

# Adoption of Mobile Apps: The Role of Experience

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The form of initial experience with mobile application determines consumers' likelihood to adopt it. This paper examines the effects of two forms of experience: direct versus indirect, toward the formation of consumers behavioral intentions (versus behavioral expectations) to adopt mobile applications. A direct experience induces concrete mental process that underlies the formation of behavioral expectations, whereas an indirect experience induces abstract mental process that underlies the formation of behavioral intentions. Results from Experiment 1 show significant increased in behavioral expectations' predictive ability when subjects engaged in a direct experience than an indirect experience. Meanwhile, the effects of a direct experience were subtle toward behavioral intentions' predictive ability. In Experiment 2, the intensity of direct experience revealed additional caveats on the predictive ability of behavioral intentions and behavioral expectations. It is found that higher intensity of a direct experience has a stronger effect toward behavioral expectations than behavioral intentions. Findings of these experiments could be used as a ground to design an intervention strategy for mobile applications pre-adoption experience.

**Keywords:** behavioral intentions, behavioral expectations, direct experience, intensity of experience, mobile applications

Bentuk pengalaman dalam menggunakan mobile applications turut menentukan keseriusan konsumen dalam memutuskan untuk iya tidaknya mereka mengadopsi aplikasi tersebut. Berdasarkan hal itu, penelitian ini bermaksud mengukur efek dari dua bentuk pengalaman: pengalaman langsung dan pengalaman tidak langsung, terhadap behavioral intentions (versus behavioral expectations) konsumen untuk mengadopsi sebuah mobile applications. Pengalaman langsung dipercaya bisa merangsang bekerjanya proses berpikir yang konkret yang melandasi pembentukan behavioural expectations seseorang. Sementara dalam pembentukan behavioral intentions seseorang, justru pengalaman tidak langsung-lah yang berperan. Hasil dari Eksperimen 1 menunjukkan adanya kenaikan signifikan dari kemampuan prediksi behavioral expectations seseorang saat ia menerima pengalaman langsung. Sementara efek pengalaman langsung tidak terlalu kuat dalam meningkatkan kemampuan prediksi behavioral intentions seseorang. Dalam Eksperimen 2, teridentifikasi bahwa intensitas dari pengalaman langsung yang dialami seseorang turut mempengaruhi kemampuan prediksi behavioral intentions dan behavioral expectations. Dalam hal ini, intensitas pengalaman langsung yang tinggi memiliki pengaruh yang kuat terhadap behavioral intentions daripada terhadap behavioral expectations. Hasil dari penelitian ini diharapkan bisa menjadi landasan dalam menyusun pengalaman yang tepat sebagai strategi intervensi pada tahap pre-adoption untuk mobile applications.

**Kata kunci:** behavioral intentions, behavioral expectations, direct experience, intensity of experience, mobile applications

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## Introduction

The interaction between consumers and their mobile devices have changed dramatically in recent years. Mobile devices, such as smart phones and tablets, offer abundant applications (apps) to consumers and enable them to per-

form activities beyond calling, messaging and browsing. It is reported that around 570,000 apps are available for smart phone users (Davidsson & Moritz, 2011), and no less than 5,000

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new apps are launched by developers every day (Sharma, 2010). As the number of downloadable mobile applications grows exponentially, partly since most of them can be downloaded for free, the gap between adoption and actual usage increases. The main reason behind consumers' adoption of a mobile application is no longer because the app is needed, but it is more because the adoption process is almost effortless and risk free. Consumers adopt apps that they desire, not necessarily the apps that they need.

In that particular situation, only a limited number of apps are actually used regularly and thus generate sustainable business for the developers. Hence, competition intensifies; on average a typical consumer adopts only 60 apps in their mobile device lifetime (Sharma, 2010). It is not merely a difficult situation for the developers, but more importantly it is also difficult for consumers. The abundant choice of apps could be frustrating for consumers. As a result, it is becoming more difficult to predict consumers' adoption of an app. Our ability to forecast whether a particular app will be a hit is diminishing. Therefore, it is important for marketers and researchers to increase the accuracy of their prediction. Of various noteworthy notion, the predictive accuracy of new technology (mobile apps) adoption could be determined by what construct is being used as an immediate predictor (Bagozzi, 2007).

