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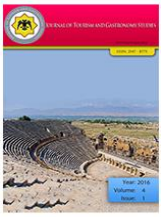

An Evaluationary Work on Two Prevailing Research Methods: SEM and MR in the Context of Food Tourism

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Abstract

The aim of this study is to compare the fitness of structural equation modeling and multiple regression in the context of food tourism. To perform of this aim, 137 questionnaires were filled out of tourists who were attending food tourism. According to the results of the study, structural equation modeling was found much more advantageous over multiple regression, especially when latent constructs were to be measured.

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INTRODUCTION

Multiple regression (MR) and structural equation modeling (SEM) are both effectual statistical techniques which have been referred by numerous researchers as MR, a first generation technique, used over a hundred year, while SEM is a relatively new analytical tool with its roots extend back to the first half of the twentieth century (Hair, Anderson, Tatham & Black, 2006; Nusair & Hua, 2010). As a multivariate statistical technique, MR analysis is used to examine the relationship between a simple dependent variable (DV) and a set of independent variables (IV). On the other hand, SEM, as a combination of both MR and factor analyses, estimates a series of separate, but interdependent MR equations simultaneously (Hair et al., 2006). This study aims to help the researcher to decide whether SEM or MR to adopt in his studies.

LITERATURE REVIEW

Multiple Regression versus Structural Equation Model

SEM is the only multivariate technique that allows the simultaneous estimation of multiple equations (Hair et al., 2006). This means, in structural model, an IV in one relationship may become a DV in another relationship. Another advantage of SEM is that SEM has the ability to incorporate latent variables. This not only improves statistical estimation and represents theoretical concepts better, but also directly accounts for measurement error (Hair et al., 2006; Ho, 2006). When the observed variables are used, there will be a measurement error with the observation (True score = observed score + error). In MR, all variables are assumed to be observable and have no measurement error (i.e. perfect measurement of variables) (Musil, Jones & Warner, 1998). In social sciences perfect measurement is very rarely met, and some constructs cannot be often observed directly.

Food Tourism and Theory of Reasoned Action (TRA)

Food tourism describes the journeys themed by foods and drinks, specials or simply savory meals, foods' preparation process and festivals (Akkuş & Erdem, 2013). There are also other terms related to food and tourism like Gastronomy, Gourmet or Culinary tourism. Recently increasing number of authors consider food tourism as an umbrella concept that encompasses other terms (e.g. Hall et al., 2004; Tsai & Wang, 2016).

Although every tourists have to eat during their travels, few of them plans their travel for food. Understanding food tourists will definetely serve for marketing efforts of destinations. Among the theories that attempt to describe human behaviour, TRA, which was proposed by Fishbein and Ajzen in 1975 most frequently utilised by researchers. The starting point for this theory is the assumption that human behaviour can be predicted from individual intentions.

According to TRA, there are two different determinants of behavioral intention (BI): (1) Attitude toward behavior (AtB), representing the sum of the assessments in favor or against the behaviour in question; and (2) subjective norms (SN), known as the social pressure determining the behaviour's practicability.

Just as BI can be estimated by means of AtB and SN, it can also assayed by beliefs, which can be defined as the antecedents of these factors. In this case, it is possible to evaluate AtB according to the individual's behavioural beliefs (BB) and outcome evaluation (OE); SN, according to the normative beliefs (NB) that reflect the judgment of the surrounding people, and his motivation to comply to these beliefs (MC). So the hypotheses of the study can be listed below:

H1: AtB has a significant effect on BI.

H2: SN has a significant effect on BI.

H3: BBOE has a significant effect on AtB.

H4: NBMC has a significant effect on SN.

METHODOLOGY

The study was conducted on a social networking (Facebook) group named "Sonradan Gurmeler" (Nouveau Gourmet) between May 28 and August 22, 2012. A total of 1575 members of this group were sampling frame of the study. Following a comprehensive review of the literature, author collected preliminary information by using the deep interview method from 10 individuals who previously took part in FRT. An item pool of 98 was formed based on the information obtained from the literature review and the interviews. The item pool that was formed was decreased to 81 items by eliminating certain expressions. Feedback was then obtained from a total of six faculty members (four from the discipline of marketing and two from the discipline of economy and tourism), and once the necessary adjustments were performed, a questionnaire form was designed by decreasing the item pool to 52 items. Sources for scale items are given in Table 1.

Table 1. Resources for scale items

Variables	Resources
AtB	Lam and Hsu, 2004, Lee et al, 2007, Sparks, 2007, Han; Hsu; Sheu, 2010, Kim et al., 2010, Kocagöz, 2010, Tsai, 2010, Han; Lee; Lee, 2011.
SN	Lam and Hsu, 2004, 2006, Cheng et al., 2005, Han; Hsu; Sheu, 2010, Kocagöz, 2010, Ryu and Han, 2010.
BI	Cheng et al., 2005, Kocagöz, 2010, Ryu and Han, 2010.
BB & OE	Brown, 1999, Kim et al., 2009, Kocagöz, 2010, Ryu and Han, 2010.
NB & MC	Joshi, 2003, Lam and Hsu, 2004, 2006, Han; Hsu; Sheu, 2010, Kocagöz, 2010, Ryu and Han, 2010.

