In Search of Better Predictors of New Product Adoption:

Three Essays on the Key Determinants, Predictive Ability and Temporal Stability of Behavioural Expectations

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Statement of authorship

This thesis does not contain material which has been accepted for the award of any other degree or diploma in any university or other institution. To the best of my knowledge, the thesis contains no material previously published or written by another persons, except where due references is made in the text of the thesis.

I have had sole responsibility for the research design, for the conduct of the research and the drafting of the entire manuscript. There are three unpublished papers from the thesis. These are joint papers with my supervisors, Dr. Dominic Thomas and Professor Michael T. Ewing, as a second author and a third author consecutively.

I certify that I am the sole author of the thesis submitted today, entitled 'In Search of Better Predictors of New Product Adoption: Three Essays on the Key Determinants, Predictive Ability and Temporal Stability of Behavioural Expectations'.

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Abstract

Predicting the adoption of new products has long been a priority for researchers and managers alike. Scholars and marketers are continually seeking better and more stable immediate predictors of consumers' adoption of new products. This dissertation aims to explain the efficacy of behavioural expectations as a viable alternative predictor of behaviour than the more established behavioural intentions. Specifically, this dissertation offers a conceptual and empirical explanation for why behavioural expectation is potentially a better predictor than behavioural intention in terms of adoption of a new product. The explanations are presented in three related essays. The first essay examines, from a conceptual perspective, the role of behavioural expectations as a potentially superior predictor of behavioural intentions when the targeted behaviour is subject to impediments. A *meta-analysis* is conducted to demonstrate that behavioural expectation potentially has greater temporal stability and superior predictive ability than does behavioural intention. However, this determination ultimately depends on the antecedents, the key determinants, germane to the adoption process of the particular new technology under examination. To increase the generalizability of this thesis, the second essay is an empirical examination of the *temporal stability* and the *predictive ability* of behavioural expectations versus behavioural intentions in the context of pro-environmental marketing. It seeks to explain whether differences in the way in which consumers' behavioural expectations versus behavioural intentions judgments are measured, discourage the adoption of new pro-environmental products and changes in pro-environmental behaviour. Three online experiments were conducted, including a longitudinal online experiment on pro-environmental donation behaviour. Findings confirm that behavioural expectation has a higher temporal stability than behavioural intention, potentially accounting for the greater predictive ability of the former. One key reason for this finding is that subjects may over-estimate their intention to act when responding to questions regarding behavioural intention. Finally, the third essay considers the extent of the *predictive ability* of behavioural expectations versus behavioural intentions in terms of the adoption/use of new technology subject to *impediments*. An online longitudinal

experiment was designed to examine the sources and effects of two possible impediments to the adoption/use of new technology: experience (internal impediments) and facilitating conditions (external impediments). Findings indicate that behavioural expectations have a greater predictive ability than do behavioural intentions when subjects encounter impediments to adopting/using the new technology, particularly when experience and facilitating conditions are poor. The main reason was the tendency of subjects who responded to behavioural intentions measures to overestimate their control over the (internal) impediments, and to make underestimations when they think they have less control over the (external) impediments. Moreover, it is found that subjects who responded to behavioural expectations measures have a stronger Adoption-Use correlation compared to subjects who responded to BI measures regardless of the type of impediments that they had encountered.

Taken together, the three essays advance extant knowledge of the debate between behavioural intention and behavioural expectation by proposing its key determinants, comparing its temporal stability and examining its predictive ability. Specifically, findings from this study suggest that behavioural expectation is a better predictor of behaviour that is subject to impediments, and also it is found to have superior temporal stability than behavioural intention. Based on aforementioned results, this study recommends scholars and marketers to consider behavioural expectation to be incorporated as immediate predictor of behaviour (i.e. adoption of new product) to extend various theoretical models, such as the Theory of Reasoned Action, Theory of Planned Behaviour and Technology Acceptance Model.

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"And from the fruits of the palm trees and grapevines you take intoxicant and good provision. Indeed in that is a sign for a people who reason." (Qur'an 16:67)

List of Publications Included as Part of the Thesis

Essay 1: Mahardika, H., Thomas, D. & Ewing, M. (2012). *Predicting Consumers' Trial/Adoption of New Technology: Revisiting the Behavioural Expectations - Behavioural Intentions Debate.*

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Essay 2: Mahardika, H., Thomas, D. & Ewing, M. (2011). *The Temporal Stability of Behavioural Expectation versus Behavioural Intention in the Prediction of Consumers Pro-Environmental Behaviour.*

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Essay 3: Mahardika, H., Thomas, D. & Ewing, M. (2012). *Experience and Facilitating Conditions as Impediments to New Technology Adoption.*

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Chapter One

Introduction

The ability to predict consumers' acceptance of new products is particularly important to marketers. Accuracy of prediction is crucial, as small errors in forecasting demand can lead to wasted marketing expenditure. Among new product adoption settings that attract marketers is mobile application adoption. The market for mobile applications has been growing tremendously in recent years (Kim, Lin & Sung, 2013). Mobile applications were available through application marketplaces (i.e. AppStore), and these applications offer various forms of content, from games to mobile marketing tools. As mobile platforms gain momentum, marketers need to consider how best to integrate mobile marketing into their existing strategies. For example, many are now starting to recognize the benefits of using mobile application as a brand activation tool. In short, mobile applications enable marketers to implement inter-activating cross-channel marketing concepts. In addition, they enhance activities such as sponsorship, events, promotion, advertising response and product review. Furthermore, mobile applications offer opportunities for a better marketer-consumer interaction, which leads to increasing consumers' response toward marketing activities.

As mobile applications start gaining significant recognition from marketers, there is a strong need to understand their adoption. Marketing literature has, over the years, adopted various theoretical models for predicting consumers' adoption of new products. These models typically consider *behavioural intentions* (BI) as the principle predictor of behaviour. Despite this widespread use of BI to predict consumers' adoption of new products, it is by no means an infallible measure. As a sole predictor of behaviour, BI has some limitations and therefore marketing researchers need a more effective alternative (Bagozzi, 2007).

BI has been incorporated in the widely-cited Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975) and the Theory of Planned Behaviour (TPB; Ajzen, 1991). In marketing literature, TRA and TPB have been subject to extensive modification to

suit researchers' needs as well as to improve the models' predictive ability. As a result, various new conceptual models have emerged in the marketing literature as extensions of TRA and TPB. However, despite its limitations, BI remains a popular immediate predictor of behaviour employed by marketing scholars (Sutton, 1998).

The origins of BI can be traced back to the theoretical discourse on the prediction of behaviour, attracting significant attention in the psychological literature over the last five decades. Fishbein (1967) was one of the first authors to discuss the development of measurement techniques to analyze different sets of antecedents of behaviour such as attitudes and normative beliefs. Later, Wicker (1969) expanded on Fishbein's work by investigating the notion of attitude-behaviour consistency and proposed that attitude-behaviour relationships are affected by multiple factors. However, it was not until Fishbein and Ajzen's (1975) paper that BI was proposed as a sole immediate predictor of behaviour. BI describes a person's motivation to consciously form plans to perform certain future behaviour (Fishbein & Ajzen 1975). In TRA, BI is determined by two conceptually independent factors: *attitude* toward certain behaviour, which explains the degree of favorability of a person toward the targeted behaviours, and *subjective norms*, which motivate a person to act in accordance with the behaviour approved by others (Ajzen & Fishbein, 1975).

Since BI is said to be able to capture attitude and subjective norms, it should reflect a person's judgment about the likelihood of his/her actually performing a targeted behaviour. Therefore, the strength of a person's BI should be positively correlated with the degree to which certain behaviour will actually be performed (Ajzen & Madden, 1986). However, BI appears to have limited ability to predict behaviour that is not fully under a person's control. Behaviour is considered to be not fully under a person's control when it relies on the presence of appropriate opportunities or on the possession of adequate resources such as time, money, skills, or opportunities not freely available (Ajzen & Madden, 1986). This shortcoming of BI was addressed in TPB by incorporating perceived behavioural control (PBC) in the model (Ajzen, 1988; 1991). PBC explains a person's perception of the extent to which performance of the behaviour is easy or difficult (Ajzen, 1991). Various studies that employed TPB have found that PBC is a significant predictor of behavioural intention (e.g. Ajzen and

Madden, 1986; Devellis, Blalock, & Sandler, 1990). However, several other studies have reported different outcome. For instance, Fishbein and Stasson (1990) found that PBC had no effect on BI in predicting attendance at telephone training sessions. Furthermore, Eagly and Chaiken (1993) suggest that having control over a behaviour will not necessarily predict behavioural performance.

