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Model Development Through an Exploratory Factor Analysis of Online Shopping in Thailand.

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Abstract
The main purpose of this study was 1) to develop a model using exploratory factor analysis, 2) to determine way to develop online shopping. A sample of 400 online shoppers who used to booked or purchased products and services on the web were used in this research. Data were collected through an online questionnaire. The analysis of the overall harmony index of the model according to Thai people, this indicates that the model corresponds to the empirical data. The 6 harmony indexes that have passed the accepted variable is Product Characteristics, Perceived Website Quality, Electronic Loyalty, Electronic Willingness.

The research result from the E-Loyalty model indicates that Product Characteristics and Perceived Website Quality have a positive effect on the Electronic Willingness among the variables obtained from the exploratory factor analysis. Moreover, it shows that Product Characteristics, Perceived Website Quality, and Electronic Willingness have a statistically significant effect on Electronic Loyalty. This research can be utilized entrepreneurs to insure they develop and improve their websites to build-in customer trust, and by the government agencies who can set a policy for commercial web based trust-building.

Keywords: E-Loyalty, Shopping Online, Product Characteristics, Website Quality, E-Satisfaction

1. Introduction

The World Wide Web (www) has become an important tool for current trade. Many stores have used the web as a new place of marketing to sell their products and services, create a change in consumer's tastes and consumers' demand. The lifestyle is comfortable. Consumers have a better understanding of technology, and more shops have turned to websites to sell their products. There are services available, there is extensive information and the better price. The following factors encourage customers to buy products on the website. In addition, shopping on the website is also widespread. There are more choices to buy. Consumers can customize their purchase of products and services. There is a cheaper price, delivered immediately, and availability of information. Consumers are involved in buying products. The website has the ability to interact with the website community, and in many countries, shopping on the website does not include sales tax, so electronic commerce is beneficial to consumers (Turban et al. 2001).

Chang et al. (2009) states that since online marketing has grown rapidly over the past several years, electronic marketing activities have received a lot of attention. Many companies create customers' loyalty by improving the quality of electronic services. Chen & Cheng (2009) define that the increased popularity of shopping on the website has led to the emergence of new economic activity. Businesses will succeed in a highly competitive electronic commerce environment. Therefore understanding what motivates consumers is important, because such intentions are the key to survival in a competitive environment in online business. The growth of shopping on the website has become an important thing to understand the factors that have

an influence on consumers' intention to actually shop from the website rather than just browsing. Influential factors are of interest to both academics and marketers. Chiou et al. (2009) supports that the success of shopping on the website depends on customers' satisfaction, and other factors which will eventually increase the customers' loyalty and intention. According to Khan & Rizvi (2012), the success of any business depends on the understanding of the behavior of their target customers. For this reason, to find the factor of consumers' goods ordering to build the success of an electronic business has become a necessity for the online stores to understand the behavior of consumers, and the factor to create acceptance.

For the above reasons, the researcher has done this research on the topic of model development of exploratory factor analysis on online shopping in Thailand to develop a model of loyalty that has an effect on shopping on the website of consumers in Thailand, and to set a policy for online shopping development.

2. Theoretical Background

Technology Acceptant Model: TAM was proposed by Davis (1985) describing about technology acceptance by indicating that intentional behavior determines the use of technology. Zhang & Prybutokl (2003); Wong et al (2014) state that Technology Acceptant Model: TAM has been proven to be successful in predicting and describing the usage acceptance of computer users. TAM is a useful theoretical model to describe technology acceptance, applied to the result of education and supporting the knowledge. TAM describes how the integration of characteristics contributes to the customers' electronic loyalty and electronic satisfaction. Perceiving benefits and ease of use are the most outstanding factors of computer users' technology acceptance. These two dimensions have the component that describes shopping on the Internet.

Consumer behavior model is a study of motivation to make a purchasing decision starting with the stimulus that causes the stimulus demand to pass through the Buyer's black box which is like the black box that the manufacturer or seller cannot estimate. The Buyer's black box will be influenced by the buyer's characteristics, and there will be buyer's response (Philip Kotler, 2003).

3. Methodology

A mixture of both qualitative and quantitative research was employed to conduct this study. The research methods are as follows:

Qualitative Research: The researcher used a Focus Group interview to confirm a model of exploratory factor analysis on online shopping in Thailand.

Quantitative Research: The researcher collected data using the questionnaire data for the exploratory factor analysis by employing Structural Equation Model: SEM. The analysis result showed the model, role of variables affecting online shopping behavior.

1. Population

The 1,568,398 respondents who used to book or purchase products and services on the internet throughout Thailand were used in this study. (National Statistical Office, 2015).

2. Sample Group

The group of sample is randomly selected through online questionnaires. They are consisted of 400 respondents who used to book or purchase products and services on the website using Taro Yamane's to determine the sample size.

