

# Examining User Intention Behaviour towards e-Readers in Japan Using the Decomposed Theory of Planned Behaviour

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**Abstract**— The e-reader is a mobile electronic device designed specifically for reading electronic books. E-readers have captured public attention all over the world, making it essential to better understand the patterns of user adoption and intention behaviour regarding these devices. In this paper, we examine two adoption models, the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB), and four Decomposed Theory of Planned Behaviour (DTPB) models with our proposed extended antecedents (hedonic and utilitarian) and determine that the DTPB model-2 is, relatively speaking, the best among all of these models. In terms of the Akaike information criterion (AIC) and the Browne–Cudeck criterion (BCC), the TRA is more accurate than the TPB. However, the other fit index, the Root Mean Square Error of Approximation RMSEA (RMSEA) is not acceptable for the TRA and the TPB ( $> 0.1$ ) although it is for the DTPB models. As e-readers offer an increasing variety of products to use (e-books, music, applications, etc), this will change users' beliefs regarding the opportunities that are needed to perform a behaviour. In our conclusion, the utilitarian products offering by e-reader are an important variable that influences consumer intention to use e-book reader, but the variable of hedonic product is not.

**Keywords**- E-reader; DTPB model; User intention; Type of products.

## I. INTRODUCTION

An e-reader is a mobile electronic device designed primarily for the purpose of reading digital e-books and periodicals [1]. The main advantages of the e-reader are convenience and information access. Users have the ability to access information anytime, anywhere, and will appreciate that this access is fast and easy. E-readers are becoming ever more popular in high-tech cultures, such as that in Japan, the US, and Europe. According to the latest research from Informa Telecoms & Media (2012), e-reader sales are expected to peak at 14 million in 2013 [2]. The consumption of e-books is also growing in Japan. Interestingly, 80% of all e-books read in Japan are consumed on mobile devices [3].

As Japanese youth are technology savvy, they typically feel great enthusiasm towards new technologies. However, e-readers are not yet as popular among young Japanese as other new technologies (e.g., smart phones). It has become

extremely important for the e-book industry to explore the consumer attitudes and adoption behaviours regarding this technology. Examining Japanese consumer perceptions of e-reading devices is essential for current and future device development.

Our main objectives are, first, to achieve a clear understanding of consumer attitudes towards e-readers; we have investigated the antecedents related to their adoption and usage. Second, we aim to generate a research model that accurately describes Japanese youths' e-reader usage behaviour and belief structure. There is no prior research comparing the TRA [4], TPB [5], and DTPB [6] models regarding e-book usage in this population. To accomplish these objectives, the TRA, TPB, and DTPB models have been used as a guideline, and we have considered both hedonic [7] and utilitarian products [7] as the two extended antecedents of our DTPB models.

One general research question drove this study: how do students' multidimensional beliefs influence their adoption of or intention to use e-readers. In an effort to answer this question, here we examined four different DTPB models. Among them, DTPB model-2 is better in terms of RMSEA and chi-square. It also explains how potential users' intentions are influenced by significant paths of attitude, subjective norm, and perceived behavioural control, regarding their decomposed antecedents. DTPB model-2 was statistically significant for our proposed antecedent of utilitarian products, which improves our understanding of users' perceived behavioural control regarding e-readers; however, the hedonic product was not found to be significant. Users appeared to be more focused on the utilitarian aspects of e-readers rather than their hedonic aspects, rendering the latter statistically insignificant to our results.

This paper is organized as follows: the next section focuses on the literature review and the theoretical background. Then, we conceptualize the research model and propose our hypotheses. The subsequent section describes the research methodology and empirical findings. Finally, the study discusses the implications of the research in terms of theoretical and practical contributions and provides concluding remarks with limitations and future research directions.

## II. LITERATURE REVIEW

### A. e-Reader market in Japan

In a recent edition of the eBook Journal, Yashio Uemura of Tokyo Denki University [8] laments that the current e-book boom in Japan is in reality a boom in e-book seminars. This sense of frustration within the industry may seem at odds with its annual revenues, as reported by Impress R&D, of \$600 million and growth in excess of 20% per year. These impressive numbers belie the fact that comics make up 75% of this revenue and that, apart from comics and magazines, there seems little significant advance in broadening the e-book consumer base within Japan [9]. Currently, there are two e-reader devices in the Japanese market, the Sony Reader and the Biblio Leaf, which is available through the mobile retailer KDDI [10]. It is expected that the increased volume and richness of e-book content will spur the formation of new e-reader markets. As shown in Fig. 1, the e-reader market includes any device that can be used for reading, including tablet personal computers, such as the iPad [4].

### B. e-Reader adoption models

One of the important and significant issues related to IT is the identification of factors that cause people to accept new technologies and information systems and to use them [11]. Several relevant theories are offered, such as Theory of Reasoned Action [4], the Technology Acceptance Model (TAM) [12], the Theory of Innovation Diffusion [13], the TPB [5], and the DTPB [6]. In addition, Venkatesh, Morris et al. [14] developed the Unified Theory of Acceptance and Use of Technology (UTAUT) model.