Based on the pre-test of a group of 25 students, it was determined that there were no general problems regarding the questionnaire form. The number of individuals who completed the questionnaire forms within a period of approximately three months was 140. As three of these forms were not included due to incomplete data, the analyses were performed based on 137 questionnaires. The rate of response for the questionnaires was 8%.

Five point Likert type scale has been used in all measurements except AtB. Expressions of "strongly disagree / strongly agree" and "not important at all / very important" have been used in BB and OE scales, respectively. There are ten items in both scales like "travelling for food is …exciting…" and "doing …exciting… things is not

important / important for me". AtB scale is measured by five point semantic differential scale and involves eight items like "travelling for food is …unuseful / useful...".

NB and MC have three items like "my family thinks that I should travel for food" and "I want to do whatever my family thinks that I should do", whereas SN scale has also three items like "most people that I consider think I should travel for food". BI scale has three items including "I am planning to travel for food".

RESULTS

Individual Characteristics of the Participants

The gender of the participants showed nearly equal distribution (48.8% were female, while 51.1% were male). The large majority of the participants were individuals between 20-40 years of age (82.7%) and university graduates (93.1%). More than half of the participants worked in the private sector (54.3%), with the majority (78.6%) earning between 1000 to 5000 TL per month. In order to evaluate traveling behaviour, the participants were asked to describe the socio-economic group they identified with, in addition to their level of income. As such, the majority of the participants identified themselves with the middle and upper-middle socio-economic group (80.9%). Of these participants, 90% worked between 4 to 12 hours a day.

Multiple Regression

After performing exploratory factor analysis (EFA) for the main construct to assess reliability and validity of the scale, three factors have been extracted named AtB, BI and SN. Antecedents have been recalculated as ∑BBiOEi and ∑NBjMCj, as Ajzen (1991) suggested. Cronbach alpha values which represent reliabilities of the factors have been found above 0.70. Validity of the scales has been evaluated with convergent (high loadings at the same factor) and discriminant validity (low correlations with other factors). So reliability and validity have not been an issue. There has been no multicollinearity problem between IVs (TOI: 1.000, VIF:1.000).

According to the MR results in Figure 1, 31% of variance on BI has been explained by AtB and SN. BBOE also explained 18% of variance on AtB, whereas NBMC explained 19% on SN.

Structural Equation Model

Before utilizing SEM analysis, BBOE has been split into two parcels. NBMC has been analysed through the multiplication of each item. SEM consists of two parts: the measurement model and the structural equation model. Measurement model concerns if the indicators measure the latent factors reliably, besides structural model considers if the predictor variables explain the variance in outcome variables adequately (Musil et al., 1998). Goodness-of-fit indices have been used to assess the overall model fit. After overall measurement model indices have been found acceptable ($\chi 2$ not significant, $\chi 2$ / df= 1.12, RMSEA= 0.03, CFI= 0.99, IFI= 0.99, NFI= 0.92, GFI= 0.92) , reliability and validity have been assessed.

Reliability of the model has been measured by item and construct reliability (C.R.) on the other hand, convergent and discriminant validity have been employed for the validity. Looking at the results in Table 2, reliability values ranged from 0.514 – 0.877 have represented good item reliability. Since all constructs have reliabilities ranged from 0.785 – 0.924, C.R. has been found high compared to the threshold. Average variance extracted (AVE) values ranged from 0.549 – 0.803 have displayed convergent validity. To assess discriminant validity, AVE for each construct must be greater than the squared correlations between the construct and all other constructs in the model (Nusair & Hua, 2010). Values obtained from measurement model have indicated high discriminant validity.

Table 2. Measurement Model Results

Construct	Variables	Standardized Loadings	Item Reliability	C.R.[a]	AVE[b]
BBOE	Parcel 1	0.84*	0.710	0.827	0.705
	Parcel 2	0.84*	0.710		
NBMC	NBMC1	0.78*	0.628	0.785	0.549
	NBMC2	0.65*	0.598		
	NBMC3	0.79*	0.688		
AtB	AtB02	0.76*	0.680	0.848	0.588
	AtB03	0.88*	0.780		
	AtB04	0.81*	0.813		
	AtB05	0.58*	0.575		
SN	SN01	0.96*	0.790	0.853	0.669
	SN02	0.88*	0.762		
	SN03	0.56*	0.514		
BI	BI01	0.96*	0.877	0.924	0.803
	BI02	0.92*	0.838		
	BI03	0.80*	0.739		

a CR= (∑ Standardized loadings)2 / [(∑ Standardized loadings)2 + ∑ϵj], ∑ϵj: Measurement error

b AVE= (∑ Standardized loadings2) / [(∑ Standardized loadings2) + ∑ϵj]

In the second stage, structural model has been evaluated by goodness-of-fit indices. The overall model has a good model fit to the data ($\chi 2$ not significant, $\chi 2$ / df= 1.31, RMSEA= 0.05, CFI= 0.97, IFI= 0.97, NFI= 0.90, GFI= 0.90). However, the path from SN to BI hasn't been significant in the structural model. After this path has been

[2] Extraction Method: Maximum Likelihood, Rotation: Promax. KMO: 0,788, Bartlett test significant, Total Explained Variance: 69.182%.

