A Model of Consumer Perception and Behavioral Intention for E-Reading

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***Abstract*—**Recently, the mobile technology market has experienced significant growth, resulting in the introduction of numerous tablet devices to the market, such as the iPad, Android pad, Kindle, and Nook. For e-books providers, determining an approach to providing high service value for readers is a significant challenge. This paper examines key motivators for consumers' attitude towards continuing the reception of existing e-book reading. The study uses Structure Equation Modeling (SEM) to analyze users who have used e-books. First, Confirmatory Factor Analysis (CFA) was performed to determine whether the measured variables reliably reflected the hypothesized latent variables. Second, structural models were tested to determine overall model fit and path coefficients. The measurement model indicates the theoretical constructs have adequate reliability and validity, while the structured equation model is shown to have a high model fit for the empirical data. The study's findings show that the proposed model has good explanatory power and confirms its robustness in predicting customers' intention to use e-book service. The results indicated the e-book's usefulness, ease to use, attitude, and subjective norm are positively affecting users' behavior intention.

***Keywords*—**Behavior Intention; E-Book; Structural Equation Modeling; Technology Acceptance Model; Theory of Planned Behavior.

***Abbreviations*—**Behavioral Intention (BI); Structural Equation Modeling (SEM); Technology Acceptance Model (TAM); Theory of Planned Behavior (TPB).

I. INTRODUCTION

DUE to rapid innovation and development in information technology, people are no longer satisfied by traditional means of learning and obtaining knowledge. Advances in information technology have a significant impact on people's lives. An electronic book (variously, e-book, eBook, digital book) is a book-length publication in digital form, consisting of text, images, or both, and produced on, published through, and readable on computers or other electronic devices. The emergence of e-books and the rapid progress of e-book technology also offer a completely novel approach to reading. E-book readers are energy-efficient, lightweight, portable devices with numerous features. Users can read anywhere at any time with an e-book reader. The e-novella, Riding the Bullet by Stephen King debut in 2000, the world's first mass-market e-book, and gave rise to upsurge in the e-book industry [Lee et al., 2002]. The development of e-book is an efficient business model that enables new relationship between readers and publishers. In recent years, the proposing of e-book readers and Tablets seems that the epoch of digital books is coming. With the development of e-book, paper book is not the only vector of book. Thus, e-book is bound to become the new trend in reading in the future. E-book has been a very hot topic recently since the success of Kindle from Amazon, which combines the three key characteristics: (1) a reader that is suitable for reading eBook content, (2) wireless communications for simplicity and convenience, and (3) a rich and attractive content line-up. The trend of e-book has extended to outside of the most matured U.S. market into other parts of the world [Folb et al., 2011].

Four factors that can cause market disaggregation and recapitalization are customer expectations, technological innovations, circulation changes, and changes in economic environments. The emergence of e-book technology provides consumers with a completely novel approach to reading. E-books are becoming more important for online or offline readers. For e-books providers, how to provide good service value for readers is one of the most important challenges. According to the reference, e-book studies have been through five significant stages: Initiate (1978-1991), Incubation (1992-1999), First Burst (2000-2002), Rally (2003-2007) and Rapid Growth (2008-2010). Nine issues are found significant in the overall 33 years of e-book research, among them the publishing of e-books, genesis of e-book, e-book in libraries, e-book market and e-book technology are the top 5 issues. Although there are many empirical e-book studies regarding

behavior intention, most of them dealt with cloud computing applications [Lu et al., 2005], user preference [Chang & Tung, 2008], e-learning [Daisy & Adriana, 2012] or function and industry issues [Lee et al., 2002; Sohn et al., 2002]. However, there are few studies which focused on explaining the process of behavior intention of e-book is rarely addressed.

This study aims to use SEM combine the Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB) to understand what kind of factors will influence the behavior intention of use of e-reader for reading, and explore the relationship among perceived usefulness, perceived ease of use, attitude toward using, subjective norm and behavior intention. Base on the research background mentioned above, there are several objectives of this study: (1) Use Structure Equation Model (SEM) to investigate the relationship among perceived usefulness, perceived ease of use, attitude toward using, subjective norm and behavior intention; (2) To provide suggestions on developing marketing strategies for the managers of on-line bookstores to increase market share.

