# "A study of consumer behavioral intention to use e-books: the Technology Acceptance Model perspective"

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# A study of consumer behavioral intention to use e-books: the Technology Acceptance Model perspective

## Abstract

Under the global trend of environmental protection, energy conservation and carbon reduction have become goals that are being pursued worldwide. Smartphones, Tablet PCs, and the Notebooks replacement wave have resulted in many research and development applications involving touch screens. As using the Internet platform has become a new learning trend, e-books have become indispensable teaching materials and are the focus of new technology applications with great market potential.

The key factor for assessment of the "e-book" market is first to understand consumer behavioral intentions. To achieve this understanding, the Technology Acceptance Model (TAM) proposed by Davis (1989) was used as the main theoretical basis of this study. Three cognitive factors – "brand and service trust", "perceived usefulness" and "perceived ease of use" – were used to measure the interactions among all factors and whether these factors have positive effects on "attitude toward using", as well as whether "attitude toward using" has a possible effect on "behavioral intention to use".

Using convenience sampling, 213 effective samples were collected from consumers who are using or have had the experience of using e-books. After analysis, the study produced the following results: (1) Brand and service trust has a significantly positive effect on attitudes toward using e-books; (2) Perceived usefulness has a significantly positive effect on attitudes toward using e-books; (3) Perceived ease of use does not have a significantly positive effect on attitudes toward using e-books; (4) Attitudes toward using e-books has a significantly positive effect on behavioral intention to use e-books.

**Keywords:** Technology Acceptance Model, e-book, brand and service trust.

## Introduction

The development of information technologies, such as electronic, digital and network technologies has resulted in an ever-increasing advancement in digital products, which continues to challenge and cater to the attitudes of consumers who are accepting of new technology products to gain market opportunities. In response to the new ideas involving energy conservation and carbon reduction for global environmental protection, e-books have become the focus of new technological applications. Fueled by worldwide mobile Internet access, the prospect of e-books cannot be overlooked.

In the study of prediction or explanation of personal behavior, the Intention Model proposed by Fishbein and Ajzen (1975) is considered an excellent reference model. The Technology Acceptance Model (TAM) is one such intention model and is a theory that mainly explores the relationship between attitude and behavioral intention. The TAM provides its robustness in predicting behavioral intention or behavior when the user is under complete volitional control (Limayem, Hirt & Chin, 2001; Rawstorne, Jayasuriya & Caputi, 1998; Wang & Butler, 2007; Lee & Lehto, 2012).

In particular, the TAM assumes that a person's beliefs about it's ability to use a piece of technology and their subjective evaluation of the usefulness of

that technology are the key determinants of behavioral intentions (Bruner & Kumar, 2005; Ha & Stoel, 2009; Hernandez, Jimenez, & Martin, 2009; Palvia, 2009; Pavlou et al., 2007; Morgan-Thomas & Veloutsou, 2011).

In the past, scholars seldom used the consumer's point of view combined with the intention model to discuss factors that affected behavioral intention to use a product. Because the e-book is an innovative high-tech product, the study of e-book services is an interesting topic. Therefore, this study used e-books as study subjects and used TAM to investigate populations who use e-books or have the potential intention to use e-books to explore whether consumer attitudes concerning e-books have significant effects on the behavioral intention to use e-books.

Because e-books provide intangible services, information asymmetry between consumers and enterprises may occur. Therefore, this study used brand and service trust as an antecedent for the control variable of attitude to discuss whether brand and service trust significantly affect consumer attitudes toward using e-books and whether consumer attitudes toward using e-books affect consumer behavioral intention to use e-books.

## 1. Literature review

This study mainly applied TAM to examine consumer attitudes on e-books and the factors that affect consumer intention to use e-books. Two

aspects indicate the existence of a relationship between the consumer and the brand: the emotional connection and communication (Veloutsou, 2007, Morgan-Thomas & Veloutsou, 2011;). Brand and service trust, perceived usefulness, and perceived ease of use were used as antecedents, and the extents of their effects were investigated. E-books involve the systematic and structured processing of various digitized data (books), and these books are provided for people to read and reuse through computers, PDAs, cell phones, and e-book readers. E-books are paper-free and provide connectivity, multimedia access, diversification and new life. E-books also offer the advantages of ease of manufacture and a low production budget and do not require extensive printing equipment; they are compact, permit reading in low-light environments, enable adjustments to text size and color, can recite text using external voice software, and have no risk of damage. The disadvantages are that illegal copying is facilitated, which harms the interests of the original authors; long-term viewing of electronic screens can cause vision damage; and certain e-books are non-transferable to others because of technological protection.

