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**Study of consumer attitudes towards connected reader devices in Japan based on the
decomposed Theory of Planned Behavior**

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Abstract

Some of the most interesting developments within mobile and wireless technologies have evolved from an enhancement of our daily life; creating objects and technologies that we can consume to hopefully increase our quality of life. Lately, a new (mobile) convergence is underway globally with new embedded connected devices entering the markets such as the iPad, the Galaxy tablet and dedicated connected reader devices such as Kindle, Librie and the biblio Leaf SP02 launched by KDDI in Japan. The framework of this study focuses on developing a deeper understanding of the attitudes and purchase intentions of end users of eBook readers. To accomplish that objective, the decomposed model of the Theory of Planned Behavior has been used as a guideline. Based on this a survey was carried out with prospective users utilizing Theory of Reasoned Action (TRA) dimensions such as attitude, subjective norm, perceived behavioral control and behavioral intention. Structural equation modeling was used to estimate the maximum likelihood for these dimensions. Results showed that the Theory of Planned Behavior (TPB) and the traditional form of TRA fit the data adequately. To the author's knowledge, this is the first known paper to deeply explore the cognitive constructs underlying purchase intentions of eBook readers.

Keywords: eBook reader; convergence; Theory of Planned Behavior; Theory of Reasoned Action; embedded devices; wireless technology

American historian Tuchman (1980) once said:

Without books the development of civilization would have been impossible. They are the engines of change, windows on the world, 'Lighthouses' (as a poet said) 'erected in the sea of time.' They are companions, teachers, magicians, bankers of the treasures of the mind, books are humanity in print. (p. 13)

Books are easy to use, consisting of a stack of paper, nicely bound and engineered. They can be obtained at a rather low price, are easy to carry around, and are self-explanatory without a necessary manual for their use. However, comparing to the relative advantage of information technology, conventional printed books have considerable limitations.

Traditional printed books are sometimes extremely costly to produce, they take a considerable time to process, store, ship, and they require the management of a long supply chain until they reach the readers. In addition, environmental issues are also related to the processing and manufacturing process. With a dedicated electronic eBook reader device users can carry around hundreds of books as well as have access to hundreds of thousands of books if the device is connected to the internet. These embedded devices are getting more popular around the world, especially in developed countries, such as Japan, the U.S.A and Europe. A number of them are in the market already from different manufactures and new, improved versions are being introduced constantly. According to a forecast by Informa Telecoms (2010), the overall global sales of these new connected embedded devices are expected to grow from 3.65 million in 2010 to close to 50 million in 2011. Along with manufacturers, a number of publishers are also very confident about the positive shift of traditional book publishing industries (Reid, 2002). This development has already started over 10 years ago. For example, palm media, sold more than 180,000 eBooks in 2001 to their 33,000 members, a 400% increase in revenue according to a report by Fictionwise.com, showing an increasing trend of the industry. (Kozak, 1993).

According to Gartner research (2010) in 2010 the worldwide sales for connected eBook readers were expected to reach a total of 6.6 million devices, an increase of roughly 80% compared to the year before. These numbers will likely increase in 2011 to over 11 million, which represents an annual increase of nearly 70%. At the same time, the consumption of eBooks as consumable products is also growing globally with Japan leading all other countries in terms of overall consumption. Interestingly 80% of eBooks in Japan are already consumed on mobile devices (Voyager, 2008). Given this situation it is interesting to look at the Japanese consumer perspective regarding embedded devices and the implications this perspective has for current and future device development. A great deal of academic research has been conducted globally to better understand users in the “active reader” category, which includes knowledge workers and students (Princeton, 2010; Slater, 2010; Christianson & Aucoin, 2005; Snowhill, 2001) but reading for pure leisure and entertainment has not been fully explored so far. This paper offers the first in-depth study of this important consumer segment, creating the beginning of what we hope will evolve into a rich area of academic research going forward. Additionally, this paper serves to expand the scope of the application of the decomposed Theory of Planned Behavior, as outlined by Taylor and Todd (1995), as it relates to readers in Japan. In this specific case the theory has been applied to attitudes towards eBook readers, showing that this theory can be a viable approach to analyzing and understanding consumer attitudes for connected consumer electronic devices within the Japanese market.