Various efforts have been made to explain BI's modest predictive ability for behaviours that are not fully under a person's control. One of them, and the focus of this dissertation, is Warshaw and Davis's (1985a) proposition that prior studies employing TRA and TPB have repeatedly interchanged BI with a similar but different construct, *behavioural expectations* (BE). The origin of BE can be traced back to Ajzen's (1985) paper that offered two different conceptualizations of immediate predictors of reasoned behaviour: BI and another construct that precedes BI that he labeled BE. This other construct states that "people will expect to perform a behaviour if they intend to try it…" (Ajzen, 1985 p. 33) such that the probability of performing a targeted behaviour determines the level of control over it. Thus, BE predicts an *attempt* to perform a targeted behaviour, whereas BI predicts the *likelihood of actually performing* a targeted behaviour. However, in his subsequent work, Ajzen was focused more on BI as a sole immediate predictor of behaviour. In contrast, Warshaw and Davis (1985a) contend that BE is more worthy of attention since it is potentially a better predictor of behaviours that are not fully under a person's control. In their more recent work, the authors found that BI measures in studies such as Ajzen (1971) and Ajzen and Fishbein (1974, 1975, and 1980) are basically measuring BE (Warshaw and Davis, 1985a). Their study encompasses the findings from Sheppard, Hartwick and Warshaw (1988), which reviewed forty-nine studies predicated on TRA and TPB and found that nineteen of the twenty-four studies in which the BI measures were reported, actually measured BE.

Warshaw and Davis (1985a), therefore, attempted to differentiate items that measure BI such as "do you intend to" or "do you plan to," from items that measure BE such as "do you expect to" or "are you going to." According to Warshaw and Davis (1985b, p. 218), BI measures capture "the degree to which a person has formulated conscious plans to perform specified future behaviour," whereas BE measures

capture “the individual’s estimation of the likelihood that he or she actually will perform some specified future behaviour.” For example: a junior scholar or a PhD student might answer ‘yes’ when asked whether s/he *intends* to publish in top tier journals. However, they may answer differently when asked whether s/he *expects* to publish in top tier journals.

Warshaw and Davis (1985a; 1985b) introduced BE as an alternate conceptualization to BI, because BI has a limited ability to fully account for external factors that may affect behavioural performance. According to the authors, BI has a limited ability to account for uncertainty and lack of information, whereas BE is more able to address that limitation since it captures the dynamics of the situation and the foreseeable impediments. Warshaw and Davis’s (1985a) contention became the basis for more recent studies explaining the efficacy of BE as a better predictor of behaviour than BI. For example, Gordon (1989) compared the predictive ability of BE versus BI in the context of academia. Specifically, the research asked participants to predict their final grades using two different measurement: BE measures versus BI measures. The results confirm that BE has a greater predictive ability than does BI as the time interval between BE/BI measurements and actual behaviour increases. This indeed supports the notion that BI changes over time, whereas BE is more stable over time.

Focusing on another aspect of the result, Gordon (1989) also found that a person’s self-understanding—defined as their ability to accurately self-report (Warshaw & Davis, 1984), plays an important role in the formation of BE estimations. Results found no significant difference between the predictive ability of BE and BI among subjects in the upper half of the final grade distribution. However, significant differences were found in the lower half of the final grade distribution. This indicates that subjects in the lower group naturally overstate their BI estimations; thus their BI became less consistent with their final grades. Meanwhile, when they answered BE questions, they were consciously predicting their ability to achieve relatively high final grades and formed a more moderate estimation of their BE. Hence, for subjects who responded to BE measures, the consistency between their BE and final grades is higher. Overall, Gordon (1989) suggests that subjects with high self-efficacy (high academic achiever) indicate the highest consistency between their BE estimations

and their final grades. In a related study, Gordon (1990) explains that subjects who responded to BI measures rely more heavily on information regarding beliefs, while subjects who responded to BE measures focus more on their past behaviour and foreseeable impediments. In sum, comparisons between BE versus BI have been undertaken by prior studies to identify the limitations of the two constructs in areas including health-related behaviours (Richard, van der Pligt & de Vries, 1996), exercise (Burgess et al., 2010; Rhodes & Matheson, 2005), social behaviour (Konerding, 2001) and new technology adoption (Venkatesh, Maruping & Bala, 2006). Findings from these studies offer a basis for future research on understanding when and why BE can be a better predictor of behaviour than BI.

Grounded in the aforementioned discussion on the efficacy of BE to overcome BI's limitations, the overarching research intention of this dissertation is to **compare and contrast the predictive ability of BE versus BI**. More specifically, this study focuses on the following three research questions:

> Research Question 1: What are the differences between BE and BI as sole immediate predictors of of new product adoption?
>
> Research Question 2: How these differences influence BE' and BI's temporal stability and predictive ability toward adoption of new products?
>
> Research Question 3: Under what conditions does BE outperform BI in predicting new product adoption?

Essay 1 will address Research Question 1 in a conceptual and meta-analytic review that provides a foundation for the dissertation. It will examine the reasons for BE being hitrorically overlooked by marketing scholars and mount an argument as to why this needs to be re-visited. It will also offer a new conceptual framework for researchers and practitioners that incorporates key determinants of BE in the prediction of consumers' trial/adoption of new technology. The specific objective of Essay 1, however, is to compare different conceptualizations of BE and BI when the act of *trying* a new technology appears as a goal rather than a reasoned behaviour.

This objective is driven by the need to explain the act of trying to adopt, in addition to the act of adopting, a new technology. Hence, Essay 1 first explains the role of BE as a more robust immediate predictor of behaviour than BI when the consequences are goals rather than reasoned behaviours, following Warshaw and Davis's (1985a) suggestion. Further, it discusses the temporal stability of BE versus BI as suggested in Gordon (1989) and Venkatesh (2006), to address whether BE is likely to remain more stable over time for goals than for reasoned behaviours, and whether BI should be more stable for reasoned behaviours than for goals. Finally, Essay 1 offers a conceptual framework that incorporates seven key determinants of BE estimations: experience, perceived behavioural control, facilitating conditions, self-efficacy, attitudes, subjective norms, and availability of information. These factors are important when comparing and contrasting the predictive ability of BE versus BI.

Essay 2 addresses Research Question 2 by conducting an empirical examination of why BE estimations differ from BI estimations and how this influences the temporal stability and predictive ability of BE and BI. Temporal stability is the main focus in Essay 2, since it has been identified as an important factor that influences the predictive ability of BE and BI (Konerding, 2001). In an extended run of predictions, BE should be potentially more stable than BI since BE can better capture the foreseeable impediments to behaviour (Warshaw & Davis, 1985b). Gordon (1989) observed that at two time points (short and long interval), subjects who responded to BE measures formed a more consistent estimation of their final grade compared with subjects who responded to BI measures. Moreover, Venkatesh et al. (2006), who compared the role of anticipation in moderating the relationship between BE or BI and behaviour, found that a longer time interval (higher anticipation) increased the consistency of BE-behaviour relationships but reduced the consistency of BI-behaviour relationships. However, neither Gordon (1989) nor Venkatesh et al. (2006) explicitly investigated the temporal stability of BE versus BI. Therefore, Essay 2 attempts to explain why and how the temporal stability of BE increases its predictive ability vis-à-vis behaviour. The empirical examination is conducted in the context of predicting consumers' adoption of a pro-environmental lifestyle. This will provide an opportunity to examine whether choosing between BE measures and BI

measures ultimately influences the ability to predict adoption of pro-environmental behaviours.

Essay 3 addresses Research Question 3 by means of empirically examining the predictive ability of BE versus BI in situations where new technology adoption/use is subject to two types of impediments: internal and external. *Experience*, certain feelings or emotions as a result of interacting with technology-related stimuli, represents an internal impediment to adopting/using new technology. On the other hand, *facilitating conditions* relate to whether the necessary technology-related resources can be easily accessed to facilitate adoption/use and act as external impediments to adopting/using new technology. Essay 3 in particular will investigate how the different levels of perceived control between internal and external impediments will influence the formation of BE and BI estimations. In addition, it will examine whether a person's degree of control over the impediments determines the consistency of her/his BE (versus BI) estimations and actual adoption/use. The results from Essay 3 will confirm the tendency of BI estimations to be overstated when internal impediments are foreseen, and understated when external impediments are foreseen. An understanding of the effects of internal and external impediments on the formation of BE and BI estimations offers an important basis for designing an intervention that increases the adoption/use of new technology.

The context for testing the abovementioned notion is mobile app adoption. Mobile apps provide an ideal avenue to explain the tension between consumers' mental judgments toward internal impediments (experience) and external impediments (facilitating conditions) to adopt new technology. 2D barcode readers provide an example of an app suitable for this study. Initially, 2D barcodes were developed to track manufactured vehicle spare parts, until marketers identified various applications of 2D barcodes for marketing (Beck, 2011). For example, 2D barcodes can be embedded on an advertisement, which then enables marketers to track consumers' response toward the advertisement. Although 2D barcodes become increasingly important for marketers, consumers' adoption rate of the reader app is

still relatively low. According to Kelly and O'Brien (2011), the impediments are mainly internal (low trial rate) and external (incompatibility across platforms).