MA Jiah et al. [15] proposed a model that would test the TAM's effectiveness in determining the influence factors on the acceptance and use of e-readers. Sungjoon Lee [116] examined the factors that lead to the adoption of the mobile e-book in South Korea. Jaemin Jung et al. [17] identified the predictors of e-reader diffusion with regard to consumer awareness, interest, and intention to use. Malathi Lectumanan et al. [18] have investigated consumer intentions of using e-books as educational aids by using the TAM. Brown [19] has developed a research framework demonstrating college professors' and students' acceptance of e-books and e-readers as a viable alternative to traditional paper textbooks, as well as their acceptance of these technologies for use in the classroom. Shih-Chun Chou [120] has compared pre-adoption and post-adoption beliefs to determinants of e-reader adoption and continuation. Bram Pynoon et al. [21] examined secondary school teachers' acceptance of a digital learning environment (DLE) using the UTAUT model. Jung-Yu lai et al. [22] has explored the factors that drive users to use dedicated e-readers for reading e-books.

However, no previous research has attempted to understand the behaviour of e-reader consumers by using the TRA, the TPB, and the DTPB. Here, these three models, that is, the theory of reasoned action, theory of planned

behaviour, and decomposed theory of planned behaviour, are considered and compared in order to investigate the attitudes of e-reader users. In the next section, I explain the TRA, TPB, and DTPB models.

- Model 1: Theory of Reasoned Action (TRA)

This theory, developed by Fishbein and Ajzen [4], is one of the most important theories used to explain the human behaviours [23]. According to the theory, behavioural intention (to use a technology) is explained by people's attitudes toward that behaviour and subjective norms.

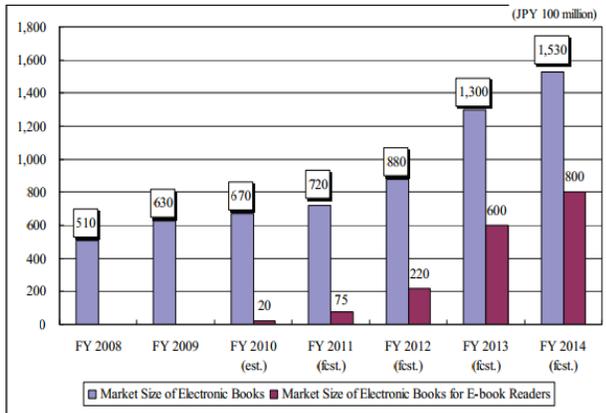
- Model 2: Theory of Planned Behaviour (TPB)

Ajzen [5] developed the theory of reasoned action by adding the construct 'perceived behavioural control' into the model as a determinant of behavioural intention and behaviour. It determines the impact of three factors, which are 'attitude', 'subjective norms', and 'perceived behaviour control' on the tendency to behave in a certain fashion [6].

- Model 3: Decomposed Theory of Planned Behaviour (DTPB)

The Decomposed Theory of Planned Behaviour was developed by Taylor and Todd in 1995 [6], as illustrated in Fig. 2. They developed the theory of planned behaviour through breaking down the structure of attitude, subjective norm, and perceived behavioural control [24]. This provided an increased ability to explain behavioural intentions and enable the accurate understanding of behavioural events [25]. According to the DTPB, individuals' use behaviours *vis-a-vis* information technology are determined by their 'intention to use'. 'Intention to use', in turn, is determined by the attitude toward behaviour, subjective norm, and perceived behavioural control. Perceived usefulness is the extent to which a person believes using a particular technology will improve their job performance [26]. Perceived compatibility is the extent to which an innovation is consistent with the existing values, past experiences, and current needs of potential adopters [23]. Relative advantage occurs when the perceived advantages resulting from the use of a technology exceeds other alternatives [27]. While the theory of planned behaviour simply explains the relationship between the structure of beliefs and the prerequisite of intention, the decomposed theory of planned behaviour offer a comprehensive approach to understanding the factors affecting users' intentions to use information technology [28]. Within this theoretical framework, complexity plays a significant role in the technology adoption decision, while there is a direct relationship between other features of model and behavioural intention [6].

Here, we use the DTPB model instead of the UTAUT model because the UTAUT model attempts to explain the relationship between perceived usefulness, ease of use, and intention to use as modified by age, gender, and experience. This model will be diversified more by demographic factors than belief factors. Additionally, as we wanted to focus on students' behaviours as situated within an immature e-reader market, we did not use the UTAUT model.



(est. =estimate, fct. =forecast)

Figure 1. Market size of electronic books and E-book readers in Japan.

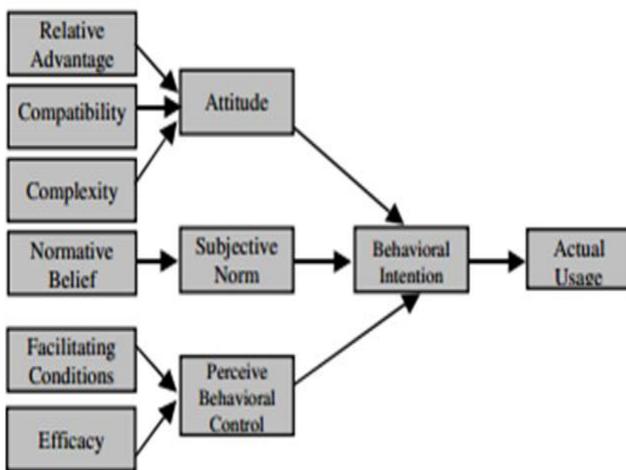


Figure 2. The Basic Decomposed Theory of Planned behavior model.