II. LITERATURE REVIEW AND RESEARCH MODEL

Consumer behavior is quite complex, because of many variables involved and their tendency to interact with & influence each other. Behavior intention is one of the important issues for marketing practitioners because of the rapid business environment [Kidwell & Jewell, 2008]. Behavioral Intention (BI) is defined as a person's perceived likelihood or "subjective probability that he or she will engage in a given behavior" [Homburg et al., 2005]. Behavioral intention can be considered the indicator that researchers use most frequently to analyze choice behavior. Wang (2010) asserted that consumer attitude toward specific products or services are based on an individual's previous experiences. Subsequently, the consumer attitude toward products and services influences their purchasing intention. How to create value or value added has be often treated as the main part of organization's mission statements and objectives

The Technology Acceptance Model (TAM) firstly proposed by Davis was conceived to predict and explain an individual's information technology (IT)/information systems (IS) acceptance [Wang & Qualls, 2007]. After Davis's first study on the TAM, the TAM has been widely applied in acceptance behavior across a board range of IT/IS in several industries. To represent the antecedents of user acceptance, the TAM focused on two factors, perceived ease of use and perceived usefulness [Adams et al., 1992]. Specifically, behavioral intention to use is influenced by two key determinants: (1) perceived ease of use and (2) perceived usefulness. Davis conceptualized perceived ease of use as "the degree to which a person believes that use of a particular system would be free of effort" but perceived usefulness as "the degree to which a person believes that use of a particular system would enhance her/his job performance.

The Theory of Planned Behavior (TPB) started as the Theory of Reasoned Action in 1980 to predict an individual's intention to engage in a behavior at a specific time and place. The theory was intended to explain all behaviors over which people have the ability to exert self-control. The key component to this model is behavioral intent; behavioral intentions are influenced by the attitude about the likelihood that the behavior will have the expected outcome and the subjective evaluation of the risks and benefits of that outcome [Fan & Liu, 2014]. The theory of planned behavior emphasizes that human behaviors are governed not only by personal attitudes, but also by social pressures and a sense of control. This model, when coupled with a few modifications, can generate some fascinating predictions. For example, individuals are more likely to execute rather than neglect their intentions, such as a plan to refrain from alcohol, if they express these plans on more than one occasion [Homburg et al., 2005; Fun & Wagner, 2008]. To improve our understanding of e-reader users' decision-making process, the study based on the literatures review [Hsu & Lin, 2008] build the research model as figure 1. The hypothesis and measurement model are formulated for the exogenous variable and the endogenous variables as shown in figure 1 to explain the relationships among Perceived usefulness (PU), Perceive ease of use (PE), Attitude (AT), Subjective Norm (SN), Perceived Behavioral Control (PBC) and Behavior intention (BI).

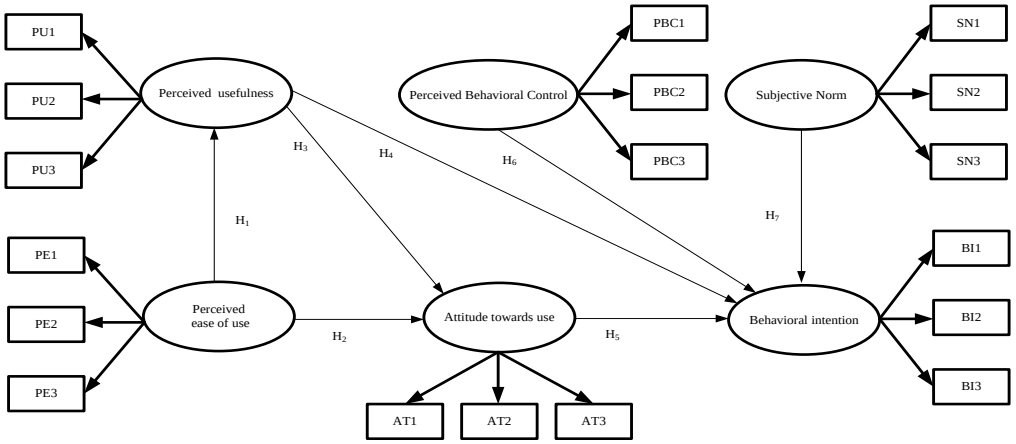


Figure 1: Research Model

III. STRUCTURAL EQUATION MODELING

The primary aim of Structural Equation Modeling (SEM) is to explain the pattern of a series of inter-related dependence relationships simultaneously between a set of latent (unobserved) constructs, each measured by one or more manifest (observed) variables. Structural equation modeling, often referred to simply as LISREL (the name of one of the more popular software packages), is a technique that allows separate relationships for each of a set of dependent variables. In its simplest sense, structural equation modeling provides the appropriate and most efficient estimation technique for a series of separate multiple regression equations estimated simultaneously. It is characterized by two basic components: (1) the structural model, and (2) the measurement model. The structural model is the path model, which relates independent to dependent variables. In such situations, theory, prior experience, or other guidelines enable the researcher to distinguish which independent variables predict each dependent variable. Models discussed previously that accommodate multiple dependent variables – multivariate analysis of variance and canonical correlation – are not applicable in this situation because they allow only a single relationship between dependent and independent variables.