In summary, Chapter 1 begins by presenting an overview of behavioural theory, specifically the TRA and TPB which provides much of the theoretical foundation for this dissertation. The discussion explains the gap in knowledge regarding the limitations of BI measures as a sole predictor of behaviour in TRA/TPB and how BE measures could potentially help to address this. Chapter 1 also explains the structure of this dissertation, which adopts a three-essays format. In this format, the dissertation comprises five chapters. The first introductory chapter explains the connection between the three essays. The second chapter contains Essay 1, a conceptual review that explains the foundation for the whole dissertation: what are the differences between BE and BI? Additionally, Essay 1 explains why BE is overlooked by marketing scholars and why it should not be overlooked. Essay 2 constitutes the third chapter which compares the temporal stability of BE and BI in the prediction of consumers' adoption of pro-environmental lifestyle. The fourth chapter presents Essay 3, which compares and contrasts the predictive ability of BE and BI in situations where new technology adoption/use is subject to internal and external impediments. Finally, Chapter 5 summarizes all findings and discussions from the three essays and highlights this study's contribution to both marketing research and practices.

Chapter Two

Essay 1: Predicting Consumers' Trial/Adoption of New Technology: Revisiting the Behavioural Expectations - Behavioural Intentions Debate

2.1 Abstract

Behavioural intention (BI) has long been considered the key to understanding and predicting the trial/adoption of new technology. However, as the new technology adoption choices faced by consumers increases (and time compresses), it will become correspondingly more difficult to predict consumers' trial/adoption in the future. Because of its greater temporal stability and potentially superior predictive ability, researchers are encouraged to consider behavioural expectations (BE) ahead of BI. However, this determination ultimately depends on the antecedents germane to the particular new technology adoption process under examination. Therefore, researchers should also examine the influence of key determinants of BE, namely experience, perceived behavioural control, facilitating conditions, self-efficacy, attitudes, subjective norms, and availability of information.

2.2 Introduction

The interaction between consumers and their mobile devices have changed dramatically in recent years. Mobile devices, such as smart phones and tablets, now offer abundant applications to consumers that enable them to perform activities beyond calling, messaging and browsing. It is reported that around 570,000 applications are available for smart phone users (Davidsson & Moritz, 2011). No less than 5,000 new applications are launched by developers every day, while on average, a typical consumer adopts 60 mobile applications (Sharma, 2010). However, the majority of the applications that have been adopted by consumers are not being used on a regular basis. This indicates that consumers who adopt mobile apps do not necessarily use the said application frequently.

As the number of downloaded 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 applications that they desire, not necessarily the applications that they need. Bagozzi (2007) contend that in this particular situation, the predictive accuracy of new technology adoption is often determined by what construct is being used as an immediate predictor.

The marketing discourse on consumers' adoption of new technology draws primarily on conceptual models developed in psychology and information systems. The most cited models include the theory of reasoned action (TRA; Ajzen and Fishbein, 1974, 1980) and the theory of planned behaviour (TPB; Ajzen, 1985, 1991), which together provide the conceptual basis for the technology acceptance model (TAM) in information systems research (Davis, 1986). What these three well-regarded models have in common is their use of behavioural intentions (BI) as the principle predictor of behaviour. In extant marketing literature, researchers similarly employ BI to predict behaviour in different settings, including in the adoption of new technology (e.g., Lu et al., 2003).

Despite this widespread use of BI to predict consumers' adoption of new technology, it is by no means an infallible measure. Consequently, the identification of BI's limitations remains a critical research gap (Bagozzi, 2007). In models that incorporate BI as a sole immediate predictor of technology adoption, the underlying acceptance (or rejection) of new technology follows a specific sequence: intention to adopt → adoption and/or use → repeat purchase/patronage. According to Bagozzi, Davis and Warshaw (1992), the TAM presumes that when a person forms BI judgments about accepting (or rejecting) new technology, s/he anticipates no impediments between BI formation and actual behaviour, such as ability limitations, time constraints, environmental contingencies, or unconscious habits. This condition appears to apply to the adoption of new technology items that are not problematic—in other words, in situations where people believe that they have a high degree of control over their behaviour (Bagozzi et al. 1992), such as deciding to adopt a new version of previously learned software. Moreover, even if consumers encounter problematic conditions, they may consider these issues as foreseeable impediments that might challenge behavioural performance. Faced with an inconsistency between BI and actual behaviour, Bagozzi and Warshaw (2001) suggest that the situation illustrates the pursuit of goals rather than reasoned behaviour. These authors contend that BI has a limited ability to account for the impediments or uncertainty that challenge behavioural performance. Therefore, researchers should find alternatives to BI as an immediate predictor of behaviour, especially if the adoption of new technology is a goal.

Venkatesh et al. (2006) also highlight some limitations of BI, most notably its modest ability to predict new technology adoption that are not under volitional control or that are subject to impediments. In searching for a better predictor of new technology adoption in an organizational setting (when the behaviours are often subject to impediments), these authors turn to research by Warshaw and Davis (1984) who suggest behavioural expectation (BE) rather than BI, is a better predictor of behaviour. In particular, Warshaw and Davis (1985a) argue that BE can better explain the act of pursuing goals than BI can. For purely volitional behaviour, both BE and BI are predictive (r_{BE} = .441, r_{BI} = .476), whereas for behaviour that entails pursuit of a goal, BE is more predictive than BI (r_{BE} = .307, r_{BI} = .091). Because

people who form BE judgments can foresee impediments to behavioural performance, they initiate the act of trying (or not trying) to overcome impediments. Meanwhile, when people form BI judgments, they ignore impediments to their behavioural performance; therefore, they do not initiate any acts associated with trying. In turn, when the adoption of new technology appears as a goal, BE should be a better predictor than BI.

These important factors determine the act of trying and the act of using new technology in consumer settings. We thus determine BE using factors that represent consumers' act of trying a new technology – to overcome impediments to behavioural performance. Furthermore, we conceptualize BI using factors that initiate consumers' act of using new technology, without worrying about the uncertain consequences before or during usage. Ultimately, we offer a new conceptual framework for researchers and practitioners. The different conceptualizations of BE and BI, as predictors of goals versus reasoned behaviours, offer the promise of improving the manner in which researchers in this domain predict consumer behaviour.

2.2.1 Behavioural expectations

Warshaw and Davis (1985a) contend that BE is a more robust immediate predictor of goals than is BI, whereas Ajzen and Fishbein (1974, 1980) had previously proposed TRA as a model to predict behaviour by incorporating BI as an immediate predictor of behaviour. When formulating the TRA, Ajzen (1985) offered two different conceptualizations of immediate predictors: BI and another construct that precedes BI that he labeled BE, claiming that "people will *expect* to perform a behaviour if they *intend* to try it…" (Ajzen, p. 33) such that the degree of probability of performing a targeted behaviour determines the level of control over it. That is, BE predicts an attempt to perform a targeted behaviour, whereas BI predicts the likelihood of actually performing a targeted behaviour. However, in subsequent work this author focused more on BI as a sole immediate predictor of behaviour. Thus, the TRA inherited the limitations of BI—in particular its modest ability to account for foreseeable impediments to behavioural performance (Warshaw &

Davis, 1985b). Bound by this specific limitation, the TRA presumes that all behaviours are reasoned, and there is no impediment between BI and behaviour (Bagozzi & Warshaw, 1990). In contrast, Warshaw and Davis (1985a) highlight several impediments that might challenge behavioural performance, such as ability limitations, resource limitations, and unconscious habits. Behaviours that are subject to such impediments (i.e., goals) need a more robust predictor than BI, because BI cannot capture them (Warshaw & Davis 1985a). Although Ajzen (1985) appears to overlook BE, we argue that it actually may be a better predictor of the consumers' act of trying new technology.

Even as they proposed BE as a better predictor of goals than BI, Warshaw and Davis (1985a) reformulated the conceptualizations of these variables, observing that researchers have used them interchangeably. In particular, they are concerned that in prior studies (Ajzen & Fishbein 1974, 1980), some BI measurement items actually measure BE. They therefore attempt to differentiate items that measure BI, such as "do you intend to" or "do you plan to," from items that measure BE, such as "do you expect to" or "are you going to." According to Warshaw and Davis (1985b, p. 218), BI measurement items capture "the degree to which a person has formulated conscious plans to perform specified future behaviour," whereas BE measurement items capture "the individual's estimation of the likelihood that he or she actually will perform some specified future behaviour." For example, a young scholar might answer in the affirmative when asked whether s/he *intends* to publish in a top-tier journal, but the answer is likely to differ if the question is whether s/he *expects* to.