3. Data Collection

Online questionnaires were utilized to collect data. As there were a lot of samples, using online questionnaires saved time and reduced the prices. The first question was that respondents must have previously booked or purchased products and services on the Internet. If they never used to book or purchase them on the Internet, they could not answer the next questions, and they would not be the samples. Then the 400 online questionnaires were distributed to the respondents.

4. Results

1. Demographic Information

This study was conducted with a total of 400 respondents, 70.75%of the respondents are mostly females, while 41.25% of the respondents are in the age range under 25 years old, Regarding education, 56.25% of the respondents hold the bachelor's degree, while 36.25% are students, and lastly 32.00% of the respondents earn less than / equal 10,000 baht per month.

2. *Consumers' Behavioral Information for shopping on the Website.*

This study was conducted with a total of 400 respondents. The majority of respondents (65.00%) purchase the Shopping Goods, while 32.75% of the respondents spend 1,000-2,999 baht each time for buying products. 70.25% of them shop once a month, and 38.50% of the respondents shop on the website at 20.00-23.59 p.m.

3. *Exploratory Factor Analysis Model: EFA*

The purpose of this study is to explore and identify a common component that can describe the relationship of the observed variables. The result shows that it can reduce the number of the observed variables by creating a new variable in the form of a common component.

The 24 observed variables have been used to analyze in this research. The first 15 observed variables are independent variables based on the structural equation model of research framework; namely, Product Type: PT, Product Price: PP, Product Variety: PV, Product Guarantee: PG, Security: SC, Privacy: PR, Usability: UB, Web Design: WD, Perceive Usefulness: PU, Perceive Convenience: PC, Perceive Enjoyment: PE, Perceive Risk: PR, Customer Review: CR, Family: FM, and Celebrity: CB. The second 9 observed variables are dependent variables based on the structural equation model of research framework; namely, Purchase Intention: PI, Attitude toward Website: AWS, Website Experience: WSE, Information: IF, Transaction: TS, Commitment: CM, Repurchase: RP, Word of Mouth: WOM, and Member System: MS.

3.1 Checking the relationship of independent variables before analyzing the structural equation model.

By considering the 15 observed variables, the researcher has used Pearson's correlation coefficient measure, by measuring the correlation coefficient of all observed variables. The criteria is that each partner of relationship must not exceed 0.80. If the relationship value is greater than 0.80, it means that each observed variable is related to each other. The analysis result shows that the correlation coefficient of all observed variables is between 0.138-0.092 as shown in Table 1.

Table 1: Pearson's Product - Moment Correlation Coefficient of all observed variables of independent variables

Variable	PT	PP	PV	PG	SC	PRI	UB	WD	PU	PC	PE	PR	CR	FM	CB
PT	1														
PP	0.457**	1													
PV	0.441**	0.53**	1												
PG	0.349**	0.511**	0.469**	1											
SC	0.23**	0.383**	0.306**	0.531**	1										
PRI	0.264**	0.383**	0.286**	0.518**	0.835**	1									
UB	0.342**	0.353**	0.372**	0.438**	0.559**	0.579**	1								
WD	0.312**	0.377**	0.367**	0.461**	0.535**	0.571**	0.696**	1							
PU	0.425**	0.401**	0.366**	0.442**	0.52**	0.525**	0.521**	0.52**	1						
PC	0.335**	0.338**	0.345**	0.382**	0.349**	0.363**	0.475**	0.462**	0.544**	1					
PE	0.279**	0.386**	0.382**	0.466**	0.485**	0.501**	0.462**	0.52**	0.563**	0.475**	1				
PR	0.244**	0.25**	0.233**	0.319**	0.349**	0.361**	0.477**	0.485**	0.444**	0.467**	0.532**	1			
CR	0.15**	0.181**	0.201**	0.208**	0.226**	0.243**	0.261**	0.255**	0.292**	0.26**	0.396**	0.312**	1		
FM	0.138**	0.147**	0.142**	0.26**	0.27**	0.28**	0.245**	0.268**	0.288**	0.295**	0.265**	0.358**	0.293**	1	
CB	0.149**	0.156**	0.092**	0.162**	0.227**	0.233**	0.244**	0.223**	0.232**	0.227**	0.238**	0.329**	0.344**	0.373**	1

The Analysis Result of Kaiser-Mayer Olkin (KMO) shows a KMO value of 0.905, which is greater than 0.5, indicating the appropriateness. This indicates that 90.5% of the whole models can be explained, which is high value, including the Bartlett's Test of Sphericity Chi-Square, which is significant p-value = .000. It can be concluded that to test the appropriateness of the samples, the created model is statistically significant.

