Understanding the Effect of Online Shopping Behavior on Shopping Travel Demand through Structural Equation Modeling

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Abstract: This paper provides more insights into the relationships between online searching, e-shopping and shopping trip in Indonesia. It becomes attractive since nearly a fifth of total population use internet for searching product information and online shopping. An online survey was used to collect the data. Out of 312 respondents participating, only 281 respondents were selected residing in thirteen provinces in Indonesia. A Structural equation modeling was used to understand the complex variable relationships. The result shows that online shopping can replace the shopping travel demand. However, in-store shopping has no effect on the demand of online shopping. Meanwhile, online searching is not only increasing the frequency of e-shopping, but also generating a more often shopping trips. This study also found that both e-shopping and in-store shopping are influenced by exogenous factors such as shoppers' demographic features, household socio-economy, shopping characteristic and shopping attitude.

Keywords: Online Searching, E-Shopping, In-store shopping, SEM, Indonesia

1. INTRODUCTION

Since 1990, Internet users are growing rapidly in Indonesia. Referring to the data obtained from the Association of Indonesian Internet Service Provider, about 82 million people in Indonesia had become an active internet users. Of that amount, nearly 4.6 million people, almost a fifth of total population, use internet for searching product information and/or buying goods online.

The easiness in e-searching/shopping of goods will definitely have an impact on the change of shopping travel behavior. For instance, Farag *et al.* (2007) proved that more frequency to do searching online can increase the possibility for Netherlander to do in-store shopping. The similar condition is also shown by Ward and Morganosky (2002) explaining that people tend to search the information product on the internet before they go to the off-line store. More clearly, Mokhtarian (2004) states that online shopping could stimulate, modify, or substitute shopping trip.

This paper aims to understand several factors that influence people to do online searching, online buying, or in-store shopping. The relationship among those three shopping behaviors is also analyzed in this paper. Since the influencing factors are interrelated and its relationship is very complex, structural equation modeling (SEM) is used in achieving our research purpose. It is because SEM can facilitate the multiple interrelated dependence relationship (a variable can be both an explanatory variable and an outcome variable at the same time). Direct, indirect, and total effect can also be resulted in SEM (Hair *et al.*, 2010).

This paper consists of several sections. Following this section is a theoretical framework as Section 2, Section 3 and Section 4 continuously explain about research method and result. Finally, some important notes of research finding are concluded in Section 5.

2. THEORETICAL FRAMEWORK

2.1 Online Shopping Behavior

Many studies, with a variety of approaches, have been carried out to investigate the relationship between online shopping and in-store shopping. However, most widely adopted methods are structural equation modeling (Ferrel, 2005; Farag *et al.*, 2007; Cao *et al.*, 2012; Zhou and Wang, 2014) and discrete choice model (Weltevreden and Rietbergen, 2007; Ren and Kwan, 2009). Some previous studies also resulted in different findings, as Mokhtarian (2004) clearly states that the online shopping and shopping trip could be a replacement, supplement, or generator to each other. Table 1 shows various findings from previous studies concerning the relationship between e-shopping and shopping trip.

As previously explained, since we need a model that can accommodate the reciprocal relationship among variables, structural equation modeling is proposed. By using this approach, several factors that influence shopping behavior and the relationship between online searching, e-shopping, and shopping trip in Indonesia are expected to be precisely and absolutely identified.

2.2 Structural Equation Modeling

In recent times, SEM becomes a method that is widely used in behavior analysis. Golob (2001) found that until 1990's almost fifty researches using SEM in their methodology. SEM can act as a linear causal analysis, path analysis, analysis of covariance structure, and structural equation. SEM consists of two models: latent variable and measurement variable. Latent variable is an abstract concept such as behavior, attitude, feeling and motivation, etc. This variable cannot be directly observed. Meanwhile, measurement variable is an observed variable and can be empirically measured. This variable becomes indicator of each question asking to the respondent. Both latent variables and measurement variables have exogenous (independent) and endogenous (dependent) variables. These variables distinguish SEM with regression analysis. SEM correlates the variables as a unit, unlike regression analysis that correlate it by piecemeal approach.