For practitioners, this paper helps to support the current discussion about the potential of new embedded devices such as connected readers from a consumer’s perspective and what role cost, connectivity, usability and content play for Japanese users. Therefore, these results will help manufacturers, publishers, carriers as well as government institutions to re-evaluate their current and future strategies related to these embedded devices, especially those that are

dedicated to book reading. Recent research studies dealing with consumer's attitudes towards e-reading as well as e-reader devices show that consumers are concerned with a number of factors related to their adoption and usage including: Cost of the device, cost of content, range of content, overall usability/ease of use, and digital rights management which includes sub-factors such as content sharing, battery life, readability, and single purpose use (Malama, 2005; Mussinelli, 2010; Olswang, 2009; Wei-Ming, 2010). This paper takes a look at how Japanese consumers judge different functions of connected dedicated mobile reading devices, how their attitudes are formed and what role specific constructs play in the development of these attitudes.

The objectives of this paper are:

- To determine what factors/dimensions influence the purchase intentions of the eBook reader segment
- To identify the role that normative factors play on the development of these attitudes

Model and Methodology

Models

Fishbeins (1967) and Ajzens & Fishbeins (1975) Theory of Reasoned Action has already been utilized in a wide range of studies in the past. This model was then later developed into the Theory of Planned Behavior by Ajzen (1986), allowing a better insight into instances where individuals had a lower perception of control of the situation (Sheppard, Hartwick and Warshaw, 1988). Figure 1 shows the model

The TRA and the TPB place emphasis on behavioral intention, which has been proven to be the precursor to actual behavior. Fishbein and Ajzen designed behavioral intention as a weighted sum of subjective norm and attitude in their TRA Model (1975) and also the TPB shares the construct that behavioral intention is a function of subjective norm

and attitude. Ajzen and Madden added perceived behavioral control (PBC) to the TPB model as an additional dimension, to explain the situation where individuals perceive a lacking control of their behaviors (1986; 1992). For our study on eBook readers we decided to use the decomposed model of the TPB by Taylor and Todd (1995) shown in Figure 2. This approach allows to illustrate the relationships between the belief structures related to behavioral intentions better by further decomposing the different elements.

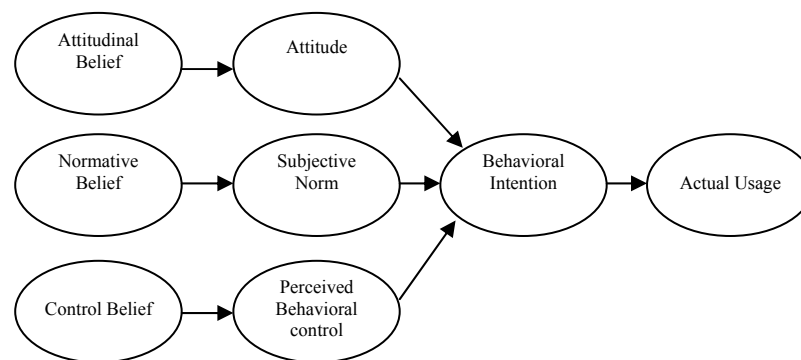


Figure 1 The theory of planned behavior from Ajzen & Madden (1986)

Compared to the TRA and the TPB Taylor and Todd (1995) also proved that decomposed model of the TPB demonstrate the intention behavior better. As eBook readers can be considered innovations in a technical sense we expect the decomposed model of the TPB to provide more in-depth insights into such factors as complexity.

In line with the decomposed TPB model, we adopted the following constructs for our research study as antecedents of attitudes, subjective norm and perceived behavioral control.

1. Relative Advantage
2. Complexity
3. Compatibility
4. Subjective norm
5. Efficacy

6. Facilitating conditions

In general, relative advantage can be seen as how a product or service is perceived as better or more useful than its predecessors. (Rogers, 1983). As noted, connected eBook readers allows customers to read and download books wherever and whenever they want to and so the authors felt that these eBook readers provide relative advantage to users from these enhanced capabilities. The level at which consumers perceive an innovation to be cumbersome to understand or to use corresponds to the second factor of innovation diffusion called complexity (Rogers, 1983). Generally, new technologies which are rapidly adopted are perceived to be less complex and easier to use, thus complexity should be considered as a negative influence on consumer attitudes to new product innovations. Davis, Bagozzi and Warshaw (1989) proved that complexity plays a significant role within the technology adoption decision, with their construct of “perceived ease of use”.