The measurement model enables the researcher to use several variables (indicators) for a single independent or dependent variable. For example, the dependent variable might be a concept represented by a summated scale, such as self-esteem. In a confirmatory factor analysis the researcher can assess the contribution of each scale item as well as incorporate how well the scale measures the concept (reliability). The scales are then integrated into the estimation of the relationships between dependent and independent variables in the structural model. This procedure is similar to performing a factor analysis of the scale items and using the factor scores in the regression. SEM is a multivariate technique combining aspects of multiple and factor analysis. When using SEM, latent variables can be separated into "exogenous" (independent) variables and "endogenous" (dependent) variables, and there existing several linear regression equations that describe how the endogenous variables depend on the exogenous variables. SEM encourages confirmatory rather than exploratory modeling, so it is critical that all construct of SEM must be directed by theory for model development and modification. Goodness-of-fit tests are used to determine whether the model should or should be rejected. A number of goodness-of-fit indexes are used to evaluate the overall fit, the comparative fit to a base model, and model parsimony. The recommended level of the goodness-of-fit indexes are shown in table 1.

Table 1: Goodness-of-Fit Measures for Overall Model Fit

Goodness-of Fit Index	Recommended Level	Description
Chi-square Statistic (χ^2)	P>0.05	The most fundamental measure of overall fit.
Root Mean Square Residual (RMR)	<0.05	The average residuals between observed and estimated input matrices.
Root Mean Square Error of Approximation (RMSEA)	<0.08	It is less affected by sample size than χ^2 and it has been better than RMR.
Goodness of Fit (GFI)	>0.9	A descriptive goodness-of-five measure ranged from 0 to 1.
Adjusted Goodness of Fit (AGFI)	>0.9	It adjusts the GFI for the number of degrees of freedom expended in estimating the model parameters.
Normal Fit Index (NFI)	>0.9	It assesses fit by comparing the tested model with a null model, and its range is from 0 to 1.
Nonnormed Fit Index (NNFI)	>0.9	It involves the degree of freedom, and it can exceed the 0 to 1 range.

IV. DATA AND ANALYSIS RESULTS

The design of the survey questionnaire is based on multiple-item measurement scales. We have adjusted some variables by using the results of a preliminary survey conducted with researchers and marketing experts form the retailing delivery services industry. The measurement items are setting all of the measurement items are based on a 5-point Likert scale related from 1 = strongly disagree/unimportant to 5 = strongly agree/important. To test the hypotheses, an online field survey was conducted. It used a questionnaire designed to be placed on a web site. The data was gathered through an on-line questionnaire survey, the final survey yielded a total of 452 valid questionnaires. There was no missing data among the 452 questionnaires, and all of them were usable. There are more than 71% of the respondents are female. More than 75% of the respondents are 19-40 years old while less than 4% of the respondents are over 51 years old. Most respondents (70%) are single, and most respondents (63%) have a Bachelor's degree. Furthermore, more than half of the respondents are students or employees of a company, and more than 45% of the respondents live in northern Taiwan.

There are different regarding the experience of internet using and reading habits, including hours of internet using per day, experience in internet shopping, frequency of books purchasing, amount spent for books purchasing, and frequency of reading. Of the respondents, first, in the item of hours of internet using, the top four are very close. 17.5% samples are four to five hours per day mostly, 16.9% samples are more than six hours per day secondly, 16.2% samples are five to six hours per day thirdly, 14.2% samples are two to three hours per day and three to four hours per day fourthly, 8.6% samples are less than one hour per day the last; in the item in experience of internet shopping, 48.7% samples are less than one year mostly, 18.6% samples are one to two years secondly, 12.6% samples are two to three years thirdly,

13.6% samples are more than six years fourthly, 7.6% samples are four to five years the last; in the item of frequency of books purchasing, 26.3% samples are more than one year mostly, 23.5% samples are one year secondly, 16.6% samples are six months to one year thirdly, 14.7% samples are four to six months fourthly, 17.1% samples are two to three months the last; in the item of amount spent for books purchasing each time.

