

An Empirical Study on the E-commerce User's Technology Acceptance Behavior in China based on TSC-TAM Model

Wenpin Lin

Department of Marketing, College of Business Administration, Baise University, Guangxi, China

Abstract

Most of literature about consumer's behavior study were based on basic assumptions and theories of traditional economics. It is significant meaning to re-define new paradigm of on-line marketplace under network economics pattern. This study introduced new variables from network economy, two-sided market, social networks and consumer cognitive psychology theories to establish the theoretical model of technology acceptance and innovation diffusion of E-commerce platforms. This study focus on E-commerce user's technology acceptance behavior survey base on TSC-TAM model and applied structural equation modeling (SEM) methodology, SPSS 19.0 and AMOS 17.0 software to analyze the 435 valid questionnaires which collected through professional online survey company. By means of path, mediation effects and moderating effects analysis, this paper discover the E-commerce user's technology acceptance behavior in China base on defined TSC-TAM model.

Keywords

Entrepreneurship; E-business; Two-sided Market; Technology Acceptance; Structural Equation Modeling.

1. Introduction

Network economic pattern has re-defined economics rules, consumer's behavior and marketplace competition mode. Scholars suggested further studies on consumer behavior topics must to re-examine the assumptions and theories that based on.

Diffusion is the process by which an innovation is communicated over time among the participants in a social system. When innovation diffusion reaches the "Critical mass" defined by Rohlfs [1], the cumulative adoption curve rises rapidly and maintains this trend into the "take-off" phase[2]. Evans found that the innovated E-commerce operators had to solve the "Chicken and Egg" problem at the start-up phase, otherwise they would fail because of could not pass through the gate of critical mass [3].

Although Caillaud and Jullien established a two-stage game model [4] firstly, Hagiu and Eisenmann summarized "Staged approach"[5], and Davis proposed a two-sided market catalytic reaction and critical scale diagram[6]. However, above scholars did not point out the answer—should the E-commerce entrepreneurship develop consumer side users (egg) or supplier side users (chicken) firstly?

2. Theoretical Model

Technology Acceptance Model (TAM) that proposed by Davis[7] and Davis[8] had became the most widely used theory in technology acceptance behavior research domain. According to the new paradigm of on-line marketplace under the network economic pattern, this paper extracted some relevant variables from the network economy, two-sided market, social network and consumer behavior theory as the external influential and moderator variables of

technology acceptance model. Then this study innovated develop the conceptual model, as named TSC-TAM, shown in Figure 1.

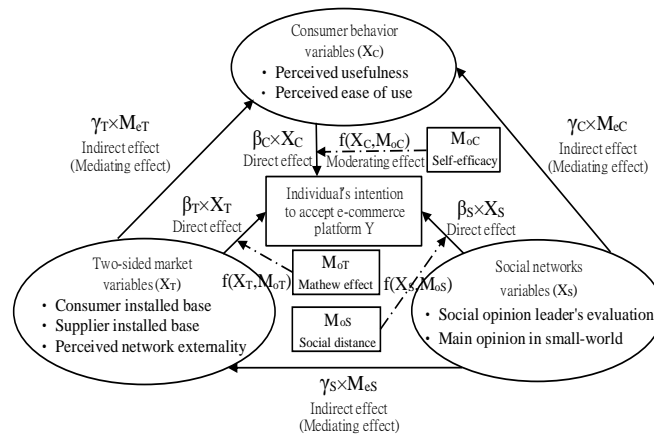


Figure 1. The internal mechanism of E-commerce platform acceptance and innovation diffusion mechanism (draft TSC-TAM model)

The equation of consumer's intention level to accept E-commerce platform is defined as below.

$$Y = f(X_T, X_S, X_C, M_e, M_o) = \alpha_0 + \beta_T \times X_T + \beta_S \times X_S + \beta_C \times X_C + \gamma_T \times M_{eT} + \gamma_S \times M_{eS} + \gamma_C \times M_{eC} + f(X_T, M_{oT}) + f(X_C, M_{oC}) + f(X_S, M_{oS}) + \varepsilon \tag{1}$$

Y means the consumer's intention level of accepting E-commerce platform.

α_0 means the initial level of acceptance in TAM without external influential factors.

X_T, X_S, X_C mean the external influential variables what were extracted from two-sided market, social networks, and consumer behavior theory.