Compatibility describes the match between the innovation and the users overall lifestyle. (Rogers, 1983). Therefore, the factor compatibility is expected to have a positive influence on adoption. Subjective norm is the feeling that an individual has regarding how his or her peers or other important social influences will react to his or her adoption of a new product or service, and in this model has been further separated into normative influences, or those psychological sub-factors that create such social perceptions (Ajzen & Fishbein, 1980). Efficacy (Ajzen, 1991) is the feeling of self confidence to behave positively in a certain situation while experiencing the product (device) or service directly or indirectly (Bandura, 1982). In preparing for this study, we believed that an individual with the skills of using a mobile phone/smart phone/iPad and the internet would be more likely to adopt an eBook reader because they already possessed the skills and therefore the feelings of efficacy required to operate these new devices. Efficacy ensures the comfortableness of using the new

technology. If the individual has the required resources needed to enable a particular behavior this is described as facilitating conditions (Triandis, 1979).

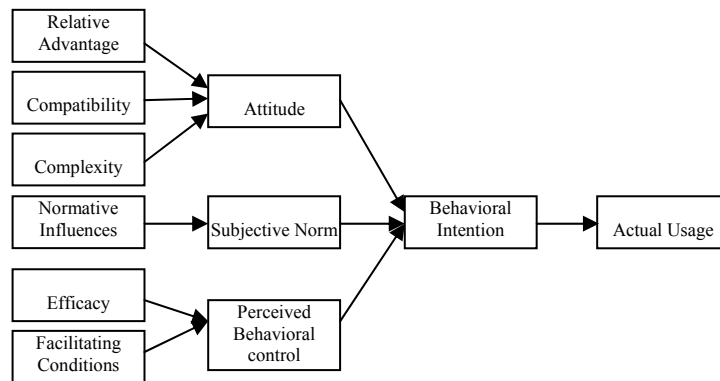


Figure 2: Decomposed Theory of Planned Behavior according from Taylor & Todd (1995)

In this study, data was acquired through surveys amongst Japanese mobile internet users. The questions were derived from past studies as well as qualitative interviews with Japanese consumers, connected eBook reader owners and industry experts. Based on the model combination recommended by Taylor and Todd (1995) measurement items were developed. The questionnaire was pre-tested with a smaller sample of Japanese mobile internet users in order to confirm the validity and reliability of our research methodology. Feedback was obtained from five users and five general civilian with moderate level of knowledge about eBook readers. Based on the positive results from this initial study, we slightly revised our survey instrument and fielded it to our full sample. The study took place from August 2010 to April 2011.

Methodology

Background research on eBook readers and eBook usage in developed countries including Japan was conducted to develop initial models for adoption and usage of these devices. These models served as the foundation of our initial qualitative research interviews where we took a grounded approach as outlines by Glaser & Strauss (1967) to develop our initial survey instrument. To discover the factors affecting purchase intentions of eBook

readers and to identify the role that normative factors that play on the development of these attitudes, an online survey was conducted during the first quarter of 2011.

The survey contributors were either mobile phone or smart phone users who access the internet frequently through their existing mobile devices. Respondent fulfilling the criteria mentioned above have been chosen randomly. 42 responses were collected and 40 were analyzed as two responses remained incomplete. 48% of participants were male and 52% female. A scale from 1 to 7 was used to gather the relevant information for the research model.

Based on the discussions in the previous sections, to determine what factors influence the purchase intentions of eBook readers and to identify the role that normative factors play the following basic hypothesis are proposed for this study:

H1: Relative advantage (RA) has a significant, positive influence on the behavioral (purchase) intention

H2: Compatibility (COM) has a significant, positive influence on the behavioral (purchase) intention

H3: Complexity (CPX) has a significant, positive influence on the behavioral (purchase) intention

H4: Normative influence (NI) has a significant, positive influence on the behavioral (purchase) intention

H5: Efficacy (EFC) has a significant, positive influence on the behavioral (purchase) intention

H6: Facilitating conditions (FCT) has a significant, positive influence on the behavioral (purchase) intention

Results

Table 1 shows the validity test results for the factors through reliability (Cronbach Alpha) test of the constructs.