The TAM conceptualizes perceived usefulness as a measure of performance related expected outcome on a retrospective basis (Halilovic & Cicic, 2011; Saadé, 2007). Both the satisfaction and perceived usefulness of an information system are formed while responding to past learning experiences, satisfaction is likely determined by the realized perceived usefulness of its users (Lee & Lehto, 2012). Davis (1989) proposed TAM and used this model to discuss the effect of external variables on personal internal beliefs and attitudes; this model also considered that behavioral intentions were affected by personal attitudes toward using the system. The main concepts of TAM are described below:

♦ **Attitude.** The positive or negative feelings or evaluations generated when an individual uses new information technologies. Attitude is determined by both perceived usefulness and perceived ease of use. The perceived usefulness is "the degree to which a person believes that using a particular system will enhance his or her job performance"; therefore, when a user believes that the new information technology is useful, the user will have a positive attitude toward this new information technology. The perceived ease of use is "the degree to which a person believes that using a new information technology is free from effort"; when using a new information technology is easy, then a person does not have to expend extra effort and

time to learn how to use it. Therefore, when all other conditions are the same, a new information technology that is perceived by users to be easy to use and that requires less labor and time is more likely to be accepted by users.

♦ **Behavioral intentions.** The degree of a person's willingness to use new information technology.

♦ **External variables.** These factors indirectly affect behaviors including the personal variables of users, system characteristics, and environmental variables. Depending on the characteristics of information technology and differences in use situations, the selection of variables changes accordingly.

In the basic theory of TAM, the first is that when a person has a higher positive attitude toward using new information technology, the behavioral intention is also higher. The second is that perceived usefulness and perceived ease of use are beliefs that affect attitude. The third is that perceived usefulness will also directly affect behavioral intentions. The fourth is that when perceived ease of use is more positive, the perceived usefulness is also higher. The fifth is that external variables (latent variables) will indirectly affect internal personal attitude, intention, and behavior, as well as the two factors of perceived usefulness and perceived ease of use; these variables are the major determinants for a person to accept and use new information technologies and prove that TAM has an excellent explanatory power (Davis et al., 1989).

Many scholars have studied the factors that affect the use of new information technologies, performed an in-depth study on innovative characteristics and developed a scale and proposed eight innovative characteristics, including relative advantage, ease of use, compatibility, trialability, visibility, result demonstrability, image, and voluntariness (Moore & Benbasat, 1991). The perceived ease of use and perceived usefulness would affect the behavior of using computers, and the external variables included individual characteristics, system characteristics, and organizational support (Igbaria et al., 1995). Except that perceived ease of use did not have a significant effect on intention to use, the effects of other results were similar to those proposed by TAM (Szajna, 1996).

This study applied TAM as the study basis and proposed "perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention to use" combined with such variables as "brand and service trust" to discuss the possible relationships among variables and further infer the research hypotheses of this study.

**1.1. The influence of brand and service trust on attitude toward using e-books.** The relationships between people and people, people and objects, or people and things must be developed based on trust. Trust is calculated based on the measure of the amount of benefits (North, 1990). It is an institutional basis dependent on overall environmental norms or functions (Williamsom, 1993) between a group member and the group. It is a belief, expectancy, or feeling about certain items (Lee & Turban, 2001), an expectation for the transaction object that presents its tendency to want to believe the transaction object; certain antecedents will increase or maintain the degree of trust that will affect the trust of both parties on the transaction.

A trustor believes a trustee will meet the trustor's needs (Anderson and Weitz, 1990), be confidence in the intentions or actions of a person or a group (Carnevale and Wechsler, 1992). When an organization is in a risk situation, organizational members will execute loyal and appropriate actions (Ratnasingam, 2003) the trusting party expects the party to be trusted will complete a particular action without monitoring or controlling (Mayer et al., 1995). The degree of willingness to rely on others (McAllister, 1995), as belief of benevolence, competence, honesty, and redictability (McKnight et al., 1998). A person will not take any unexpected action that would result in negative outcomes or risks for the trading partners (Anderson and Narus 1990; Crosby et al., 1990). Trust is confidence in the reliability and honesty of trading partners (Morgan and Hunt; Ganesan, 1994; Kumar, 1996; Moorman et al., 1993), that is the degree of confidence in the behavior and goodwill of others (Hart and Saunders, 1997). Trust is perceived credibility and benevolence (Doney and Cannon, 1997; Gefen and Silver, 1999; Singh and Sirdeshmukh, 2000), involves specific beliefs in ability, benevolence, and integrity and is willing to depend on another party, suggested that trust is a presentation of confidence in some relationships (Garbarino and Johnson, 1999). Trust is the confidence of the trusting party that the party to be trusted will not take advantage of the weakness of the trusting party (Dyer and Chu, 2003). The three elements of trust are benevolence, honesty, and competence (Walter et al., 2003). Trustee in a system is defined as an individual's belief in the competence, dependability, and security of the system (Kini and Choobineh, 1998). It is the general belief of an individual in the integrity, benevolence, and ability of electronics retailer (Jarvenpaa et al., 2000). A party to be trusted will not use deception to obtain benefits and trustworthiness (Gefeen et al., 2004).

Therefore, because of Internet anonymity and insufficient information technology capacity, it is impossible to confirm the identity of both parties of the transaction and to determine the quality of merchandise; traders are vulnerable to fraud and damage, which are the risk factors in an e-business transaction (Ba and Pavlou, 2002). The website is the key for users to feel trust. A high-quality website can provide online users with a better experience and thus generate a sense of trust (McKnight,1998). When the quality and relevant functions of the product are unclear, the brand can help consumers make a selection (Dayal et al., 1999).

Enterprises can take advantage of the reputation of their brand value, such as its stability, long history, and trustworthiness to overcome a consumer's trust question. The brand and service reputation of enterprises have positive effects on trustworthiness in consumers.

