Assessment Model for Determinant Factor Constructs in Edu-Tourism Using Confirmatory Factor Analysis (CFA)

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ABSTRACT

The purpose of this study is to evaluate the determinant factors model construct using Confirmatory Factor Analysis (CFA). The determinant factor constructs consist of: i) tour operators, ii) event management, iii) local communities, iv) investments, v) educational institutions, and vi) tourism organizations. The data for the study was collected by the researcher from 384 respondents who are tourists who arrived and visit the Edu-tourism destinations in Terengganu. CFA is carried out for measurement models of the latent constructs which verify the fitness for determinant factors constructs. A total of 36 items of overall variables were studied. Data were analyzed using IBM-SPSS-AMOS (SEM) program version 21.0 which consists of two main models: the measurement model and the Structural model. The result for Cronbach alpha is greater than 0.6 and AVE is above 0.5 which demonstrated reliability. Meanwhile, the study resolves that the discriminant validity for all constructs is achieved. The study produces new knowledge which resulted in practical contributions that can be practiced by tourism organizations, event managers, tourism operators, academicians and government sectors.

1. INTRODUCTION

Confirmatory factor analysis is a process that analyses constructs or measurement models to assess how well the generated items represent their underlying constructs. Thus, in CFA, the study clarifies the issues of construct validity and reliability. The CFA results show the factor loading and fitness indexes for every construct item and its residual. This method enables the simultaneous correlation between the constructs as the constructs were linked together during the "covariance" procedure. This is the first step in conducting CFA after the successful completion of the exploratory factor analysis (EFA). Thus, the analysis begins by linking the constructs and determining their factor loading and correlations [1].

This measurement model is developed on the constructs of: i) tour operators, ii) event management, iii) local communities, iv) investments, v) educational institutions, and vi) tourism organizations carefully so that no items are surplus. In tourism, CFA has been used in some Edu-tourism models and can be built individually or as a pooled measurement model of a particular construct. SEM is used to construct and analyze a comprehensive structural model after the measurement model is developed. CFA has been used by the researcher to test and assess all the constructs of: i) tour operators, ii) event management, iii) local communities, iv) investments, v) educational institutions, and vi) tourism organizations. All main CFA components such as; unidimensionality, validity, reliability, and fitness index can be accomplished for the measurement model [1].

Nizar et al. [1] stated that CFA is used to determine construct validity and assert the measurement model which is based on theory and data obtained is represented in the model based on theory. In the first step, the researcher needs to test the reliability, validity, and unidimensionality of the measurement model using CFA [2]. Using this test, a high-value scale of latent variables is symbolized as fulfilling convergent validity whereas the same scale imparted low value to other latent variables is symbolized as fulfilling discriminant validity [3].

The measurement model contained the relationship between items and factors in the questionnaire which was focused on by the CFA [4]. CFA also measured the degree of items in the questionnaire (that evaluated the predetermined variables) [5]. There is two access to carrying the CFA that are; i) individual CFA and ii) pooled measurement model. CFA is an instrument that measures the fitness of a latent measurement model and helps researchers to accomplish the intention of the empirical study [6]. The factor validation analysis method is applied to assert substantial items in the questionnaire on each construct and it is a special phase of factor analysis [6].

Before screening the significant relationship between the two variables in the structure model, CFA will first engage in the establishment of every item in the latent construct of the measurement model. Before testing the entailing of the relationship in the construction model, the measurement model needs to follow the accepted level of validity and reliability degree of legitimacy and dependability, also the compatibility index [7]. Results for measurement model of: i) tour operators, ii) event management, iii) local communities, iv) investments, v) educational institutions, and vi) tourism organizations are significant and met the criteria's conditions.