There are also two models in SEM, structural model and measurement model. The relationship between exogenous and endogenous variables is represented by structural model with the equation as follow (Bollen, 1989):

$$\eta = \beta\eta + \gamma\xi + \zeta \tag{1}$$

where:

η : latent endogenous variables in *m x l* vector
ξ : latent exogenous variables in *n x l* vector
ζ : random variables in *m x l* vector
β, γ : coefficient in *m x m* matrix (for latent endogenous) and *m x n* matrix (for latent exogenous)

Table 1. Previous studies concerning to Shopping Behavior

Author	Case Study and Its Data	Conclusions
Ferrel (2005)	San Francisco Bay Area Travel Survey 2000	▪ Home teleshopping time can minor substitute shopping travel time ▪ Household income, shop accessibility, employment, and time starved have positive effects on online shopping
Weltevreden and Rietbergen (2007)	Eight cities in Netherland involving 3074 respondents	▪ E-shopping complements in-store shopping in short run, and substituting in long run ▪ Education and internet access with positive impact on e-shopping, and gender (male) and shopping enjoyment with negative impact on e-shopping
Faraq *et al.* (2007)	Four municipalities in Netherland, consisting of 826 respondents	▪ Shopping trips and e-shopping are complementary to each other ▪ Urban location, shop accessibility, and shopping attitude have a positive impact on online shopping, female, income, and age have a negative impact on e-shopping
Cao *et al.* (2012)	A number of 539 adults in Minneapolis – St. Paul seven country metropolitan area	▪ Online shopping complements shopping trip ▪ Household income, urban location, full time worker, and education are positively effect on e-shopping behavior, only shopping attitude with negative impact on online shopping
Zhou and Wang (2014)	United States by using NHTS data at both national and state levels	▪ Online shopping encourage shopping trip (generator), but shopping trip reduce the frequency of online shopping (replacement) ▪ Household income, education, urban location, full time worker, and travel time have positive impact on e-shopping except shopping attitude (negative impact)

In the measurement model, each latent variable has indicator or observed variables, in which each latent variable is modeled as a factor underlying observed variable and latent variable called as loading factor. The basic equation both for exogenous and endogenous variables are respectively shown in equation below (Bollen, 1989):

$$x = \lambda_x \xi + \delta \tag{2}$$

$$y = \lambda_y \eta + \varepsilon \tag{3}$$

in which:

x : observed endogenous variables in column q-vector
y : observed exogenous variables in column p-vector
λ_x : a (q x n) structural coefficient matrix for the effect of the latent exogenous

variables on the observed variable

λ_y : a (p x m) structural coefficient matrix for the effect of the latent endogenous variables on the observed ones

δ, ε : error term

SEM also recognizes the direct, indirect, and total effect (Jöreskog and Sörbom, 2001). Direct effect is a link directly connecting one variable to another variable that is the target of the effect. While the link is called as indirect effect if there are intervening variables between two variables that involve each other. Finally, total effect is the sum of direct effects and all indirect effects.

3. RESEARCH METHOD

3.1 Data Collection

An online survey was used in collecting the data regarding to the judgment that only the internet users doing online searching and/or shopping. A total of 312 respondents fill out the online questionnaire form in the period of data collection ran from early March to late April 2013. However, only 281 forms were completed. Several items were asked to the respondents can be divided into: Respondent characteristics (gender, age, education, type of work, income), Respondent's household characteristics (number of family member and its characteristic, vehicle ownership), Internet behaviors (frequency of using internet in a week and the availability of internet connection at home), Shopping attitudes (frequency of searching product information and e-shopping, credit card ownership, shopping duration both e-shopping and in-store shopping-excluding travel time to store, e-shopping payment method). Table 1 shows the definition of variables used in the model and frequency distribution of the respondents.

Taking into account the distribution of respondent domicile, respondents came from thirteen provinces out of 34 provinces in Indonesia (nearly 40%). Some provinces with big cities have already become the representative sample of respondent although the respondent percentage in each province is unequal, as shown in Figure 1.