Our research is an extended version of an unpublished e-reader study [10] that used the basic DTPB model with limited sample size.

C. Our proposed model

With respect to e-reader research, MA Jiah et al [15] have shown in their technology acceptance model that there is a significant relationship among product features and perceived ease of use. Perceived behaviour control is that which refers to the perceived ease or difficulty of performing the behaviour [4]. Sanjukta et al. [7] have shown that the type of product is likely to be an important driver of PBC for internet shopping behaviour. Products can be classified as hedonic or utilitarian. These classifications are primarily intended to better understand how consumers search for, evaluate, choose, take delivery of, and consume different types of products [7]. Both hedonic and utilitarian products offer benefits to the consumer, the former primarily in the form of experiential enjoyment and the latter in practical functionality [7]. The hedonic products offered by e-readers are games, music players, voice

recorders, etc. The utilitarian products offered by e-readers are calendar applications, contact list applications, and reading Essentials (zoom/size, page jump, bookmarks, search, and auto page). Perceived behavioural control (PBC) reflects consumer beliefs regarding access to the resources and opportunities needed to perform a behaviour [6]. The type of product (e.g., e-books, music) featured on e-readers can be an important driver of consumer purchase behaviour [7]. Therefore, we hypothesise that both hedonic and utilitarian products have influence on PBC in the case of e-readers and we add these antecedents to our proposed DTPB models. Figure 3 shows our proposed model with the addition of the new antecedents of hedonic and utilitarian products, along with the basic DTPB model used in previous studies [6], [10].

The same hypotheses (H1–H10) by Taylor et al. [6] and Koeder et al. [10] are included and illustrated in Figure 2. H11 and H12 are our proposed hypotheses for e-readers. The hypotheses are as follows:

- H11: That the hedonic products offered by e-readers positively affect perceived behavioural control.
- H12: That the utilitarian products offered by e-readers positively affect perceived behavioural control

III. METHODOLOGY

A. Data collection

- Question Development

In developed countries, including Japan, research has been conducted to develop initial models for the adoption and usage of these devices. For our initial qualitative research interviews, the survey items were adapted from previous studies [4], [6], [10] to develop our initial survey instrument. Items to measure behavioural intention, attitude, subjective norm, and perceived behavioural control were based on scales developed by Ajzen and Fishben [4]. Items to measure relative advantage, complexity, and compatibility were based on scales developed by Taylor et al. [6]. Facilitating condition and self-efficacy items were generated based on the work of Ajzen [5]. The survey instrument was pretested with students (N = 13) at the University of Tsukuba, Japan. Based on pretest results, items were revised to ensure reliability and the logical flow of questions. The pretest sample was not included in the final data set.

Behavioural beliefs were adapted from the scale developed by Koeder et al. [10]. The scale included seven items on a 7-point range bipolar-scale: 1 = ‘strongly disagree’ to 7 = ‘strongly agree’. The attitudes toward e-readers were measured using a scale developed by Taylor & Todd [6]. The 7-point semantic differential scales included the following sets: stupid/wise, bad/good, very bad/very good, very unimportant/very important. The other items were measured using a 7-point range bipolar scale (1 = ‘less likely’ to 7 = ‘more likely’) adapted from Taylor and Todd [6]. Consumer demographic characteristics were measured for a descriptive

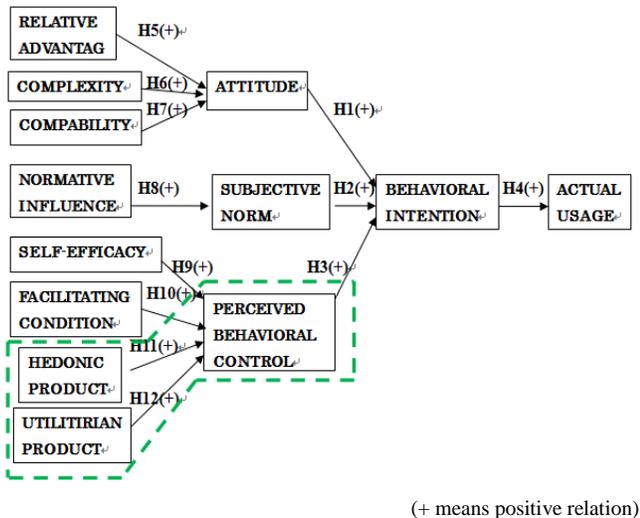


Figure 3. Our proposed Decomposed Theory of Planned Behavior model with new hypotheses.

purpose and included gender, age, occupation, income, and reading habits.

● Subjects

Participation in the survey was voluntary and the survey instrument was developed using the software Qualtrics and was administrated online. The English version of the questionnaire was translated to Japanese. This has been checked to ensure its accuracy. The students of the University of Tsukuba, Japan, were selected as the population of interest. Students comprised our sample because it is mainly students who are, or will be, the primary users of e-readers for reading, convenience, and information access. In an effort to determine the intention of students to adopt e-readers as tools, a survey was conducted towards the end of 2011. With a total of 164 completed responses obtained, 151 usable data sets were analyzed to describe the hypothesised paths using structure equation model.

IV. RESULTS

A. Descriptive statistics

A profile of the respondents who participated in this study is displayed in Table 1, which shows that 24.4% of the responding students were female and 75.6% were male.