In recent years, with the constant technological breakthroughs in mobile technology, mobile commerce has had unlimited business opportunities. To avoid encountering transaction uncertainty and risk such as those in e-businesses, which reduce the willingness of consumers to use services or purchase merchandise, it is even more important to strengthen the relationship of brand and service trust between consumers and enterprises when promoting e-book services. Trust can be gained by using the accumulated long-term excellent experiences (such as the brand, company reputation, and website quality) of enterprises; in addition, the willingness of consumers to use services can be increased. Apparently, brand and service trust are notably important factors that affect the willingness of consumers to use products; therefore, this study defined "brand and service trust as the degree of influence that company reputation, website quality, and system security have on the behavioral intention of consumers to use e-books".

In 2003, Heiden, Verhagen, and Creemers proposed that cognition of trust and experiences when using new technology will directly affect a consumer's attitude toward purchasing online. When the brand and service trust of consumers is higher, the attitude toward purchasing is more positive. When consumers believe that the information provided by enterprises is honest, their customer care is sincere, and the enterprise makes customers' interests a priority, understands the customer's individual needs, provides personalized service, and is trustworthy, then consumers will adopt a positive attitude toward this enterprise. Thus, the first research hypothesis of this study was inferred:

Brand and service trust has a significant positive effect on a consumer's attitude toward using e-books.

**1.2. The effect of perceived usefulness and perceived ease of use on attitude toward using e-books.** "Attitude" is determined by both perceived usefulness and perceived ease of use. To promote a user's willingness to use a new information technology, it is necessary to let potential users believe that the new information technology is easy to use and that they can benefit from using it. Therefore, if perceived usefulness and perceived ease of use are more positive, the attitude is also higher; in contrast, if perceived usefulness and perceived ease of use are more negative, the attitude is lower. This study analyzed the acceptance attitude of consumers on new technology and its effects from the consumer's perspective. This study focused on the consumer's acceptance attitude and use intentions on new technology products from psychological and social viewpoints.

The "usefulness" and "ease of use" of technology acceptance factors both have positive effects on "attitude", and the effect of 'ease of use" is even more evident. Users believe that the benefits provided by e-books are useful (e.g., they can rapidly complete their life or work tasks) and are easy to use (e.g., they can get started without another's guidance), which is helpful for increasing users' attitude toward e-books. If consumers believe that e-books are more useful for their work or are easy to use, their attitude toward using e-books is also higher. Thus, the perceived usefulness and ease of use of e-books are cognitive factors for consumers to accept e-books.

"Perceived usefulness" and "perceived ease of use" have positive effects on a "user's attitude toward using e-books"; that is, "perceived usefulness" and "perceived ease of use" will indirectly affect a user's behavioral intentions through the behavioral attitude of using the technology or services. Based on the abovementioned description, we can conclude that perceived usefulness and perceived ease of use have positive effects on the attitude of using; therefore, the second and third hypotheses of this study were inferred: Perceived usefulness will have a significant positive effect on a consumer's attitudes toward using e-books; Perceived ease-of- use will have a significant positive effect on a consumer's attitudes toward using e-books

**1.3. The effect of attitude on behavioral intention to use e-books.** Moon and Kim (2001) studied the world-wide-web context and used perceived playfulness as an external variable in TAM; after validation, they observed that perceived playfulness had a significant effect on the relationship among perceived ease of use, user's attitude toward using, and intention to use. Chen et al. (2002) integrate compatibility into TAM and demonstrated that compatibility affects attitude but perceived usefulness did not significantly affect intention to use.

In the literature, the theory of TAM is suitable for studying the relationship between consumer's attitude and behavioral intention. Attitude will affect behavioral intention; if a consumer's attitude toward accepting e-books is higher, they will use e-books more frequently; therefore, consumer attitude is also one of the factors that affect using e-books.

A consumer's "attitude toward using" and "willingness of using" e-books should have a significantly positive relationship. Attitude has a significant positive effect on the willingness of using e-books. When consumers sense positive evaluations, they will believe that using e-books is a good experience and increase their willingness of using them. In addition, when friends or relatives of consumers believe that using e-books is a convenient and practical tool and recommend using them, the consumers' attitude toward using e-books will be affected and increased. Thus, attitude has a positive effect relationship with behavioral intention to use. Therefore, the fourth hypothesis of this study was inferred: The consumer's attitude toward using e-books has a significant positive effect on behavioral intention to use e-books.

