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Research Article

Validating Scales for Tourism Impacts, Quality of Life, and Support Tourism: An Exploratory Factor Approach

I. Oladeji Kolawole

Okavango Research Institute,
University of Botswana,
Gaborone, Botswana.

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Abstract

The purpose of this paper is to validate measurement instrument that can be used to determine tourism impacts, people's quality of life, and support for tourism. The primary data for this study were collected from 394 households in Maun, Botswana. Exploratory factor analysis was performed to measure internal consistency, construct and content validity to explicate the robustness of the factor structures, using principal component analysis (PCA) as an extraction method. Exploratory factor analysis is an applied statistical technique used by researchers to determine relationships within a group of observed variables. The reliability coefficients for the factors were all strong, which shows that the measures were reliable for measuring the latent constructs including economic, socio-cultural, and environmental impacts, people's quality of life, and support for tourism development. The results of the factor analysis validate the measurement scale and authenticate the psychometric properties of the tourism impacts, quality of life, and support for tourism scale items. The main contribution of this paper is the development and understanding of psychometrically reliable scale items with content and convergent validity that can be used in tourism studies.

Keywords: *Exploratory factor analysis, tourism impacts, quality of life, support for tourism*

1. Introduction

The tourism industry has contributed significantly to global economy (World Travel & Tourism Council (WTTC, 2018). Tourism is now an inevitable option various economies use for diversifying their respective economies worldwide (see Sharpley, 2002). In 2017, the direct contributions of tourism to Gross Domestic Product was USD2, 580.1 billion and supported 118,454, 000 jobs (WTTC, 2018). On the aggregate, the travel and tourism have contributed 10.4% and 9/9% to the global GDP and employment respectively (WTTC, 2018). This therefore calls for more understanding of the industry. Yoon, Gursoy and Chen (2000) note that most of the studies focusing on tourism impacts are meant to understand the reactions and opinions of local people towards tourism development in their localities. Meanwhile, Yoon, Gursoy and Chen (2000) had earlier argued that the structural effects of various tourism impacts have not been rigorously investigated. Furthermore, literature reveals that research findings on tourism impacts are based on the inconsistent instruments used to collect data from different study sites. McGehee and Andereck (2004) reiterated that the plethora of tourism impacts studies focused on tourism attitude and perceptions approach. Therefore, since the question of tourism attitude and perception is a matter of semantics, most the studies relied on the previous documented items which included the scale type of measure (McGehee and Andereck, 2004). Similarly Hinkin, Tracey and Enz (1997) contented that, instruments of data collection in the hospitality industry lack reliability and validity.

Hinkin, Tracey and Enz (1997) further explained that any measure that is characterized by psychometric problems causes misinterpretation of research outputs.

Having recognised the importance of the industry, planning to attain sustainable development of the industry is indispensable. One way to attain sustainable tourism development is through robust research findings that could be converted into policies to enhance tourism industry. Young (2008) notes that the impact of any research findings is based on the effect it has on policies and programmes. There is a plethora of publications on factor analysis in the literature (see Boley, Strzelecka and Woosnam, 2016; Nimako, Azumah, Donkor, and Adu-Brobbey, 2012; Hinkin, Costello and Osborne, 2005; Tracey and Enz, 1997; Ford, MacCallum and Tait, 1986; Nunnally, 1978). However, McGehee and Andereck (2004) noted that the assessment of factor analysis in most empirical studies on tourism is limited. The conflicting opinions on the best practices on the uses of factor analysis have also raised debates and discussions among researchers since the 20th century (Beavers et al., 2013). Beavers et al. (2013) further explained that the confusion among researchers has to do with the issues of rotational use, methods of confirmatory analysis, and sample size. Beavers et al. (2013) further clarified that the level of subjectivity of factor analysis emanated from the methodological decisions that a research must make to complete a single analysis.

The purpose of this paper was to measure the psychometric properties of factors influencing tourism (economic, socio-cultural, and environmental impacts), quality of life and support for tourism development. Specifically, papers on psychometric properties analysis of tourism impacts are not frequent. Therefore, the identification of appropriate constructs with their corresponding items, measurement scale, and adequate sampling size are common issues that need consistent attention of researchers to maintain robust research outputs, and avoid conflicts and confusion among tourism researchers.