Finally, no prior studies have examined explicitly whether BE is a better predictor of goals than BI. For example, research indicates that BE can overcome BI's limitation as an immediate predictor of behaviour, without explicitly distinguishing between goals and reasoned behaviours in various contexts such as health-related behaviours (Richard et al., 1996), academic performance (Gordon, 1989, 1990), exercise (Burgess et al., 2010; Rhodes & Matheson, 2005), and new technology adoption (Venkatesh et al. 2006, 2008). However, these studies report that BE is a better predictor than BI, despite the proposition that behaviours combine goals and reasoned behaviours. There are various explanations for why BE might offer better

predictive ability than BI. First, BE takes into account foreseeable events that may challenge behavioural performance, whereas BI's ability to address them is limited (Warshaw & Davis 1985b). Second, BE is better able to capture uncertainty than BI, because respondents who form BE judgments are more aware of factors that may decrease or increase the probability of performing the targeted behaviour, compared with those who form BI judgments (Venkatesh et al., 2008). In the context of pro-environmental behaviour for example, Mahardika et al., (2011) contend that BE reflects a person's judgments about whether or not a targeted behaviour is feasible, whereas BI reflects the desirability of the targeted behaviour. The authors also observe that people make better estimations of their actual behaviour when they respond to BE questions rather than BI questions. Therefore, researchers who employ BI questions need to take into account subjects' utility maximizing response, otherwise the subjects will overstate their true intentions (Lusk, McLaughlin, & Jaeger, 2007). Third, the role of BE differs from the role of perceived behavioural control (PBC) in the theory of planned behaviour. Konerding (2001) argues that unlike PBC, which captures only those factors under the respondents' control, BE captures the factors both within and beyond their control. This argument is supported by empirical studies that investigate the effects of PBC on the predictive ability of BE and BI (e.g., Rhodes & Matheson 2005; Venkatesh et al. 2006).

Behavioural expectation versus behavioural intention

Experts consider BI as the most widely-adopted construct for understanding, examining, and predicting the adoption of new technology in various consumer settings (Okazaki, 2005). A literature search (Dec 2011) using "behavioural intention" and "intention" as keywords illustrates the extensive use of BI in marketing research. Among marketing journals included in the Business Source Premier database from 1950 to 2011 (see Table 1), 6,526 articles mention "intention" in the body text, 1,420 texts mention one of the keywords in the abstracts, and 376 use one of the keywords in their titles. A more narrow search, focused on the consumer setting, reveals that 5,717 articles mention "intention" in the body text, 1,143 include the keyword in their abstracts, and 299 use one of these keywords in their titles. A third search focused on organizational settings reveals that 2,777 articles mention "intention" in their body text, 308 use it in their

abstracts, and 66 use it in their titles. In contrast, BE has received scant interest from marketing researchers; a literature search using "behavioural expectation" as a keyword (though not "expectation," because it has a distinct, well-established definition in marketing literature) but excluding scales indicated that only 10 articles mention "behavioural expectation" in the body text, and not a single study mentions it in the abstract or title. These 10 articles all fell within the consumer setting, with one of them also pertaining to an organizational setting. As the results in Table 1 demonstrate, extant marketing literature appears to have overlooked BE.

Perhaps the main reason for this lack of attention is that BE is equally not well recognized in other fields, including psychology, where the concept first surfaced. A count of the number of studies that cite the primary resources for BE (Warshaw & Davis, 1984, 1985a, 1985b) reconfirms this scant attention (see Table 2). According to the Google Scholar database, the 26 citations of Warshaw and Davis (1984) introduction of BE include 10 psychology texts, but no marketing articles. The 40 citations of Warshaw and Davis (1985a) next text apply to all fields, although the majority are in psychology (8) and social psychology (6), as well as information systems (5), and health (4). Finally, we find 243 citations of the third (and main) article by Warshaw and Davis (1985b), including 52 in cognitive psychology, 31 in social psychology, and 26 in health fields. It is apparent that scholars across disciplines have not given BE adequate attention, and marketing scholars are perhaps one of the most significant group that need to consider BE as a potentially better immediate predictor of behaviour. But why? We consider several possible explanations in the next section.

Table 1 Summary of BI and BE in marketing literature

Area of Research	**Behavioural Intention**			**Behavioural Expectation**		
	Mentioned in Body Text	Quoted in Abstract	Used in Title	Mentioned in Body Text	Quoted in Abstract	Used in Title
All	6,526	1,420	376	10	none	none
Consumer	5,717	1,143	299	10	none	none
Organization	2,777	308	66	2	none	none

Source: Business Source Premier, 1950–2011.

Table 2 Summary of BE in literature

Area of Research	Primary Studies		
	Warshaw and Davis (1985b)	Warshaw and Davis (1985a)	Warshaw and Davis (1984)
All Fields	243	40	26
Cognitive psychology	52	8	10
Social psychology	31	6	4
Information systems	9	5	5
Health	26	4	3
Marketing	11	1	0
Economics	2	0	0

*Source: Google Scholar, 1950–2011

Why do scholars overlook BE?

We trace the first explanation for why scholars overlook BE back to the development of the TPB (Ajzen, 1985), which suggested that BE can predict the attempt or intention (BI) to perform a targeted behaviour. However, according to Morojele and Stephenson (1994), Ajzen abandoned this conceptualization of BE (e.g., Ajzen, 1988, 1989, 1991). Furthermore, Schifter and Ajzen (1985) indicate that the underlying process of predicting actual behaviour is similar to the underlying process of predicting an attempt to perform (Morojele & Stephenson, 1994). We might speculate then that Ajzen chose to incorporate BI, and not BE, into the model to establish a sole immediate predictor of behaviour. Subsequently, other studies that employ TPB and its extensions accordingly have excluded BE (Davis, 1986).

Also, researchers might overlook BE because of their conceptual understanding of this construct. That is, findings from various studies show that BE demands a different conceptualization than BI (e.g., Gordon, 1990; Pomery et al., 2009; Venkatesh et al., 2006; Warshaw & Davis, 1984, 1985a, 1985b), because intentions cannot address the basic question of "whether behavioural expectation qualifies in causal models of behaviour" (Sheeran 2002, p. 12). Yet researchers seemingly accept

constructs in established causal models as sound if graphical diagrams or mathematical equations support their roles (Sutton 1998). In Konerding's (2001) initial attempt to address the issue, using statistical equations to differentiate the formation of BE and BI judgments, the results confirm that BE has a causal effect on actual behaviour, which lays the groundwork for further study.

Another explanation is the potential redundancy in terms of PBC and BE. Sutton (1998) reports that in various studies that have applied TRA and TPB, the extent of the effect of BI in predicting non-volitional behaviour increases when PBC is incorporated. Warshaw and Davis (1985b) argue that BE can overcome BI's limited ability to predict behaviour but do not acknowledge that this effect pertains only to behaviour that is not under volitional control. Fishbein and Stasson (1990) also assert that BE's predictive ability is not significantly better than BI's for behaviour that is not under volitional control. Therefore, BE may be redundant in the presence of PBC. However, Venkatesh et al. (2006) contend that PBC has limited ability to overcome the tendency of BI to change over time because it, also, cannot capture factors such as uncertainty, that are beyond a person's control. Because BE is more stable over time, it can better account for factors beyond a person's control (Venkatesh et al. 2006; Warshaw & Davis 1985a). Therefore, BE and PBC demand different conceptualizations, and each plays a distinctive role in dealing with the limitations of BI.

A final explanation relates to the predictive performance of BE. Although BE offers greater predictive ability than BI, the differences are trivial and inconsistent across different types of behaviours. Sheppard et al.'s (1988) meta-analysis reveals that the average correlation for BE is 0.57 and that for BI is 0.49, which they consider insufficiently reliable to prove that BE's predictive ability is significantly better than BI's. Similarly, Sheeran and Orbell (1998) find insignificant differences in the average correlation between the estimate and intention measures. However, Warshaw and Davis (1985b, 1992) contend that researchers should avoid using items from both constructs interchangeably when comparing the average correlations of BE and BI. Therefore, in the following section, we meta-analyze 10 articles that compare BE with BI, using specific terminology and items (Warshaw & Davis, 1985b).

Why should scholars recognize behavioural expectations?

The act of trying. Researchers seemingly have overlooked BE because some reports suggest that it inadequately addresses the limitations of BI. Yet the efficacy of BE should make it a better predictor of behaviour than BI, and thus marketing researchers need to distinguish observed behaviours in accordance with Bagozzi and Warshaw's (1990) guidelines. That is, not all behaviours are reasoned behaviours; therefore, some behaviour must be associated with the pursuit of goals. A Behaviour is goal-related when people who exhibit it foresee impediments. Conversely, behaviour is reasoned when people do not expect or foresee any impediments to their performance. Bagozzi et al. (1992) propose that the adoption of new technology constitutes a goal pursuit intention when there are impediments, such as limited ability, that affect the likelihood people will adopt it. For example, deciding to upgrade to a new version of a statistical software program is a reasoned behaviour, because people are unlikely to foresee impediments. In contrast, deciding to purchase a new statistical software program with which they are not familiar is a goal, because they foresee impediments (e.g., learning). When people have behavioural goals, they exercise some judgment when deciding whether or not to try (or not try) to overcome the impediments.