## 2. Method

This study used TAM as a basis and referenced relevant literature to deconstruct attitude and determine the influencing antecedents, which are brand and service trust, perceived usefulness, and perceived ease of use. The architecture of development research is described below (Figure 1).
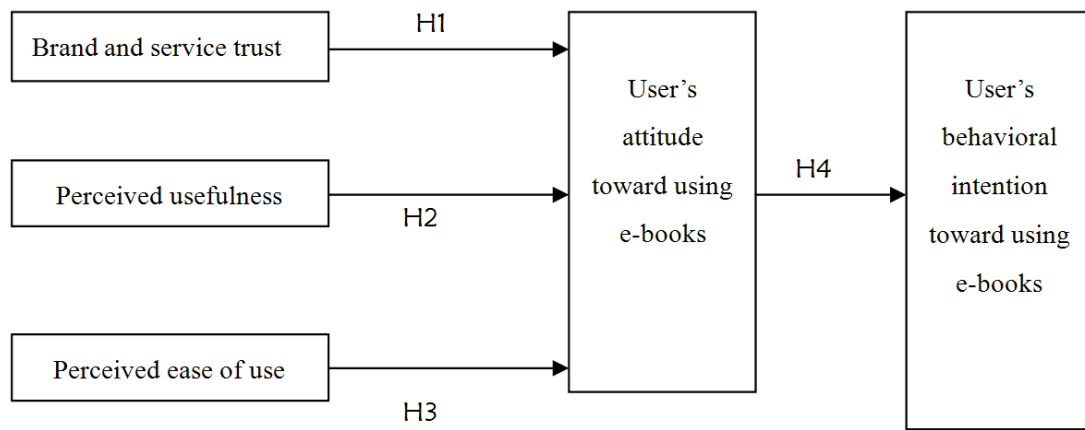
**Fig. 1. Research framework**

**2.1. Research hypotheses.** The hypotheses of the study are the following:

*H1: Brand and service trust has a significant positive effect on consumer attitude toward using e-books.*

*H2: Perceived usefulness will have a significant positive effect on consumer attitude toward using e-books.*

*H3: Perceived ease of use will have a significant positive effect on consumer attitude toward using e-books.*

*H4: Consumer attitude toward using e-books has a significant positive effect on behavioral intention to use e-books.*

**2.2. Operational definition.** Brand and service trust: the degree of effect on consumer trust toward enterprises that provide e-books by brand, website quality, and system security. Perceived usefulness: Consumer belief as to the degree of helpfulness of using e-books. Perceived ease of use: consumers believe that the use of e-books is easy and does not require too much effort to learn. Attitude: the degree of a consumer's positive and negative evaluations on using e-books. Behavioral intention: the subjective judgment of consumers on the possibility of willingness to use e-books in the future.

**2.3. Questionnaire design and collection.** The questionnaire was designed based on TAM proposed by Davis et al. (1989). There were five variables: brand and service trust, perceived usefulness, perceived ease of use, attitude, and behavior intention. These variables were mainly measured using the 4-point Likert scale, and the opinions of respondents were surveyed using the choices of "agree", "somewhat agree", "somewhat disagree", and "disagree"; respondents were urged to make their positions and give "1, 2, 3, or 4" score levels; a higher score meant that the degree of agreement was higher.

This study distributed 80 copies of the pre-test questionnaire and used the data of the pre-test questionnaire to perform reliability analysis. The values of Cronbach $\alpha$ coefficient of 5 dimensions were all larger than the standard value of 0.7. Therefore, this study used the pre-test questionnaire as the formal questionnaire. Using convenience sampling, this study collected the questionnaire data and used e-mail to notify and invite people to fill out the online questionnaire, electronic questionnaire files, or paper questionnaire in writing. The distribution of the formal questionnaire occurred from March 2012 to April 2012. During this period, 360 copies of the questionnaire were distributed, and 298 copies were collected; there were 85 invalid questionnaires and 213 valid questionnaires; the percentage of valid questionnaires was 71.5%.

## 3. Results

**3.1. Reliability analysis of dimension measures.** The five dimensions in this study were brand and service trust, perceived usefulness, perceived ease of use, attitude of using, and behavioral intention to use. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) calculated using SPSS 18.0 was 0.894, and the $p$-value of the Bartlett test of sphericity was 0.000; these results met the KMO standard value of larger than 0.5 and $p$ value smaller than 0.05. Principal components analysis was performed to extract common factors. The screening was performed following the standard of factor selection: "the eigenvalue of factors after rotation is larger than 1, the percentage of cumulative explained variance after rotation is larger than 60%, factor loading after rotation is larger than 0.6, the difference between the largest and the second largest factor loadings is larger than 0.3, and communality is larger than 0.5". The standard of reliability test required that the Cronbach $\alpha$ coefficient be greater than 0.6 and that the item-to-total correlation coefficients be greater than 0.5. After screening and analysis, the dimensions in this study all attained acceptable test standard values and exhibited clear reliability. The results are described below:

1. After reduction, the measurement items in each dimension still maintained 2-5 items. The measurement items of "brand and service trust" dimension was reduced from 6 to 3 items; the items of "perceived usefulness" dimension remained unchanged; the items of "perceived ease of use" dimension was reduced from 5 to 4 items; the items of "attitude toward using" dimension was reduced from 5 to 3 items; and the items of "behavioral intention to use" dimension was reduced from 5 to 4 items.

2. After rotation, the eigenvalues of factors of all dimensions were between 1.952 and 3.145, which met the standard of larger than 1.
   The cumulative explained variance of each dimension after rotation was between 62.904% and 75.271%, which met the standard of larger than 60%.

4. After reduction of measurement items in all dimensions, the factor loading of each item after rotation was between 0.717 and 0.896, which met the standard of larger than 0.6.