Because of the proposed measurement model was consistent with the data, the hypothesis were tested with LISREL, using the covariance matrix. By using LISREL, the simultaneous estimation of: (1) a measurement model can be obtained that items in each scale to the construct represented, giving factor loadings for each item; (2) a structural model that related constructs to one another, providing parameter value. The LISREL model represents a series of hypothesis, and how the variables are related. Validity refers to the degree to which a study accurately reflects or assesses the specific concept that the researcher is attempting to measure. Standardized factor loading and t-value are estimated to display validity, and the average variance extracted is also estimated to display validity. Table 2 indicated the measurement model was first assessed through CFA. The measurement model was further assessed for construct reliability and validity. Construct validity was evaluated by examining the standardized factor loadings within the constructs, Average Variance Extracted (AVE), and the correlation between constructs [Hair et al., 1998]. Standardized factor loadings on all latent constructs were satisfactory (0.84–0.93), showing satisfactory item convergence on the intended constructs. The AVE of all latent constructs was higher than the suggested value of 0.50. The above tests indicated that the discriminate validity was upheld for the measurement model. Overall, the confirmatory factor model adequately reflected a good fit to the data.

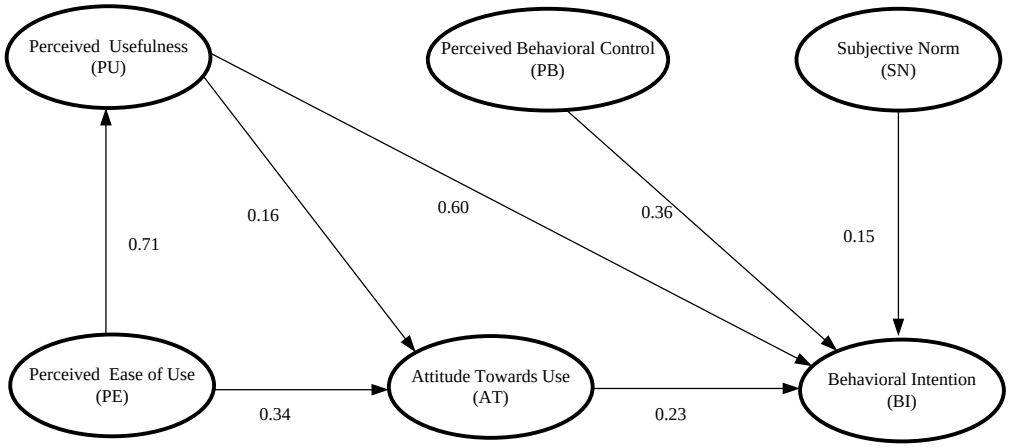
Table 2: Internal Consistency Reliability and Convergent Validity of the Measurement Model

Constructs and Indicators	**Construct Reliability and Validity**			
	Factor Loadings	***t*-value**	**Average Variance Extracted**	**Composite Reliabilities**
Perceived ease of use			0.85	0.79
PE1	0.76	12.74		
PE2	0.82	15.88		
PE3	0.91	17.81		
Perceived usefulness			0.93	0.89
PU1	0.92	17.46		
PU2	0.86	20.12		
PU3	0.87	19.57		
Attitude towards use			0.91	0.88
AT1	0.81	20.33		
AT2	0.91	25.67		
AT3	0.89	19.92		
Perceived Behavioral Control			0.89	0.81
PB1	0.88	16.28		
PB2	0.91	18.94		
PB 3	0.84	12.20		
Subjective norm			0.84	0.84
SN1	0.85	16.06		
SN 2	0.87	19.88		
SN 3	0.64	12.45		
Behavioural intention			0.86	0.83
BI1	0.87	12.99		
BI2	0.91	19.51		
BI3	0.79	22.75		

Figure 2 portrays the hypotheses test results and the completely standardized parameters in the proposed structural model. All of our hypothesized associations were significant at p=0.01. In general, NFI, NNFI, CFI and GFI greater then 0.9 are indicative of good model fit; the RMSR value of 0.04, PGFI value of 0.63 and most other value surpass the recommended level while PNFI value of 0.71 is at a marginal acceptance level. The results of structural equation modeling obtained for the proposed conceptual model revealed a good model fit (x^2 = 621.66, p < 0.001; CFI = 0.95; IFI = 0.95; RMSEA = 0.11; SRMR = 0.07; NFI = 0.92).