*Behavioral intentions* (BI) is considered as one of the most widely used immediate predictor of technology adoption (Straub Jr & Burton-Jones, 2007). Largely because BI has been incorporated in the Technology Acceptance Model (TAM; Davis, 1986). Intention is described as "the degree to which a person has formulated conscious plans to perform or not perform some specified future behavior" by Warshaw and Davis (1985b, p. 214-215). A typical measurement item for BI is "I intent to adopt X". It is a highly influential predictor of behavior in various field, including psychology, marketing and information system. Although popular, it has some limitations. Bagozzi (2007) contend that intention changes over time and has a limited ability to capture various factors that surrounds new technology adoption. Hence, it only has modest ability to accurately predict adoption of

new technology (Mahardika, Thomas & Ewing, 2012). In the meantime, Venkatesh, Maruping and Brown (2006) contend that some of the limitations of BI can be addressed by a similar but overlooked construct, *behavioral expectations* (BE). Warshaw and Davis (1985b, p. 214-215) described BE as "the individual's estimation of the likelihood that she/he actually will perform some specified future behavior". One of typical BE measurement item is "I expect to adopt X". BE was proposed to address some limitations of BI since it has a stronger ability to capture and account for various factors that important in the adoption of new technology, including experience (Venkatesh et al., 2006). In addition, prior studies found BE as a better predictor of behaviour compared to BI in various contexts, including health (e.g. Gordon, 1990), academia (e.g. Gordon, 1989), and social behavior (Warshaw and Davis 1984, 1985a, 1985b).

Despite its ability to overcome some limitations of BI, BE is still largely overlooked. One of the most notable reason is the notion that both constructs are basically measuring similar things (Sheeran, 2002). This notion, however, cannot be generalized. Prior studies examined the boundary conditions of that notion, and found that BI and BE are indeed different in some contexts (e.g. non-volitional behavior (Warshaw and Davis, 1985b); pro-environmental behavior (Mahardika, Thomas & Ewing, 2011). Therefore, It is important to clarify the different role of BI and BE as immediate predictors of behavior. One way to do it is by identifying key determinant that stimulate different effects toward the formation of a person BI and BE. This paper proposes *experience* as one of key determinant that may disentangle BI and BE. Consumers often rely on the direct experience in their first encounters with the app to indicate their likelihood to adopt it. Smith et al. (1999) described experience as "specific feelings or emotions that are engender by computer-related stimuli" (p. 241). Specifically, direct experience prompts more concrete mental judgments (Smith & Swinyard, 1983), which may reinforce consumers' BE rather than their BI.

Based on aforementioned background, the main objective of this paper is to examine the effects of direct experience on the predictive ability of BI and BE. Hypotheses were tested

using experimental methods in a laboratory setting. Apps trial was given to the subjects in two experiments and subsequently their BI/BE were recorded. The findings from these experiments provide valuable insights in specifying the role of experience in the adoption of mobile apps.

## Literature Review

In this internet era, consumers' minds are continuously challenged by a constant flow of stimuli and information. As a result, their behavior is increasingly difficult to be predicted (Peterson, Balasubramanian, & Bronnenberg, 1997). For example, a person who initially has a 60% probability to purchase an app may have a lower probability to purchase (e.g. 40%) after reading reviews about the app. S/he read about the flaw of the app and follow reviewers suggestion to purchase another app instead. In short, consumers' intention to purchase an app changes over time as new stimulus arrives and then challenge their judgments. This makes their minds become increasingly volatile, which prompts difficulty in predicting their behavior.

As previously mentioned, we have been borrowing BI (mainly from TAM) heavily to predict consumers' adoption of new technology. This paper contends that this overreliance towards BI needs to be reconsidered. It is since BI has some limitations that lowered its predictive ability (Bagozzi, 2007). In order to address this limitation, we should aim to compare BI with similar and sometimes confounded construct—BE, proposed by Warshaw and Davis (1985b). BE may overcome the shortcomings of BI such as BI's limited ability in dealing with non-volitional behavior. Conversely, BE is considered as better predictor for non-volitional behavior since a person who form a BE judgments integrate both her/his perceived control toward performing the targeted behavior and foreseeable events that may challenge her/his BE (Mahardika, Thomas & Ewing, 2009).

As stated earlier, 'experience' plays an important role in the consumers' adoption of new technology, such as mobile apps. Venkatesh et al. (2008) observed that experience with new technology reduce users' perceived uncertainty over the new technology, and thus increase their sense of control on it. Given this nature,

experience may gives different effects on BI and BE. As it is evidenced, increasing experience strengthen the relationship between BI and technology adoption/use, while weaken the relationship of BE and technology adoption/use (Venkatesh et al., 2006; 2008).

