

Developing and Validating the Measurement Model for Employee Engagement Construct Using Confirmatory Factor Analysis

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Abstract

The purpose of the study is to develop and validate the instruments designed to measure employee engagement construct. The pilot study used the structured survey randomly sampled 300 lecturers. The effectiveness of measuring items and the dimensionality of the construct determined by the Exploratory Factor Analysis (EFA) procedure. At last, utilizing the recently developed instruments, the field study attained a random sample of 401 lecturers to survey employing the structured survey. The field data were used via the Confirmatory Factor Analysis (CFA) procedure to validate the instruments. The EFA procedure identified three components that emerged from the items. The CFA procedure validated the uni-dimensionality, validity, and reliability of the instruments measuring employee engagement construct. The finding indicated that the employee engagement construct measurement model accomplished the requirement for construct validity and reliability and ought to be applied for research in the future. This study developed instruments specifically for assessing employee engagement among vocational lecturers in the North Zone of Malaysia. Future researchers could foster widen the instrument showed in this study by cross-surveying across the different Zone of Malaysia and compared with other related EE instruments.

Keywords: Employee Engagement, Vocational College, Exploratory Factor Analysis, Confirmatory Factor Analysis.

Introduction

Employee engagement (EE) is the key factor in attaining targeted vision and mission and has a great impact on organizations, institutions, and companies. Engagement of employees towards an organization's leadership is critical to ensuring excellent work

performance. EE is an essential component of an organization because employees involved in organizational goals are expected to be more productive and more sensitive to achieving higher contribution levels than workers with no value for involvement (Mora, Hakim, Agustriyana, 2020; Tritch, 2003; Yildiz, Temur, Beskese & Bozbura, 2020). Furthermore, EE is an individual's physical, emotional, cognitive, and intellectual involvement. The role of an active and enthusiastic lecturer in the higher education sector in today's stormy environment is extremely undoubted. An engaged lecturer will exhibit a high degree of commitment and involvement in the profession resulting in quality results (Madhavi Latha, Ramakrishna & Mohanthi, 2020). Meanwhile, lecturers with a high degree of engagement to their work will have positive feelings that will guide them to recuperate their quality through imaginative and explorative thinking, incorporating innovating in teaching and learning activities (linasikin, Murni & Akbar, 2019).

However, the issue of EE requires more attention due to current circumstances showing 13 percent of worldwide employees involved (Gallup, 2013) and it is reflecting a low level of employee engagement (Nienaber, 2019). On the other hand, there is a more alarming rate of EE in Malaysia where 8 percent of the study shows no direct engagement, 11 percent with engagement compared to a high 81 percent with less involvement. Besides, structures of the current education system involving frequent changes in educational policy increased administrative demands, insufficient autonomy of lecturers, a focus on performativity and sparse material constraints may lead to lecturer disappointment and, consequently, low work commitment and job satisfaction (Buric, Cvijetovic & Macuka, 2017). Abundant problems are underlined regarding the lecturers' performance because they are doing multitasking against the principles of the conventional role of teaching (Kola & Challapalli, 2019). Vocational college lecturers experience the ill effects of stress and burnout issues that can cause significant workplace issues (Janssen, Heerkens, Van Der Heijden, Korzilius, Peters & Engels, 2020). Therefore, EE is a critical issue to be dealt with in the public sector.

Even though EE have been assessed and clarified to some extent in several previous studies (Abror, Patrisia, Syahrizal, Sarianti, & Dastgir, 2020; Atcioğlu & Köse, 2018; Ibnu Ruslan, Islam, Mohd Noor & Norsiah Mat, 2016; linasikin, Murni & Akbar, 2019; Kaldeen & Maran, 2020, Muthuveloo, Basbous, Teoh & Choi, 2013; Puteh, Kaliannan & Alam, 2015; Rashid & Mohd Harif, 2015), notwithstanding, the literature review shows that there is still no regular understanding between the researchers as the terms of aspects and items which should be used to access EE. Nonetheless, though wide-ranging research has been conducted on EE, current studies seem to ignore some of the crucial factors that can assist with giving a precise and point by point comprehension of the number of aspects as well as items of EE. To give an increasingly complete understanding of the EE measurement model, this study plans to develop and validate the instruments for measuring EE construct among vocational colleges' lecturers in Malaysia. The exploratory factor analysis used to acquire validity and reliability and the right items of measuring instruments (Hoque & Awang, 2016a, Hoque & Awang, 2016b, Hoque & Awang, 2016c). Whereas validity and composite reliability of the construct will be validated through confirmatory factor analysis. Therefore, the objective of this study is:

- to explain how to develop and validate the instruments intended to gauge employee engagement construct.