Figure 2 and table 3 shows the standardized path coefficients for our research model. Results indicate that perceived ease of use (β = 0.71, p < 0.05) was a significant determinant of perceived usefulness. Perceived ease of use (β= 0. 34, p < 0.05) and perceived usefulness (β= 0.16, p<0.05) were significant determinants of attitude towards use, respectively. Perceived usefulness (β= 0.60, p < 0.05), attitude towards use (β= 0.23, p < 0.05) and subjective norm use (β= 0.15, p < 0.05) were, in turn, significant antecedents of e-reader users' behavioral intention. This study further evaluated the direct and indirect effects subsumed in the

proposed research model. Comparing the direct, indirect, and total effects among the study variables show attitude towards use has the strongest direct and indirect on behavioral intention (Total effects are simply the sum of direct and indirect effects.); and perceived ease of use and perceived usefulness are all exit the direct effect on behavioral intention.



$x^2 = 621.66$, $p < 0.001$; CFI = 0.95; IFI = 0.95; RMSEA = 0.11; SRMR = 0.07; NFI = 0.92

Figure 2: Completely Standardized Solution of the Empirical Causal Model

Table 3: Results of Reliability and Convergent Validity Test

Independent Variable	Direct Effects	Indirect Effects	Total Effects
Perceived ease of use (PE)	-		0.53
PE → PU → BI		0.426 (0.71*0.60)	
PE → AT → BI		0.078 (0.34*0.23)	
PE → PU → AT → BI		0.026 (0.71*0.16*0.23)	
Perceived usefulness (PU)	0.60		0.637
PU → AT → BI		0.037 (0.16*0.23)	
Perceived behavioral control (PB)	0.36		0.36
Subjective norm (SN)	0.15	-	0.15
Attitude towards use (AT)	0.23	-	0.23

V. CONCLUSION AND SUGGESTIONS REFERENCES

E-book is a fast growing service for mobile Internet and created a new business model and caused a global revolution in the digital publish industry. Modeling consumer behavior for predictive purpose has been a primary concern of marketing researchers in the highly competitive service industry. Recently, there has been a dramatic proliferation in the number of e-books, based on the theory of reasoned action, we developed a model involving technology acceptance model. A sample survey of online trading investors was employed to empirically examine this research model. A survey of 452 e-book participants found strong support for the model. The data were analyzed using the two-step approach. This paper examines key motivators for consumers' attitude towards continuing the reception of existing e-book reading. Multiple theoretical perspectives are synthesized to hypothetically construct a model of continuance behavior, which is then empirically tested using a field survey of online e-book users, and Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB) are the study's theoretical bases. The study uses Structure Equation Modeling (SEM) to analyze users who have used e-books. First, Confirmatory Factor Analysis (CFA) was performed to determine whether the measured variables reliably reflected the hypothesized latent variables. Second, structural models were tested to determine overall model fit and path coefficients. The measurement model indicates the theoretical constructs have adequate reliability and validity, while the structured equation model is shown to have a high model fit for the empirical data. The study's findings show that the proposed model has good explanatory power and confirms its robustness in predicting customers' intention to use e-book service. The results indicated the e-book's usefulness, ease to use, attitude, and subjective norm are positively affecting users' behavior intention.

Our study presented and validated a multi-facet model to help understanding the factors contributing to e-book usage. With empirical analysis, several implications were obtained. First, this study indicates that using innovation characteristics such as perceived ease of use, perceived usefulness which can be used to plan appropriate e-book marketing program for the e-book provider. Second, although the attitude of towards use is the great effect on behavioral intention, but the attitude of towards use is an abstract concept for e-book provider manager. We suggested that the manager would be focused on the service quality about perceived usefulness in order to intensify the readers' attitude of towards use. In addition, some studies suggest that most consumer choice behavior can

be regarded as a discontinuous catastrophe phenomenon. The behavior can be nonlinear and complex, and the satisfaction or the dissatisfaction thresholds that may not be occurred at the same point. Based on the previous studies that have employed cusp catastrophe theory, the cusp catastrophe model is considered suitable for understanding the process of customer satisfaction [Lange et al., 2001]). We also suggested the future researcher can consider to explore the nonlinear behaviour of e-reading by the cusp catastrophe model.

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