Generally, consumers' first experience with the new technology occur either directly or indirectly. An example of a direct experience is a consumer who try out a 3D TV in manufacturer's showroom, whereas an indirect experience is when s/he is watching an advertisement about a 3D TV. According to Fazio and Zanna (1981), an attitude that based on direct experience tend to have a higher predictive ability compared to attitude that based on indirect experience. It is since direct experience offers augmented information than an indirect experience, which is required in the formation of a cognitive judgment. It is also reported by Smith and Swinyard (1983) study that a product trial (direct experience) produce stronger attitude-behavior relationships compared to verbal description from an advertisement. In this sense, product trial generates non-verbal information, an augmented information that stimulates cognitive judgment more comprehensively compared to verbal-only information generated by advertising exposure. More importantly, direct and indirect experience leads to affect different formation of cognitive judgments. A direct experience tend to form more concrete stimulation, whereas an indirect experience tend to form more abstract simulation (Hamilton and Thompson, 2007).

The efficacy of direct versus indirect experience in the adoption of technology could be an important factor for testing the boundary conditions of BI and BE predictive ability. A direct experience provides augmented stimulation to support the underlying process of a person's judgments toward adopting a new technology. In her/his encounter with the technology, s/he obtains ample amount of information from various senses: visual, audio, verbal and physical. Meanwhile, an indirect experience provides only limited information to support the underlying process of her/his judgments, thus trigger her/his needs for additional abstraction to substitute the missing information. In this sense, a direct experience induces a more concrete

mental process, whereas an indirect experience induces a more abstract mental process (Hamilton and Thompson, 2007).

In this backdrop, it is important to investigate whether and how the formation of BE and BI to adopt mobile apps differ because of direct (versus indirect) experience. Prior experience with targeted new technology should affect the formation of BI and BE judgments. However, it has not been clarified in prior studies whether the effects of a direct experience on BI/BE differs than the effects of an indirect experience.

## Hypotheses

It has been reported that an indirect experience increase subjects' preference toward highly desirable product that is less feasible to be acquired, whereas a direct experience increase their preference on low desirable but more feasible to be acquired product (Thompson, Hamilton & Rust, 2005). In addition, Hamilton and Thompson (2007) observed that a direct experience induces a more concrete mental process, whereas an indirect experience induces a more abstract mental process. It can be implied that an indirect experience stimulates more abstract (unrealistic) mental process (more desire, less feasible), while a direct experience stimulates more concrete (realistic) mental process (less desire, more feasible). Mahardika et al. (2012) contend that for a behavior that is non-volitional, BI describes a person's *desire* to perform the targeted behavior, while BE describes her/his estimation whether performing the targeted behavior is feasible or not feasible. Therefore, encounter with an indirect experience should strengthens a person's BI judgments, whereas encounter with a direct experience should strengthens a person's BE judgments.

Given the aforementioned nature of BI and BE, a direct (and an indirect) experience should stimulates different effects on the two constructs. In making an evaluation whether a targeted behavior is desirable or not, a person generally use a more abstract mental process. At the other hand, a person requires more concrete mental process to examine whether the targeted behavior is 'feasible' to be performed or not. For example, a fresh college graduate aims to purchase a luxury apartment in a near

future can be referred as a desire, if induced by motivation to build his/her social image as a successful person—or can be referred as feasible or unfeasible, if induced by a careful calculation on the availability of resources s/he had or will have to purchase the property. In a sense, BI will best fit as an immediate predictor of the former, while BE will best fit to predict the later.

As for volitional behavior, the intensity of the effects of experience toward the formation of BI and BE are lesser than non-volitional behavior. This is of interest of this paper, since adoption of mobile apps is a typical volitional behavior. Thus, this paper contends that the effects will be similar, whether it is a volitional or non-volitional behavior. It is only the intensity of the effects that will be different. Hence, in a context of mobile apps adoption, a direct experience will have stronger effects toward BE than BI. Conversely, an indirect experience will have stronger effects on BI than BE. Specifically, this applies if subjects have positive attitude toward the apps. Grounded from above discussion, this paper hypothesizes:

**Hypothesis 1a:** *BE is higher than BI for subjects engaged in a direct experience.*

**Hypothesis 1b:** *BI is higher than BE for subjects engaged in an indirect experience.*

The influences of direct experience should also increase the accuracy of a person's prediction towards performing the targeted behavior. Smith and Swinyard (1983) reported that the consistency between attitudes – behavior is greater for subjects engaged in a direct experience than subjects engaged in an indirect experience. Therefore, this paper contends that a direct experience could strengthen the relationship between BE – apps adoption, whereas the effects are lesser toward BI – apps adoption relationships. On the other hand, the influence of an indirect experience should strengthen the relationship of BI – apps adoption, while the effects are lesser for BE – apps adoption. Hence, this paper hypothesizes that:

**Hypothesis 2a:** *A direct experience will strengthen BE – Apps Adoption relationship relative to BI – Apps Adoption relationship.*

**Hypothesis 2b:** *An indirect experience will strengthen BI – Apps Adoption relationship relative to BE – Apps Adoption relationship.*