The specific objective of this study was to determine the internal consistency and construct validity of the tourism impacts using household data collected in Maun, Botswana. The credibility and dependability of any research output is determined by the robustness of the scale items meant to measure constructs. This study aimed at validating the measurement scale to authenticate the psychometric properties of the tourism impacts scales in tourism studies. Due to the confusion on how to use exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) a panel of experts at the 1996 Society for Industrial and Organisational Psychology (SIOP) annual meeting in San Diego, California was assembled to discuss the underlying issues and provide guidance for researchers interested in utilizing factor analytic procedures (Hurley, Scandura, Schriesheim, Brannick, Seers, Vandenberg and William, 1997). At the annual meeting, the following areas that need to be addressed were identified as follows: (a) When should EFA be used? When should CFA be used? (b) The role of CFA in scale development. (c) Should both EFA and CFA be used on the same data set? (d) Should models be changed based on CFA results? (e) Appropriateness of `forcing' models into a preset number of factors (Hurley et al. (1997). This study focuses on exploratory factor analysis (EFA) rather than confirmatory factor analysis (CFA).

2. Literature Review

2.1 Exploratory Factor Analysis (EFA)

Hurley et al. (1997) noted that EFA is appropriate at the early stage of scale development. Hurley et al. (1997) further argued that EFA is theoretically less demanding than CFA. This technique places more emphasis on eigenvalues as an indicator of dimensionality. The purpose of performing EFA is to determine the underlying latent constructs that might be represented by a set of items (Musa and Kassim, 2012), and to determine the correlation and groupings between the variables under study (Stylidis, 2012). Hinkin et al. (1997) argued that while there are no specific rules for retaining items, Kaiser Criterion (Eigenvalues greater than 1) is used to determine the number factors to retain. Therefore, the essence of performing EFA and CFA are to dichotomise factors into different systematic dimensional structures. The tests of analytical technique also determine the dimensionality of the scales to reduce items to a manageable set. Nimako et al. (2012) contented

that factor analysis is a data reduction technique. Therefore, Anderson and Gerbing (1988) recommended EFA whenever sufficient theory is unavailable to support the underlying dimensions of latent constructs.

Hinkin et al. (1997) reiterated that the aim of EFA is to identify specific items that represent domain of the underlying construct. Thurstone (1947) explains that while a measure must be internally consistent and be parsimonious, there must also be minimum number of items that adequately assess the construct. Furthermore, factor analysis has been considered as an interdependence technique (Hair, Black, Babin and Anderson, 2010), mainly to come up with summaries of the information contained in a number of original variables to a more generalized composite dimensions. The factor analytical techniques answer whether the original items used in the study are related to the latent constructs. Beavers et al. (2013) also concurred that 'factor analytic procedures are statistical methods used for examining the relationships within a group of observed variables, as measured through questions or items'.

Costello and Osborne (2005) noted that 'principal component analysis accurately report and evaluate a large number of variables using fewer components, while still preserving the dimensions of the data'. The analysis is a data reduction technique and it is usually used to summarize a large set of variables. From the theoretical point of view, DeCoster (1998) noted that component analysis assumes that the component is a composite of the observed variables, or that the individual item scores *cause* or define the component. However, despite numerous advantages, Costolle and Osborn (2005) pointed out that the technique is only meant for exploratory and not designed to test hypothesis or theories due to lack of inferences.

3. Research Methods

3.1 Survey Instruments and Measurement Scale

The instrument for this study was developed to assess the local people's perception concerning the impacts of tourism on their quality of life and their support for tourism development. The questionnaire was based on the research questions, and consequently the variables were extracted from the related literature. The choice of measurement scale to use in any study is a function of the amount of available information on a given variable, the nature of the variable intending to measure, and anticipated statistical techniques for the analysis (Mwanje and Botu, 2001, p. 10).