5. The value of the Cronbach $\alpha$ coefficient of each dimension was between 0.7341 and which met the standard of larger than 0.6. The item-to-total correlation coefficient was between 0.497-0.748, which also met the standard of near or greater than 0.5. These results indicated that the reliability of all dimensions attained an excellent degree of consistency (Table 1).

Table 1. Reliability analysis of dimension measures

| Dimension | Operational variable | Factor loading | Eigenvalue after rotation | Cumulative explained variance after rotation | Item-to-total correlation | Cronbach's $\alpha$ | KMO |
|---|---|---|---|---|---|---|---|
| Brand and service trust | I have confidence in e-books provided by enterprises (A_25) | 0.896 | 2.258 | 75.271 | 0.681 | 0.835 | 0.711 |
| | I believe the transaction process and results of e-books are correct (A_33) | 0.857 | | | 0.669 | | |
| | I believe the transaction system of e-books is secure (A_41) | 0.849 | | | 0.748 | | |
| Perceived usefulness | I think using e-books can make reading more efficient (B_26) | 0.865 | 3.145 | 62.904 | 0.603 | 0.851 | 0.836 |
| | I think using e-books will not be limited by time and location restriction, which is helpful for me (B_34) | 0.813 | | | 0.545 | | |
| | I think using e-books can make life more convenient (B_18) | 0.809 | | | 0.681 | | |
| | I think I can rapidly obtain information using e-books (B_2) | 0.753 | | | 0.618 | | |
| | I think using e-books transaction rapidly (B_10) | 0.717 | | | 0.575 | | |
| Perceived ease of use | I think it is easy to download application programs from Internet using e-books (C_35) | 0.835 | 2.555 | 63.882 | 0.668 | 0.811 | 0.784 |
| | I think it is very easy to complete transactions using e-books (C_27) | 0.806 | | | 0.631 | | |
| | I think it is easy to get started using e-books without reading the service manual (C_19) | 0.780 | | | 0.607 | | |
| | I think it is easy to learn e-books without spend too much time (C_11) | 0.775 | | | 0.602 | | |
| Attitude toward using | I think it is very convenient to look up information using e-books anytime and anywhere (D_23) | 0.830 | 1.952 | 65.063 | 0.588 | 0.731 | 0.672 |
| | I like using e-books (D_31) | 0.826 | | | 0.578 | | |
| | I like e-books connect with Internet function (D_39) | 0.762 | | | 0.497 | | |
| Behavioral intention to use | I am willing to download application programs for e-books (E_24) | 0.867 | 2.877 | 71.936 | 0.749 | 0.870 | 0.826 |
| | I want to use e-books to connect information (E_40) | 0.857 | | | 0.736 | | |
| | I want to use the services provided by e-books (E_8) | 0.856 | | | 0.735 | | |
| | I want to use the information by e-books (E_32) | 0.811 | | | 0.670 | | |

To understand the level of acceptance of the respondents on measurement items in each dimension, this study performed the calculation of mean and standard deviation on the measurement items of the five dimensions.

The standard deviations of the measurement items in the "brand and service trust" dimension were all less than 1; therefore, it can be concluded that the respondents have consistent views on all of the three measurement items in this dimension. The result of the

means indicated that the respondents have the highest level of recognition on "I believe the transaction process and results of e-books are correct" followed by "I have confidence in e-books provided by enterprises".

The standard deviations of measurement items in "perceived usefulness" were all less than 1; therefore, it can be concluded that the respondents have consistent views on all three measurement items in this dimension. The respondents had the highest level of recognition for "I think using e-books can make life more convenient" followed by "I think I can rapidly obtain information using e-books", "I think using e-books will not be limited by time and location restriction, which is helpful for me", and "I think using e-books can make reading more efficient".

The standard deviations of measurement items in "perceived ease of use" were all less than 1; there- fore, it can be determined that the respondents have consistent views on all four measurement items in this dimension. The respondents had the highest level of recognition for "I think it is easy to download application programs from Internet using e-books" followed by "I think it is very easy to complete transactions using e-books" and, next, "I think it is easy to get started using e-books without reading the service manual".

The standard deviations of measurement items in "attitude toward using" were all less than 1; therefore, it can be concluded that the respondents have consistent views on all three measurement items in this dimension. The respondents have the highest level of recognition for "I think it is very convenient to look up information using e-books anytime and anywhere" followed by "I like using e-books".

The standard deviations of measurement items in "behavioral intention to use" were all less than 1; therefore, it can be concluded that the respondents have consistent views on all four measurement items in this dimension. The respondents have the highest level of recognition for "I am willing to download application programs for e-books" followed by "I want to use e-books to connect information" and then "I want to use the services provided by e-books".

The reliability and validity of the brand and service trust, perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention to use dimensions have already met rigorous testing standards requirements. Next, the structural equation model was used to perform the analyses of overall model fit, basic model fit, hypothesis testing of each variable path, and effects analysis of influencing path of variables to discuss the fitness and casual relationship of the architecture model in this study.

**3.2. Analysis of overall model fit.** This study performed analysis according to the three types of indicators of overall model fit, "absolute fit test", "incremental fit test" and "parsimonious fit test". The analytic results are described below (Table 2).