In axis rotation, to analyze or set the independent variables into a group of single component based on Varimax method that will test all variables. Each independent variable will have a weight of only one component. (Table 2)

Table 2: Analysis Result of Kaiser & Bartlett's Test of Independent Variables

Kaiser – Mayer Olkin (KMO)		0.905
Bartlett's Test of Sphericity Chi-Square	**Approx. Chi-Square**	2661.156
	Df	105
	Sig.	.000

Source: From Calculating

According to the Analysis Result of Communalities, the Initial shows the value whether or not those variables are good ones compared to other variables. And the Extraction shows the value that whether the variables are good or not compared to the latent factor. From all values, there are no variables inappropriate in this structural model, since the value of each variable is not significantly different. (Table 3)

Table 3: Analysis Result of Communalities of Independent Variables

Variable	Initial	Extraction
PT	1.000	.596
PP	1.000	.624
PV	1.000	.651
PG	1.000	.550
SC	1.000	.788
PRI	1.000	.801
UB	1.000	.619
WD	1.000	.625
PU	1.000	.572
PC	1.000	.473
PE	1.000	.554
PR	1.000	.531
CR	1.000	.473
FM	1.000	.475
CB	1.000	.532

Source: From Calculating

To consider how many components the model consists of. It can be considered in two parts; namely, Analysis Result of Scree Plot and Analysis Result of Rotated Factor Matrix as follows.

According to the Analysis Result of Scree Plot, the graph shows the value of eigenvalue, and has component number determined by the point where the graph sharply increases, there are 3 Factors. (Figure 1)

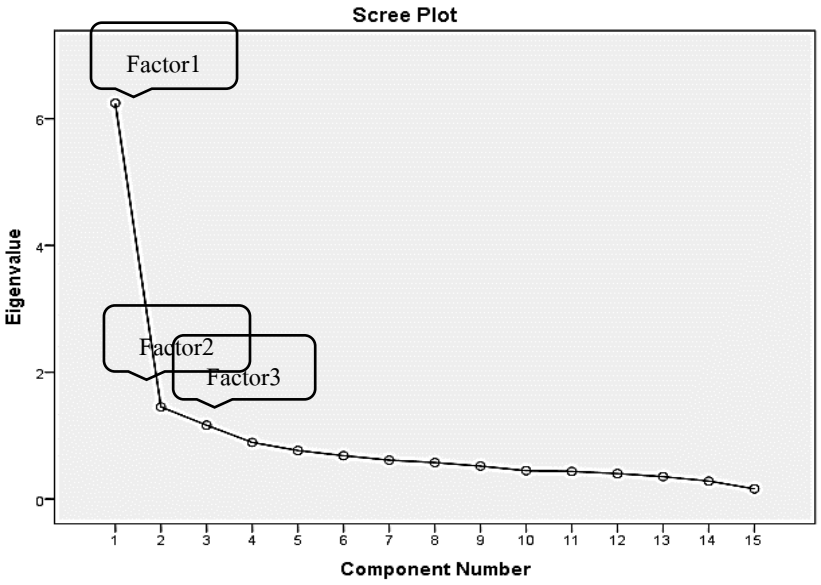

Figure 1: Analysis Result of Scree Plot to Indicate the Component Number of Independent Variables

The Analysis Result of Rotated Factor Matrix is indicated in Table5.The Analysis Result of Rotated Factor Matrix which is the value of axis rotation with Varimax method, three components are shown; namely,1) Product Characteristics, 2) Perceive Website Quality, and 3) Perceive Information. (Table 4)

Table 4: Analysis Result of Rotated Factor Matrix of Independent Variables

Rotated Component Matrix			
	Component		
	1	**2**	**3**
PT	.093	**.755**	.131
PP	.281	**.737**	.053
PV	.190	**.781**	.064
PG	**.537**	.502	.099
SC	**.873**	.119	.109
PRI	**.877**	.121	.132
UB	**.693**	.272	.255
WD	**.694**	.274	.259
PU	**.540**	.412	.333
PC	.358	.409	**.422**
PE	**.518**	.339	.413
PR	.384	.177	**.594**
CR	.090	.144	**.666**
FM	.177	.024	**.666**
CB	.077	.011	**.725**

Source: From Calculating

For this model that consists of these three components, when analyzing the value from the Total Variance Explained, this shows that the cumulative percentage of Initial Eigenvalues is 59.087% which it is the percentage of the sum of cumulative variance in this model.(Table 5)

Table 5: Analysis Result of Total Variance Explained of Independent Variables

Total Variance Explained									
	Initial Eigenvalues			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.245	41.632	41.632	6.245	41.632	41.632	3.784	25.229	25.229
2	1.453	9.688	51.320	1.453	9.688	51.320	2.658	17.719	42.948
3	1.165	7.767	59.087	1.165	7.767	59.087	2.421	16.139	59.087
4	.893	5.956	65.043						
5	.766	5.105	70.147						
6	.684	4.563	74.710						
7	.614	4.095	78.805						
8	.576	3.841	82.646						
9	.520	3.465	86.110						
10	.448	2.985	89.095						
11	.437	2.911	92.007						
12	.402	2.680	94.687						
13	.352	2.349	97.036						
14	.284	1.895	98.931						
15	.160	1.069	100.000						

Source: From Calculating

Confirmatory Factor Analysis of latent variables within the group of dependent variables.