Literature Review

Definition of Employee Engagement

Kahn (1990) is the initial scholarly canvasser to exploit the phrase of EE and saw it as a stage of devotion and involvement of employees towards its organization. Besides, he conceptualizes engagement as harnessing oneself in terms of physical, cognitive, and emotional for their work roles, to articulate their role performances. While Kinicki and Fugate (2016) having the same thought and stated EE as the removal of an organization gives itself job roles, commitment, individuals and expresses itself physically, intellectually, and emotionally all through the implementation of roles. Meanwhile, Harter, Schmidt, and Hayes (2002) agree with the opinion of EE by Kahn and defined it as the participation and gratification of a person with the spirit of working. But Chartered Institute of Personnel and Development (CIPD) (2007) stated EE as an amalgamation of obligation to the organization and the value of being willing to help his colleagues. Soon, EE claimed by researchers as a sincere and wide-ranging relationship with companies that result in a willingness to act unexpectedly to help the organization achieve success (Gebauer & Lowman, 2009), and it also affirmed as objectives and labor aimed at others through personal initiative, suitability, craft and persistence leading towards the objectives of the organization (Macey, Schneider, Barbera & Young, 2009).

Engagement of employees is important to urge innovation and thoughts and to make sure that staff is fully engaged in their jobs, inspiration, and excitement in the organization. An organization needs enthusiastic employees (Bohlander & Snell, 2013) since they have solid emotions, eagerness, and center which will make them progressively dedicated to their superiors and invest more energy in their work (Dessler, 2013). Employees that engaged in their work will often be more attentive, have ambition, be optimistic, and concentrate their energies on meeting organizational targets (Macey et al., 2009). All in all, a few things that can enhance EE, among others, will increase employee rewards, strong remarks, and empowering criticism from colleagues or superiors on a specific day (Schaufeli & Baker, 2010).

Employees are divided into three types. The first type is engaged employees, they are constructors who continually aspire to achieve success within their positions. Next, not engaged employees, where they are concentrating on the duties they have set out, rather than the organization's goals. They do what he tells them to do. Lastly, actively disengaged employees, where they are hazardous people who perform well in the organization as well as discourage the performer (Gallup, 2002). Hence, keeping the employees engaged is very important otherwise, they may be a threat to the organization.

Methods

In order to determine a valid and reliable measure for the EE construct, a cross-sectional research design was applied. The population for this study is the lecturers who are teaching in the vocational college in North Zone of Malaysia, which is Penang, Kedah, Perlis, and Perak. The data was carried out in two phrases, specifically pilot study and field study. The stratified random sampling method was employed in both stages to pick out a sample of 300 and 401 respondents, respectively. The data were gathered using a structured survey questionnaire.

Research Instrument

For developing the EE measuring instrument, the study adapted from Schaufeli, Salanova, Gonzalez-Roma, and Bakker (2002) and finally produced three constructs, namely

dedication, absorption, and vigor. By developing a structured questionnaire, data is collected to measure EE construct in this study, which contains fourteen (14) items measured using a five-point interval scale.

Exploratory Factor Analysis (EFA)

Before continuing to result in the analysis of Confirmatory Factor Analysis (CFA), EFA was performed (Nasir, Mohamad, Ghani & Afthanorhan, 2020). EFA performs a vigorous position to explore the interrelationships among the items of three aspects of EE. In the meantime, a set of items compacted into a littler arrangement of blend factors with a base loss of data which consumed by EFA and can be understood much clearly and significantly (Duntemen, 1989; Field, 2006; Lewis-Beck, 1994) and thus placed the basis of structural equation modeling (Hair et al., 2006). Meanwhile, it is a standard method of developing an instrument to gauge the data set for its appropriateness (Kung-Tech, Omar, Yassin, Mustafa, Abdullah, Rahmatullah & Samuri, 2019).