On the other hand, three characteristics need to be considered in finding reliability which are [8]: i) the internal reliability value is greater than 0.70, ii) the reliability of the constructs (CR) value is greater than 0.60, and iii) the average variance extracted (AVE) value is greater than 0.50. There is a crucial need for validity and reliability testing to decide whether the questionnaire evaluates the measured concept [9]. Legitimacy involves the legitimacy of the development and the legitimacy of the substance [10]. Two sorts of legitimacy are the legitimacy of strength and consistency [9]. Legitimacy additionally suggests an understanding between two endeavors to gauge similar attributes to the most extreme by various techniques [11]. Also, to accomplish a level wherein every poll depends on a high connection with the develops [12]. Build legitimacy comprises merged legitimacy and segregation legitimacy. Validity contained the credibility of the construct that has two types which are [10]: i) validity of stability and ii) consistency. This entails an arrangement between two activities to evaluate the same trait into the upper limit by varied methods [11]. This arrangement also works to a strain level that is based on a high correlation with the constructs in each questionnaire [12].

Convergent validity and discrimination validity consist in construct and both types need to be tested simultaneously to find out that the questionnaire has reached the construct validity standard [13]. Exploratory Factor Analysis (EFA) is one of the methods which is used to run the validity of the constructs. Hence, convergence and discrimination validities will be determined through the factor analysis procedure. There are three categories of validity that are; i) convergent validity, ii) construct validity, and iii) discriminant validity [14]. The measurement model values in construct validity need to exceed all fitness indexes which are; i) absolute fit index, ii) incremental fit index, and iii) parsimonious fit index. Modification indices (MI) will be used if the fitness index's values did not meet the requirement. Some study [8] claimed that in determining reliability, the internal reliability using Cronbach's alpha value should be greater than 0.7, the CR value should be greater than 0.6, and the AVE should exceed 0.5.

2. RESEARCH METHODOLOGY

To conduct this study, 10-point Likert scale questionnaires have been distributed to a total of 384 respondents that visited seven Edu-tourism destinations in Terengganu. The list of destinations was advised by Terengganu Tourism Department and the total sample size is based on population and as referred to in the table suggested [15].

The researcher contacted the receptionist at Edu-tourism destinations to distribute survey questionnaires and once approved, the researcher distributed questionnaires to visitors and students at the main entrance of destinations and inside the buildings. The questionnaires were then collected.

Questionnaires were adapted from several scholars to meet the objectives of this study. The survey questionnaires consisted of six section names that are:

i.   Section C01: Tourism Operators
ii.   Section D01: Event Management
iii. Section E01: Local Communities
iv.   Section F01: Investments
v.   Section G01: Educational Institution

vi.   Section H01: Tourism Organizations

Firstly, Section C01 points out tourism operators (independent variables) [16] that inquire about the quality of the tourism operators in Terengganu. Next, is Section D01 which deals with event managements (independent variable) [17]. This section ascertained tourists' experience with the quality, accessibility and atmosphere of Edu-tourism events in Terengganu.

Section E01 elaborated on local communities (independent variable) [18-20] which find out the sense of local community contribution in Terengganu towards Edu-tourism activities. Next is Section F01 which is an investment (independent variable) [21, 22] which examined the investment's significance contribution towards Edu-tourism outcomes. Afterward, educational institutions are Section G01 (independent variable) [23] which discovered the development and understanding towards appreciation of Edu-tourism.

Last is Section H01 which is the tourism organizations (independent variable) [24] that discovered the effectiveness of tourism organization's strategies leading towards Edu-tourism improvements.

SPSS 24.0 and AMOS 24.0 are software that has been used to analyze the data of the study. There are three main criteria in CFA that are:

i.   Unidimensionality: If the construct follows the specified factor loading, the unidimensionality will be accepted [10]. To this, the value for factor loading must be greater and equal to 0.5, and for existing and stable items, the load factor must be greater and equal to 0.6.
ii. Validity: Convergent validity is achieved when the AVE value is greater than 0.5 and construct validity is achieved when all the fitness indices meet the required level.
iii. Reliability.

Table 1 below shows the Fitness index table and meanwhile Table 2 shows the overall corresponding statistics for each measurement model.