The importance of BE becomes more obvious, especially to marketing researchers, if they realize its role in capturing consumers' acts of trying. Bagozzi and Warshaw (1990) explain that consumers initiate trying when the consumption is problematic and the anticipated action is a goal. Theoretical models that employ BI instead aim to predict the act of using, rather than the act of trying (Bagozzi et al. 1992). Behavioural intentions have limited ability to predict goals, because the formation of a person's BI judgments does not take into account unforeseen consequences before or during the performance (Morwitz, 1997). Warshaw and Davis (1985a) further suggest that BE is a more robust predictor of trying than BI, because a person who forms BE judgments is aware of impediments that may stand in the way. Three factors associate behaviours with goals: (1) scarcity of supply, (2) scarcity of resources, and (3) a limited or unfeasible time period for performing the behaviour

(Bagozzi & Warshaw, 1990). As mentioned previously, BE reflects the feasibility of performing a behaviour; it already considers these three factors. More importantly, BE should be an accurate representation of the likelihood of people trying (or not trying) to overcome the impediments that stand in their way. Therefore, it is important to understand the conceptualization of BE as an immediate predictor of goals.

Predictive ability. In a meta-analytic review of studies that use BI as an immediate predictor of behaviour, Sutton (1998) finds that BI can explain 19% and 38% of the variance (i.e., correlation of .44–.62). Another meta-analysis by Sheeran (2002), using 10 meta-analytic studies, suggests that BI explains 28% of variance (correlation of .53). These studies support the assessment that BI's predictive ability is weak since it explains less than 50% of the variance. However, these studies do not follow Warshaw and Davis's (1985b) recommendation to disentangle BE from BI items.

For our meta-analysis, we adopted this distinction and selected 10 studies of BE versus BI, using two criteria. First, each study disentangles the BE and BI items in accordance with Warshaw and Davis's (1985b) recommendation. Second, the studies measure actual behaviour and correlate it with either BE or BI measurements. In Table 3 (panel a), we present the results of this meta-analysis and the correlations with behaviour, whether goals or reasoned behaviours. Table 3, panel b, contains the results when we limit the correlations to goals. In all selected studies, the predictive ability of BE exceeds that of BI.

The total sample size was 2,550 for BE and 2,532 for BI. The BE–behaviour correlations ranged from .38 to .64, with an average of was .51; the BI–behaviour correlations ranged from .20 to .52, with an average of .40. On average, BE explained 26% of the variance, whereas BI accounted for 16%. Cohen's (1992) power primer offers a useful basis for analyzing correlations and R-square values: A small effect size is $r_+ = .10$, a medium effect size requires $r_+ = .30$ and a large effect size indicates that $r_+ = .50$. Thus, the average BE–behaviour correlation (r = .51) was large, whereas the average BI–behaviour correlation (r = .40) was a medium effect size. A paired test of differences using the Fisher's Z transformations of the BE–behaviour and BI–

behaviour correlations showed that the former were significantly greater than the latter across 10 studies ($t(9) = 4.95$, $p < .05$, one-tailed).

The results in Table 3 reveal that the predictive ability of BE and BI was equal for reasoned behaviour (Panel c), but BE was significantly more predictive than BI for goals (panel b). Three studies measured the predictive ability of BE/BI for both goals and reasoned behaviour: Warshaw and Davis (1985a), Warshaw and Davis (1985b), and Konerding (2001). We calculated them separately to determine the varying strengths of the correlations; all other studies measured goals only. The BE–goals correlations ranged from .34 to .64, with an average of .50 (large effect size). The BI–goals correlations ranged from .13 to .52, with an average of .38 (medium effect size). On average, BE explained 25% of the variance, whereas BI accounted for 14%. The paired test of differences using Fisher's Z transformations confirmed that the BE–goals correlations were significantly greater than the BI–goals correlations across 10 studies ($t(9) = 5.32$, $p < .05$, two-tailed).

For the BE–reasoned behaviours, the correlations ranged from .36 to .43, and the average correlation was .40 (medium effect size), whereas the BI–reasoned behaviours correlations ranged from .23 to .41, and the average correlation was .34 (medium effect size). Moreover, BE explained 16% of the variance for reasoned behaviour, whereas BI explained 12%. This paired test of differences using Fisher's Z transformations shows that BE–reasoned behaviour and BI–reasoned behaviour correlations were not significantly different across three studies ($t(2) = 0.76$, $p < .05$, two-tailed).

Table 3 Meta-analyses

a. BE–behaviour versus BI–behaviour correlations

Study	BE–Behaviour			BI–Behaviour		
	n	***R²***	***r***	***n***	***R²***	***r***
Warshaw and Davis (1985a)	39	0.14	0.38	39	0.07	0.27
Warshaw and Davis (1985b)	113	0.27	0.52	84	0.21	0.46
Gordon (1989)	81	0.30	0.55	82	0.19	0.44
Courneya and McAuley (1993)	170	0.20	0.45	170	0.13	0.36
Konerding (2001)	107	0.13	0.36	107	0.04	0.2
Rhodes and Matheson (2005)	241	0.30	0.55	241	0.27	0.52
Venkatesh et al. (2006)	1,182	0.22	0.47	1,182	0.15	0.39
Venkatesh et al. (2008)	321	0.41	0.64	321	0.18	0.43
Pomery et al. (2009)	254	0.27	0.52	254	0.17	0.41
Mahardika et al. (2011)	42	0.38	0.62	52	0.26	0.51
Overall	**2,550**	**0.26**	**0.51**	**2,532**	**0.16**	**0.40**

b. BE–goal versus BI–goal correlations

Study	BE–Goals			BI–Goals		
	n	***R²***	***r***	***n***	***R²***	***r***
Warshaw and Davis (1985a)	39	0.12	0.34	39	0.02	0.13
Warshaw and Davis (1985b)	113	0.26	0.51	84	0.18	0.43
Gordon (1989)	81	0.30	0.55	82	0.19	0.44
Courneya and McAuley (1993)	170	0.20	0.45	170	0.13	0.36
Konerding (2001)	107	0.13	0.36	107	0.03	0.18
Rhodes and Matheson (2005)	241	0.30	0.55	241	0.27	0.52
Venkatesh et al. (2006)	1,182	0.22	0.47	1,182	0.15	0.39
Venkatesh et al. (2008)	321	0.41	0.64	321	0.18	0.43
Pomery et al. (2009)	254	0.27	0.52	254	0.17	0.41
Mahardika et al. (2011)	42	0.38	0.62	52	0.26	0.51
Overall	**2,550**	**0.25**	**0.50**	**2,532**	**0.14**	**0.38**

c. BE–reasoned behaviour versus BI–reasoned behaviour correlations

Study	BE–Reasoned Behaviour			BI–Reasoned Behaviour		
	n	***R²***	***r***	***n***	***R²***	***r***
Warshaw and Davis (1985a)	39	0.18	0.43	39	0.17	0.41
Warshaw and Davis (1985b)	113	0.16	0.40	84	0.14	0.38
Konerding (2001)	107	0.13	0.36	107	0.05	0.23
Overall	**259**	**0.16**	**0.40**	**230**	**0.12**	**0.34**

Temporal stability. Although overlooked by researchers, BE helps to address the temporal stability of BI and its modest predictive ability (Sheeran, 2002). According to Sheeran and Orbell (1998), researchers use BI widely because of its high propensity for change over time, although they also report that the predictive ability of BI diminishes as its time interval with actual behaviour increases. Ajzen and Fishbein (1974) also note that as the time between BI and the actual behaviour increases, there is a greater propensity for BI to change, which lowers its predictive ability (see also Albarracin et al., 2001; Armitage & Conner, 2001) . That is, the predictive ability of BI depends on its temporal stability, which Sheeran and Abraham (2003, p. 206) define as "the extent to which an immediate predictor of behaviour (e.g., BI) persists over time regardless of whether it is challenged." A shorter interval between BI and behaviour observations leads to a stronger BI–behaviour correlation. Therefore, to increase BI's predictive ability, Ajzen (1985, 1991) suggests measuring actual behaviour immediately after measuring BI—an approach we consider impractical.

Moreover, the gap between BI and actual behaviour constitutes a key issue for conceptual models that employ BI as a sole immediate predictor (Sutton, 1998), in that respondents who indicate strong intentions to perform a targeted behaviour do not necessarily do so. Sheeran (2002) identifies possible causes of this anomaly: First, a person's BI judgments may change over time, so a longer time interval between the measurement of BI and the behaviour increases the chances of unforeseen events that might lead to changes in BI (Warshaw & Davis 1985b). Bagozzi (2007) thus suggests that a link between BI and action initiation is required, because BI changes over time to conform with anticipated or unanticipated interventions and obstacles. For example, subjects' perspectives of time (i.e. present-time oriented versus future-time oriented) moderate the consistency between BI and behaviour, so that future-time oriented subjects form a more stable BI over time (Van Ittersum, 2011). Second, BI may be provisional; studies that employ it as an immediate predictor of behaviour rarely place their respondents in a real decision-

making scenario. Thus, BI responses to a questionnaire are hypothetical or provisional.