B. Reliability and validity

We have tested the Cronbach  $\alpha$  coefficient for our research, a reliability coefficient of the measured value of questionnaire items for each construct from the point of view of internal consistency, which is used to verify whether each item shows common parts. If the coefficient is 0.7 or more, the internal consistency of the measurement scale is considered to be high and its reliabilities are adequate. The coefficients for each factor are shown in Table 2. Since all values exceed 0.7, the items in this intention model are judged to have shown common parts [29], which render the model acceptable for exploratory research [30]. Test items with lower values than 0.7 have been excluded.

TABLE I. DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

Gender	Total	%
Men	124	75.6
Women	40	24.4
sum	164	100.0

Dept. of the students	Total	%
Social technology	144	95.4
other	7	4.6
sum	151	100.0

TABLE II. CRONBACH'S ALPHA FOR EACH CONSTRUCTS

Items	No	Cronbach's Alpha
Behavioral Intention	3	0.822
Actual Usage	2	0.711
Attitude	2	0.925
Subjective Norm	3	0.843
Perceived Behavioral Control	3	0.729
Relative Advantage	3	0.833
Compatibility	3	0.847
Complexcity	3	0.850
Normative Influence	3	0.876
Self-Efficacy	3	0.788
Facilitating condition	2	0.709
Utilitarian Product	3	0.809
Hedonic Product	2	0.930

Confirmatory factor analysis (CFA) is a visual representation that specifies the model's constructs, indicator variables, and interrelationships. CFA provides quantitative measures of the reliability and validity of the constructs. In order to check the properties of the measurement scales, we conducted CFA to assess reliability, convergent validity, and discriminant validity. In order to assess the reliability of all the measurement scales, we calculated composite reliabilities (CR) for internal consistency and average variance extracted (AVE) for construct convergence for each construct by using the formula proposed by Fornell et al. [31]. The recommended value of CR is suggested as 0.7 by Hulland et al. [32]. A marginal but acceptable AVE value is 0.4 or higher, as has been reported and used in marketing literature [33], [34], [35]. In addition, we calculated AVE that exceeds the squared intercorrelations (SIC) of the construct with other constructs in the model in order to ensure discriminant validity [32]. CR, AVE, and SIC for each construct of the e-reader are shown in Table 3 where AVE > SIC, AVE > 0.5, and CR > 0.7. Therefore, we may be able to conclude that the reliability of the constructs developed for the e-reader was acceptable.

TABLE III. CR, AVE AND SIC FOR EACH CONSTRUCTS

Convergent Validity	AVE	CR	Discriminant validity	SIC
RA	0.64	0.84	Relative advantage <-> Complexity	0.05
COMP	0.65	0.85	Relative advantage <-> Compability	0.10
COMX	0.68	0.86	Relative advantage <-> Normative influence	0.04
BI	0.60	0.82	Relative advantage <-> facilitating condition	0.06
AU	0.56	0.72	Complexity <-> Compability	0.05
SN	0.67	0.85	Complexity <-> Normative influence	0.43
PBC	0.61	0.80	Complexity <-> facilitating condition	0.33
NI	0.71	0.88	Compability <-> Normative influence	0.09
UTI	0.57	0.80	Compability <-> facilitating condition	0.08
ATT	0.85	0.92	Normative influence <-> facilitating Condition	0.14
FC	0.59	0.73	Normative influence <-> Utilitarian product	0.10
Discriminant validity AVE>SIC			Complexity <-> Utilitarian product	0.18
Convergent validity AVE>0.5			Compability <-> Utilitarian product	0.25
CR>0.7			Relative advantage <-> Utilitarian product	0.09

C. Model fitting test

Fit statistics, including chi-square, normed fit index (NFI), root mean square error of approximation (RMSEA), goodness of fit (GFI), and adjusted goodness of fit (AGFI), AIC, and BCC were used to assess model fit. An omnibus cut-off point of 0.90 has been recommended for GFI. For GFI, it is generally accepted that values of 0.90 or greater indicate well fitting models [36]. A value of about 0.08 or less for the RMSEA would indicate a reasonable error of approximation [37].  $\chi^2$  to degrees of freedom ratios in the range of 2 to 1 is indicative of an acceptable fit between the hypothetical model and the sample data [38]. With parsimony fit measures, such as the AIC and the BCC, smaller values of these criteria indicate a better fit of the model [39]. In explanation, the total coefficient of determination (TCD)  $R^2$  for the structural equations has shown in this study. The fit statistics and the  $R^2$  values for each are shown in Table 4. These results indicate a preference for DTPB model 2.

● Theory of reasoned action

In Table 4, the statistics indicate that the TRA model provides a measurable fit to the data.  $\chi^2$  to degrees of freedom ratio is 3.56, GFI = 0.90, AGFI = 0.82, CFI = 0.90, AIC = 186.87, BCC = 130.55, RMSEA = 0.13. In terms of predictive power, the variance in all dependent variables are  $R^2_{BI} = 0.17$ ,  $R^2_{AU} = 0.32$ , respectively. The path coefficients are as hypothesised in each case ( $p > 0.05$  in all instances). Attitude and subjective norm are a significant determinant of behavioural intention. A further significant determinant of actual use is behavioural intention.