The questionnaire, which was based on a hypothetical model, was divided into four parts: tourism impacts (41) economic impact (12 items), socio-cultural impact (18 items), environmental impact (11 items), quality of life (13 items), support for tourism (16 items) and demographic information in part (4). The itemised variables mirrored the works of tourism researchers like Akarapong et al. (2010), Ko and Steward (2002), Kim (2002), Yoon et al. (2000) and Ap (1990). A 5-point Likert scale type was used to enable ease of completion of the questionnaire and to assist in the effective analysis of the collected data. A Likert scale is an interval scale for the purpose of statistical analysis (DeVaus, 2001). For example, the response format for the items with assigned values ranging from strongly disagree (SD) = 1, disagree (D) = 2, neutral (N) = 3, agree (A) = 4 and strongly agree (SA) = 5. The response was used to assess the constructs including tourism impacts, people's quality of life, and their support for additional tourism developments. Nunnally and Berstein (1994) contented that summated scales are reliable, valid, and precise to measure. The precision of the 5-point scale instrument used to collect data was appropriate.

3.2 Data Collection

This study employed a face-to-face method of interviewing to collect data from Maun residents. Beavers, Lounsbury, Richards, Huck, Skolits and Esquivel (2013) argued that an inadequate sample size affects factor analytical procedure and leads to poor research output. Krejcie and Morgan (1970) also noted that a representative sample of a given population is a function of an efficient technique used to arrive at a particular sample size for a research. Therefore, the sample size used in a study contributes immensely to the methodological soundness of a study. While it is

noted that an inadequate sample size can lead to unreliable non-valid results, the literature still shows that some researchers still hold opinions on certain criteria to achieve an adequate sample to conduct a factor analysis in order to produce a robust result.

Data for this study was collected from Maun locals who were 18 years or older, and have stayed in Maun village for at least a year at the time the study was conducted. Maun is a village located in the northwest part of Botswana. Maun is the main entrant to the Okavango delta, a renowned world heritage site in Botswana. There is an international airport in Maun. Therefore, tourists from different parts of the world frequently pass through the village before proceeding to the Okavango delta. The 400 households visited for data collect yielded 394 respondent records in the data set. This makes the response rate of the study to be 98.5%, which is considered high.

3.3 Data Analysis, Results, and Discussion

Drawing on the suggestion of Costello and Osborn (2005), Stylidis, Sit and Biran (2016) and Boley, Strzeleck and Woosnam (2016), EFA was conducted to identify the dimensions underpinning tourism economic, socio-cultural and environmental impacts, people's quality of life, and their support for tourism. The techniques were employed to determine the reliability of the structure using principal component analysis with varimax rotation to all the observable variables (sub-constructs) to test for inter-item correlation.

In other words, to guarantee distinctiveness and uni-dimensionality of the factors, EFA was performed on 70 items meant to measure five latent constructs of the model. Vaske, Beaman and Sponarski (n.d) describe methods of estimating internal consistency to include, Cronbach's alpha, Spearman-Brown stepped up reliability coefficient, and Kuder-Richardson formula 20. This study relied on Cronbach's alpha to determine internal consistency of the items. Cronbach's alpha is commonly used to examine the internal consistency or reliability of summated rating scales (See Cronbach, 1951). One of the advantages of the alpha is its capacity to estimate the proportion of variance that is consistent in the survey responses.

This paper follows the requirement suggested by Tavakol and Dennnick, (2011), that the acceptable values of Cronbach's alpha range from 0.70 and 0.95. However, Nunnally and Bernstein (1994) and Matsunga (2010) had earlier recommended that the acceptable values of Cronbach's alpha should be 0.50. While the Cronbach's alpha with low value may be caused by shortness of questions or be heterogeneous, the alpha with high value may also be due to redundant of some items (Tavakol, and Dennick, 2011) suggesting tautology. The analysis also reveals the Bartlett test of sphericity and KMO of sampling adequacy to determine demonstrate the robustness of the study.