*3.2.1. Analysis of absolute fit test.* All the test indicators of this type met the testing standards, except for the $\chi^2$ value, which was 662.828 ($P = 0.000$) and did not meet the testing standard; e.g., $\chi^2/df$ was 1.955 and less than 3, and the RMSEA was 0.067 and less than 0.08. In addition, the GFI (goodness-of-fit index) was 0.815 and the AGFI (absolute goodness-of-fit index) was 0.778, which were both close to the testing standard of greater than 0.09. The RMR (root mean squared residual) value was 0.056, which was slightly higher than the testing standard of 0.05 and was still between the acceptable range of 0.05 and 0.08.

*3.2.2. Analysis of incremental fit test.* All the test indicators of this type met or were close to the testing standard value of greater than 0.09; for example, the NFI (normed fit index) was 0.836, the NNFI (non-normed fit index) was 0.920, the CFI (comparative fit index) was 0.912, the RFI (relative fit index) value was 0.818, and the IFI (incremental fit index) value was 0.913.

*3.2.3. Analysis of parsimonious fit test.* In all test indicators of this type, the PNFI (parsimonious normed fit index) value was 0.750 and the PGFI (parsimonious goodness-of-fit) value was 0.680, which were both higher than the testing standard of greater than 0.5. The overall model fit tests mostly attained the testing standard, which had an excellent fit.

Table 2. Overall model fit tests

| Test index | | Test standard | Test result | |
|---|---|---|---|---|
| Absolute fit test | $\chi^2$ | $P > 0.05$ | 662.828 ($P = 0.000$) | Poor |
| | $\chi^2/df$ | < 3 | 1.955 | Good |
| | GFI | > 0.9 | 0.815 | Close to 0.9, fair |
| | AGFI | > 0.9 | 0.778 | Close to 0.9,f air |
| | RMR | < 0.05 | 0.056 | Close to 0.5, fair |
| | RMSEA | < 0.08 | 0.067 | Good |

Table 2 (cont.). Overall model fit tests

| Test index | | Test standard | Test result | |
|---|---|---|---|---|
| Incremental fit test | NFI | > 0.9 | 0.836 | Close to 0.9, fair |
| | NNFI | > 0.9 | 0.920 | Good |
| | CFI | > 0.9 | 0.912 | Good |
| | RFI | > 0.9 | 0.818 | Close to 0.9, fair |
| | IFI | > 0.9 | 0.913 | Good |
| Parsimonious fit test | PNFI | > 0.5 | 0.750 | Good |
| | PGFI | > 0.5 | 0.680 | Good |

**3.3. Analysis of basic model fit.** In examining whether this model had series errors, identification problems, or input errors, the standardized estimate value of the overall model was between 0.576 and 0.8985, which met the testing standard of basic model fit – "standardized estimate value is larger than 0.5, error variance cannot be negative, and there is a significant level ($C.R./t$. value larger than 1.96)". It can be concluded that the basic model fit is excellent. The details are provided in Table 3.

Table 3. Basic model fit result

| Variance | | Standardized estimate value ($β$) | $C.R./t$ | Error variance | $P$ value |
|---|---|---|---|---|---|
| Brand and service trust | A_25 | 0.786 | - | 0.161 | - |
| | A_33 | 0.795 | 11.885 | 0.156 | *** |
| | A_41 | 0.799 | 11.952 | 0.194 | *** |
| Perceived usefulness | B_2 | 0.616 | 9.486 | 0.219 | *** |
| | B_10 | 0.625 | 9.647 | 0.255 | *** |
| | B_18 | 0.764 | 12.41 | 0.135 | *** |
| | B_26 | 0.837 | 14.053 | 0.109 | *** |
| | B_34 | 0.802 | - | 0.133 | - |
| Perceived ease of use | C_11 | 0.576 | 8.388 | 0.317 | *** |
| | C_19 | 0.600 | 8.792 | 0.410 | *** |
| | C_27 | 0.839 | 12.97 | 0.103 | *** |
| | C_35 | 0.785 | - | 0.168 | - |
| Attitude toward using | D_23 | 0.714 | - | 0.170 | - |
| | D_31 | 0.790 | 11.266 | 0.158 | *** |
| | D_39 | 0.605 | 8.598 | 0.227 | *** |
| Behavioral intention to use | E_8 | 0.753 | - | 0.210 | - |
| | E_24 | 0.812 | 12.19 | 0.155 | *** |
| | E_32 | 0.746 | 11.074 | 0.201 | *** |
| | E_40 | 0.822 | 12.348 | 0.183 | *** |

The analyses of the testing results of each dimension in this study are described as follows: The "brand and service trust" dimension included three measurement items; after comparison with the standardized estimation value of each measurement item, it was concluded that "I believe the transaction system of e-books is secure" (0.799) was the most important factor in the customer's recognition of brand and service trust followed by "I believe the transaction processes and results of e-books are correct' (0.795) and, next, "I have confidence in e-books provided by enterprises" (0.786). This result demonstrated that the differences in the standardized estimation values of the three measurement items were small; therefore, transaction system security, website quality, and brand (company reputation) are all major factors that affect brand and service trust, of which "transaction system security" has the strongest association with brand and service trust.