Finally, the intensity of a direct or an indirect experience could reveal additional caveats on the predictive ability of BI and BE. A more intense direct experience (i.e. longer trial period, more free features, etc) should reinforce a person's realistic judgments toward adopting or not adopting new technology (Venkatesh & Bala, 2008). Therefore, BE should be higher than BI when the direct experience is more intensive. Conversely, a less intense direct experience (i.e. simple and quick trial, etc.) will weaken her/his realistic judgments since there are not enough information to comprehend all aspects of the app. In this particular situation, BI should be higher than BE since BI measures will less likely to activate comprehension toward such information. Thus, this paper hypothesizes:

**Hypothesis 3a:** *BE is higher than BI when the intensity of a direct experience is high.*

**Hypothesis 3b:** *BI is higher than BE when the intensity of a direct experience is low.*

## Methods

These three hypotheses will be examined using two experiments. Experiment 1 was designed to examine H1 and H2, while Experiment 2 was designed for H3. Results and implications are discussed subsequently.

### Experiment 1

#### *Methodology*

#### **Participants, Design and Procedure**

149 undergraduate students (64 percent female) from an Australian university agreed to voluntarily participate in this study. They were randomly assigned in a between subjects of 2 (direct, indirect) experience x 1 mobile apps adoption. 2D barcodes reader was selected as mobile application to be adopted by the participants. The direct experience group was given an actual trial on 2D barcodes reader. They were using mobile phones (supplied by researcher) pre-installed with 2D barcode reader to scan an

actual 2D barcodes in an advertisement. In addition, participants from this group were also given an opportunity to create their own 2D barcodes using 2D barcodes generator. On the other hand, the indirect experience group was instructed to watch an instructional video about how to use 2D barcodes reader app.

The experiment was conducted in a laboratory setting. The product trial (direct experience) and video instruction (indirect experience) were given to the participants in the beginning of the study. Accordingly, participants responded to a questionnaire containing BI and BE items. At the end of the questionnaire, participants' actual adoption was examined. They were given two options of reward: a drink voucher worth \$3 and a 2D barcodes reader application worth \$3. Their choice of 2D barcodes reader determines their adoption of this app.

#### Measures

Subsequent to their encounter with a direct (or an indirect) experience, participants responded to the BI or BE questions. Both BI and BE items were operationalized based on the guidelines of Warshaw and Davis (1985a), Gordon (1989; 1990), and Venkatesh et al. (2008). BI and BE were measured on a 9-point Likert scale, where -4 = 'strongly disagree' and 4 = "strongly agree". The BI and BE measures were adapted to fit the context of mobile apps adoption. The 3-item BI scales were: "I intent to adopt 2D barcodes reader", "I predict I will adopt 2D barcodes reader", and "I plan to adopt 2D barcodes reader". The 4-item BE scales were: "I expect to adopt 2D barcodes reader", "I will adopt 2D barcodes reader", "I am likely to adopt 2D barcodes reader", and "I am going to adopt 2D barcodes reader".

### Experiment 2

#### *Methodology*

#### **Participants, Design and Procedure**

124 undergraduate students (67.7 percent female) from an Australian university agreed to voluntarily participate in this study. They were randomly assigned to conditions of a 2 (high, low) intensity of experience x 1 adoption of

mobile apps. The context is adoption of motion Short Message Service (SMS) application. Motion SMS application allows mobile phone users to use hand gestures to perform some simple SMS commands, which provides a simple shortcut that can be useful for users in a situation such as driving, eating, or walking. The low intensity of experience group was given a set of hand gestures that can be easily performed, allowing them to try (experience) the application in a quick and simple way. Meanwhile, the high intensity of experience group was given a set of difficult hand gestures to command the app. It allows them to try the app in an intense and engaging way. The study was conducted at a laboratory setting. One set of hand gestures were given to each participant in the beginning of the study. Accordingly, participants responded to a questionnaire containing BI and BE items.

## Measures

After given a manipulation, participants responded to the BI or BE questions. Both BI and BE items were operationalized based on the guidelines of Warshaw and Davis (1985a), Gordon (1989; 1990), and Venkatesh et al. (2008). BI and BE were measured on a 9-point Likert scale, where -4 = ‘strongly disagree’ and 4 = ‘strongly agree’. The BI and BE measures were adapted to fit the context of new technology adoption. The 3-item intention (BI) scales were: ‘‘I intent to adopt motion SMS application’’, ‘‘I predict I will adopt motion SMS application’’, and ‘‘I plan to adopt motion SMS application’’. The 4-item expectation (BE) scales were: ‘‘I expect to adopt motion SMS application’’, ‘‘I will adopt motion SMS application’’, ‘‘I am likely to adopt motion SMS application’’, and ‘‘I am going to adopt motion SMS application’’.