$\beta_T, \beta_S, \beta_C$ mean the correlative coefficients of these independent variables of two-sided market, social network and consumer behavior to the dependent variable separately.

M_{eT}, M_{eS}, M_{eC} mean the mediator variables what were assigned to two-sided market, social networks, and consumer behavior theory separately.

$\gamma_T, \gamma_S, \gamma_C$ mean the correlative coefficients of these mediator variables of two-sided market, social network and consumer behavior to the dependent variable separately.

M_{oT}, M_{oS}, M_{oC} mean the moderator variables what were selected from two-sided market, social networks, and consumer behavior theory separately.

ε is error of this function.

3. Research Design, Characteristics of Sampling

This study applied script of relevant surveys to secure higher content reliability of outcomes. There are 435 valid samples collected from China countrywide in the period of August 1st to August 15th 2017.

The collected samples are representative because of the respondent's distribution of gender and age are similar to the distribution of Chinese internet users' structure of the "41st statistical report on the development of Internet in China" issued by CNNIC [9] on March 5, 2018.

Table 1. Comparison table of sampling characteristics of the study vs. sampling characteristics of CNNIC study

This study			41st Statistical Report on the Development of Internet in China [9]	
Gender	Male	45%	Male	51%
	Female	55%	Female	49%
Age	Under 18 years old	0.2%	Under 10 years old	3.3%
	18~25 years old	11.5%	10-19 years old	19.6%
	26~30 years old	33.3%	20-29 years old	30%
	31~40 years old	40.7%	30-39 years old	23.5%
	41~50 years old	9.9%	40-49 years old	13.2%
	51~60 years old	3.9%	50-59 years old	5.2%
	Above 60 years old	0.5%	60 year old and above	5.2%

4. Data Analysis

4.1. Reliability Test

The data had good reliability because all of the Cronbach 'α coefficient value of measurement shown in table 2 were greater than 0.8. Table 3 show the results of principal component analysis of 435 data collected this study. KMO = 0.880. Bartlett's Test of Sphericity Approx. Chi-Square = 8610.666 (P < 0.001). Sig. = 0.000. The total variance explained of this research model is 76.964%.

Because the KMO value was greater than 0.6 and the value of Bartlett's Test of Sphericity Approx. Chi-Square was within the significant level of 0.05. Therefore, above data collected were suitable for further factor analysis.

Table 2. Results of reliability test

Variable	CB	SB	SO	SW	PB	PF	NE	PI	UL	PE
#. of items	3	3	4	4	4	3	3	3	3	4
Cronbach'α	.85	.88	.87	.85	.90	.83	.87	.90	.80	.86

Table 3. Results of KMO measure of sampling adequacy and Bartlett's test of sphericity

KMO measure of sampling adequacy		0.880
Bartlett's test of sphericity	Approx. Chi-Square	8610.666
	DF	528
	Sig.	0.000

4.2. Exploratory Factor Analysis

This study used principal component analysis to extract the important factors of variation. The method of rotation is the maximum variance method of Kaiser's normalization. After 7 iterations, the factor loading of all items was in range of 0.654 and 0.884.

4.3. Confirmatory Factor Analysis

The measurement had higher reliability because all of the standardized factor loading (λ) of each item met the criteria of 0.6 or more. The CR values of all variables were between 0.792 and 0.904, all of which were higher than the acceptable criteria 0.7, indicated good internal consistency of the observed variables. The AVE values of each variable were between 0.560 and 0.759, all of which were greater than 0.5, indicated these observed variables selected by the research model could explain the variance of variables very well.

In summary, the constructed variables in this study had excellent convergent validity.

4.4. Discriminate Validity Test

This study used AMOS 17.0 to test the square root of the AVE of model. All of the square roots of AVE of the variable in research model were much larger than the correlative coefficient between that variable and other variables.

It indicated that there was significant discriminant validity between the selected items with other variables.

5. Model Assessment

This study adapted structural equation modeling (SEM) approach and AMOS 17.0 maximum likelihood method to perform 5000 non-parametric Bootstrapping tests in order to assess the fitting model of the research model.

Except that AGFI = 0.876 and RFI = 0.892 were slightly lower than the ideal value of 0.9, the results of other indicators were met to the ideal value of fitting indicators of measurement model what recommended by scholars. All of the structural model fitting index assessment results conformed to the ideal value recommended by scholars besides the AGFI = 0.882 which was slightly lower than the ideal value of 0.9.