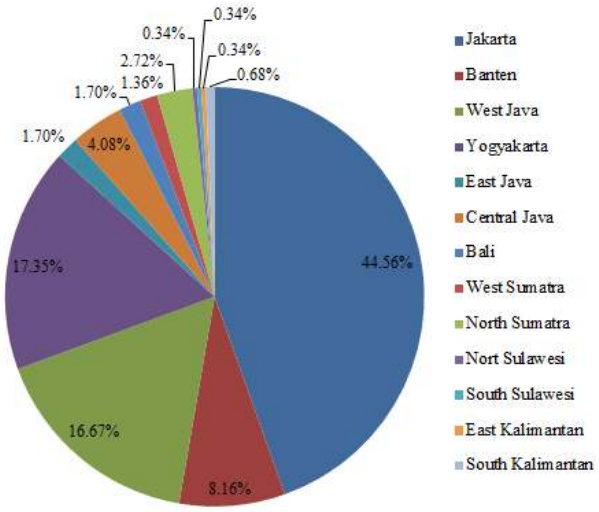

Figure 1. Percentage of respondent domicile

3.2 Method of Analysis

After all the data are entirely collected, first we checked our data for reliability and multicollinearity. Relating to the reliability test, we used Cronbach's Alpha method by correlating each item with total item and then correcting the spurious overlap effect. Table 2 shows the reliability statistic of variables. Referring to Table 2, four observed variables that must be excluded from SEM analysis are gender, type of work, household composition, and driving license ownership. Absolutely, there are no previous researches that find out correlation between driving license ownership and both e-shopping and in-store shopping behavior. However, this discovery appears different result regarding to the factor of gender, work type, and household composition. Factor of gender has a significant effect on e-shopping (Li *et al.*, 1999; Swinyard and Smith, 2003; Weltevreden and Rietbergen, 2007; Faraq *et al.*, 2007). Also, there is a positive correlation between online shopping and full time workers (Chao *et al.*, 2012; Zhou and Wang, 2014). In term of household composition, Farag *et al.* (2007) stated that household composition can influence a person's decision to combine shop trip with other activities (trip chaining).

Meanwhile, to examine the tendency of multicollinearity, it was used the variance inflation factor (VIF) and tolerance (Jöreskog and Sörbom, 2011), in which the result showed that the value of VIF and tolerance are less than 10 and 0.1 respectively and it can be absolutely stated that the multicollinearity does not occur for all variable.

4. STRUCTURAL EQUATION MODELING RESULT

4.1 Model Specification Result

Model specification aims to conceptually design the investigated variables and determine its dimension. After carrying out several re-specifications of the model, due to the model evaluation, the structure of the model and its estimated parameters are shown in Figure 2. It should be noted that in determining the estimated parameters uses covariance analysis, while maximum likelihood is utilized to estimate the coefficient such that minimizing the difference between modeled and observed variable.

4.2 Model Evaluation

After the model was successfully constructed, we need to measure the goodness-of-fit for both aggregate model and measurement model. Hair *et al.* (2010) stated that applying 4-5 goodness-of-fit is satisfied enough to assess the feasibility of model as long as each goodness-of-fit categorized in absolute fit indices, incremental fit indices, and parsimony fit indices is represented. The result of goodness-of-fit for the aggregate model is displayed in Table 3.