By adapting and modifying instruments developed by previous researchers, the items used to match current research. The researcher should conduct the EFA procedure, if they regulate the instruments earlier prepared by the researchers and alter proclamations applicable to existing research (Awang, 2012; Awang, Lim & Zainudin, 2018; Hoque & Awang, 2016b; Hoque & Awang, 2016c; Hoque et al., 2017b). It may be due to the existing field of study might be diverse from preceding studies, or the existing research population is widely dissimilar from prior studies in the point of view of demographic aspect. As a result, there might be some items that may have been designed in the past, and may no longer be appropriate for current research. Hence, the value of internal reliability for the existing instrument and the new Cronbach Alpha value need to be reanalyzed by the researchers (Awang, 2012; Awang, Lim & Zainudin, 2018; Baistaman, Awang, Afthanorhan & Abdul Rahim, 2020; Hoque & Awang, 2016b; Hoque et al. 2017a; Hoque et al., 2017c; Hoque et al., 2018a, Hoque et al., 2018c). The designated items carry each other while measuring the construct indicated by the internal reliability (Rahlin, Awang, Afthanorhan & Aimran, 2019).

Findings and Discussion

The findings and discussion of this study will be deliberated as follow:

Results of Exploratory Factor Analysis

To decide the fundamental items and recommend aspects of the EE construct, and also to validate the feature of the instrument, three hundred (300) respondents have been used in this study. There were three aspects and 14 adopted items for the EE construct. Among 14 items of EE construct, a total of 7 items, three items, and three items belong to dedication, absorption, and vigor, respectively, and one item has been deleted. The result is consequently displayed as follows:

Table 1

KMO and Bartlett's Test for the items of EE Construct

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.886
Barlett's Test of Sphericity	Approx. Chi-Square	2120.117
	df	91
	Sig.	.000

The index of KMO that over 0.6 is regularly acknowledged. In Table 1 above, the KMO value of 0.886 is outstanding as it surpasses the suggested value of 0.6. Furthermore, the significance value of Bartlett’s Test of Sphericity must not be as much of 0.05 for the factor analysis to be adequate. Based on Table 1, Bartlett’s Test significance value is 0.000, which meets the entailed significance value of the smaller amount of 0.05 (Awang, 2012; Awang, Lim & Zainudin, 2018; Hoque & Awang, 2016b; Hoque et al., 2017b). Hence, data within the KMO values, approximately 1.0, and Bartlett’s test significance value nearly to 0.0 can be expressed sufficiently. In this manner, the data can be applied, and the reduction procedure can be continued.