Table 6: Pearson's Product-Moment Correlation Coefficient of All Observed Variables of Dependent Variables.

Variable	**PI**	**AWS**	**WSE**	**IF**	**TS**	**CM**
PI	1.000					
AWS	0.637**	1.000				
WSE	0.646**	0.747**	1.000			
IF	0.543**	0.510**	0.604**	1.000		
TS	0.542**	0.585**	0.674**	0.763**	1.000	
CM	0.469**	0.506**	0.639**	0.691**	0.740**	1.000

Source: From Calculating

3.2 Checking the relationship of dependent variables before analyzing the structural equation model.

The Analysis Result of Kaiser-Mayer Olkin (KMO) shows a KMO value of 0.872, which is greater than 0.5, indicating the appropriateness. This indicates that 87.2% of the whole models can be explained, which is high value, including the Bartlett's Test of Sphericity Chi-Square, which is significant p-value = .000. It can be concluded that to test the appropriateness of the samples, the created model is statistically significant.

In Axis rotation, to analyze or set the dependent variables into a group of single component based on Varimax method that will test all variables. Each dependent variable will have a weight of only one component.
(Table 7)

Table 7: Analysis Result of Kaiser & Bartlett's Test of Dependent Variables

Kaiser – Mayer Olkin (KMO)		**0.872**
Bartlett's Test of Sphericity Chi-Square	Approx. Chi-Square	1583.458
	Df	15
	Sig.	.000

Source: From Calculating

According to the Analysis Result of Communalities, the Initial shows whether or not those variables are good ones compared to other variables. And the Extraction shows the value that whether the variables are good or not compared to the latent factor. From all values, there are no variables inappropriate in this structural model, because the value of each variable is not significantly different. (Table 8)

Table 8: Analysis Result of Communalities of Dependent Variables

Variable	**Initial**	**Extraction**
PI	1.000	.587
AWS	1.000	.640
WSE	1.000	.759
IF	1.000	.691
TS	1.000	.761
CM	1.000	.669

To consider how many components the model consists of. It can be considered in two parts; namely, Analysis of Scree Plot and Analysis of Rotated Factor Matrix as follows. According to the Analysis Result of Scree Plot, the graph shows the value of eigenvalue, and has a component number determined by the point where the graph sharply increases, that is 1 Factor. (Figure 2)

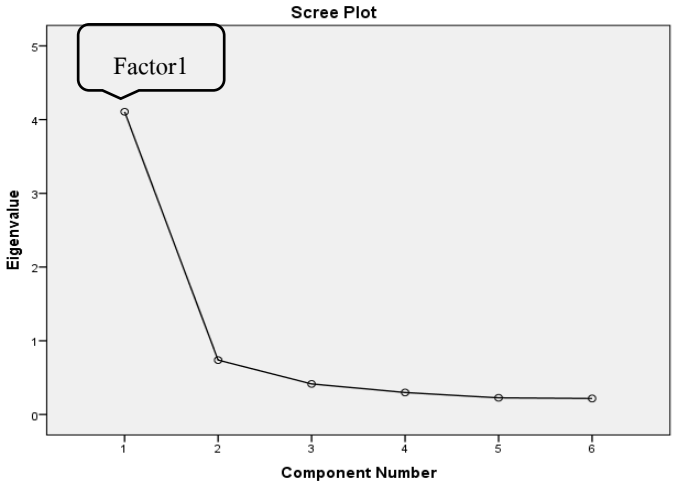

Figure 2: Analysis Result of Scree Plot to Indicate the Component Number of Dependent Variables

For this model that consists of one component, when analyzing the value from the Total Variance Explained as shown in the table, it shows that the cumulative percentage of Initial Eigenvalues is 68.444% which it is the percentage of the sum of cumulative variance in this model. (Table 9)

Table 9: Analysis Result of Total Variance Explained of Dependent Variables

Total Variance Explained

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.107	68.444	68.444	4.107	68.444	68.444
2	.738	12.295	80.739			
3	.414	6.902	87.640			
4	.298	4.974	92.615			
5	.226	3.770	96.385			
6	.217	3.615	100.000			

Source: From Calculating

Goodness-of-fit indices and Model Modification

The analysis result of harmony index of model calculated after the researcher adjusted the model. It indicates that the model corresponds to the empirical data. The 6 harmony indexes that have passed the accepted criteria are: index x^2 =589.263, x^2/d.f. = 2.518, RMSEA = 0.062, CFI = 0.916, TLI = 0.901, SRMR = 0.053. (Table 10)

