOR	0.853	0.803	0.780			
INTEGRATOR	0.722	0.848	0.871	0.718		
MONITOR	0.871	0.898	0.776	0.736	0.768	

Source: own exploratory survey.

Some experts argue that cross loading and the Fornell-Larcker Criterion are less sensitive in assessing the validity of discriminants. HTMT is a recommended alternative method for assessing discriminant validity. This method uses a multitrait-multimethod matrix as the basis for measurement. The HTMT value must be less than 0.9 to ensure the validity of the discriminant between the two reflective constructs (Henseler et al., 2015). The HTMT table 5 shows that all HTMT values less than 0.9 (< 0.9), then it can be stated that all constructs have valid discriminant validity based on HTMT calculations.

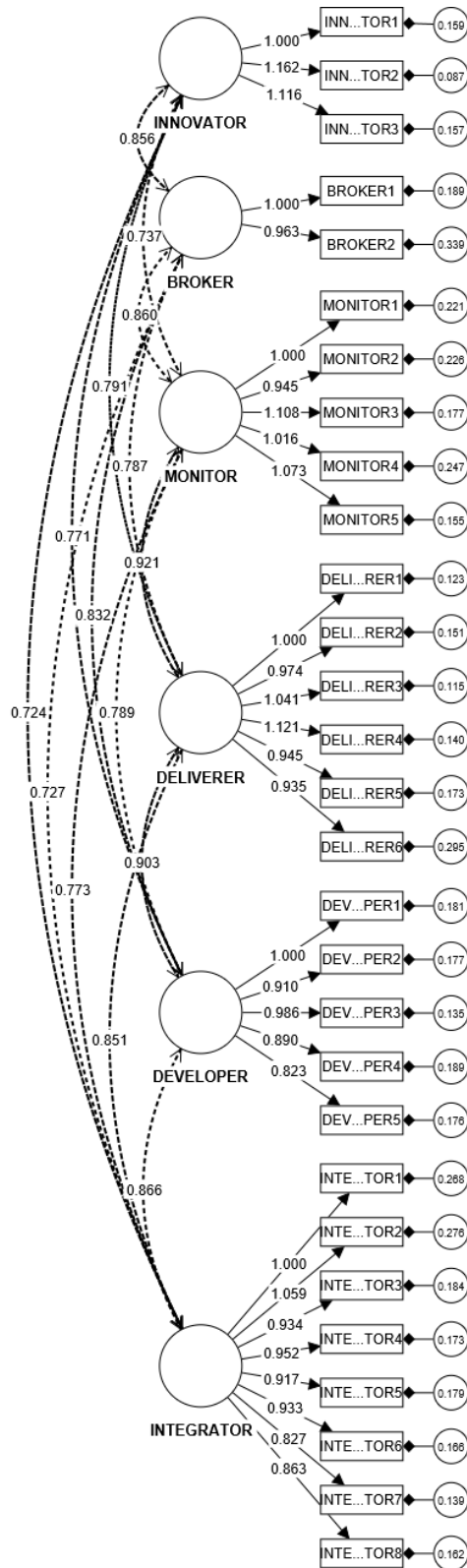


Figure 3. Results of the Academic Leadership Questionnaire for Indonesia's Private Higher Education

Conclusions and Suggestion

Conclusion

From research that has been conducted on lecturers at Indonesia's Private Higher Education, validation was obtained that previous research conducted by Vilkinas et al. (2009) is suitable and appropriate to be applied in Indonesia. The six (6) indicators used in this study are broker, deliverer, developer, innovators, monitors and, integrators proven valid and reliable to apply in Private Higher Education.

Suggestion

Some indicators sometimes have values that do not correspond to ideal recommendation values. However, other factors can be used as a reference whether the indicators applied are suitable and in accordance with the research environment. New research and development can be carried out in an effort to find the suitability of the application of the concept used as a reference.

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