● Theory of planned behaviour

In Table 4, the statistics indicate that the TPB model provides slightly same fit to the data as the TRA fit. However, there is a slight improvement in the fit and the explanatory power of behavioural intention.  $\chi^2$  to degrees of freedom ratio is 2.61, GFI = 0.88, AGFI = 0.82, CFI = 0.90, AIC = 127.55, BCC = 192.19, RMSEA = 0.1. In terms of predictive power, the variance in all dependent variables is  $R^2_{BI} = 0.20$  and  $R^2_{AU} = 0.32$ , respectively.

The path coefficients are as hypothesised in each case ( $p > 0.05$  in all instances). Attitude, subjective norm, and perceived behaviour control are significant determinants of behavioural intention. A further significant determinant of actual use is behavioural intention.

● Decomposed Theory of planned behaviour

We have conducted four DTPB models in order to establish the best-fit index. The four DTPB models are as follows:

DTPB-1 (with FC): DTPB model with the path of facilitating condition  $\rightarrow$  perceived behavioural control.

DTPB-2 (with UTI): DTPB model with the path of utilitarian product  $\rightarrow$  perceived behavioural control. We have tested these two paths individually because they have a correlation of 0.49.

DTPB-3 (with FC and UTI): DTPB model with both paths: facilitating condition  $\rightarrow$  perceived behavioural control; utilitarian product  $\rightarrow$  perceived behavioural control.

DTPB-4 (without PBC): model without PBC construct. Here, this has low  $R^2 = 0.02-0.03$  as with some previous studies [10], [40].

Among the four DTPB models, the better models are DTPB-1 and DTPB-2. For model 1,  $\chi^2$  to degrees of freedom ratio is 2.044, GFI = 0.761, AGFI = 0.713, RMSEA = 0.083, CFI = 0.848, AIC = 796.959, BIC = 960.047, BCC = 798.877, and CAIC = 1023.047. For model 2,  $\chi^2$  to degrees of freedom ratio is 1.969, GFI = 0.77, AGFI = 0.723, RMSEA = 0.080, CFI = 0.86, AIC = 801.395, BIC = 1009.588, BCC = 834.470, and CAIC = 1078.588. In terms of predictive power, the DTPB-2 explains attitude, subjective norm, and behavioural intention. The variances in all dependent variables are as follows:  $R^2_{BI} = 0.20$ ,  $R^2_{AU} = 0.31$ ,  $R^2_{ATT} = .32$ ,  $R^2_{SN} = .30$ ,  $R^2_{PBC} = .02$ , respectively for model 2. The low R square value of PBC indicates that utilitarian products and facilitating conditions alone could not provide a powerful explanation of PBC. Mathieson et al. [40] found that PBC did have a significant relationship with behavioural intention, though it did not provide substantial explanatory power.

In Figure 4 and Figure 5, the path coefficients are significantly positive in each case ( $p > 0.05$  in all instances) for DTPB-1 and DTPB-2. Attitude, subjective norm, and perceived behaviour control are significant determinants of behavioural intention. A further significant determinant of actual use is behavioural intention. Normative influence is significantly related to SN. Self-efficacy and hedonic products do not significantly and positively influence PBC. However, utilitarian products are significantly and positively related to PBC in model 2 and facilitating conditions are significantly and positively related to PBC in model 1. Taken

TABLE IV. VALUES OF MODEL SELECTION CRITERIA FOR EACH MODEL

Model fit	GFI	AGFI	RMSEA	AIC	BCC	$\chi^2/df$	CFI	$R^2_{AU}$	$R^2_{BI}$	$R^2_{ATT}$	$R^2_{SN}$	$R^2_{PBC}$
TRA	0.90	0.82	0.13	127.60	130.60	3.56	0.90	0.32	0.17	N/A	N/A	--
TPB	0.88	0.82	0.10	186.90	192.20	2.61	0.90	0.32	0.20	N/A	N/A	N/A
DTPB-1 (with FC)	0.76	0.71	0.08	796.20	798.90	2.04	0.84	0.31	0.22	0.30	0.30	0.03
DTPB-2 (with UTI)	0.77	0.72	0.08	801.40	834.50	1.96	0.86	0.31	0.20	0.32	0.30	0.02
DTPB-3 with (UTI and FC)	0.73	0.68	0.09	921.30	955.30	2.14	0.81	0.31	0.21	0.30	0.30	0.03
DTPB- 4 (without PBC)	0.82	0.77	0.09	481.60	498.60	2.10	0.89	0.31	0.17	0.30	0.30	--

together, utilitarian products and facilitating conditions do not give a good fit for model 3 as because they have correlation = 0.5. Attitude, subjective norm, and PBC are positively and significantly related to behavioural intention. Behavioural intention is positively and significantly related to actual usage for both DTPB models 1 and 2.

V. DISCUSSION

This study compared the TRA, TPB, and DTPB models with the extension of product characteristics. The aim was to provide useful and interesting results that demonstrate the best model for predicting consumer behaviour with regard to the adoption of e-readers, thus helping e-readers’ developers refine their strategic planning and enhance their competitive advantage with a better understanding of the constructs that influence consumers’ behavioural intention. We adopted reasonable fit and explanatory power to evaluate these models and to determine which version was best [6]. The findings of the study show that the decomposed theory of planned behaviour model 2 better predicts the users’ intention to use e-readers than do other models (although there is no big difference in the goodness of fitness index of the DTPB model 1 and 2). The R2 for each dependent construct is used to assess predictive power. The decomposed TPB model-2 has explanatory power for behavioural intention, attitude, and subjective norm and perceived behavioural control.