The "perceived usefulness" dimension included five measurement items; after comparison with the standardized estimation value of each measurement item, it was concluded that "I think using e-books is more efficient" (0.837) is the most important factor in a customer's recognition of perceived usefulness followed by "I think using e-books will not be limited by time and location restriction, which is helpful for me" (0.802). This result demonstrated that "Using e-books can be more efficient and will not be limited by time and location restriction" is the key factor to increase customers' perceived usefulness on e-books.

The "perceived ease of use" dimension included four measurement items; after comparison with the standardized estimation value of each measurement item, it was concluded that "I think it is very easy to complete transactions using e-books" (0.839) was the most important factor in a customer's

recognition of perceived ease of use followed by "I think it is easy to download application programs from the Internet using e-books" (0.785). This result indicated that "I can easily and simply download e-book application programs and complete transactions" is the key factor to increase a customer's perceived ease of use of e-books.

The "attitude toward using" dimension included three measurement items; after comparison with the standardized estimation value of each measurement item, it was concluded that "I like using e-books" (0.790) was the most important factor in a customer's recognition on attitude toward using followed by "I think it is very convenient to look up information using e-books anytime and anywhere" (0.714), and, next, "I like e-books with Internet functions". This result indicated that "I like using e-books and I like e-books with Internet function" (0.605) is the key factor to improving a customer's attitude toward using e-books.

The "behavioral intention to use" dimension included four measurement items; after comparison with the standardized estimation value of each measurement item, it was concluded that "I want to use the services provided by e-books" (0.898) was the most important factor in a customer's recognition of behavioral intention to use followed by "I want to use the services provided by e-books" (0.866). This result demonstrated that "I am willing to download application programs for e-books and use services provided by e-books" is the key factor to increase a customer's behavioral intention to use e-books.

**3.4. Hypothesis testing of each variable path.** From the empirical analysis and testing results, a path diagram of the relationships among the dimensions of brand and service trust, perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention to use in this study was constructed and is presented in Figure 2.
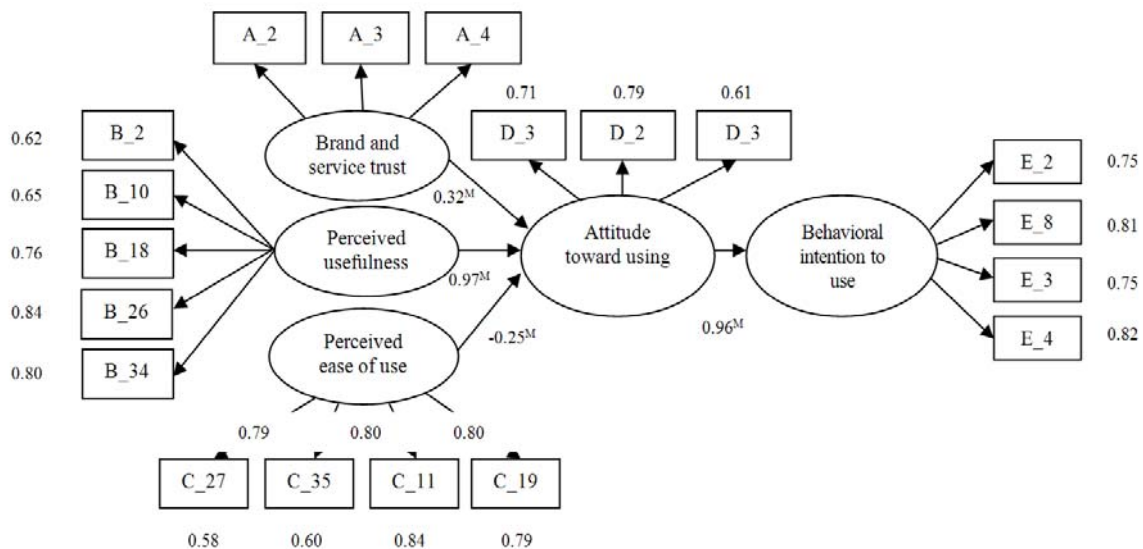


**Fig. 2. Path diagram of the relationships among the dimensions**

The conclusions of the hypothesis testing are presented in Table 4.

Table 4. Hypothesis relationship path test result

| Hypothesis | Path | Hypothesis relationship | Path value | C.R./t | E/N |
|---|---|---|---|---|---|
| H1 | Brand and service trust → attitude toward using | Forward | 0.324 | 3.283** | Established |
| H2 | Perceived usefulness → attitude toward using | Forward | 0.969 | 5.383*** | Established |
| H3 | Perceived ease of use → attitude toward using | Forward | -0.253 | -1.311 | Not established |
| H4 | Attitude toward using → behavioral intention to use | Forward | 0.945 | 10.256*** | Established |

Note: *$P< 0.05$, **$P< 0.01$, ***$P< 0.001$.

*Hypothesis 1: Brand and service trust has a significant positive effect on customer's attitude toward using e-books.*

The path coefficient of brand and service trust on attitude toward using e-books was 0.324 and $t$ value was 3.284, which was greater than the standard value of 1.96 and attained the significant level;

therefore, Hypothesis 1 is valid. This result means that if consumers have higher brand and service trust toward using e-books, then their attitude toward using e-books will be more positive.