Table 1. Fitness index table for construct validity

Index	Test	Significance Value
Absolute fit	Goodness of fit index	> 0.90
	Adjusted Goodness of Fit Index	> 0.90
	Root Mean Square Error of Approximation	< 0.08
Incremental fit	Comparative Fit Index	> 0.90
	Normed Fit Index	> 0.90
	Incremental Fit Index	> 0.90
Parsimonious fit	Chi-Square Test of Independence	< 0.5

Table 2. Reliability table for construct reliability

Internal Reliability	Cronbach's Alpha > 0.7
Composite Reliability	CR > 0.60
Average Variance Extract	AVE > 0.50

2.1 Steps to run individual confirmatory factor analysis

The determinant factor constructs have been organized into six sections, namely are; Section C: Tourism Operators, Section D: Event Managements, Section E: Local Communities, Section F: Investments, Section G: Educational

Institutions, and Section H: Tourism Organizations. The researcher has performed CFA for individual analysis on all determinant factor constructs as shown in the figures below. The reconstruction of all determinant factors constructs measurement model has been done in pooled CFA measurement model. Below are steps to run pooled measurements that need to adhere [1]:

i.   Use AMOS to create CFA for the measurement model.
ii. The measurement model needs to be matched with the corresponding compatibility index. Assure of the factor loading needed if the compatibility index is not reached the required level.
iii. Load factor with a value that is lower than 0.60 needs to be removed.
iv. Remove the low load factor at one time.
v.   Create a measurement model after removing items from the model.
vi. Repeat to analyze the equivalent index. Step up the steps of iii–v so that the accuracy index is reached.
vii. The modification index can be used if the integration index did not meet the required level.
viii. Items overlapped in the model if the value of the modification index exceeds 15. Hence, remove the lowest load factor or label it as a free parameter.
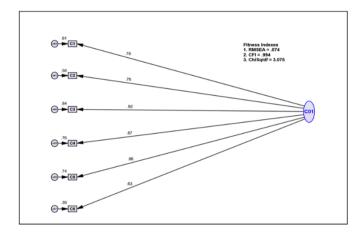ix. Define Cronbach's alpha, CR, and AVE.

Figure 1. The individual CFA model for section C01-tourism operators

By referring to Figure 1, certain fitness indexes of each category for measurement model of Tourism Operators achieve the required level, which are the parsimonious fit; ChiSq/df = 3.075 > 5 (satisfied), the incremental fit; CFI = 0.994 > 0.90 (satisfied), and the absolute Fit; RMSEA = 0.074 < 0.08 (satisfied), with factor loadings that greater than 0.60. The construct s has no redundant item. The reconstruction of all determinant factors constructs measurement model will be done in pooled CFA measurement model.

By referring to Figure 2, certain fitness indexes of each category for measurement model of Event Managements achieve the required level, which is the parsimonious fit; ChiSq/df = 1.619 > 5 (satisfied), the incremental fit; CFI = 0.998 > 0.90 (satisfied), and the absolute Fit; RMSEA = 0.040 < 0.08 (satisfied), with factor loadings that greater than 0.60.

By referring to Figure 3, certain fitness indexes of each category for measurement model of Local Communities achieve the required level, which are the parsimonious fit;

ChiSq/df = 2.147 > 5 (satisfied), the incremental fit; CFI = 0.995 > 0.90 (satisfied), and the absolute Fit; RMSEA = 0.055 < 0.08 (satisfied), with factor loadings that greater than 0.60.
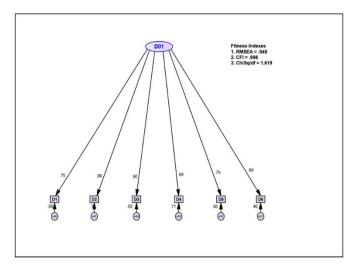

Figure 2. The individual CFA model for section D01-Event managements
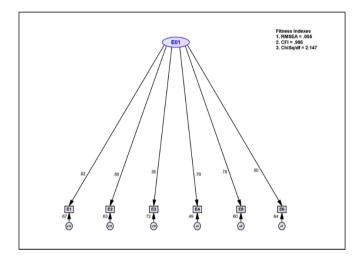

Figure 3. The individual CFA model for section E01 - local communities

By referring to Figure 4, certain fitness indexes of each category for measurement model of Investments achieve the required level, which are the parsimonious fit; ChiSq/df = 2.437 > 5 (satisfied), the incremental fit; CFI = 0.991 > 0.90 (satisfied), and the absolute Fit; RMSEA = 0.061 < 0.08 (satisfied), with factor loadings that greater than 0.60.