## Results and Discussion

Results from Experiment 1 and Experiment 2 will be presented and discussed in this section.

From Experiment 1, it is indicated that BE is higher for direct experience group ( $M_{BE,DE} = 5.47$ ) than indirect experience group ( $M_{BE,IE} = 4.39$ ) and the mean difference between the two groups is significant ( $p < .05$ ). Thus, it can be

implied that BE is higher for subjects engaged in a direct experience than to subjects engaged in an indirect experience. Meanwhile, BI is marginally lower for direct experience group ( $M_{BI,DE} = 4.93$ ) than indirect experience group ( $M_{BI,IE} = 5.09$ ) and the mean difference between the two groups is not significant ( $p > .10$ ). This result shows that the formation of BI is not subject to the type of experience encountered by participants, whether it is a direct experience or an indirect experience. A possible reason could be the tendency that the formation of BI judgments reflects subjects’ preconceived desire toward the app. Thus, they neglected any relevant new information at any type (either concrete or abstract) when responding to BI measures. At the other hand, subjects that responded to BE measures were taking into account the type of information to estimate the feasibility of adopting the app, not merely because their desire toward it. In this case, it is evidenced that more concrete information from a direct experience reinforces the mental process of BE judgments.

In examining hypothesis 1, Table 1 and Figure 1 provide an interesting finding. BE is indeed higher than BI for direct experience group ( $M_{BE,DE} = 5.47 > M_{BI,DE} = 4.93$ ), however the mean difference between the BE and BI subjects is not significant ( $p > .10$ ). Thus, Hypothesis 1a that predicts the effects of a direct experience is stronger on BE than BI is not supported. One possible explanation is the propensity of a direct experience to provide optimal information that required in the formation of both BE and BI judgments. This optimal information allows subjects from BE and BI group to make better (more accurate) estimation, regardless which measurements (BE or BI) they were responded to. Meanwhile, BI is indeed higher than BE for indirect experience group ( $M_{BI,IE} = 5.09 > M_{BE,IE} = 4.22$ ) and the mean difference between BE and BI subjects is significant ( $p < .05$ ). Hence, Hypothesis 1b that predicts the effect of indirect experience is stronger on BI than BE is supported. This confirms the notion that BI describes a person desire of performing the targeted behavior; in which different type of experience have trivial effects in changing her/his BI judgments. Conversely, a person who responded to BE measures takes into account different type of experience. A more concrete

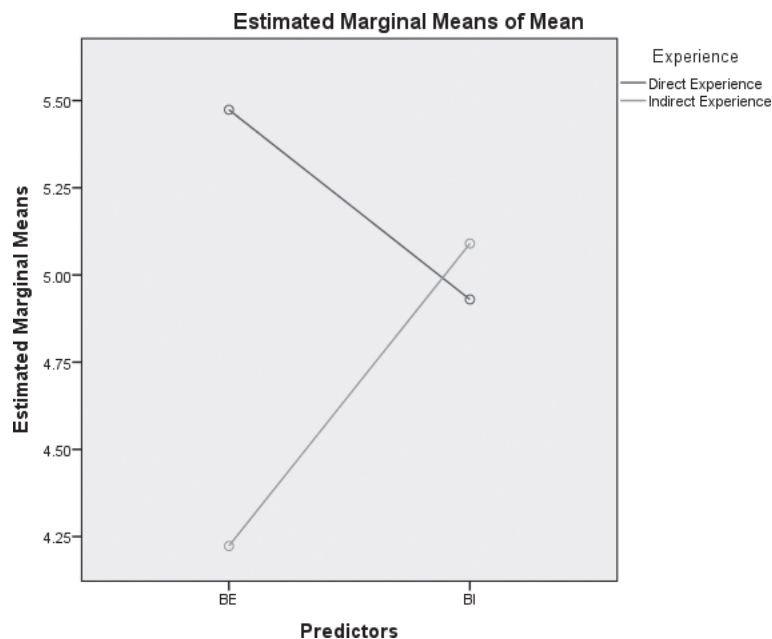


Figure 1. Direct and indirect experience: BI versus BE

Table 1. Direct and indirect experience: BI versus BE

Type of experience	BI	BE	d.f.	t	Sig.
Direct experience	4.93	5.47	74	1.15	.26
Indirect experience	5.09	4.22	72	2.20	.03

Table 2. Pearson Correlation of BI-Adoption and BE-Adoption

Relationships	Direct experience (N = 38)	Sig.	Indirect experience (N = 37)	Sig.
BI – Adoption	.24	.16	.04	.82
BE – Adoption	.39	.02	.10	.57

information from a direct experience reinforce her/his confidence on the feasibility of adopting the app. Meanwhile, more abstract information from an indirect experience is not adequate to estimate the feasibility of adopting the app. Hence, BE is lower for subjects in indirect experience group compared to subjects in direct experience group.