Table 10: Goodness-of-fit indices

Goodness-of-fit measure	Acceptable Values	Value	Result	Value Model Modification	Result
x^2.	Close to0	777.709	Pass	589.263	Not pass
d.f.	-	242		234	
x^2/d.f.	2 <X^2/d.f. ≤ 3	3.214	Not pass	2.518	Pass
RMSEA	0 ≤ RMSEA ≤ 0.08	0.074	Pass	0.062	Pass
CFI	0.90 ≤CFI≤ 1.00	0.874	Not pass	0.916	Pass
TLI	0.90 ≤TLI≤ 1.00	0.856	Not pass	0.901	Pass
SRMR	0 ≤SRMR ≤ 0.08	0.061	Pass	0.053	Pass

Source: Adapted from Hair et al., 2006

Exploratory Factor Analysis Model: EFA provides a model with independent variables and dependent variables which have new components. Furthermore, a new created model is analyzed by the structural equation model there are two steps. They are Confirmatory Factor Analysis: CFA and Path Analysis: PA. The details are as follows.

Confirmatory Factor Analysis: CFA

The Researcher has analyzed the Confirmatory Factor Analysis: CFA to examine the appropriateness and accuracy of the structural equation model by considering the value of Factor Loading, Residual, SE, t-value, and R^2value Estimateto check the variance of the indicator. The analysis result is presented into five parts; namely, Product Characteristics, Perceive Website Quality, Perceive Information Social, Electronic Willingness, and Electronic Loyalty. (Table 11)

Table 11: Confirmatory Factor Analysis: CFA

Construct	Measurement item	Factor loading	Residual	SE	t-value	R^2 value Estimate
Product characteristics						
	PT	0.786	0.381	0.032	24.917	0.619
	PP	0.848	0.282	0.029	29.102	0.718
	PV	0.829	0.312	0.027	31.291	0.688
Perceive Website Quality						
	PG	0.634	0.598	0.032	20.077	0.402
	SC	0.652	0.423	0.032	20.507	0.426
	PRI	0.759	0.423	0.032	23.930	0.577
	UB	0.617	0.619	0.037	16.823	0.381
	WD	0.620	0.615	0.037	16.807	0.385
	PU	0.713	0.491	0.037	26.836	0.509
	PE	0.659	0.565	0.032	20.285	0.435
Perceive Information Social						
	PC	0.646	0.583	0.039	16.606	0.417
	PR	0.627	0.607	0.042	15.059	0.393

Construct	Measurement item	Factor loading	Residual	SE	t-value	R^2 value Estimate
	CR	0.506	0.744	0.048	10.656	0.256
	FM	0.503	0.747	0.047	10.798	0.253
	CB	0.476	0.773	0.050	9.441	0.227
Electronic Willingness						
	CR	0.744	0.446	0.026	28.948	0.554
	FM	0.745	0.446	0.029	26.091	0.554
	CB	0.821	0.327	0.019	42.405	0.673
	IF	0.749	0.440	0.033	22.965	0.560
	TS	0.727	0.471	0.037	19.747	0.529
	CM	0.682	0.534	0.037	18.502	0.466
E-Loyalty						
	RP	0.805	0.352	0.022	36.227	0.648
	WOM	0.813	0.339	0.020	39.941	0.661
	MS	0.764	0.417	0.029	26.756	0.583
Chi-square = 589.263, RMSEA = 0.062, CFI = 0.916, TLI = 0.901, SRMR = 0.053						

Source: From Calculating

Path Analysis

The result of Path Analysis indicates the direct and indirect influence and total influence of variables shown in Table 12 and Figure 3-5.

Table 12: Parameter value of direct and indirect influence and total influence of causal variables and outcome variables after adjusting the model.

causal variable	outcome variable					
	Electronic Willingness			E-Loyalty		
	DE	IE	TE	DE	IE	TE
Product characteristics	-0.264*	-	-0.264*	-0.088	-0.206**	-0.294*
Perceive Website Quality	1.000**	-	1.053**	0.272	0.823**	1.095**
Perceive Information Social	-0.023	-	-0.023	-0.093	-0.018	-0.111
Electronic Willingness	-	-	-	0.781**	-	-