Construct	No. of Items	α -value
Behavioral intention	3	0.952
Actual Usage	2	0.955
Attitude	3	0.951
Subjective norm	6	0.952
Perceived Behavioral Controls	4	0.954
Relative Advantage	4	0.952
Compatibility	4	0.951
Complexity	4	0.954
Normative Influence	4	0.953
Efficacy	6	0.952
Facilitating Conditions	6	0.952

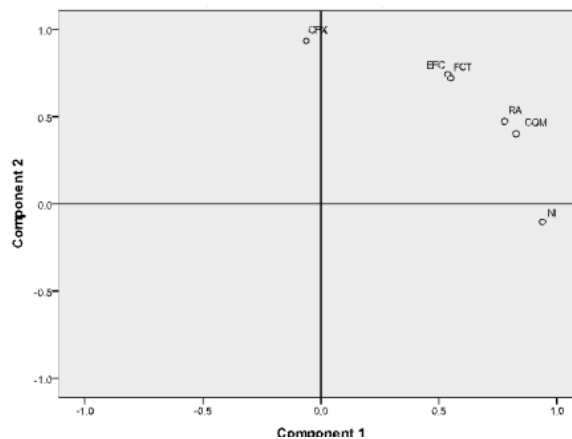
Table 1 Reliability statistics of the items constructs

H1: The hypothesis can be considered significant as the deduced probability has $.001 < \text{significance level } (.05)$; similarly: *H2*: probability has $.000 < \text{significance level } (.05)$; *H3*: probability has $.035 < \text{significance level } (.05)$; *H4*: probability has $.000 < \text{significance level } (.05)$. *H5*: probability has $.000 < \text{significance level } (.05)$; *H6*: probability has $.006 < \text{significance level } (.05)$.

As a data reduction technique, factor analysis has been considered to understand the role of the “Normative influence” as factor. Here, principle component method was applied

by using varimax rotation (Malhotra, 2004). Output shows Kaiser-Meyer-Olkin Measure of Sampling Adequacy is .799; approximate chi-square is 178.30; df is 15.00 and the results are significant at $p < 0.05$.

Our results show that the most important factor in the surveyed sample is normative influence (NI); reported 0.938 in the rotated component matrix and the second most important is the complexity (CPX); reported 0.934 in the rotated component matrix. Respectively, compatibility and relative advantage; the less important factors are efficacy (EFC) and facilitating conditions (FCT) which have a low influence in the model in understanding the purchasing intention of eBook readers. A possible reason could be the familiarity with other similar device since the Japanese market has been technologically advanced for a long time and consumers can be regarded as rather educated in this field.



Graph1 Rotated factor component plot

Table 2 shows the comparison between the decomposed TPB and revised decomposed TPB. The difference in chi square value indicates that the revised model explain the intention of buying behavior better than the pure model. Degrees of freedom ratio (CMIN/DF) proved the acceptable fit between the hypothetical model and the sample data. However, the GFI and CFI show that the pure model is a good fit.

Decomposed TPB		Revised decomposed TPB
χ^2	72.221	74.009
P	.000	.000
GFI	0.789	0.793
CMIN/DF	2.407	1.980
CFI	0.829	0.849
RMSEA	0.098	0.078

Table 2 **Decomposed TBP and revised decomposed TBP comparison.**

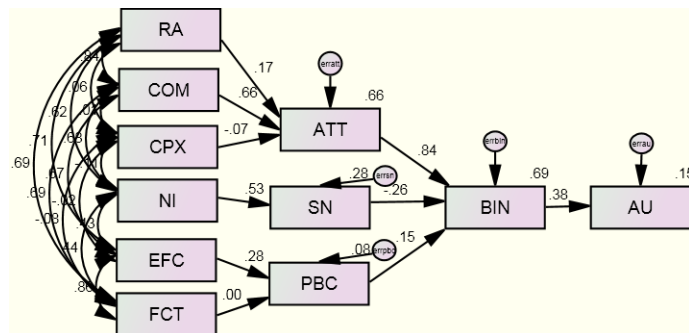


Figure 3 Decomposed TPB path model.

The comparison between the decomposed TPB and revised decomposed TPB shows that the efficacy does not have a strong influence on purchase behavior intention. The influence on complexity on attitude is negative (-.07). Relative advantage, compatibility and complexity are significantly related to attitude. On the other hand the P value $.000 < .001$ between subjective norm and normative influence and also the positive correlation with the compatibility (0.686) and relative advantage (0.685) signifies that in the Japanese market NI has a strong and positive influence within the sub-factors of our models

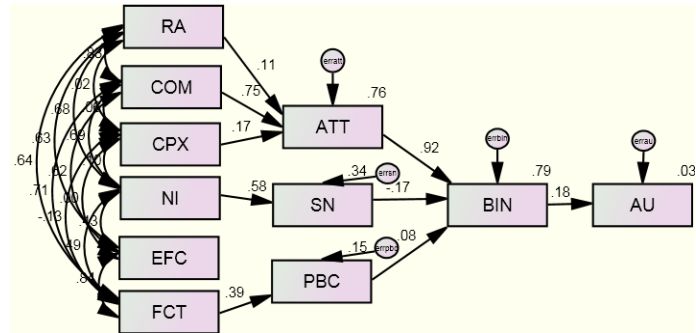


Figure 4 Revised decomposed TPB path model.