Table 2. Definition of variable, frequency distribution, and reliability test

Variables	Descriptive Stats.		Reliability Stats.	
	Mean	SD	Corr. Item-Total Corr.	Remark
Characteristics of respondent's family member				
1. Family members in a household that less than 17 years old and more than 64 years old (continuous)	0.66	1.06	0.223	Valid
2. The number of family members with driving license ownership (continuous)	2.17	1.13	0.510	Valid
3. Vehicle Ownership in a household (continuous)	2.05	1.15	0.483	Valid
Respondent information				
4. Gender (1 for male, 0 for female)	0.41	0.49	-0.202	Invalid
5. Age (continuous)	32.55	9.83	0.585	Valid
6. Education Level (1. Elementary, 2. Junior high school level, 3. Senior high school level, 4. Diploma, 5. Undergraduate, 6. Graduate and post-graduate)	3.96	0.50	0.476	Valid
7. Type of Work (1.Strict working time, 2. Flexible working time, 3. Student)	1.52	0.74	-0.065	Invalid
8. Income per month (1.Less than 118 US dollar, 2. 118-236 US dollar, 3. 236-394 US dollar, 4. 394-630 US dollar, 5. 630-787 US dollar, 6. More than 787 US dollar)	2.91	1.30	0.475	Valid
9. Household composition (1 if Single living, 0 if living with family)	0.87	0.34	-0.123	Invalid
10. Driving License Ownership (1 if yes, 0 if no)	0.98	0.13	0.004	Invalid
Shopping characteristics				
11. Advantages of in-store shopping				
Easiness (1 = strong disagree, 5 = strong agree)	3.55	0.92	0.375	Valid
Pleasure (1 = strong disagree, 5 = strong agree)	2.73	1.03	0.560	Valid
Secure (1 = strong disagree, 5 = strong agree)	2.65	1.15	0.622	Valid
Cheap (1 = strong disagree, 5 = strong agree)	2.57	1.08	0.422	Valid
No waiting (1 = strong disagree, 5 = strong agree)	2.78	0.96	0.377	Valid
12. Advantages of e-shopping				
Time saving (1 = strong disagree, 5 = strong agree)	4.01	0.81	0.551	Valid
All day (1 = strong disagree, 5 = strong agree)	4.08	0.81	0.399	Valid
Lots of choice (1 = strong disagree, 5 = strong agree)	3.77	0.84	0.368	Valid
Complete information (1 = strong disagree, 5 = strong agree)	3.38	0.85	0.387	Valid
Competitive price (1 = strong disagree, 5 = strong agree)	4.41	0.68	0.553	Valid
Fast delivery time (1 = strong disagree, 5 = strong agree)	3.90	0.88	0.438	Valid
Money saving (1 = strong disagree, 5 = strong agree)	3.70	0.91	0.446	Valid
Internet characteristics				
13. Frequency of using internet in a week (1 = every day, 2 = 5-6 times, 3 = 3-4 times, 4 = 1-2 times, 5 = once every two weeks, once a month)	4.80	0.69	0.202	Valid
14. Internet availability at home (1 = no internet connection, 2 = slow internet connection, 3 = fast internet connection)	2.31	0.62	0.238	Valid