For example, the stability of a person's BI judgments about adopting a pro-environmental lifestyle may be determined by various anticipated or unanticipated factors, such as commitment, that challenge the adoption of such lifestyle. Because BI grows less stable as the time interval between its formation and the pro-environmental action increases, along with the number of anticipated or unanticipated events, this limitation decreases BI's predictive ability over an extended prediction period. Thus, Krosnick and Petty (2003) propose two properties to determine the strength of an immediate predictor of behaviour: impact and durability. Impact explains the predictive ability of BI, whereas durability explains its temporal stability and resistance over time. Because temporal stability determines the predictive ability of BI, it can serve as an initial indication of BI's predictive strength (e.g., Conner et al., 2000; Sheeran et al., 1999). Sheeran et al. (1999) report that a stable BI strengthens the relationship with behaviour, compared to an unstable BI. In addition, BI stability should moderate the relationship between past and future behaviour.

Temporal stability of trying. Conner et al. (2000) also report that the strength of the BI–behaviour correlation is fully mediated by BI's temporal stability, which varies across situations, mainly because BI cannot effectively account for a person's sense of control over the performance of the behaviour, especially when the behaviour is a goal (Warshaw & Davis, 1985a). To increase the temporal stability of BI, Sheeran (2002) suggests incorporating a construct that can capture this sense of control; the construct also should capture the stability of a person's trying over time. BE is one such construct (Warshaw & Davis, 1985a).

Because BE can account for a person's sense of control over trying to perform a targeted behaviour (Konerding, 2001), it should be more stable over time and thus have greater predictive capabilities than BI. Prior comparisons of BI and BE have focused on how well both constructs predict actual behaviour (e.g., Pomery et al., 2009; Venkatesh et al., 2008; Warshaw & Davis, 1984, 1985a, 1985b), not specifically on their temporal stability. However, two studies offer initial empirical support that

BE has greater temporal stability than BI. Gordon (1989) observes that BE is a better predictor than BI when the interval prior to actual behaviour increases. This finding signifies that BE is more stable over time and reflects people's sense of control over performing a targeted behaviour. Venkatesh et al. (2006) instead compare the role of anticipation in moderating the relationships of BE and BI with actual behaviour. A longer time interval (higher anticipation) strengthens the BE–behaviour relationship but weakens the BI–behaviour relationship. Therefore, the effects of time on BE are the opposite of those on BI. This is most likely due to BE's superior ability to capture foreseeable events that might challenge the performance of an actual behaviour (Venkatesh et al., 2006). Despite observing the role of time for the prediction of behaviour, neither Gordon (1989) nor Venkatesh et al. (2006) explore notions of temporal stability, although their studies provide a useful foundation for further examination of the topic.

Conner et al. (2000) report that the strength of BI–behaviour correlation is fully mediated by BI's temporal stability, which they posit varies across different situations because BI has only limited ability to account for a person's sense of control over goal-directed behaviour (Warshaw & Davis, 1985a). On other hand, when the behaviour is a goal, a person who forms BE judgments foresees impediments and adjusts his or her assessment of probable success or failure accordingly, both before and during the performance of the behaviour (Bagozzi & Warshaw, 1990). That is, his or her BE judgments regarding the pursuit of goals should be more stable over time than BI judgments would be. In turn, we propose:

> P_1: *Behavioural expectations are more stable predictor of goals compared to behavioural intentions.*
>
> P_2: *Temporal stability moderates the relationships between behavioural expectations and goals.*

2.2.2 Key determinants of behavioural expectation

It is conceptualized that a person's experience, derived from past interaction with the behaviour or activities related to the behaviour, may affect her/his estimation

toward performing the targeted behaviour (Smith & Swinyard, 1983). In the context of technology adoption, direct experience or trial with the technology helps increase consumers likelihood to adopt said technology (Hamilton & Thompson, 2007). In the case of the comparison between BE and BI predictive ability toward technology adoption, Venkatesh et al. (2006, 2008) offered some constructive discussion. It is found that the effects of BE on technology usage are fully moderated by experience (Venkatesh et al., 2006), such that the greater the experience, the weaker is the relationship between BE and actual adoption/use. This study argues that the effects will be similar toward the act of trying new technology, and therefore it is proposed that:

> P_3: *The effects of experience on trying new technology are fully mediated by behavioural expectations.*

Experience with a behaviour provides information about that behaviour, which is somewhat important in the formation of BE judgments (Venkatesh et al., 2006). Venkatesh et al. (2008) also report that increasing experience or familiarity with the behaviour provides information that people can use to estimate their *control* (PBC) over that behaviour. Moreover, experience significantly improves the *sense of control* in relation to BE judgments. Because experience with new technology is likely to reduce perceived uncertainty while increasing the sense of control (PBC), consumers with more experience with an innovation have a greater awareness of the potential for anticipated or unanticipated impediments to actual adoption that might arise. In this sense, higher sense of control (PBC) should increase the consistency between self-report BE and the act of trying. Therefore, it is proposed that:

> P_4: *The effects of perceived behavioural control on trying new technology are fully mediated by behavioural expectations.*

In the context of new technology adoption/use, facilitating conditions refer to consumers' beliefs about whether or not the necessary computer-related resources can be easily accessed to facilitate adoption/use (Venkatesh et al., 2008). Facilitating

conditions become a source of impediments when access to the necessary resources is limited or scarce. When consumers perceive that they have less or no access at all over the resources, this could influence the accuracy of their BE estimations toward new technology adoption/use. In this sense, high facilitating conditions tend to increase both BE estimations, while low facilitating conditions lead to lower BE estimations (Venkatesh et al., 2008). BE estimations reflect subjects' careful prediction of whether they can improve the facilitating conditions (i.e. by getting technical support) to adopt/use the technology, while as BI measures have a limited ability to capture such prediction (Mahardika et al., 2011). In line with aforementioned discussion, it is posited that:

> P_5: *The effects of facilitating conditions on trying new technology are fully mediated by behavioural expectations.*

According to Warshaw and Davis (1985a), there are two key issues regarding the effect of availability of information on BE formation. First, the authors suggest the predictive ability of BI diminishes as the amount of information over the targeted behaviour decreases. Conversely, BE remains relatively stable regardless of whether information about the targeted behaviour is highly available or hardly available. Second, availability of information may be important for subjects to increase their sense of control over uncertainty in performing the targeted behaviour (Venkatesh et al., 2008). Subjects with low availability of information may have a lower sense of control over uncertainty compared to subjects with high availability of information. Warshaw and Davis (1985b) contend ther hand, BE remains stable whether the situations is uncertain or not. Since formation of BE judgment is based on self-prediction, less uncertain situations will not stimulate significant differences in the predictive ability of BE compared to more uncertain situations. Hence, it is proposed that:

> P_6: *The effects of availability of information on trying new technology are fully mediated by behavioural expectations.*

Venkatesh and Morris (2003) define self-efficacy as a person's estimation of his or her ability to use technology to accomplish a particular job or task. Olivier and Shapiro (1994) find that people with high self-efficacy are more likely to succeed in technology-related tasks. Thus, a person with high self-efficacy should form more stable BE judgments about adopting technology than would a person with low self-efficacy. It would be worthwhile to explain how self-efficacy influences the formation of BE judgments—in particular whether the effects of self-efficacy increase a person's sense of control over trying new technology. Thus, it is proposed that:

> P_7: *The effects of self-efficacy on trying new technology are fully mediated by behavioural expectations.*

Ajzen and Fishbein (1974) theorize that BI is determined by two antecedents: attitude toward a specific behaviour, which reflects the degree of favourability of a person toward the targeted behaviour, and the subjective norms that motivate a person to act in accordance with behaviours approved by others. Karahanna and Straub (1999) contend that BI mediates the effects of attitude and subjective norms on technology, both before and after adoption. Specifically, the formation of BI judgments for potential adopters depends significantly on subjective norms, whereas their formation in users who already have adopted is more significantly influenced by attitude. It also would be beneficial to explain how the effects of attitude and subjective norms on technology adoption might be mediated by BE. In line with this review:

> P_8: *The effects of attitudes on trying new technology are fully mediated by behavioural expectations.*

One important factor that may influence the formation of a person's judgments to try new technology is whether or not people whose opinion are important to her/him (subjective norms) have a positive belief toward the said technology (Schepers & Wetzels, 2007). Warshaw and Davis (1985b) contend that higher subjective norms increase subjects' BE or BI judgments since consumers who possess similar interests