Our results clearly show that attitudes by far have the strongest influence on overall purchase intentions ($r=0.92$, $p<0.01$) and that compatibility has the strongest influence on the creation of these attitudes ($r=0.75$, $p<0.01$). Surprisingly, in a strong social culture such as Japan, subjective norm was negatively correlated with purchase intentions ($r=-0.17$, $p<0.01$). And our measures of normative influences predicted these subjective norm results ($r=0.58$, $p<0.01$). Finally, perceived behavioral control had a very minor influence on purchase intentions ($r=0.08$, $p<0.01$).

Discussion

This initial limited study can only provide basic first insights into the different dimensions that may influence Japanese consumer's purchase intentions towards connected eBook readers. We find that the issue of normative influence, compatibility and complexity are one of the key determinants of consumer attitudes about purchasing connected eBook reader devices, and these attitudes in turn hold the key role in the development of these intentions. This is especially true for the normative influence and the complexity dimension.

Normative influence

As seen from the analysis, normative influences are one of the key factors affecting subjective norms within the study. The special role and importance of society, social conformity and the influence of peer groups in Japan has been discussed in several sociological and ethnological publications over decades (Benedict, 2006; Doi, 2002; Davies,

2002; Nakane,1972; Ronald & Alexy, 2010). In our small survey we were able to see that normative influences in Japan also play a major role when it comes to technical devices and services such as connected eBook readers. Surprisingly we have found that the opinions of important others has a negative and significant influence on purchase intentions.

One reason for this may be that connected eBook readers are not yet considered “fashionable” in mainstream Japan, and we have found the beginnings of a new trend beginning to emerge. As connected eBook readers begin to become more widely adopted, we would anticipate that these results will begin to shift to the positive side.

Compatibility

Another influencing factor identified in the study is compatibility. While relative advantage held little influence on attitude development, their counterpart, compatibility did. In the case of connected eBook readers consumers emphasized the role of compatibility of these devices and the content available through them with their current lifestyle and intended use.

Complexity

Together with normative influences, complexity is one of the strongest influencing factors we identified (see Graph 1). Different from the specific importance of the normative component in Japanese society, complexity (and compatibility) could be seen as a more general, cross-cultural dimension. For complex devices like connected eBook readers it might be essential that these devices are perceived as not so complicated to use and have to be compatible with the users’ current lifestyle. (Not requiring a major additional investment in terms of time and money from the users’ side to get used to the technology and the actual usage) What might sounds like a paradox also holds a potential for future research, In a world of increasingly complex devices the key to consumer acceptance can lie in reducing the complexity of these devices for the user. One way could be by increasing the complexity

of the system itself through intelligent “natural” interfaces (touch, voice, emotions, eye movements, etc), combined with a connected system that can provide anticipational services (behavior based, skill based, preference based, etc) that would easily fit with a users existing lifestyle and even enrich and empower this lifestyle. With such an approach in mind, the concept of “complexity” would change So a rethinking of the dimension ‘complexity’ might be fruitful in future research and replacing it with the dimension of ‘simplicity’.

Conclusion and Future Research

This paper serves as an initial qualitative evaluation and inspiration for future research. In this current study, the decomposed TPB proved to be a viable framework to analyze consumers purchase intentions for complex devices such as connected eBook readers. We found that above all other factors, attitudes about connected eBook readers were the most important factor contributing to purchase intentions, and that the construct of compatibility was the main driver of such attitudes. These results hold potentially vital insights for future researchers as well as practitioners.

Additionally, we believe that the construct of ‘complexity’ could be either substituted or developed further into one which we call ‘simplicity’, where technology itself plays an active role in reducing the perceived or actual complexity for the consumer, thus further enhancing the meaning of the Compatibility dimension as well.

Therefore it would be interesting to delve further into this field of ‘simplicity’, in future studies, analyzing how connected consumer technologies and services can be divided into complex, simple and simplex , how simplicity can be included into the decomposed TPB, TAM or even serve as a new approach by itself.

Finally, the next stage of this research will include a far larger user panel that will provide us with results that can be generalized to the entire Japanese population. While these initial results have provided some important insights into the determinants of purchase

intentions for connected eBook readers, a more comprehensive and global study will help clarify these initial results and allow us to generalize them to other markets around the world.

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