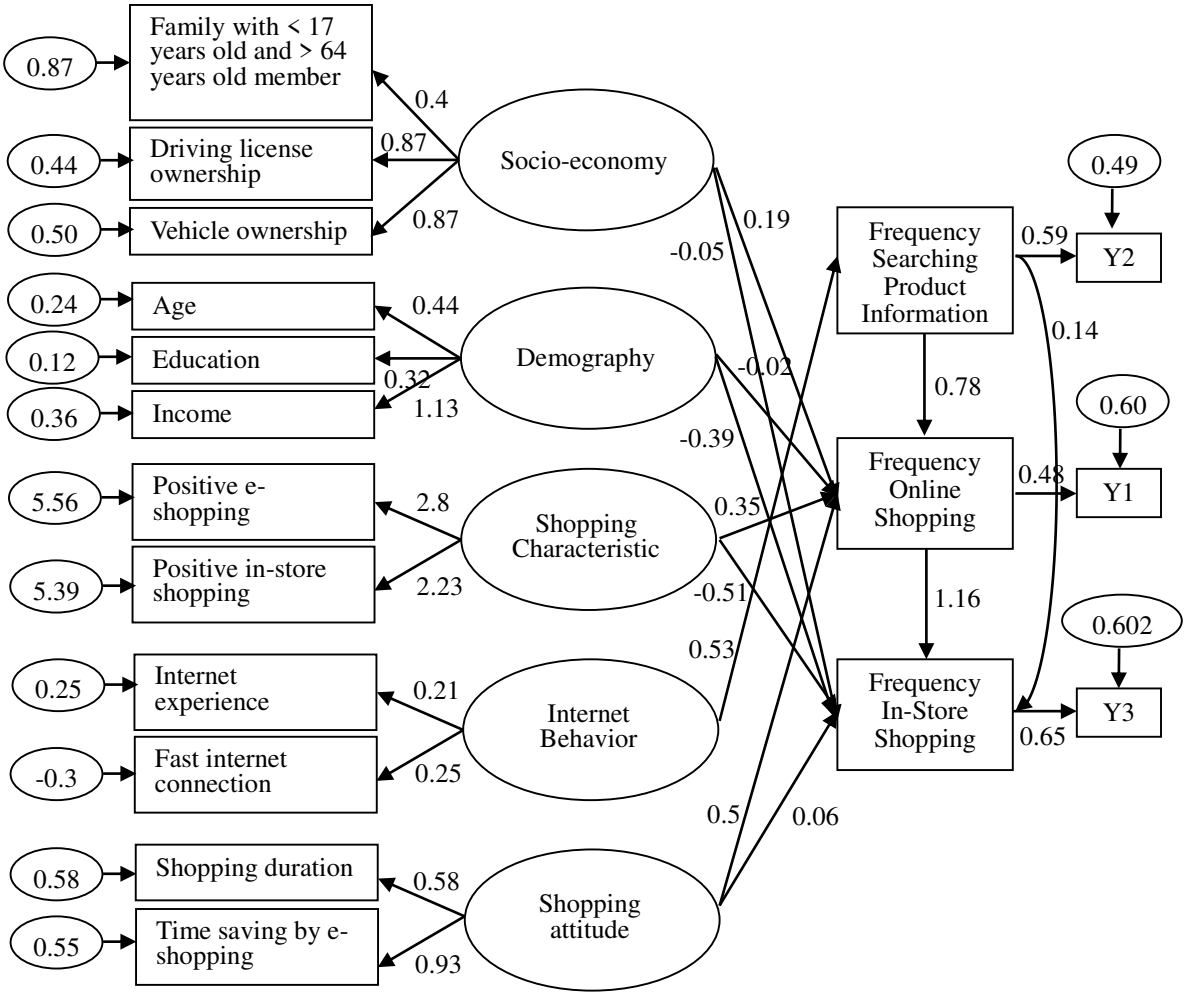

Figure 2. Structure of the Model and It Estimated Parameters

Regarding to the measurement model test, we use t-test (good fit if equal to or more than 1.96) and standard loading factor (good fit if equal to or more than 0.05) for the observed variables and using composite reliability (good fit if CR $\geq$ 0.7) and variance extraction (good fit if VE $\geq$ 0.5 to search, validate, and determine the latent variables. Table 4 presents the result of validity and reliability test for observed and latent variables respectively.

4.3 Variables Relationship

Table 5 shows the model outcomes in direct, indirect, and total effects. The relationship model can be divided into two types: relationship among endogenous variables and relationship between endogenous and exogenous variables.

4.3.1 Relationship among endogenous variables

It can be seen that there are two main discoveries in this subject. The first is the intensity to do e-shopping will directly effect on a decrease in the frequency of shopping trip. This result explicitly reveals that online shopping can substitute the willingness to purchase product in store. Due to this, it can be concluded than e-shopping reduces the shopping travel demand. The above judgment seems to be inconsistent with several previous researches stated that the correlation between online shopping and in store shopping is complementary rather than substitution (Zhou and Wang, 2014; Cao *et al.*, 2012, Faraq *et al.*, 2007)

The second outcome explains that e-searching is increasing the propensity for the people to do for both online shopping and in-store shopping. Research conducted by Faraq *et al.* (2007) and Ward and Morganosky (2002) found that e-searching tends to increase in store shopping only, and does not effect on e-shopping. This finding becomes a more realistic result than two earlier researches since a general argument that before a person decides to do online purchase, he/she will definitely compares the similar products which he/she chooses. On the other side, there are some people who searching product using internet to help them to decide what kind of product that they want to buy, but they will still go to off-line shop to buy their desired product. Perhaps, they have to look and surely check the product first before buying.