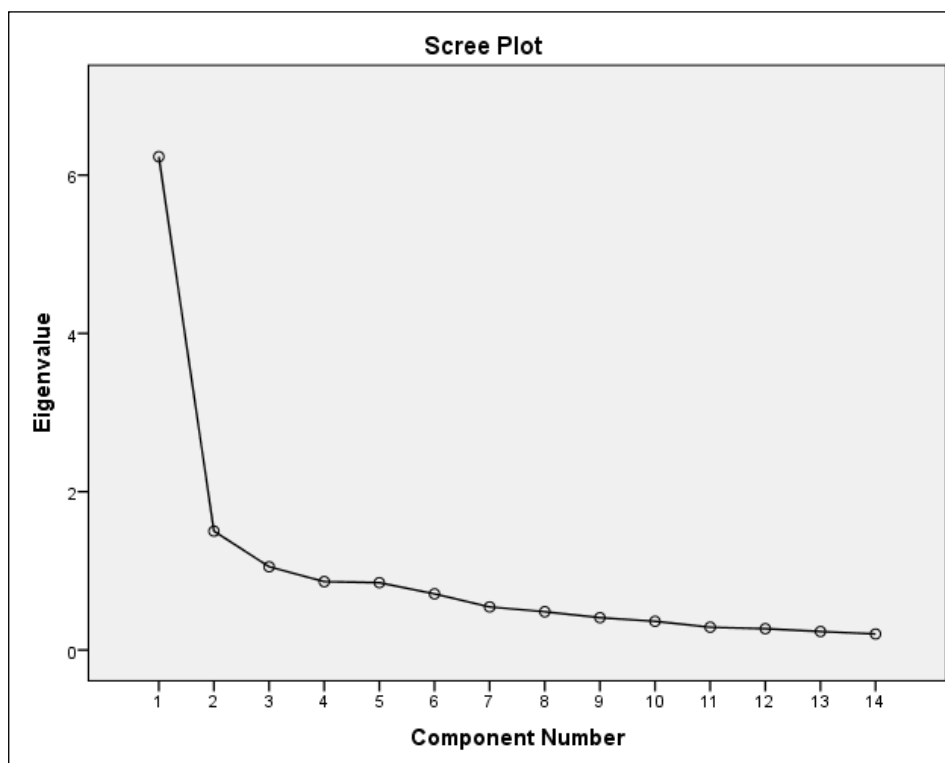


Figure 1: Three component extraction

Table 2

Total Variance Explained for EE Construct

Comp.	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.234	44.525	44.525	6.234	44.525	44.525	3.799	27.134	27.134
2	1.501	10.724	55.249	1.501	10.724	55.249	2.517	17.979	45.113
3	1.052	7.515	62.764	1.052	7.515	62.764	2.471	17.651	62.764
4	.864	6.168	68.933						
5	.850	6.074	75.007						
6	.709	5.062	80.069						
7	.544	3.883	83.952						
8	.483	3.452	87.405						
9	.408	2.917	90.322						
10	.362	2.587	92.908						
11	.288	2.054	94.962						
12	.269	1.921	96.883						
13	.234	1.671	98.554						
14	.202	1.446	100.000						

Note: Principal Component Analysis as the extraction method

An extraction process of items need to be carried out to diminish them into an adaptable number before further analysis, is known as total variance explained. On top of it, components with eigenvalues higher than 1.0 are extracted into different components (Awang, 2012; Awang, Lim & Zainudin, 2018; Hoque & Awang, 2016b; Pallant, 2007). As can be perceived in Table 2, EFA has extracted three aspects, or components of EE construct with eigenvalue 6.234, 1.501, and 1.052 for component numbers 1, 2, and 3 individually disclosed by the output. This designates that the items are convened into three aspects or components and could be reflected for further analysis. The total variance explained of 62.764 presented in Table 2.

Table 3

Rotated Component Matrix of EE Construct

Item Code	Statement	Component		
		1	2	3
EE1	I am proud of the work that I do	.780		
EE2	I find the work that I do full of meaning and purpose	.756		
EE3	Time flies when I am working	.683		
EE4	I am enthusiastic about my job	.644		
EE5	At my work, I always persevere, even when things do not go well	.616		
EE6	To me, my job is challenging	.606		
EE7	I get carried away when I am working	.605		
EE8	My job inspires me	Deleted		
EE9	I can continue working for very long periods at a time		.867	
EE10	At my job, I am very resilient, mentally		.722	
EE11	When I am working, I forget everything else around me		.666	
EE12	When I get up in the morning, I feel like going to work			.887
EE13	At my work, I feel bursting with energy			.789
EE14	At my job, I feel strong and vigorous			.613

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

The result in Table 3 indicates that three components have been extracted by the EFA procedure. Several numbers of items with their separate factor loading for each component. For those item denotes the helpfulness in measuring the specific construct which having factor loading exceeding 0.6, will be preserved (Awang, 2012; Awang, Lim & Zainudin, 2018; Awang et al., 2017a; Awang et al., 2017b; Hoque & Awang, 2016b; Hoque & Awang, 2019). However, the factor loading of Item EE8 is less than 0.6, therefore it is removed due to this item do not contribute to accessing the planned construct.

Table 4

Rotated Component Matrix of EE Construct (After the deletion process)

Item Code	Statement	Component		
		1	2	3
EE1	I am proud of the work that I do	.780		
EE2	I find the work that I do full of meaning and purpose	.756		
EE3	Time flies when I am working	.683		
EE4	I am enthusiastic about my job	.644		
EE5	At my work, I always persevere, even when things do not go well	.616		
EE6	To me, my job is challenging	.606		
EE7	I get carried away when I am working	.605		
EE9	I can continue working for very long periods at a time		.867	
EE10	At my job, I am very resilient, mentally		.722	
EE11	When I am working, I forget everything else around me		.666	
EE12	When I get up in the morning, I feel like going to work			.887
EE13	At my work, I feel bursting with energy			.789
EE14	At my job, I feel strong and vigorous			.613

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

The selected item to be applied for the study is shown in Table 4 after the deletion process. Consequently, these 13 items within factor loading that exceed 0.6 that displayed in the above-rotated component matrix, will be cogitated for further analysis under three aspects or components of the EE construct