On the examination of hypothesis 2, it is indicated in Table 2 that the correlation between BE – Adoption for direct experience group ( $r_{BE,DE} = .39$ , two-tailed) is significant ( $p < .05$ ), while the correlation between BI – Adoption ( $r_{BI,DE} = 0.24$ , two-tailed) is not significant ( $p > .10$ ). Thus, Hypothesis 2a that predicts BE has a greater predictive ability compared to BI for direct experience group is supported. This result confirms that BE is a more accurate predictor of apps adoption than BI when more concrete information is provided. On hypothesis 2b, both correlation between BI – Adoption ( $r_{BI,IE} = .04$ , two-tailed) and BE – Adoption ( $r_{BE,IE} = .10$ , two-tailed) for indirect experience group are not significant ( $p > .10$ ). Therefore, Hypoth-

esis 2b that predicts BI has a greater predictive ability compared to BE for indirect experience group is not supported. There are two possible explanations for Hypothesis 2b rejection. First, more abstract information induces attitude – behavior gap. A subject who reported a high likelihood of adopting the app does not necessarily will actually adopt it. The tendency of this attitude-behavior gap is evidenced in both BI and BE, however it was higher for subjects who responded to BI measures than subjects who responded to BE measures. Second, subjects who have a positive attitude toward the app (2D barcodes reader) tend to overestimate their BI or BE judgments when they are exposed only to an indirect experience.

Finally, based on the results from Experiment 2 presented in Table 3 and Figure 2, it is confirmed that BE is indeed higher than BI when subjects encounter high intensity of direct experience ( $M_{BE,HDE} = 4.85 > M_{BI,HDE} = 3.83$ ;  $p < .10$ ), and therefore hypothesis 3a is supported. Subjects who receive a more challenging hand gestures were more likely to experi-

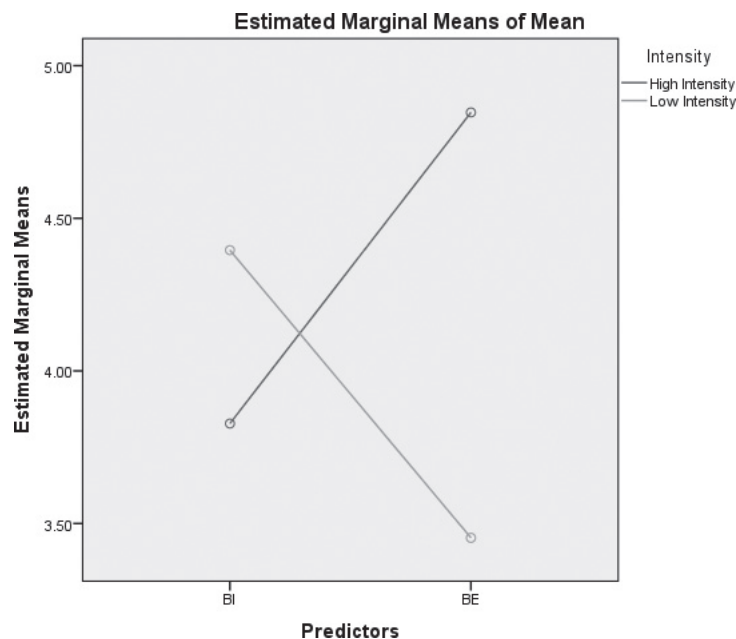


Figure 2. Intensity of direct experience: BI versus BE

Table 3. Intensity of direct experience: BI versus BE

Intensity of experience	BI	BE	d.f.	T	Sig.
High intensity	3.83	4.85	58	1.79	.08
Low intensity	4.39	3.45	62	1.86	.07

ence higher engagement with the app. Thus, it reinforces their (realistic) judgments toward adopting (or not adopting) it. In particular, the reinforcement effects were greater toward BE than BI. On the other hand, for a low intensity of direct experience group, BI is indeed higher than BE ( $M_{BI,LDE} = 4.39 > M_{BE,LDE} = 3.45$ ;  $p < .10$ ), and therefore hypothesis 3b is supported. A less intense direct experience (i.e. simple hand gestures) may challenge subjects' realistic judgments toward adopting motion SMS app. In a sense, they perceive that the information to comprehend all aspects of the app is not adequate to make an accurate judgment. In particular, subjects who responded to BE measures indicate higher sensitivity toward it compared to subjects who responded to BI measures.