4.3.2 Relationship between endogenous variables and exogenous variables

There are also important findings about the correlation between exogenous variables and shopping propensities, especially regarding to the direct effect. First is the factor of socio-economy or respondent's household characteristics. It consists of the number of productive family members, the number of family members who have obtained driving license, and the number of vehicle owned by the household. This factor leads directly to a positive effect on on-line shopping and a negative effect on in-store shopping. More productive family members,

Table 3. Aggregate model goodness-of-fit test

Criteria of Fit Indices	Goodness of Fit	Goodness of Fit Standard	Estimated result	Remark
Absolute fit indices	Chi Square	The smaller of value, the better	144.91	Close fit
	Goodness of Fit Index (GFI)	GFI ≥ 0.9 is good fit, 0.8 ≤ GFI < 0.9 is marginal fit	0.94	Good fit
	Root Mean Square Error of Approximation (RMSEA)	RMSEA ≤ 0.08 is good fit, < 0.05 is close fit	0.065	Good fit
	Degree of Freedom	The greater of value, the better	66	Good fit
	Probability	≥ 0.05	0.08	Good fit
	P value for RMSEA	≥ 0.05	0.061	Good fit
	Expected Cross Validation Index (ECVI)	The smaller of value, the better	0.86	Good fit
Incremental fit indices	Adjusted Goodness of Fit Index (AGFI)	For AGFI, NFI, CFI, IFI, and RFI, Good fit if greater than or equal to 0.9, marginal fit if ≥ 0.8 and < 0.9	0.88	Marginal fit
	Normed Fit Index (NFI)		0.9	Good fit
	Comparative Fit Index (CFI)		0.94	Good fit
	Incremental Fit Index (IFI)		0.94	Good fit
	Relative Fit Index (RFI)		0.85	Marginal fit
Parsimony fit indices	Akaike Information Criterion (AIC)	The smaller of value and close to saturated AIC, the better	M: 252.9 S: 240 I: 1576.9	Good fit
	Consistent Akaike Information Criterion (CAIC)	The smaller of value and close to saturated CAIC, the better	M: 503.4 S: 796.6 I: 1646.5	Good fit
	Parsimonious Normed Fit Index (PNFI)	0.06 – 0.09	0.07	Good fit
	Parsimonious Goodness Fit Index (PGFI)	PGFI ≥ 0.6	0.57	Close fit

M = Model, S = Saturated, I = Independence

more driving license and vehicle ownership in a household will not encourage them to go to the stores, but more to the online shopping. Conflicting to our expectation, household with more vehicles and family members that have the ability to travel anytime are more likely to do in-store shopping. By reason of this, again, it is noted that e-shopping can diminish shopping travel demand.

Second, in contrast to most previous studies (Yun and O'Kelly, 1997; Li *et al.*, 1999; Forsythe and Shi, 2003; Swinyard and Smith, 2003), respondent demography such as age, education level, and income has a direct positive effect on shopping trip and a direct negative effect on e-shopping. It indicates that in Indonesia, older adults with more highly educated and higher income are more likely to make a trip to shop than online shopping.

Third, as expected, internet experience and fast internet connection is positively affect the frequency of online searching and online buying. The similar findings are also presented in previous researches (Swinyard and Smith, 2003; Farag *et al.*, 2006). This is because those factors above are stimulate people to search and buy goods more often.