3.3.1 Economic Impacts of Tourism

The economic impacts of tourism were measured by the positive impact on individuals, positive impact on businesses and the wider community, and deteriorating economic situation. EFA using maximum likelihood was conducted to determine the dimensionality of the scales designed to measure economic impacts. With the initial step in the analysis, the factor structure was examined using 12 items developed specifically for the economic impacts. Table 1 shows the results of EFA. The factor loading is for 12 items ranging from 0.50 and 0.81. The positive impacts of tourism on individuals demonstrated the highest variance of 63.33%, with reliability coefficient of 0.80 in the data with the Eigenvalue greater than 1. The test of KMO and Bartlett test of Sphericity suggested that there was sufficient inter-item correlation with the data for performing factor analysis. The factor incorporated four items including creation of employment, creation of lucrative jobs, increase in personal income, and improved standard of living. The relative proportion of the variance explained by positive impact on individuals signifies that the community agreed that the development of the tourism sector has improved their standard of living.

Table 1: Economic Impact of Tourism

Observable variables and items (questions)	Loading	Eigenvalue	Variance explained	Kaiser-Meyer-Olkin MSA	Bartlett's test of Sphericity
Positive Impact on Individuals	**.804***	2.533	63.33%	.785	.000
Creation of employment	.806				
Lucrative jobs	.784				
: Increased personal income	.812				
Improved standard of living	.781				
Positive impact on businesses and wider community	**.641***	1.993	49.829%	.654	.000
Positive impact on business	.728				
Attract new business	.844				
Improved infrastructure	.742				
Local business benefits	.449				
Deteriorating economic situation	**.464***	1.546	38.662%	.587	.000
Increased prices	.643				
Increased house rent	.726				
Seasonal benefits	.591				
Few people benefit	.506				

These results further signify that the distribution of values in the initial measure of tourism impacts was adequate for conducting factor analysis, and the high proportion of variance means that the positive impact of tourism on individual is an important determinant of tourism impact in a community.

With the second and third factors, the Cronbach's alpha values for positive impact on businesses and wider community and deteriorating economic situation are 0.64 and 0.46 respectively compared to the first factor (i.e., positive impact on individual) with the Cronbach's alpha value of 0.80 (see Table 1). The results show an inconsistency of measure. While the Kaiser-Mayer-Olkin (KMO) measure of positive impact on businesses and wider community yielded 0.65 with the total variance of 49%, the KMO and variance explained for deteriorating economic situation were 0.58 and 38% respectively. The factors did not reflect a good measure of economic impact of tourism in the community.

3.3.2 Socio-Cultural Impact of Tourism

Socio-cultural impacts were measured using four observable variables namely: deteriorating living standard, damaging local culture, improving living standard, and preservation of culture. In this study, the deteriorating living standard was split into two sub-constructs. Therefore we split these into 2 sub-constructs: deteriorating standards (crowds) and deteriorating standards (crime). Based on this, the Cronbach's alpha for all the observable variables loaded well with the deteriorating living standards (crowding (0.70), deteriorating living standards (crime (0.80), damaging local culture (0.78), improving living standard (0.75) and preservation of culture (.079). With the exception of deteriorating living standards (crowding) that the KMO was 0.50, results show a higher proportion of variance explained and acceptable level of KMO by each of the variables (see Table 2). Therefore, considering the results of the factor analysis, the sub-constructs with the associated items are good measure of the socio-cultural impact.

Table 2: Socio-Cultural Impact

Observable variables and items (questions)	Loading	Eigenvalue	Variance explained	Kaiser-Meyer-Olkin MSA	Bartlett's test of Sphericity
Deteriorating living standards(crowding)	**.703***	1.542	77.079%	.500	.000
Overcrowding	.878				
Not comfortable	.878				