Source: From Calculating

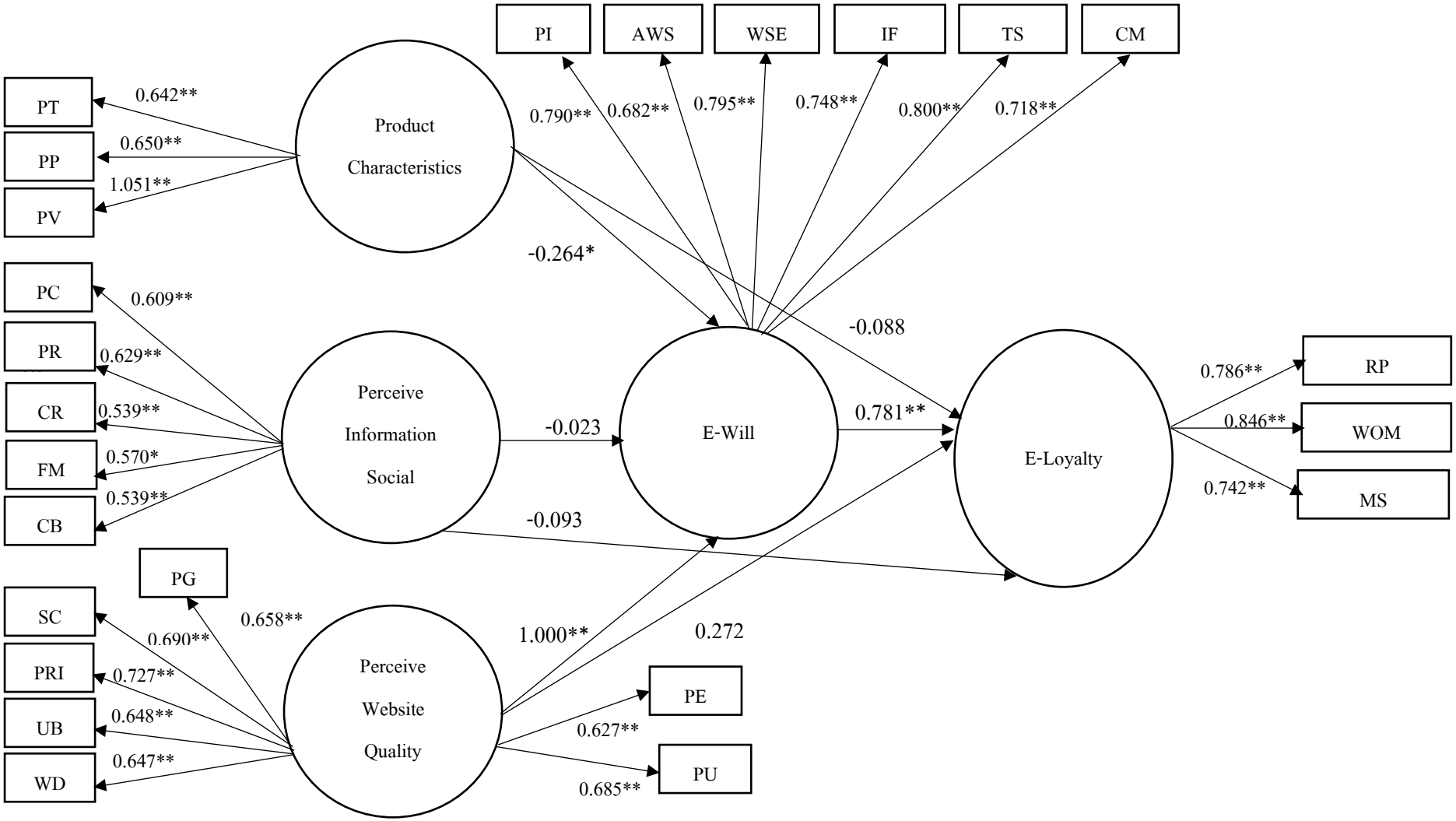

Figure 3: The result of parameter estimation, influence of observed variables and latent variables from confirmatory factor analysis after a model modification.