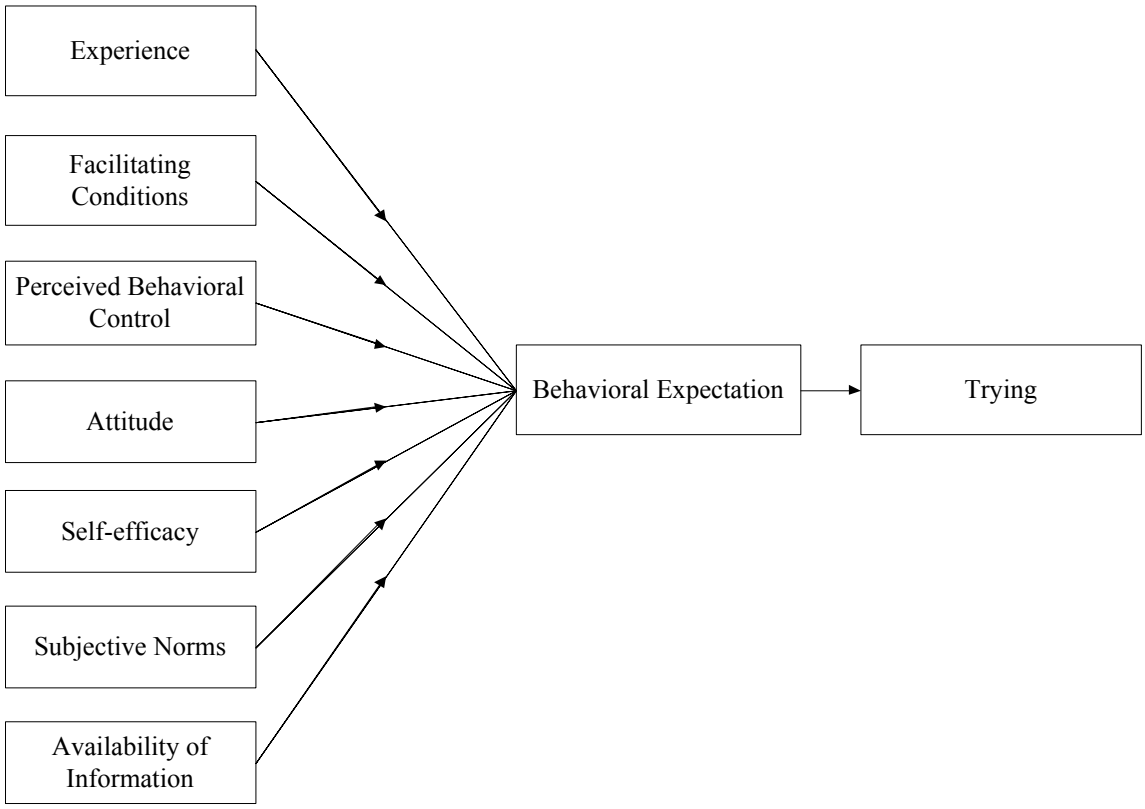
and characteristics tend to have positive beliefs towards each other. Therefore, subjective norms should be considered in the formation of BE judgments toward trying new technology. In addition, Venkatesh et al. (2008) indicate that BE may have an ability to mediate the effects of subjective norms toward adoption of new technology. Thus:

> P_9: *The effects of subjective norms on trying new technology are fully mediated by behavioural expectations.*

Table 4 Key determinants of BE for further research

Author	Determinants																				
	Behavioral Intention	Facilitating Conditions	Self-Understanding	Personal Base Rate	Circumstances	Personal Disposition	Attitudes	Behavioral Belief	Availablity Heuristic	Change in Intention	Peer support	Anticipation of Behaviour	Experience	Frequency of Behaviours	Non-cognitive Habit	Self-efficacy	Possible Environment Facilitators	Anticipated Affective Reaction	Perceived Behavioral Control	Subjective Norms	Availability of Information
Caroll 1978									X												
Warshaw and Davis 1984a			X																		
Warshaw and Davis 1984b										X					X	X	X				
Warshaw and Davis 1985	X																				
Osberg and Shrauger 1986	X			X	X	X															
Gordon 1989	X																				
Gordon 1990	X			X	X	X	X	X													
Courneya and McAuley 1994	X			X										X							
Richard et al. 1996							X											X	X	X	
Konerding 2001	X																		X		
Rhodes and Matheson 2004							X												X	X	
Venkatesh et al. 2006												X	X	X							
Venkatesh et al. 2008	X	X																			
Pomery et al. 2009													X								
Burgess et al. 2010	X			X																	
Conceptual model in this paper		**X**					**X**						**X**			**X**			**X**	**X**	**X**

Figure 1 Conceptual framework for trying new technology in the consumer setting



2.3 Conclusions

This article proposes BE as a potentially effective (sole) predictor of consumers' initial trials of new technology. We explain how BE can help overcome the limitations of BI—in particular its temporal stability and predictive ability issues. Because BE has better temporal stability than BI, we propose that BE can offer a better predictor of new technology adoption. This improved temporal stability stems from BE's ability to take into account anticipated or unanticipated factors that may challenge actual behaviour (Venkatesh et al., 2008). In addition, BE acknowledges a person's sense of control when performing the behaviour, whereas as a sole predictor of behaviour, BI cannot capture uncertainty or a sense of control (Warshaw & Davis, 1985b). Prior studies in various contexts provide extensive evidence that researchers should use BE as a sole predictor of behaviour instead of

BI (e.g., Burgess et al., 2010; Gordon, 1989, 1990; Mahardika et al., 2011; Rhodes and Matheson, 2005). However, marketing researchers have overlooked BE thus far (see Table 2). We contend that BE deserves more attention as a mechanism to address several limitations of BI and better predict new technology adoption.

Our work also confirms the substantial importance of clearly defining the difference between the underlying mental judgments that form BE and those that form BI. Mental judgments that lead to BI generally are based on the desirability of the targeted behaviour, whereas those for BE rely more on the feasibility of performing the targeted behaviour (Fishbein & Stasson, 1990). When a researcher asks BI questions, a respondent makes an estimation about whether adopting the new technology is desirable; if a researcher instead asks BE questions, the respondent considers whether it is feasible or unfeasible for him or her to adopt the new technology, on the basis of the available resources and foreseeable challenges. For example, adopting 3D television might be desirable if the consumer's motivation is to provide the best family entertainment, and this desire is either feasible or unfeasible, depending on the availability of resources and cost benefits. Thus, the consistency between BE and actual behaviour is stronger than that between BI and actual behaviour.

As a theoretical contribution, we explain different conceptualizations of BE and BI in terms of consumers' adoption of new technology. As mentioned previously, marketing researchers have largely been relying on BI to predict new technology adoption, such as in the widely used TAM. Yet the TAM presumes that when a person forms BI judgments, he or she expects to encounter no impediments (Bagozzi et al., 1992), whereas in some cases, consumers clearly foresee such impediments. In these conditions especially, BE is a far more robust predictor than BI (Bagozzi & Warshaw, 1990).

Adoption of new technology also offers its own levels of efficacy. For example, individual consumers have more control over their decisions than users in an organization, and they enjoy the freedom to seek new technology that suits their needs. Intuitively, if behaviour is not fully under the users' volitional control, BE should be a better immediate predictor of behaviour (Warshaw & Davis, 1985b).

Counter-intuitively, BE also may be a better predictor of behaviour than BI even if the behaviour is under volitional control, such as in the context of consumers' new technology adoption.

Furthermore, consumer and organizational adoption settings involve varying degrees of uncertainty in the decision-making process. Organizations adopt new technology that suits their needs and resources, not necessarily the needs of individual users, which limits the number of options available to users. This limitation also reduces uncertainty in their decision-making, because some factors that influence decisions are already controlled by the organization. In contrast, consumers encounter more uncertainty as they attempt to deal with anticipated or unanticipated impediments that challenge their actual adoption. Because BE is a better predictor of technology adoption than BI when the degree of uncertainty is high (Venkatesh et al., 2008), it should be particularly effective in consumer settings but also in organizational settings marked by high uncertainty.

Finally, this article provides marketers with the basis for identifying whether BE or BI will provide them with a better immediate predictor of behaviour in various technology adoption situations. Consumers confront abundant new technology options that are easy to obtain by, for example, downloading applications directly to mobile devices. As the number of options increases, consumers face increasing challenges and uncertainty in their decision-making, which in turn makes it more difficult for marketers to predict behaviour, because the consumers' BI is changing rapidly over time. Marketers thus should employ BE and BI selectively when developing designs for their new technology or product, although BE is likely to be more predictive than BI because it offers better temporal stability. However, the final decision ultimately depends on the various factors and antecedents involved in the new technology adoption process. Therefore, marketers should further investigate the efficacy of the seven key determinants of BE: experience, perceived behavioural control, facilitating conditions, self-efficacy, attitudes, subjective norms, and availability of information.

Chapter Three

Essay 2: The Temporal Stability of Behavioural Expectation versus Behavioural Intention in the Prediction of Consumers Pro-Environmental Behaviour

3.1 Abstract

This study investigates whether behavioural expectation is a better predictor of behaviour than behavioural intention. By comparing these two distinct predictors of behaviour, the author seeks to explain whether differences in the way in which consumers' mental judgments are measured act as a barrier to understanding pro-environmental behaviour change. Three distinct online experiments: Study 1 assessed the likelihood of subjects' purchasing certain pro-environmental products. Study 2 assessed the relative predictive utility of behavioural intention and behavioural expectation across two time periods. Study 3 assessed subjects' behavioural intention and behavioural expectation to donate to a pro-environmental campaign, as well as their actual donation behaviour. Findings confirm that behavioural expectation has a higher temporal stability than behavioural intention, potentially accounting for the greater predictive ability of the former. One key reason for this finding is that subjects may overestimate their likelihood to act when responding to behavioural intention questions. Overall, this study confirms that behavioural expectations are a better immediate predictor of pro-environmental behaviour than are behavioural intentions.