Observable variables and items (questions)	Loading	Eigenvalue	Variance explained	Kaiser-Meyer-Olkin MSA	Bartlett's test of Sphericity
Deteriorating living standards(crime)	**.813***	2.574	64.358%	.765	.000
Increased crime rate	.712				
Increased prostitutions	.839				
Increased drug use	.847				
Increased STDs	.804				
Damaging Local culture	**.778***	2.088	69.587%	.691	.000
Damage culture	.793				
Changing arts and crafts	.857				
Dilute culture	.851				
Improving Living Standard	**.746***	2.315	57.885%	.724	.000
Recreational opportunities	.841				
Accessible entertainments	.874				
Promote cooperation	.776				
Facilities for benefit people	.491				
Preservation of culture	**.793***	2.806	56.112%	.780	.000
Encouraged cultural activities	.756				
Positive cultural identity	.768				
Preservation of culture	.797				
Brought people's pride	.817				
Cherish to culture more					

3.3.3 Environmental Impacts of Tourism

The environmental impact of tourism was measured by drivers of environmental pollution, conservation of environment and public place, and the degradation of the environment. The variable of drivers of environmental pollution was well loaded with the Cronbach's alpha of 0.86 with variance explained of 71% and KMO of 0.79. The Cronbach's alpha values for conservation of environment (0.49) and public place and degradation of environment 0.67 were loaded poorly. The variance explained and KMO for each of the variables were 50% and 0.54 for conservation of environment, and 51% and .70 for public place and the degradation of the environment. The factor solutions were obtained using eigenvalues greater than 1.

Table 3: Environmental Impact of Tourism

Observable variables and items(questions)	Loading	Eigenvalue	Variance explained	Kaiser-Meyer-Olkin MSA	Bartlett's test of Sphericity
Drivers of Environmental Pollution	**.865***	2.871	71.782%	.792	.000
Increased solid waste	.860				
Water pollution	.877				
Dust and air pollution	.903				
Noise pollution	.739				
Conservation of Environment	**.495***	1.523	50.776%	.541	.000
Encourage conservation initiative	.821				
Beautification of Environment	.723				
Protection of environment	.572				
Public Place and Degradation of Environment	**.675***	2.066	51.641%	.704	.000
Constructions destroy community	.776				
Reduced allocation of land	.692				
Traffic congestion	.593				
Destruction of natural resources	.796				

The results of the factor analysis in Table 3 have shown how local people perceived tourism in terms of environmental impacts. Local people will not be involved in any activity that is capable of

destroying their natural environment.

3.3.4 People's Quality of Life

People's quality of life measures how the wellbeing of community people has been affected due to the development of tourism in Maun. Therefore, people's quality of life was measured using four dimensional observable variables including economic well-being, social well-being, cultural well-being, and environmental well-being. The items meant to measure the socio-cultural wellbeing were divided into two due to cross loading. Based on this, the socio-cultural wellbeing was split into two concepts namely social wellbeing comprising of items and cultural wellbeing (see Table 4 below). After the adjustment, the results of the analysis became robust. The factors were well loaded with Cronbach;s alpha of economic wellbeing (0.90), social wellbeing (0.81), cultural wellbeing (0.74) and environmental wellbeing (0.77) in line with Nunnally and Berstein (1994). The variance explained by the variables and values of KMO were all good. The responses have shown that improving economic, socio-cultural, and environmental well-being are crucial to improve the quality of lives of people in any destination area.

Table 4: People's Quality of Life

Observable variables and items(questions)	Loading	Eigenvalue	Variance explained	Kaiser-Meyer-Olkin MSA	Bartlett's test of Sphericity
Economic Well-being	**.901***	2.507	83.581%	.732	.000
Satisfied with cost of living	.904				
Satisfied with family income	.939				
Satisfied with comm. benefits	.899				
Social well-being	**.815***	2.191	73.025%	.707	.000
Satisfied with accessibility	.846				
Satisfied with local involvement	.881				
Satisfied with social benefits	.836				
Cultural well-being	**.741***	1.981	66.037%	.647	.000
Satisfied with tourists	.724				
Satisfied with culture	.863				
Satisfied with preservation of culture	.844				
Environmental well-being	**.774***	2.399	59.986%	.745	.000
Satisfied with safety	.761				
Satisfied with health of my environment	.860				
Satisfied with conservation	.734				
Satisfied with cleanliness	.737				