By referring to Figure 5, certain fitness indexes of each category for measurement model of Educational Institutions achieve the required level, which are the parsimonious fit; ChiSq/df = 1.636 > 5 (satisfied), the incremental fit; CFI = 0.998 > 0.90 (satisfied), and the absolute Fit; RMSEA = 0.041 < 0.08 (satisfied), with factor loadings that greater than 0.60.

By referring to Figure 6, certain fitness indexes of each category for measurement model of Tourism Organizations achieve the required level, which is the parsimonious fit; ChiSq/df = 2.500 > 5 (satisfied), the incremental fit; CFI = 0.990 > 0.90 (satisfied), and the absolute Fit; RMSEA = 0.063 < 0.08 (satisfied), with factor loadings that greater than 0.60.
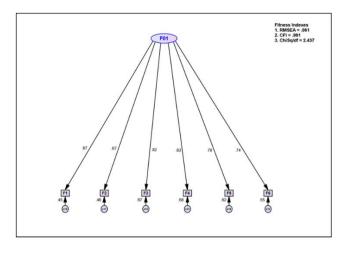
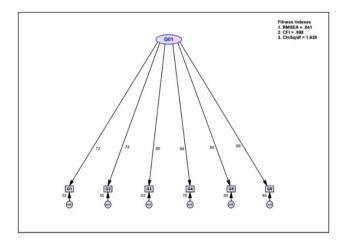**Figure 4.** The individual CFA model for section F01-investments

Figure 5. The individual CFA model for section G01-educational institutions
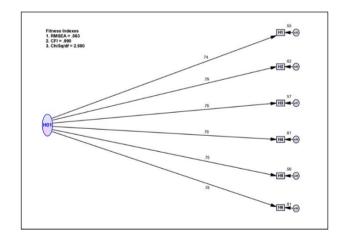

Figure 6. The individual CFA model for section H01 - tourism organizations

2.2 Pooled CFA measurement model of determinant factor constructs

The pooled CFA for the measurement model can be run together after the CFA for all measurement models is computed with all the assessments for unidimensionality, validity, and reliability for all Determinant Factor constructs; i) Tourism Operators, ii) Event Managements, iii) Local Communities, iv) Investments, v) Educational Institutions,

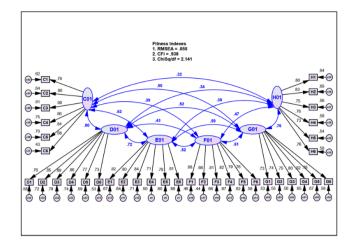and iv) Tourism Organizational as shown in Figure 7.

Figure 7. Pooled measurement model of determinant factors

As shown in Figure 7, certain fitness indexes of each category for the pooled construct have achieved the required level, which are the parsimonious fit; ChiSq/df = 2.141 < 5 (satisfied), the incremental fit; CFI = 0.938 > 0.90 (satisfied), and the absolute fit; RMSEA = 0.055 < 0.08 (satisfied).

The fitness indexes for the pooled constructs meet the required level and the factor loadings indicated a perfect model fit.

The factor loadings for all items appeared to be above the cut-off (0.6). However, there are no items deletion in and model to achieve unidimensionality. The model is perfectly fit with no deletion of any redundant items in the construct as depicted in Figure 7. The unidimensionality was achieved when the factor loading for each item was higher than 0.6 [25, 26]. Hence, the model is now fit and perfect to proceed with further analysis in the structural equation modeling software.

3. RESULTS

The CFA results for the measurement model of: i) Tourism Operators, ii) Event Managements, iii) Local Communities, iv) Investments, v) Educational Institutions, and iv) Tourism Organizational are presented in Table 3.

Table 3 depicts the Average Variance Extracted (AVE) and the volume of Composite Reliability (CR) for all constructs exceed the value of 0.5 and 0.6 respectively. Normally, the Average Variance Extracted (AVE) value must be higher than 0.5 but we can accept this value as the composite reliability is higher than 0.6, where the convergent validity of the construct is still adequate. Thus, this has affirmed that the Convergent Validity and Composite Reliability for all constructs in the model have been achieved in the analysis.