Based on the findings, we examined the following ten hypotheses: from H1 to H8, H10, and H12 (attitude → behavioural intention; subjective norm → behavioural intention; perceived behavioural control → behavioural intention; behavioural intention → actual usage; relative advantage → attitude; complexity → attitude; compatibility → attitude; normative influence → subjective norm; utilitarian product → perceived behavioural control). Two hypotheses, H9 and H11, (self-efficacy → perceived behavioural control and hedonic product → perceived behavioural control) were not supported. Our results are in agreement with the result of a previous study by Koeder et al. [10], apart from two hypotheses, H2 (subjective norm → behavioural intention) and H10 (facilitating condition → perceived behavioural control). In terms of H10, their model has the same component as our DTPB-1. DTPB-1 has the component of facilitating conditions and DTPB-2 has the component of utilitarian products. DTPB-1 is not much different from model-2, which has component facilitating conditions, as also shown by Koeder et al. [10]. Utilitarian products have correlations with facilitating conditions. Therefore, we tried these components individually for good model fit.

In terms of non-agreement on H2 with Koeder et al. [10], their results showed that the subjective norm was negatively correlated with behavioural intention for e-reader consumers in Japan; however, our result is positively correlated. The

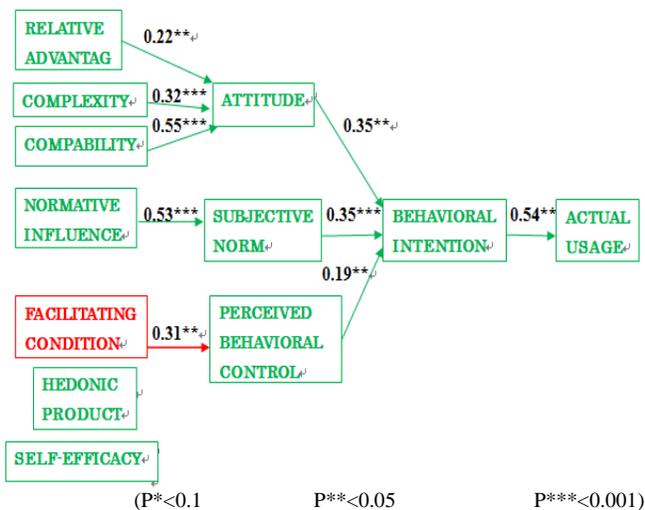


Figure 4. DTPB model 1 with significant paths (same components as Koeder et al.(28))

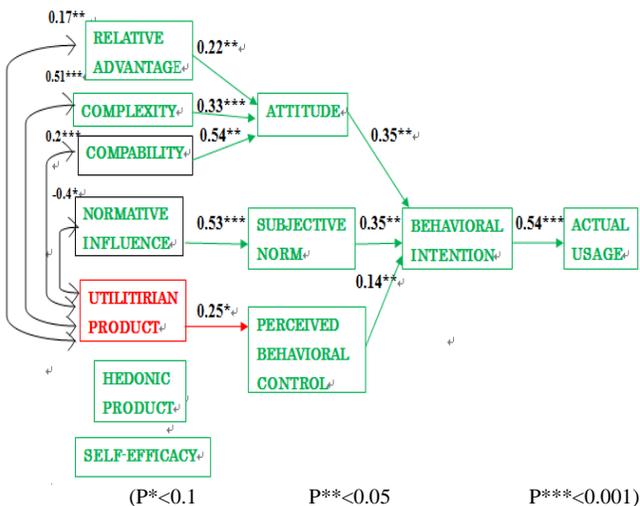


Figure 5. DTPB model 2 with significant paths (our proposed components)

special role and importance of society in Japan has been discussed in several sociological publications [41], [42]. In a strong social culture such as Japan, it is reasonable to find that there are positive relations between the subjective norm and the behavioural intention to purchase or use e-readers. This finding is in agreement with other research: Taylor et al. [6], Sanjukta et al. [7], Paul et al. [43], Majali et al. [44], Ozer et al. [45], and Mathieson et al. [40] also found a significant relationship between SN and BI.

In our study, the type of product is an important variable that influences consumer choices to purchase specific products (e-books, audio recordings, etc.). Hedonic products are not a significant predictor for the PBC variable but utilitarian ones are. This result coincides with the findings of Sanjukta et al [7]. In that study, they found that the Internet is used more for utilitarian product shopping. Consumers use e-readers when their main focus is on the functional attributes of products/services. E-readers offer various kinds of utilitarian products/services (e-books, applications and so on) to use or purchase, so this will change users' beliefs regarding the opportunities that are needed to perform a particular behaviour. The absence of this construct represents barriers to usage of e-readers. Hedonic products were not a significant predictor for PBC variable, which is again in agreement with previous research [36] in case of Internet shopping behaviour. The absence of hedonic products/services (games, music and so on) may not, per se, encourage users' intention behaviour.

Here, we examined three adoption models: the TRA, TPB, and DTPB (4 different models) with extended antecedents (hedonic and utilitarian products). We chose DTPB-2 as the best model. Utilitarian products are a newly founded component of the model that can improve understanding of users' perceived behavioural control regarding e-readers.

## VI. CONCLUSION

This study developed a model with the extension of utilitarian and hedonic products for explaining consumers' behavioural intention to use e-readers. The results indicate that the decomposition of beliefs can provide additional insights into consumers' behavioural intention to use e-readers.