*Hypothesis 2: Perceived usefulness has a significant positive effect on customer's attitude toward using e-books.*

The path coefficient of perceived usefulness on attitude toward using e-book bank was 0.969, and $t$ value was 5.383, which was greater than the standard value of 1.96 and attained the significant level; therefore, Hypothesis 2 is valid. This result means that if the consumer's view regarding how helpful it is to use e-books is more positive, then their general attitude toward using e-books is more positive.

The path coefficient of perceived ease of use on attitude toward using e-books was -0.253, and $t$ value was -1.311, which was less than the standard value of 1.96 and did not attain the significant level; therefore, Hypothesis 3 is invalid. This result means that the degree of ease of learning and using e-books for consumers will not affect consumer's attitude toward using the product.

The path coefficient of attitude toward using on behavioral intention to use e-books was 0.945, and $t$ value was 10.256, which was greater than the standard value of 1.96 and attained the significant level; therefore, Hypothesis 4 is valid. This result means that if the level of a consumer's positive and negative evaluation of e-books is higher, then the consumer's behavioral intention of using will be higher.

**3.5. Effects analysis of influencing path of variables.** The direct and indirect effects analyses of the influencing path of variables are presented in Table 5. In the direct effects analysis, the variables that had direct effects on attitude toward using were "brand and service trust" (0.324), "perceived usefulness" (0.969), and "perceived ease of use" (-0.253), of which perceived usefulness (0.945) had the largest direct effect on attitude toward using e-books. In addition, the variable that had direct effects on behavioral intention to use was attitude toward using, which had the largest effect on behavioral intention to use. In the indirect effects analysis, brand and service trust had positive indirect effects on behavioral intention to use; its path was brand and service trust → attitude toward using → behavioral intention to use, and the total effect was 0.306. In addition, perceived usefulness also had a positive indirect effect on behavioral intention to use; its path was perceived usefulness → attitude toward using → behavioral intention to use, and the total effect was 0.915. Furthermore, perceived ease of use did not have a positive indirect effect on behavioral intention to use; its path was perceived ease of use → attitude toward using → behavioral intention to use, and the total effect was -0.239.

Table 5. Effects analysis of influencing path of variables

| Variance | Direct effect | Indirect effect | Total effect |
|---|---|---|---|
| Brand and service trust → attitude toward using | 0.324 | - | 0.324 |
| Brand and service trust → behavioral intention to use | - | 0.306 | 0.306 |
| Perceived usefulness → attitude toward using | 0.969 | - | 0.969 |
| Perceived usefulness → behavioral intention to use | - | 0.915 | 0.915 |
| Perceived ease of use → attitude toward using | -0.253 | - | -0.253 |
| Perceived ease of use → behavioral intention to use | - | -0.239 | -0.239 |
| Attitude toward using → behavioral intention to use | 0.945 | - | 0.945 |

## Conclusions

Based on TAM, this study proposed "perceived usefulness", "perceived ease of use" and "brand and service trust" as variables to discuss consumer attitudes toward using e-books. The "attitude toward using" variable was also used to study the degree of behavioral intention to use e-books. After data analyses, the causal relationships among all the dimensions in this study were summarized:

1. "Brand service trust has a significant positive effect on a customer's attitude toward using e-books". If customers are satisfied, enterprises (brand/company reputation/trust) that provide e-book services, the transaction processes and results are correct without errors (website quality), or the transaction system of enterprises is safe and secure (system security), then customers will have high levels of brand and service trust in e-books.

2. "Perceived usefulness has a significant positive effect on customer's attitude toward using e-books". If the e-books service can enable customers to efficiently, conveniently, and quickly obtain relevant information on enterprises or perform transactions in real-time and free of time and location restrictions, then the customer's positive attitude toward using e-books will increase.

3. "Perceived ease of use does not have a significant positive effect on a customer's attitude toward using e-books". Ease-of-using, operation friendliness, and ease of downloading application programs in e-book services are not factors that affect a customer's attitude toward using e-books.

4. "Attitude toward using has a significant positive effect on a customer's behavioral intention to use e-books". The degree of positive and negative evaluation of customers in using e-

books is the most important factor that affects whether customers will use e-book services.

5. The direct effects of each variable to affect the attitude of using and behavioral intention to use.

The variable that has the largest direct effect on the attitude of using is "perceived usefulness". Compared with the two variables of brand and service trust and perceived ease of use, consumers are most concerned about whether the downloaded e-book application is easy to use. In addition, the variable that has the largest direct effect on behavioral intention to use is "attitude toward using"; as long as customers trust the brand and service of the e-books and recognize that using e-books is beneficial to themselves, their attitude will be more positive; when the attitude is more positive, the willingness to use e-books will increase.

This study observed that customer's attitude toward using e-books has significantly positive effects on the behavioral intention to use; the formation of this attitude is deeply affected by customer's "brand and service trust" and "perceived usefulness" of e-books. Therefore, if enterprises want to develop e-book services that are expected to be accepted by customers, there are several methods:

1. Consider existing customers as their priority for promotion.
2. Strictly control website quality and system security to reduce the customer's insecurity concerning the use of e-books.
3. Provide real-time, convenient, and fast service functions that meet customer needs for e-books.

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