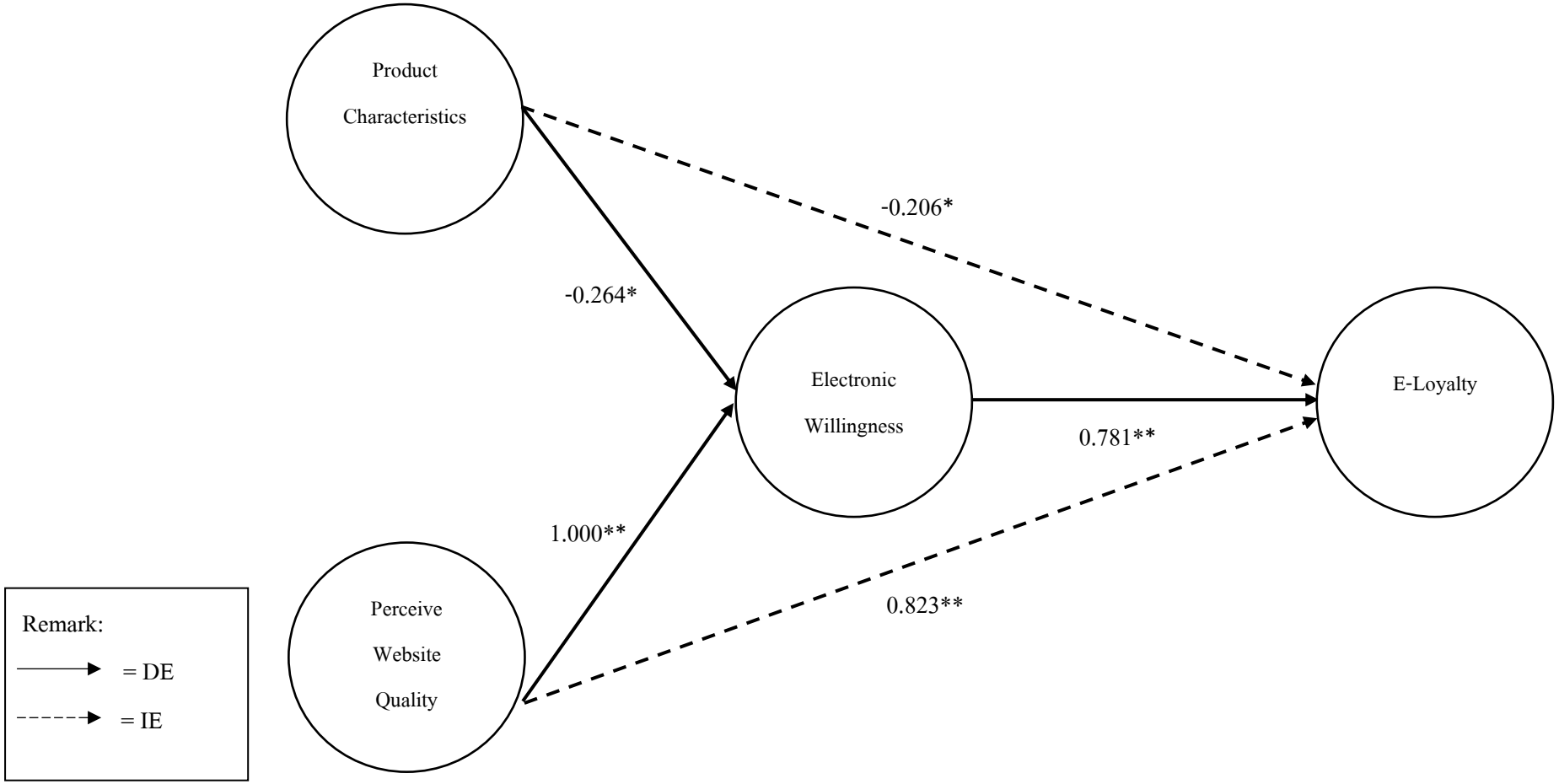

Figure 4: The result of parameter estimation, influence of observed variables and latent variables from confirmatory factor analysis after a model modification.