Reliability Analysis for the Measuring Item of EE

The technique that needs to be implemented to evaluate the measuring item under each construct and assess the degree to prove the items are error-free called reliability analysis. The reliability of items is measured by using the renowned value of Cronbach's Alpha. Yet, the acquiescence value of Cronbach's Alpha as an indicator of internal consistency items diverge by numerous researchers. For validating internal consistency reliability, Cronbach's Alpha of greater than 0.5 is recommended (Kerlinger & Lee, 2000). Besides, Cronbach's Alpha of 0.6 or greater presents a reliable measure of internal consistency (Awang, 2012; Awang, Lim & Zainudin, 2018; Hair et al., 1998; Hoque & Awang, 2016b; Nunnally & Bernstein, 1994; Nunnally, 1978; Sekaran & Roger, 2013; Darwish, Abdo, & AlShuwaiee, 2018) whereas the value of 0.7 indicates that the instrument holds a high-reliability standard (Hoque & Awang, 2019; Hoque et al., 2018c) and it applied in this study.

Table 5

Reliability Statistics for the three Components of EE Construct

Component	Number of items in a component	Cronbach's Alpha	Cronbach's Alpha based on standardized item	Alpha on
1	7	.852	.852	
2	3	.700	.700	
3	3	.827	.827	

As displayed in Table 5, there are seven items, three items, and three items for component 1 (dedication), component 2 (absorption), and component 3 (vigor) of EE construct, and its Cronbach's Alpha is 0.852, 0.700, and 0.827 correspondingly. It showed a high-reliability standard for the three aspects or components of the EE construct, which have surpassed the needed value of 0.6. Thus, the extracted aspects or components with their particular items are reliable and suitable to measure the EE construct. Hence, employing those items for measuring EE constructs in future researches.

Findings for the field study**Confirmatory Factor Analysis (CFA)**

CFA is applied for authenticating the factor loading and measurement that included. Factor loadings and fitness indexes play a significant role in the CFA approach. Additionally, the fitness index unable to achieve the requirement whenever the factor loading is in high value which indicates the data is incompetent to be accepted.

Absolute fit, incremental fit, and parsimonious fit are three categories included in the measurement of the fitness index. However, the researcher able to choose any fitness as long as each category is included, or at least one fitness index from each category model fit is used (Afthanorhan, 2013).

Meanwhile, if the fitness indexes achieved the requirements from the three Model Fit aspects which are Absolute Fit (RMSEA <0.08), Incremental Fit (CFI and TLI >0.9) and Parsimonious Fit (Chisq/df <5.0) respectively, the specific latent construct is counted valid (Awang, Lim & Zainudin, 2018)

Next, there are three types of validity explicitly construct validity, convergent validity, and discriminant validity need to be achieved by the measurement model of latent constructs which measure by Fitness Indexes of the Measurement Model, Average Variance Extracted (AVE), and Discriminant Validity Index Summary individually (Mohamad, Ali & Awang, 2018).

Table 6

Types of validity and its threshold

Validity	Name of Category	Threshold	Sources
Construct Validity	Fitness Indexes	Absolute Fit Incremental Fit Parsimonious Fit	Awang et al. 2015
Convergent Validity	Average Variance Extracted (AVE)	RMSEA <0.08 CFA & TLI >0.9 Chisq/df <3.0 > 0.5	Afthanorhan et al., 2018, 2019
Discriminant Validity	Discriminant Validity Index Summary		
Composite Reliability	CR	> 0.6	Awang 2014, 2015

The Assessment of Normality of the Items

Initially, the distribution of items for measuring the EE construct ought to be evaluated. Table 7 displayed the evaluation of normality the distribution from the text-output of IBM-SPSS-AMOS by using the skewness of the distribution within the Maximum Likelihood Estimator (MLE). In order to be adequate for normally distributed, the skewness values should plunge in the range between -1.5 to 1.5 for all items (Awang et al., 2018).