To make e-readers more adoptable, their developers should pay attention to a number of important factors. This study, on the basis of empirical results, provides such developers with suggestions in three areas: (1) system design that makes reading more enjoyable (2) improved network facilities and (3) technological support aimed at increasing e-reader acceptance among consumers. With more complex devices, such as Internet-enabled e-readers, it is essential that they are perceived as relatively easy to use and are compatible with their users' current lifestyle [28]. E-readers should be designed in such way that technology is easy to understand and use. User-friendliness is essential to increasing users' acceptance of e-readers. The newly found factor (utilitarian products) that influences Japanese consumer adoption of e-readers transforms users' beliefs

regarding the opportunities that are needed in order to perform a behaviour. Therefore, the absence of utilitarian products represents a barrier to greater adoption of e-readers. Users' main focus is on the utilitarian products of e-readers rather than on their hedonic aspects. This finding will be crucial for the current and future development of e-reader devices. This paper will help to provide a better understanding of user perception of e-readers and what roles cost, connectivity, usability, and content play for users. The DTPB provides useful, easily understood, and relevant information for discerning consumer behavioural intention regarding e-reader adoption.

## VII. LIMITATIONS AND FURTHER RESEARCH

Our study was limited to student sample data. Furthermore, all respondents were from the same university. Future studies could collect data from people of multiple age groups and occupations, and/or from multiple universities, noting that there are correlations between utilitarian products and facilitating conditions. Further investigation into these interrelationships may help to better understand consumer behaviour towards e-readers. The explanatory power of PBC was low and further research is necessary.

## REFERENCES

- [1] [http://en.wikipedia.org/wiki/E-book\\_reader<06-09-2011>](http://en.wikipedia.org/wiki/E-book_reader<06-09-2011>)
- [2] <http://blogs.informatandm.com/1463/press-release-mobile-broadband-e-reader-sales-to-peak-at-14-million-units-in-2013/<06-09-2012>>
- [3] Voyager (2008). Japanese eBook market. Voyager online. Retrieved from: [epub-revision.googlecode.com/.../Voyager%20proposal%20Appendix%202.pdf<06.09.2012>](http://epub-revision.googlecode.com/.../Voyager%20proposal%20Appendix%202.pdf<06.09.2012>)
- [4] Fishbein, M. and Ajzen, I. (1975) «Belief, Attitudes, Intention and Behavior: An Introduction to Theory and Research», Reading, MA: Addison-Wesley.
- [5] Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50, pp. 179-211.
- [6] Taylor, S. and Todd, P. (1995), "Decomposition and crossover effects in the theory of planned behavior: a study of consumer adoption intentions", *International Journal of Research in Marketing*, Vol. 12, pp. 137-55.
- [7] Sanjukta P., Jana H., and Ge X., 2011: Explaining consumers' channel-switching behavior using the theory of planned behavior, *Journal of retailing and consumer services* 18(2011) 311-321.
- [8] Yano Research Institute, 2010: <http://www.yanoresearch.com/press/pdf/707.pdf<06.09.2012>>
- [9] <http://www.teleread.com/paul-biba/waiting-for-a-push-the-japanese-ebook-market-in-2011-by-robin-birtle/print/<06.09.2012>>
- [10] Koeder Marco Josef, Mohammed Upal, and Sugai Philip (2011): Study of consumer attitudes towards connected reader devices in Japan based on the decomposed Theory of Planned Behavior Study of consumer attitudes towards connected reader devices in Japan based on the decomposed Theory of Planned Behavior, *Economics & management series EMS-2011-10*, 2011-05
- [11] Rao, S. and Troshani, I. (2007), "A conceptual framework and propositions for the acceptance of mobile services", *Journal of Theoretical and Applied Electronic Commerce Research*, Vol. 2, No. 2, pp. 61-73.
- [12] Davis, F.D., Bagozzi, R.P., and Warshaw, P.R. (1989), User