E-Loyalty Model

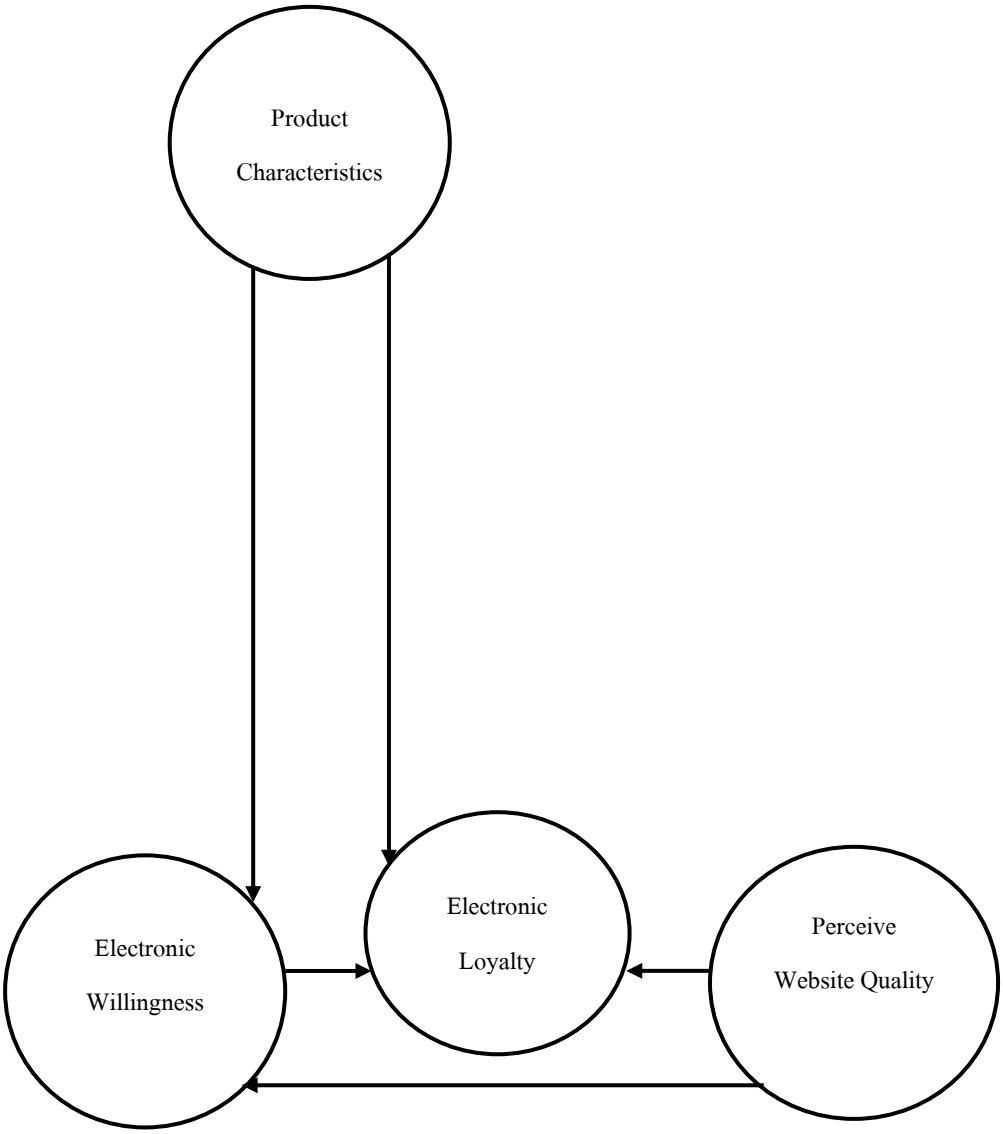

Figure 5. E-Loyalty model

5. The Result of the Focus Group

The researcher has utilized a new developed model to conduct the subgroup discussion with both the traders selling products on the website and consumers to confirm the developed model. It can be seen that the attendees have agreed and thought that E-Loyalty Model developed by the researcher is acceptable, and it can be used as a model for website shopping in the context of Thai people.

In addition, the attendees have proposed a security system; for instance, Verified by Visa, DBD Verified, Department of Business Development, and One Time Password: OTP. The entrepreneurs should be processed one or the other to help improve the quality of the website to be safe to use, and customers reduce the risk of shopping on the website.

Discussion

Research of model development of exploratory factor analysis on online shopping in Thailand can discuss the results based on the research hypothesis as follows.

(1) Product Characteristics directly affect the Electronic Willingness, and indirectly affect Electronic Loyalty in the opposite direction, as it can be seen that high price of the product affects the Electronic Willingness.

(2) Perceive Website Quality directly affects the Electronic Willingness, and indirectly affects Electronic Loyalty.

(3) Perceive Information Social does not affect the Electronic Willingness and Electronic Loyalty.

(4) Electronic Willingness directly affects Electronic Loyalty.

As a result, for developing an exploratory factor analysis model, the researcher has got a new model called E-Loyalty Model.

Product Characteristics affect to customer behavior according to Janda (2005) state that product characteristics affect the relationship between online experience and satisfaction. Jain (2011) state that some of the product characteristics do influence consumer adoption of e-commerce. In addition Brynjolfsson (2003) state that increased product variety made available through electronic markets can be a significantly larger source of consumer surplus gains. Perceive Website Quality affects to customer behavior according to Chen & Dibb (2010) state that web site interface in consumer online behavior by systematically examining different quality features affect consumer trust. And Wolfinbarger and Gilly, (2001), perceived website quality contains values like the design, reliability and the services provided by the site.

In the same way McKnight et al, (2002a) ; Maghrabi et al. (2011) state that web site quality and good interface design enhance the formation of consumer trust, and if a consumer perceives a vendor website to be of high quality, he or she should trust the vendor competence, integrity, and benevolence Electronic Willingness directly affects Electronic Loyalty according to Muhmin, (2011) In the online context, a positive link between online purchase satisfaction and willingness to continue patronizing online purchasing has been found by R. E. Anderson and Srinivasan (2003) and Hellier and colleagues (2003).

Conclusion

The research result shows the personal information of respondents shopping on the website, most of them are females who are older than 65. In addition, they hold a bachelor's degree, some are students, and they earn less than / equal 10,000 baht per month. With regard to consumers' behavioral information about the website shopping, the majority of respondents purchase the Shopping Goods. They spend 1,000-2,999 baht each time for buying products. The respondents shop on the website once a month, and they shop on the website at 20.00-23.59 p.m. Product Characteristics directly affect the Electronic Willingness, and indirectly affect Electronic Loyalty in the opposite direction. Perceive Website Quality directly affects the Electronic Willingness, and indirectly affects Electronic Loyalty. Lastly, Electronic Willingness directly affects Electronic Loyalty.

Recommendation

1. *Contribution*

For the Electronic Willingness, the entrepreneurs need to use the product strategy by developing the product characteristics to have product categories and product variety, for example, size of products, color of products and brand of products, to support the need of consumers. Also there should be a strategy to set the price of products to attract the customers

by setting the lower price than the shops with storefront, there is a price reduction, free delivery service to encourage the consumers to recognize the value of shopping on the website. In addition, the entrepreneurs must encourage the customers to recognize the quality of the website that it is safe and private; especially, the website design must be beautiful with details of various multi-angle pictures and information of products so that the consumers will be willing to shop on the website.

2. *Areas for Further Research*

For the next study, moderators should be used in the research, such as gender, age group, type of products purchased, to study the relationship between independent variables and dependent variables that they may change when moderators are included.

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