## Conclusion

This study compares two immediate predictors of technology adoption: BI and BE as a function of direct and indirect experience. Despite have been widely used as a predictor of technology adoption, BI by no means perfect. The boundary conditions of BI predictive ability, in particular its limited ability to account for experience, were tested in this study. BE is

introduced to address this limitation of BI since it has a higher ability to capture the effect of experience toward subjects' judgments of adopting new technology. Hypotheses were tested using two experiments, in which mobile apps adoption were employed as a context. Results from Experiment 1 provides support that: (1) the effects of indirect experience is stronger on BI than BE; (2) BE has a greater predictive ability compared to BI for direct experience group; and (3) BE is indeed higher than BI when subjects encounter high intensity of direct experience. These findings contribute to the discussion about the role of BE as a better immediate predictor of technology adoption in consumers' context compared to BI.

### Implications for research

In the context of mobile apps, consumers who encounter a direct experience (i.e. through the free version of the app) form a different mental judgments compared to consumers who encounter an indirect experience (i.e. from reviews or video instruction). A direct encounter with the app provides more concrete information and more diverse experience from different type of stimulus (Jones and Clark, 1995). Con-



sequently, a direct experience with mobile app strengthens consumers' ability to identify, and thus anticipate impediments to adopt the targeted mobile app. On the other hand, an indirect encounter provides more abstract information and more homogenous experience, which less likely to improve consumers' ability to identify and anticipate impediments to adoption.

The results from this study mainly contribute to the discussion of the prediction of new technology adoption in consumers' context. This paper contends that the predictive ability of BI has some boundary conditions. Specifically, BI has a lower predictive ability in the situation where a subject is given a more concrete information upon the targeted new technology. This paper suggests BE as a better alternative compared to BI in the situation where subjects encounter a direct experience. However, similar to the study of this nature, this paper has some limitations. One notable limitation is related to the design of the experiment that uses a lab setting. This has lowered the external validity of the results.

In order to expand the discussion of the boundary conditions of BE versus BI predictive ability, this study suggest three avenues of research to be pursued. First, it could be useful to examine the role of self-efficacy or a subject's ability to use the targeted new technology in the formation of BE (versus BI) judgments. Warshaw and Davis (1985b) contend that ability limitations may be considered as an important factor in the formation of a person's BE judgments. For example, high academic achievers are found to have a higher BE-behaviour relationship compared to low academic achievers (Gordon, 1989). Second, we may also interested in measuring the efficacy of subject's perceived risk toward the formation of BE (versus BI) judgments in the adoption of new technology. Venkatesh et al. (2008) suggest that BE has a higher ability to incorporate uncertainty than BI. Hence, different level of risks should have lesser effects on BE, while they may have a significant effect on BI. Finally, it will be important to understand the influence of peer endorsement on BE versus BI judgments. Ajzen (1991) suggests that social factors, such as peer endorsement, may reinforce a subject's perceived control toward performing the targeted

behavior. This in turn, should reveal the different conceptualization of BE versus BI on their ability to take into account subjects' perceived behavioral control. Prior research found BI has a limited ability to capture perceived behavioral control (e.g. Ajzen, 1991), whereas BE found to have a better ability in capturing subjects' perceived behavioral control (e.g. Venkatesh et al., 2006). Therefore,

### *Implication for practice*

The findings from this study provide some key marketing implications. One notable implication is relevant to the notion that a product trial or a direct experience increases subjects' likelihood to adopt mobile apps. In particular, a direct experience strengthen the relationship between BE - Adoption, while weaken the relationship between BI - Adoption. According to this results, if using a product trial strategy (direct experience), marketers need to incorporate BE as a basis for developing a designed intervention to increase consumers' adoption of new technology. Consumers' BE judgments could be intervened by allowing them to get relevant information for estimating the feasibility of adopting the targeted product. This can be followed by a marketing communication strategy emphasized on the information that stimulates more concrete mental process rather than abstract mental process.

On the context of the mobile app used in this study, there is an interesting insight from the findings. 2D barcodes was purportedly developed to track manufactured vehicle spare parts. However, this role has evolved dramatically when marketers identified various applications of 2D barcodes for marketing (Beck, 2011). For example, 2D barcodes can be embedded on an advertisement, which enable marketers to track consumers' response toward the advertisement. Although 2D barcodes become increasingly popular, its adoption rate is still relatively low as most consumers overlook the value of 2D barcodes on their first encounter as their mobile devices are unable to read the codes (Kelly & O'Brien, 2011). This paper suggests marketers to intensify their effort in educating consumers about how to download and acquire 2D barcodes reader. Marketers and developers of

2D barcodes may have been too relying on an indirect approach (e.g. video instruction on the internet) to educate consumers about the value of 2D barcodes reader or the 2D barcodes ecosystem in general. In addition, this study con-

tends that a more direct approach (e.g. push approach, such as product trial) could be a better alternative to increase the adoption rate of 2D barcodes reader.