In summary, the model constructed by the structural equation modeling approach had an excellent fit with 435 data collected.

6. Hypothesis Testing

The empirical results of consumer's technology acceptance and innovation diffusion mechanism of E-commerce platform were shown in Figure 2. This model can explain 32.9% of variance of consumers' intention to accept E-commerce platform.

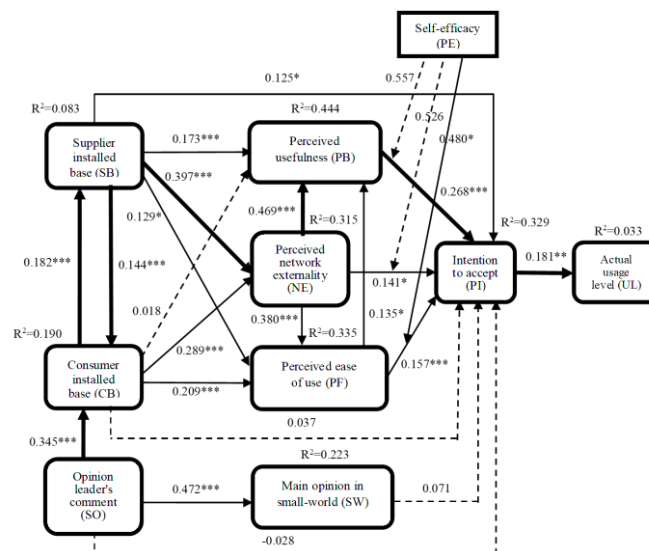


Figure 2. Empirical results of E-commerce platform acceptance and innovation diffusion mechanism

Note: * indicates the significant level $p < 0.1$ by two tail test; ** indicates the significant level $p < 0.01$ by two tail test; *** indicates the significant level $p < 0.001$ by two tail test.

The solid line on the diagram shows that the empirical result supports the hypotheses of direct effect or moderating effect causality between variables at this path. The dotted line on the diagram indicates that the empirical study does not support the hypothesis of direct effect or

moderating effect causality in that path but it does not mean there is no indirect effect existed in there. The thicker solid line means the critical path to affect individual's intention level of accepting E-commerce technology. Therefore, the independent variables in the critical paths shown in Figure 2 should be regarded as the "key successful factors of innovation diffusion".

7. Discussion

At the end, this study found out the internal mechanism of E-commerce platform acceptance and innovation diffusion, as named TSC-TAM model, as shown in Figure 3. These core factors in the traditional TAM, perceived usefulness and perceived ease of use, can affect consumer individual's intention level of accepting new introduced E-commerce technology directly. The two-sided market factors, perceived network externality, consumer installed base, and supplier installed base, and complex social network factor, social opinion leader's evaluation, will impact consumer individual's new E-commerce technology acceptance intention mainly through the intermediary path.

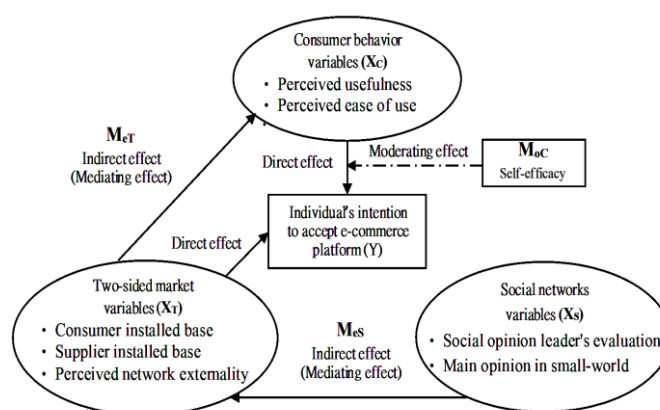


Figure 3. The internal mechanism of E-commerce platform acceptance and innovation diffusion mechanism (TSC-TAM model)

The key factors of influencing individual's intention to accept E-commerce platforms from high to low are Supplier installed base > Perceived network externality > Perceived usefulness > consumer installed base (complete mediation) > Perceived ease of use > Opinion leader's comment (complete mediation). Two-sided market dimension variables deliver the main contribution of E-commerce innovation diffusion. Previous empirical studies just consider the direct effect only that will mislead management decisions because lack of comprehensive points of view. This study found the complex social network variables can influence innovation diffusion via mediation effect also. It is a vital finding to social network marketing domain.

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