- Acceptance of Computer Technology: A Comparison of Two Theoretical Models, *Management Science*, Vol.35, No.8, PP. 982-1003.
- [13] Rogers, E.M. (1983), *Diffusion of Innovations*, Free Press, New York, NY.
- [14] Venkatesh, V., Morris, M.G., Davis, G.B., and Davis, F.D. (2003). User acceptance model: for longitudinal field studies, *management science* 46(2), pp.186-204.
- [15] MA Jian, 2011: A study on the acceptance and use of handheld E-book readers, *Applied mechanics and materials Vols.50-51*, pp 209-213.
- [16] Sungjoon Lee (2012): An integrated adoption model for e-books in a mobile environment: Evidence from South Korea. *telemat.Informat.82012*, doi:10.1016/j.tele.2012.01.006.
- [17] Jaemin J., Sylvia Chan-Olmsted, Belline Park, and Youngji K. (2011): factors affecting e-book reader awareness, interest and intention to use. *New media & society* 14(2) 204-224.
- [18] Malathi Letchumanan and Rohani Tarmizi (2011): Assessing the intention to use e-book among engineering undergraduates in University Putra Malaysia. *Library Hi Tech*, Vol.29, Iss:3, pp.512-528.
- [19] Randy Brown (2011): professor acceptance and use of E-readers and E-books in the classroom. *The 2011 Las Vegas International Academia Conference*, pp 793-796.
- [20] Shin-Chun Chou, Jay Stue, and Yutting Lin (2010): determinants of E-book readers adoption and continuation: A comparison of pre-adoption and post-adoption beliefs. *2010 5th International Conference on Computer Sciences and Convergence Information Technology (ICCIT)*, pp. 853 – 856.
- [21] Bram Pynoo, Pieter Devolder, Jo Tandeur, Johan van Braak, Wouter Duyck, and Philippe Duyck (2011): Predicting secondary school teacher's acceptance and use of a digital learning environment: A cross-sectional study. *Computers in human behavior* 27(2011), pp.568-575.
- [22] Jung-Yu Lai and Chih-Yen Chang (2012): user attitudes toward dedicated e-book readers for reading: the effects of convenience, compatibility and media richness. *Online Information Review*, Vol.35, Iss:4, pp. 558-580.
- [23] Puschel, J. and Mazzon, J. A. (2010), Mobile banking: proposition of an integrated adoption intention framework. *International Journal of Bank Marketing*, Vol. 28, No. 5, pp 389-409.
- [24] Luarn, P. and Lin, H. (2005), "Toward an understanding of the behavioural intention to use mobile banking", *Computers in Human Behaviour*, Vol. 21, pp. 873-91.
- [25] Pedersen, P.E. (2005), "Adoption of mobile internet services: an exploratory study of mobile commerce early adopters", *Journal of Organizational Computing*, Vol. 15 No. 2, pp. 203-22.
- [26] Laukkanen, T. and Cruz, P. (2009), "Comparing consumer resistance to mobile banking in Finland and Portugal", in Filipe, J. and Obaidat, M.S. (Eds), *e-Business and Telecommunications*, Springer, Berlin, pp. 89-98.
- [27] Riivari, J. (2005), "Mobile banking a powerful new marketing and CRM tool for financial service companies all over Europe", *Journal of Financial Service Marketing*, Vol.10, No.1, pp.11-20.
- [28] Suoranta, M. and Mattila, M. (2004), "Mobile banking and consumer behaviour: new insights into the diffusion pattern", *Journal of Financial Services Marketing*, Vol. 8 No. 4, pp. 354-66.
- [29] Malhotra and K. Naresh : (2004), *Marketing Research*, 4<sup>th</sup> edition, Pearson Education Education.
- [30] Nunnally J (1978). *Psychometric Theory*. McGraw-Hill, New York.
- [31] Fornell, C., Johnson, M.D., Anderson, E.W., Cha, J., and Bryant, B.E., 1996: The American consumer satisfaction index: nature, purpose, and findings, *Journal of marketing*, 60(october), pp. 9 7-18).
- [32] Hulland 1999: use of partial least squares in strategic management research: A review of four recent studies. *Strategic management journal*, 20(2):195-204.
- [33] Green D.E., Morris, T.W., Green J., Cronan, J.E., Jr., and Guest, J.R. (1995). Purification and properties of the lipotein ligase of *Escherichia coli*. *Biochem J.* 309, 853-862.
- [34] Menguc, B. and Auh, S. (2006): Creating a firm level dynamic capability through capitalizing on market orientation and innovation. *Journal of the Academy of Marketing Science*, vol.34, pp.63-73.
- [35] Cadogan J.W., Souchon, A.L., and Procter, D.B. (2008): The quality of market oriented behaviors: formative index construction. *Journal of business research*, 61(12), 1263-1277.
- [36] Daire Hooper, Joseph C., and Micheal R. M. (2008): Structure equation modeling: guidance for determining model fit. *Electronic Journal of Business Research Methods*. Vol 6, Issue. 1, pp.53-60.
- [37] Browne, M. W. and Cudeck, R. (1993). *Alternative ways of assessing model fit*. Newbury Park: Sage Publications.
- [38] Rust, R.T., Zahorik, A.J. and Keiningham, T.L. (1995), "Return on quality (ROQ): making service quality financially accountable", *Journal of Marketing*, Vol. 59 No. 2, pp. 58-70
- [39] Hair JF, Anderson RE, Tatham RL, and Black WC (1998). *Multivariate data analysis*. 5th ed, Upper Saddle River, NJ: Prentice-Hall International, Englewood Cliffs, NJ.
- [40] Matheison, K. (1991): predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. *Information system research*, Vol.2839, 173-191.
- [41] Benedict, R. (2006). *The Chrysanthemum and the Sword*, Chicago, IL: Mariner Books / Houghton Mifflin Harcourt Company
- [42] Doi, T. (2002). *The Anatomy of Dependence*. Tokyo: Kodansha International
- [43] Paul A. and Lin Chai (2002): What drives electronic commerce across cultures? A cross-cultural empirical investigation of the theory of planned behavior. *Journal of electronic commerce research*, vol.3, No.4, pp.240-252
- [44] Malek Al-Majali and Nik Kamariah Nik Mat, 2010: *Journal of Internet Banking & Commerce*; July 2010, Vol. 15 Issue 2, Special Section p1 (<http://www.arraydev.com/commerce/jibc/>) <19-09-2012>
- [45] Gokhan Ozer and Emine Yilmaz, 2011: Comparison of the theory of reasoned action and the theory of planned behavior: An application on accountants' information technology usage, *African Journal of Business Management* Vol.5(1), pp.50-58.