The next step in CFA analysis is to assess the discriminant validity of the constructs in order to verify that they are not redundant to each other. Table 4 below showed that the discriminant validity of the constructs is achieved if the correlation among exogenous constructs in the model does not exceed 0.85.

The outcome presented in Figure 7 shows that all the fitness indexes achieved the fitness level and met the measurement model requirement. The RMSEA value for the pooled measurement model is 0.055, which is lower than 0.08. Meanwhile, the value of CFI is 0.938 which is above 0.90 (requirement level) and ChiSq/df = 2.141 which is below 5

(satisfied). These results point out that all categories of fitness index are satisfied and all items are significant to their constructs. The same procedure applies to other pool measurement models and all CFA fitness indexes are achieved for all constructs.

In brief, the CFA results for unidimensionality, validity, and reliability need to be performed before modeling the structural model of; i) Tourism Operators, ii) Event Managements, iii) Local Communities, iv) Investments, v) Educational Institutions, and iv) Tourism Organizational. In measuring these criteria, the AVE and CR are calculated as shown in Table 3. In the meantime, all the parameters in Table 4 show the result for discriminant which is distinct from other constructs.

Table 3. CFA results for Cronbach's Alpha, CR, and AVE

Construct	Items	Loading Factor (> 0.6)	Cronbach's Alpha (> 0.7)	CR (> 0.6)	AVE (> 0.5)
Tourism Operators	C1-C6	0.66-0.90	0.925	0.659	0.920
(Cont.)					
Event Managements	D1-D6	0.73-0.89	0.943	0.660	0.920
Local Communities	E1-E6	0.71-0.84	0.934	0.631	0.911
Investments	F1-F6	0.66-0.82	0.841	0.571	0.888
Educational Institutions	G1-G6	0.74-0.82	0.858	0.591	0.897
Tourism Organizational	H1-H6	0.74-0.81	0.921	0.596	0.898

Table 4. Discriminant index summary

Constructs	Tourist Operators	Event Management	Local Communities	Investments	Educational Institutions	Tourism Organizational
Tourist Operators	**0.812**					
Event Managements	0.29	**0.812**				
Local Communities	0.35	0.15	**0.794**			
Investments	0.39	0.43	0.52	**0.756**		
Educational Institutions	0.50	0.27	0.21	0.27	**0.769**	
Tourism Organizations	0.32	0.34	0.37	0.47	0.35	**0.772**

4. DISCUSSION

CFA was performed to verify the unidimensionality, validity, and reliability of determinant factors construct in Edu-tourism and each construct evaluates different things. CFA has been applied to check the reliability of the research equipment based on the validation factor analysis. The result for all correlation values is less than 0.85 and this proves that each configuration measures different matters [5]. This showed that the CFA's decision on the measurement model combined with the configuration validity test would better define the quality of the applied measurements. Moreover, the measurement model must meet established validity and reliability levels, as well as compatibility indicators, before testing the importance of structural model relationships [7].

Three aspects need to be considered when determining reliability. The first aspect is that the internal reliability determined by Cronbach's alpha value must be greater than 0.60 and secondly, the CR must be greater than 0.60. The third aspect is AVE which needs to be greater than 0.50 [26]. On the other hand, Table 3 shows the results for all variables that meet the internal reliability criteria where Cronbach's alpha coefficient is greater than 0.70. Also, the AVE score is greater than 0.50 and the Construct reliability CR scored greater than 0.60. In addition, Table 4 shows the results of the discriminative validity of; i) Tourism Operators, ii) Event Managements, iii) Local Communities, iv) Investments, v) Educational Institutions, and iv) Tourism Organizational technical. The diagonal values, i.e., the AVE square must be greater than the correlation between all the provers tested. It is important to make sure the square root of the AVE is greater than the correlation between all of the tested constructs when testing the validity of the problem [7].

Correlation is the apportioned variance among constructs. In summary, all the necessary tests performed by the CFA, i.e., undimensionality, validity and reliability met the measurement model of: i) Tourism Operators, ii) Event Managements, iii) Local Communities, iv) Investments, v) Educational Institutions, and iv) Tourism Organizational. This allows research to further its next step through Structural Equation Modelling (SEM) analysis.