[3] **AtB**: 0.86; **SN**: 0.83; **BI**: 0.91; **BBOE**: 0.83; **NBMC**: 0.80.

[4] Factor loadings: 0.49 - 0.98.

[5] Values in the factor correlation matrix: 0.18 - 0.50. (threshold: 0.70).

[6] Threshold: TOI ≥0.10, VIF≤:10. (Hair et al., 2006).

[7] **AtB SN** -> BI: R^2=0.31.

[8] **BBOE** -> AtB: R^2=0.18; **NBMC** -> SN: R^2= 0.19.

[9] **P1**: BBOE8, BBOE9, BBOE6, BBOE7, BBOE2; **P2**: BBOE4, BBOE1, BBOE3, BBOE5.

[10] NBMC1, NBMC2, NBMC3.

[11] Threshold for data **n<250** and **12<m<30** (Hair et al., 2006): $\chi 2$ / df ≤ 3, RMSEA< 0.08, CFI≥ 0.95 (**n**: sample size, **m**: number of observed variables).

[12] Threshold: 0.70 (Hair et al., 2006).

excluded, path analysis has been repeated ($\chi 2$ / df= 1.36, RMSEA= 0.05, CFI= 0.97, IFI= 0.97, NFI= 0.90, GFI= 0.90). As Figure 1 shows, only AtB has explained 33% of the variance on BI, whereas BBOE has explained 39% for AtB and NBMC explained 33% for SN.

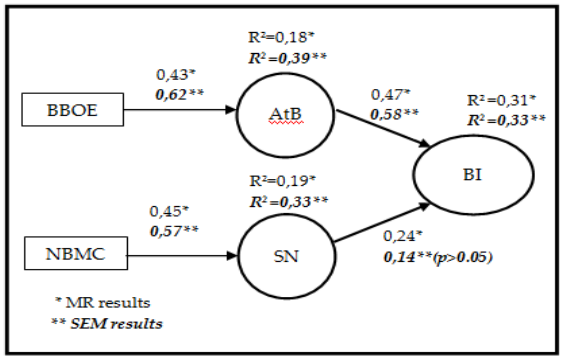

Figure 1. Results of MR and SEM Analyses

CONCLUSION AND IMPLICATIONS

In this study, MR and SEM analyses have been compared in the context of food tourism. Intention of travelling for food has been tried to be explained by TRA, the theory Fishbein and Ajzen (1975) have introduced. MR has successfully explained BI through TRA, although SEM hasn't. SEM has explained antecedents successfully, but not the main construct. The path from SN to BI hasn't been significant. However, ratios obtained from SEM have been much higher than those of MR.

In the literature, there are very few studies which compare and contrast MR and SEM (Musil et al., 1998; Gefen, Straub & Boudreau, 2000; Dursun & Kocagöz, 2010; Nusair & Nua, 2010). Most important point in these studies, SEM is more flexible and has higher R2 ratios than MR. For example; Musil et al., (1998) have utilized MR, path with regression and SEM to explain depression. In conclusion, all paths have been significant in SEM and R2 has been almost two times more than MR. According to the authors, SEM is more challenging than MR both conceptually and operationally.

Investigating two different SEM and MR analyses, Gefen et al., (2000) have also reported that Lisrel, as a covariance-based SEM technique, have similar results with MR, nonetheless revealed higher R2 ratio. But the authors warn that these results shouldn't be generalized. In their very detailed and useful study, they mention about some of SEM's advantages: (1) its usefulness for complex processes, (2) how it provides fuller information about the extent to which the research model has been supported by the data. They also emphasize research objectives and limitations are crucial when choosing an analysis.

Nusair and Hua (2010), have also found that one path is not significant in MR and path coefficients are higher in SEM. So they have agreed with Musil et al., (1998) and concluded this is just because MR assumes perfect measurement. They also suggest when there are latent variables, SEM is probably be a good choice, however, when censored, truncated, time-series or panel data are involved, MR is likely to be preferred.

Dursun and Kocagöz (2010), as consistent above, have higher ratios in SEM, even some paths aren't significant in MR. Authors note down the reason of having low ratios is the fact that MR doesn't account for indirect effects, and suggest using several analyses simultaneously.

This study has similar results with the studies abovementioned. However, MR has calculated all paths significantly, while SEM hasn't. This might stem from latent variables SEM utilized. SEM is much more advantageous over MR, especially when latent constructs are to be measured. Beliefs, attitudes, norms and intentions, are all latent in essence. SEM is the right technique to adopt when latent variables are the subject matter in social sciences.

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