## References

- Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour & Human Decision Processes*, 50(2), 179.
- Bagozzi, R. P. (2007). The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift. *Journal of the Association for Information Systems*, 8(4), 244-254.
- Beck, K. (2011, January). Barcodes Reach a New Dimension. *Customer Relationship Management*, 15(1), 14-15.
- Davidsson, C., & Moritz, S. (2011). Utilizing implicit feedback and context to recommend mobile applications from first use. Paper presented at the Proceedings of the 2011 Workshop on Context-awareness in Retrieval and Recommendation.
- Davis, F. D. J. (1986). *A Technology Acceptance Model for Testing New End-User Information Systems: Theory and Results*. Ph.D., Massachusetts Institute of Technology, United States -- Massachusetts.
- Fazio, R. H., & Zanna, M. P. (1981). Direct experience and attitude-behavior consistency. *Advances in Experimental Social Psychology*, 14, 161-202.
- Gordon, R. (1989). Intention and Expectation Measures as Predictors of Academic Performance 1. *Journal of Applied Social Psychology*, 19(5), 405-415.
- Gordon, R. (1990). Informational Bases of Behavioral Intentions and Behavioral Expectations or Self-Predictions. *Basic and Applied Social Psychology*, 11(4), 433-442.
- Hamilton, R. W., & Thompson, D. V. (2007). Is there a substitute for direct experience? Comparing consumers' preferences after direct and indirect product experiences. *Journal of Consumer Research*, 34(4), 546-555.
- Kelly, S., & O'Brien, F.. (2011, January). QR codes: Are they worth the investment? *DM News*, 33(1), 25.
- Mahardika, H., Ewing, M., & Thomas, D., (2009). Comparing the Temporal Stability of Behavioral Intention, Behavioral Expectation and Implementation Intention. *Proceedings of the 2009 Australian and New Zealand Marketing Academy Conference*, Melbourne, Australia, Nov 30-Dec 02, 2009.
- Mahardika, H., Thomas, D., & Ewing, M. (2011). Predicting Consumers Pro-environmental Behaviour. *Proceedings of the 2011 Australian and New Zealand Marketing Academy Conference*, Perth, Australia, Nov 28-30, 2011.
- Mahardika, H., Thomas, D., & Ewing, M. (2012). Experience and Facilitating Conditions as Impediments to New Technology Adoption. Manuscript submitted for publication.
- Peterson, R. A., Balasubramanian, S. & Bronnenberg, B. J. 1997. Exploring the implications of the internet for consumer marketing. *Journal of the Academy of Marketing Science*, Vol. 25, No. 4, p.329-394.
- Sharma, C. (2010). Sizing up the global mobile apps market. Report, Chetan Sharma Consulting, Issaquah, WA.
- Sheeran, P. 2002. Intention—behaviour relations: a conceptual and empirical review. *European Review of Social Psychology*, 12(1), 1-36
- Smith, R. E., & Swinyard, W. R. (1983). Attitude-behavior consistency: The impact of product trial versus advertising. *Journal of Marketing Research*, 257-267.

- Smith, B., Caputi, P., Crittenden, N., Jayasuriya, R., & Rawstorne, P. (1999). A review of the construct of computer experience. *Computers in human Behavior*, 15(2), 227-242.
- Straub Jr, D. W., & Burton-Jones, A. (2007). Veni, Vidi, Vici: Breaking the TAM Logjam. *Journal of the Association for Information Systems*, 8(4), 224-229.
- Thompson, D. V., Hamilton, R. W., & Rust, R. T. 2005. Feature fatigue: When product capabilities become too much of a good thing. *Journal of Marketing Research*, 42(4), 431-442.
- Venkatesh, V., Maruping, L., & Brown, S. (2006). Role of time in self-prediction of behavior. *Organizational Behavior and Human Decision Processes*, 100(2), 160-176.
- Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision sciences*, 39(2), 273-315.
- Venkatesh, V. Brown, S. Maruping, L. & Bala, H. (2008). Predicting different conceptualizations of system use: The competing roles of behavioral intention, facilitating conditions, and behavioral expectation. *Management Information System Quarterly*, 32(3), 483-502.
- Warshaw, P. R., & Davis, F. D. (1984). The Accuracy of Behavioral Intention Versus Behavioral Expectation for Predicting Behavioral Goals. *Journal of Psychology*, 119(6), 599.
- Warshaw, P., & Davis, F. (1985a). The accuracy of behavioral intention versus behavioral expectation for predicting behavioral goals. *The Journal of psychology*, 119(6), 599-602.
- Warshaw, P., & Davis, F. (1985b). Disentangling behavioral intention and behavioral expectation. *Journal of experimental social psychology(Print)*, 21(3), 213-228.