Table 4. Validity test of observed variables and Reliability test of latent variables

Variables	Validity test		Reliability test	
	Standard loading factor	t-test	Composite reliability	Variance extraction
Household socio-economy			0.72	0.5
▪ Family members in a household that less than 17 years old and more than 64 years old	0.4	4.16		
▪ Family members with driving license ownership in a household	0.87	9.41		
▪ Vehicle ownership in a household	0.87	9.28		
Respondent demography			0.83	0.69
▪ Age	0.44	11.27		
▪ Education level	0.32	10.11		
▪ Income	1.13	14.45		
Shopping characteristics			0.7	0.54
▪ Positive/Advantages of online shopping	2.8	11.26		
▪ Positive/Advantages of in-store shopping	2.23	9.89		
Internet behavior			1.31	1.83
▪ Internet experience	0.21	5.35		
▪ Fast internet connection at home	0.25	5.49		
Shopping attitude			0.71	0.52
▪ Shopping duration	0.58	8.03		
▪ Time saving (excluding travel time)	0.93	9.94		
Frequency of in-store shopping			1	1
Frequency of product information searching			1	1
Frequency of online shopping			1	1

Table 5. Coefficient of Direct, Indirect, and Total Effects

Explanatory Variables	Frequency e-shopping			Frequency e-searching			Frequency in-store shopping		
	Direct effect	Indirect effect	Total Effect	Direct effect	Indirect effect	Total Effect	Direct effect	Indirect effect	Total Effect
Endogenous variables									
Frequency e-shopping							-0.1439		-0.1439
Frequency e-searching		1.1644	1.1644				0.7833	0.1675	0,9508
Frequency in-store shopping									
Exogenous variables									
Socio-economy	0.1861		0.1861				-0.0452	0.0268	-0.0184
Demography	-0.0189		-0.0189				0.3921	-0.0027	0.3894
e-shopping positive characteristic	0.3527		0.3527				0.3950	0.0507	0.4457
Internet behavior	0.6177		0.6177	0.5305		0.5305		0.5044	0.5044
Shopping attitude	0.5028		0.5028				0.0642	0.0723	0.1365

Lastly, regarding to the e-shopping characteristics (positive online shopping and positive in-store shopping) and shopping attitude (shopping duration and time saving), we discover that two mentioned factors are directly affect to e-shopping and in store shopping more often. It means that people with a positive in-store shopping attitude tend to make a trip to shop more frequent and people with a positive online shopping attitude search and purchase online more frequent.

Moreover, taking into account all of the exogenous variables, internet behavior consists of internet experience and fast internet connection has a major influence on shopping behavior for not only online shopping and online searching, but also shopping trip. Meanwhile, factor of respondent demography and household socio-economy are the most minor factors influencing frequency of online shopping and in-store shopping respectively.

5. CONCLUSION

Since Indonesian internet users are significantly increasing in a few decades, this study aims to understand the behaviors relationship between e-shopping, online searching, and in-store shopping, in which a structural equation modeling (SEM) was proposed. By using online questionnaire survey, out of 281 respondents are involved in this research. The majority of respondents came from big cities in Indonesia such as Jabodetabek (Jakarta-Bogor-Depok-Tangerang-Bekasi), Medan, Yogyakarta, etc. First, a validity and multicollinearity tests were used to check whether the observed variables from the respondent are reliable or not. The finding shows that factor of gender, type of work, household composition, and driving license ownership were not satisfied enough and must be disqualified.

In SEM, it was found that there were twelve observed variables grouped into five exogenous latent variables: respondent's household socio-economy (family members in a household that less than 17 years old and more than 64 years old, the number of family members who have obtained driving license, and the number of vehicle owned by the household), respondent demography (age, educational level, and income), shopping characteristic (positive/advantages of online shopping and positive/advantages of shopping trip), internet behavior (internet experience and fast internet connection at home), and shopping attitude (shopping duration and time saving). Internet behavior becomes the major factor influencing online shopping directly and in-store shopping indirectly. Meanwhile, factor of respondent demographic, household socio-economy, shopping characteristic, and shopping attitude are directly affect shopping behavior for both e-shopping and shopping trip.

Taking into account the correlation among endogenous variables, it was found that online shopping has a negative impact on shopping travel demand. Due to this, it can be pointed and noted that e-shopping could be a replacement of in-store shopping. The research finding also shows that online searching is not only increasing the frequency of online shopping, but also stimulating the shoppers to do shopping trip more often.

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