3.3.5 Support for Tourism Development

The Social Exchange Theory (SET) underpinning this study preaches that community people are likely to participate in an exchange with tourists if they believe that they are likely to benefit from the development, without incurring unacceptable cost (Yoon et al., 2000). Based on this, support for tourism development was measured using five observable variables. These include economically motivated support for tourism, socio-culturally motivated support for tourism, environmentally motivated support for tourism, level of involvement, and community's hospitality. There seems to be a natural split between 'level of involvement' and 'community's hospitality'. Therefore, the level of involvement and community's hospitality was split into two sub-constructs of level of involvement and community hospitality due to cross loading. With the exception of environmentally motivated support for tourism (0.58), the values of the Cronbach's alpha were impressive (economically motivated support for tourism (0.86), socio-culturally motivated support for tourism (0.80), level of involvement and community's hospitality (0.83) and community's hospitality (0.84)).

Table 5: Support for Tourism Development in the Community

Observable variables and items(questions)	Loading	Eigenvalue	Variance explained	Kaiser-Meyer-Olkin MSA	Bartlett's test of Sphericity
Economically Motivated Support for Tourism	**.863***	2.850	71.249%	.769	.000
Create employment	.785				
Create new business	.879				
Attracts investors	.883				
Increased standard of living	.825				
Socio-culturally Motivated Support for Tourism	**.801***	2.533	63.320%	.771	.000
Popularity of our product	.728				
Recreational Activities	.871				
Promote cooperation	.812				
Preservation of culture	.764				
Environmentally Motivated Support for Tourism	**.586***	1.665	55.507%	.624	.000
Protect natural environment	.695				
Community attractiveness	.790				
Development of new programme	.746				
Level of Involvement and Community's Hospitality	**.837***	1.720	86.012%	.500	.000
Active participation	.927				
Pride of inputs	.927				
Community's hospitality	**.844***	1.732	86.602%	.500	.000
Tourists are welcome	.931				
Attracting tourists to community	.931				

In line with the SET, it is difficult for local people to enthusiastically accept and support tourism without receiving economic benefits, preservation of culture, conservation of the environment and local people involvement in various activities withing tourism sector in their community.

4. Conclusion

The factor analytical techniques chooses enough adequate factors that simultaneously represent data and eliminate factors that are not statistically or theoretically relevant (see Fabrigar, Wegener, MacCallum, and Strahan, 1999). The present study has psychometrically examined the properties of the scales of measurement of tourism impacts, quality of life, and the support for tourism using data from Maun in Botswana. The results of KMO and Bartlett test of Sphericity suggest that there were sufficient inter-item correlations with the data for performing factor analysis. Furthermore, the values of Cronbach's alpha have shown that the sub-constructs are reliable.

Generally, the results of the EFA for the constructs have robust psychometric properties. The convergent validity of the respective constructs that determine the degree to which the items within a particular construct measure the same uni-dimensional of which the degree of different items in a various subscales measure differently rather than the same construct, were considered in this paper. The current paper has validated the instrument of data collection for tourism economic, socio-cultural, and environmental impacts, quality of life, and support for tourism.

The literature notes that regardless of statistical values, the decision to retain more factors that are needed in analysis is more beneficiary to the analysis than to delete relevant factors that are needed to justify theoretical framework. However, Pett, Lackey and Sullivan (2003) caution that 'retaining too many factors can deplete the solution erroneously resulting in weak factor loadings'. This study shares the same view with Beavers et al. (2013) who argued that factor analysis should always be interpreted with caution by aligning the results in light of theory and common sense. Like Beavers et al. (2013), this paper argues that the factor analysis is a mathematical process using computer programming that can fail to align with the theory. The interpretation of the results of factor analysis must be in line with theory and common sense to avoid deleting important

influencing factors of a certain construct.

From a theoretical point of view, this paper contributes to the literature on tourism studies. Though it is a challenge to come up with an instrument comprising of unified and acceptable constructs to measure tourism impacts, quality of life, and the support for tourism that could be used in various destinations, such instrument will allow researchers to perform meta analytical studies for comparison. The comparability of research outputs using the same constructs for various destinations is an important addition to the literature on tourism and even among practitioners.

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