Table 7

The assessment of normality of the items

Variable	Min	Max	Skew	C.R.	Kurtosis	C.R.
C13	2.000	5.000	.006	.047	2.916	11.918
C12	2.000	5.000	.213	1.743	2.797	11.433
C11	1.000	5.000	-.580	-4.741	3.404	13.916
C9	2.000	5.000	-.018	-.147	2.280	9.320
C8	1.000	5.000	-.706	-5.774	1.153	4.711
C7	3.000	5.000	.530	4.335	.936	3.828
C5	2.000	5.000	.180	1.469	1.520	6.211
C4	2.000	5.000	.433	3.537	3.379	13.814
C2	2.000	5.000	-.184	-1.504	2.791	11.409
C1	3.000	5.000	.655	5.353	.360	1.471
Multivariate					96.345	62.268

The study realized that all skewness values plunge within the range between -1.5 to 1.5 by referring to Table 7. Hence, the data distribution for items measuring the EE construct can prove that it accomplished the normality assumption of parametric statistical analysis.

Table 8

Construct validity

Construct Validity	Name of Category	Name of Index	Level of Acceptance	of Index Value	Remark
	Absolute Fit	RMSEA	< 0.08	0.097	Not Achieved
	Incremental Fit	CFI	> 0.9	0.938	Achieved
	Parsimonious Fit	Chisq/df	< 5.0	4.751	Achieved
Hence, the measurement model of EE has achieved the requirement for construct validity					

Table 8 indicated the result for Absolute Fit (RMSEA = 0.097), Incremental Fit (CFI = 0.938) and Parsimonious Fit (Chisq/df = 4.751) correspondingly. Even though the index value of RMSEA does not reach the required acceptance level (slightly higher than 0.08), but the model does achieve another two index which is CFI and Chisq/df. As Afthanorhan (2013) mentioned that at least one fitness index is used from each category model fit, therefore the model still considers fit. Hence, the measurement model of EE has met the requirement for construct validity.

Table 9

Composite reliability, convergent validity and discriminant validity

Construct	Item	Factor Loading	CR (above 0.6)	AVE (above 0.5)	$\sqrt{\text{AVE}}$	Convergent Validity CR > AVE AVE > 0.5
EE	EE1	0.98	0.90	0.78	0.88	Yes
	EE2	0.81				
	EE3	0.84				
EE1	C1	0.73	0.84	0.52	0.72	Yes
	C2	0.70				
	C4	0.76				
	C5	0.65				
	C7	0.75				
EE2	C8	0.67	0.73	0.60	0.77	Yes
	C9	0.87				
EE3	C11	0.79	0.83	0.62	0.79	Yes
	C12	0.76				
	C13	0.81				

The result of the test of reliability and validity for testing the measurement mode displayed in Table 9. The composite reliability of EE, EE1, EE2, and EE3 are 0.90, 0.84, 0.73, and 0.83 separately, which meet the requirement (above 0.6). Whereas the result AVE of EE, EE1, EE2, and EE3 are 0.78, 0.52, 0.60, and 0.62 singly, which also achieve the requirement (above 0.5). By applying the CFA approach, the result well performs after achieving all the requirements of the measurement model. The study displays that the reliability of CR meets the requirement, convergent validity as well as the discriminant validity.