5. PRACTICAL CONTRIBUTIONS

Discussions will include practical contributions towards tourism organizations, tourism operators, event managers, tourism promoters' academicians and scholars, Edu-tourism industries and as well as government sectors:

i.   Tourism organizations
Preceding studies have proved that practices toward determinant factors in Edu-tourism are related to tourism development which involves sustainable educational programs from both the Ministry of Higher Education and the Ministry of Tourism. Hence, relative organizations need to focus on understanding different aspects of these determinant factors.

ii.   Tourism operators
To encourage tourists' intention to revisit Edu-tourism, the tourism operators should be mindful of the wants and needs of tourists. Tourism operators need to carry out improvement programs that formulate the potential of determinant factors in Edu-tourism and maintain existing relationships with tourists that will ensure competitive benefits and increased profitability.

iii. Event Managers

With regards to these determinant factors in each Edu-tourism segmentation, event managers will require public assembly for promotion, education, ideas and celebration. Hence, the output given from this study, helps event managers to summarize and identify Edu-tourism major themes, concepts and terms being employed in each of the elements of the event framework. Additionally, this study will help event managers to identify elements of the event framework which involve; outcomes, planning, management, the core phenomenon (experience and meanings), dynamic patterns and processes.

iv. Tourism promoters

Tourism promoters need to implement strategies that will improve Edu-tourism products and services. This study can help tourism promoters to lead activity, create a great strategy and construct an effective portfolio. Based on findings, tourism promoters should conduct many programs that center on tourists' perspectives and build relationships with them. On the other hand, the use of an electronic network could enhance the effective marketing strategies towards Edu-tourism fields in terms of using internet facilities as it is convenient.

v. Academicians and scholars

Significantly, other scholars and researchers could use this research in their context studies and cite the findings of this research which allow the benefits of this study to be broadly accessible to people, organizations, educational and business groups. In brief, they will use these findings as a reference point to provide insights and to enhance information even further in similar fields.

vi. Government sectors

The Edu-tourists from emerging economies will continue to choose Terengganu if the Edu-tourism destinations are perceived to be more attractive. Hence this requires commitment from governance especially the Terengganu state government to make the best attractive image in the context of its economic and socio-cultural factors and design marketing strategies to attract more Edu-tourists.

vii. Edu-tourism industries

The merging of education with tourism industries has converged education facilitates, mobility and learning to become an important part of tourist's experience. Hence, Terengganu could become more successful if it can link both the education and tourism industries as a line of approach for local or international exchange and learning. These discoveries are useful in Edu- tourism product development activities in Terengganu where it helps to plan tourism product segmentation, design tourism promotion programs and develop destination decisions.

6. CONCLUSION

The purpose of this study is to perform confirmatory factor analysis on the determinant factor constructs in Edu-tourism. In brief, from the analyses above, the study has empirically shown the relationship between the latent constructs of the study framework. The path analysis was performed in the analysis using the AMOS graphic. It is clarified that he individual and pooled measurement models were operated and the CFA results for all the constructs have met the unidimensionality, validity, and reliability (Cronbach's alpha > 0.7) [26]. Subsequently to this, the construct items of determinant factor constructs in Edu-tourism are fit for the following structural equation modeling.

6.1 Limitations

Overall results using SEM are not completely generalizable even though the sample size had the requisite qualities to test the hypotheses. The significance of the research model is limited by the sample size which may conduct more or less error to the insignificant results found in this study.

Secondly, this research however has been explored in Terengganu where cultural variations will exist between Terengganu and other developed and modern states.

6.2 Future research

For future studies, a triangulation or mixed process is suggested where it is using both qualitative and quantitative methods. The process of triangulation will include an advanced value of data accuracy to improve the awareness of the researcher about the specific subject which will be explored. Additionally, the most appropriate approach to examining human behaviour in social science is to incorporate both the questionnaire and the interview into the data collection process.

The relevance of current findings able to be evaluated by reproducing and enhancing this research in other states and countries as well as other environments in the tourism industry. The external evaluation of the framework constructed in this research would provide a basis for understanding the cultural and regional patterns in tourist behaviour.

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