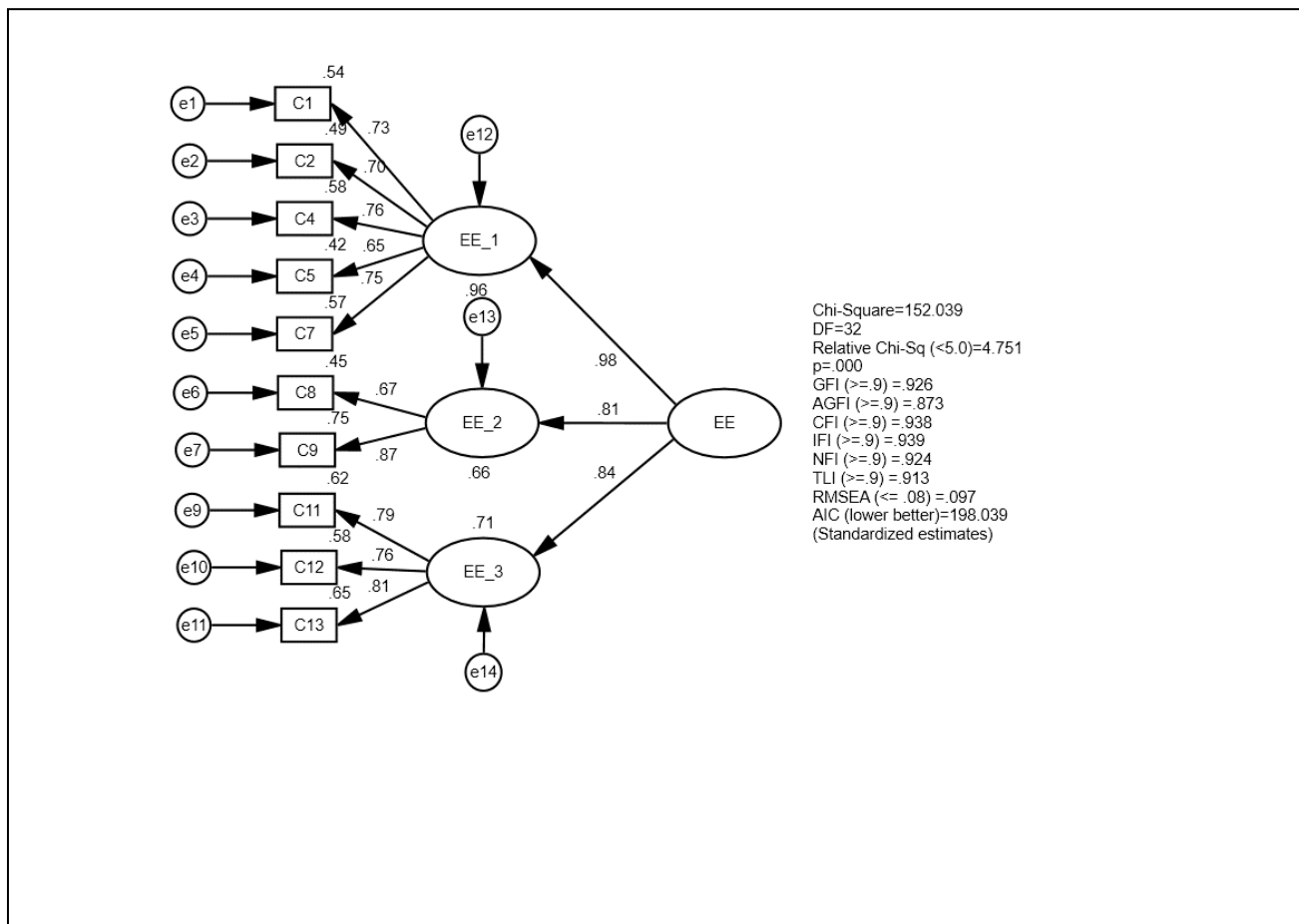


Figure 2: CFA results for EE

The second-order construct for the measurement model of EE demonstrated in Figure 2. This construct has three components which are EE1 represents dedication, EE2 represents absorption, and EE3 represents vigor.

Whereas discriminant validity is another validity requirement which also needs to be tested. The intensity of the correlation between these three components requests to be examined since EE is a construct with three components in second-order. If the correlation coefficient between the components does not exceed 0.85, the discriminant validity for the EE construct is accomplished (Noor, Aziz, Mostapa & Awang, 2015). The correlation coefficient between the components is considered and organized in Figure 3.

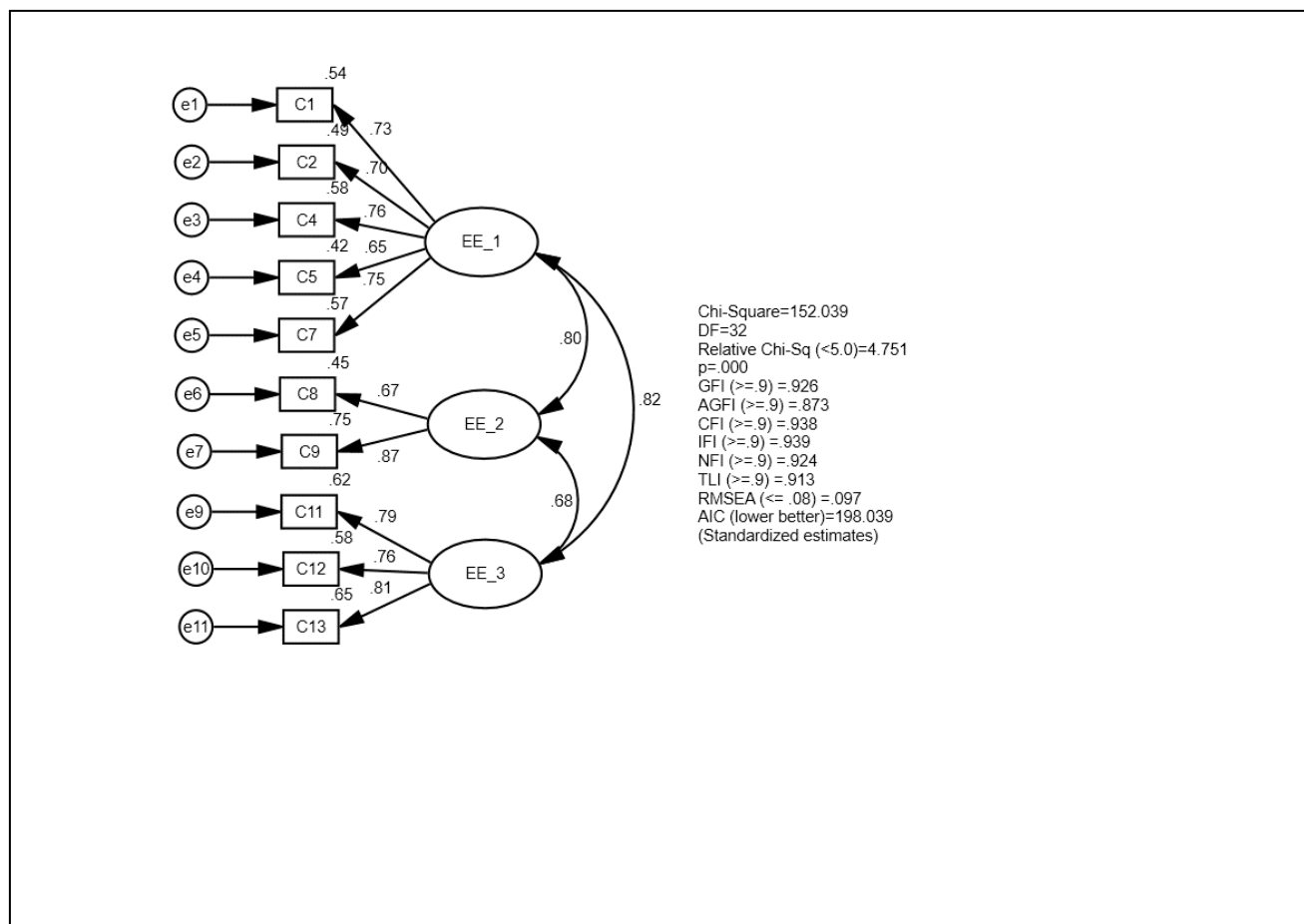


Figure 3: The assessment of convergent validity for EE construct

The review of discriminant validity for the EE construct exhibited in Figure 3. The correlation coefficient between EE1, EE2, and EE3 figured by the IBM-SPSS-AMOS. The results designate the correlation coefficients between all components are 0.80, 0.68, and 0.82 which do not exceed 0.85. Accordingly, the discriminant validity accomplished by the measurement model for the EE construct.

Conclusion

Overall, this study attempt to develop and validate the indicator connected to EE in the vocational college context. The EFA procedure has been done to test the requirement for KMO measure of sampling adequacy, Bartlett's Test for sphericity, and Cronbach's Alpha for internal reliability. While the required fitness and the reliability and validity test has been achieved by using the CFA procedure. For future research, this measurement model could be measured with the goal that the following study will be counted in this model.

Contribution of the Study

The contextual contribution of this study will be the EE construct among vocational colleges' lecturers in Malaysia. In the meanwhile, the findings can help the employer to reflect on themselves especially their leadership and practices to enhance EE among the lecturers in vocational colleges. Furthermore, this study recommending validating the measurement item on EE in Malaysia which could be a crucial element and dependable wellspring of data for guiding related researchers to brawl the EE research in the future particularly in the

educational context.

Limitation and Recommendation

It could not be dexterous to abridge for the entire Malaysian lecturers' population as far as their EE status since the study only focuses on the North Zone of Malaysia. Subsequently, further research can be performed in another zone of Malaysia to provide a big and clear picture of lecturers' involvement in their daily job scope. Besides, the following researcher can compare the current EE instruments with The Gallup Workplace Audit (GWA) and ISA engagement scale to gather the similarities and differences of the EE instrument in detail.

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