3.2 Introduction

Academic inquiry into environmental issues has paralleled heightened pro-environmental awareness among consumers (Straughan & Roberts, 1999). One salient line of inquiry has been the value and efficacy of social marketing in explaining consumers' pro-environmental behaviour change (Andreasen & Tyson, 1994). In recent years, pro-environmental lifestyles have been on the rise as consumers increasingly express concern for the quality of the environment, and tend to have stronger desire to conform to the generally accepted norms, such as behaving in the interest of environment (Shaw, Grehan, Shiu, Hassan, & Thomson, 2005). Melillo, Miller and Solman(2006) reported that 67% of (American) consumers believed the quality of the environment was deteriorating, compared to just 25% who believed that it was improving. In addition, the number of consumers who considered environment as "extremely" important has increased significantly from 31% in 1998 to 49% in 2006. In response, firms have begun to invest considerable resources servicing the growing market for environmentally sensitive products and services (Gary, 2007). However, many of these pro-environmental products have ended up under-performing in the marketplace (Pickett-Baker & Ozaki, 2008). It would appear that most consumers take into account opposing factors such as cost benefits and norms, *before* adopting a pro-environmental stance (Steg & Vlek, 2009). Hence, consumers frequently face a dilemma between sacrificing additional resources to pursue pro-environmental lifestyles and avoiding social censure for not showing environmental concern (Gupta & Ogden, 2009).

Gatersleben et al. (2002) have highlighted the inconsistency between consumers' attitudes towards the environment and their actual pro-environmental behaviours. Specifically, consumers who report a concern about environmental issues do not necessarily purchase pro-environmental products. Kollmuss and Agyeman (2002) contend that attitude-behaviour measurement is a key indicator of the gap between consumers' attitudes towards the environment and their actual pro-environmental behaviour. Constructs that have been employed as predictors of pro-environmental behaviour, such as attitude and intention, often produce misleading results about subjects' attitudes towards the environment. In this sense, researchers need to

employ more accurate immediate predictors of pro-environmental behaviour. Accordingly, this study contends that a more relevant cause of any potential attitude that leads to a pro-environmental behaviour gap actually lies in the selection of constructs employed as immediate predictors of pro-environmental behaviours.

One construct that has been widely used to predict pro-environmental behaviour is Fishbein and Ajzen's (1974) *behavioural intention* (BI). BI has been incorporated in the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB), (Fishbein & Ajzen, 1974; Ajzen, 1991). The extension of TRA/TPB shaped various models that predict pro-environmental behaviour, including a popular environmental behaviour model developed by Hines, Hungerford and Tomera (1987). In their model, BI is conceptualized as an immediate determinant of pro-environmental behaviour that mediates the effects of cognitive and personality variables. However, a meta-analysis by Bamberg and Möser (2007) of 57 pro-environmental behaviour studies showed that BI is able to explain only 27% of variance of behaviour. Further, the authors suggest that these results indicate that BI may not be an ideal immediate predictor of pro-environmental behaviour. Their suggestion is noteworthy, since despite its widespread use, BI is not without its limitations. Indeed, BI has been found to be less accurate in predicting behaviour across numerous contexts (Bagozzi, 2007). One factor that may account for the relatively weak predictive utility of BI is its temporal instability. Ajzen and Fishbein (1974) acknowledged this potential limitation when they introduced BI, noting that individuals have a propensity to change their BI over time. As a result, the predictive utility of BI tends to decrease as the length of time between the measurement of BI and behaviour increases (Armitage and Conner, 2001; Sheeran and Orbell, 1998). This issue has since been noted by researchers extending TRA/TPB (e.g. Bagozzi et al., 1992).

An alternative predictor of behaviour is *behavioural expectation* (BE; Warshaw and Davis, 1985b). The relationship between BE and behaviour has been found to be stronger than the BI-behaviour relationships in contexts as varied as academia (Gordon, 1990) and technology adoption (Venkatesh et al., 2006, 2008). One possible explanation for this differential predictive ability is that a subject who forms BI

judgments about performing certain behaviour anticipates no impediments (Bagozzi et al., 1992), whereas BE questions trigger subjects' anticipation toward foreseeable impediments (Warshaw and Davis, 1985b). Thus, BE demonstrates greater predictive ability than BI when the behaviours are subject to impediments. Another possible explanation for this differential predictive ability is that BE is better able to account for impediments to behavioural performance than BI and should therefore be more stable over time (Konerding, 2001) A person who responds to BE questions such as "do you expect to perform xyz behaviour?" will anticipate change (due to impediments) in her/his intention to perform the said behaviour; whereas, BI has a limited ability to capture this change (Warshaw and Davis, 1985b). Therefore, for an extended run of prediction, BE should be more stable than BI. Indeed, Gordon (1989) observed that at two time points (short and long intervals), subjects who responded to BE questions produced more stable responses than subjects who answered BI questions. Moreover, Venkatesh et al. (2006), who compared the role of anticipation in moderating the relationship between BE or BI and behaviour, found that a longer time interval (higher anticipation) increased the BE-behaviour relationship but reduced the BI-behaviour relationship. However, neither Gordon (1989) nor Venkatesh et al. (2006) specifically investigated the notion of the temporal stability of BE versus BI.

The aim of this paper is therefore to compare the temporal stability of BE versus BI to offer an alternate discussion on the longitudinal application of TRA/TPB. In particular, pro-environmental behaviours that are repetitive in nature *and* subject to impediments will be selected as a context for the comparison between BE versus BI. A second aim is to determine whether the temporal stability of BE increases its predictive ability vis-à-vis behaviour. Pro-environmental behaviour is employed as the context for this comparison, providing an opportunity to examine whether choosing between measures of BE and BI ultimately influences the ability to predict pro-environmental behaviour change.

3.2.1 The gap between pro-environmental attitude and pro-environmental behaviour

The gap between consumers' pro-environmental attitudes and their actual pro-environmental behaviour presents unprecedented challenges for marketers. Prior research has attempted to explain the underlying cause of this inconsistency. Based on Rajecki's (1982) observations, Kollmus and Agyeman (2002) identified four key causes of this attitude-behaviour gap: experience with environmental problems, social influences, the temporal stability of attitude, and the selection of pro-environmental predictors. These four causal factors are elaborated on below.

Consumers who have direct experience with environmental problems are more likely to have a consistent attitude–behaviour relationship than consumers with indirect experience (e.g. social advertisements about pollution). Direct experience offers more enriched information that is required in the formation of a cognitive judgment (Smith & Swinyard, 1983), so direct encounters with environmental problems tend to have a stronger effect on attitude than do verbal descriptions. Moreover, the accumulation of direct experiences tends to result in cognitive generalizations when forming mental judgments toward adopting the targeted behaviour (Smith & Swinyard, 1983).

When forming attitudes toward the environment, consumers also tend to comply with prevailing social norms (Fransson & Gärling, 1999). For example, not accepting the widely-held social norm that individuals should be concerned about environmental degradation may incur peer censure, resulting in the development of *pro-environmental attitudes*. Having a pro-environmental attitude (versus actual pro-environmental behaviour) is important in today's society, since not having one will likely result in social stigma. On the other hand, the same social norm is not applicable to *actual pro-environmental behaviour*. A person who is not exhibiting a pro-environmental behaviour (or lifestyle) is less likely to receive such social stigma because it is seen to be socially understandable (excusable) if a person does not adopt such a lifestyle. There is a general perception that adopting a pro-environmental lifestyle is expensive and requires a strong commitment (Stern, 1992). Therefore, against this backdrop, people tend to overestimate their attitude

(concern) toward environmental issues in order to conform to the social norm, and in such situations, they may tend to make inaccurate predictions about whether they are actually willing to demonstrate the actual pro-environmental behaviour.

Attitudes toward the environment also change over time. Kollmus and Agyeman (2002) noted that the consistency between attitude and pro-environmental behaviour diminishes as the time interval between the observation of an environmental problem and the observation of actual behaviour increases. The authors illustrated this effect by examining approval of nuclear power. Specifically, two years after the Chernobyl nuclear accident, the rejection of nuclear energy in Switzerland was at its highest possible level. However, ten years after Chernobyl, the level of rejection of nuclear energy among the Swiss decreased. This shows the tendency for attitude to change over time in that it is unable to capture foreseeable events that may affect the performance of actual behaviour. Indeed, when forming their judgments two years *after* Chernobyl, Swiss people did not take into account rising electricity consumption and advances in nuclear technology in the subsequent ten years.

The final focus of this study is the selection of the immediate predictor of pro-environmental behaviour. That is, the effects of attitude on behaviour need to be mediated by a construct that can capture consumers' judgment regarding the demonstration of a particular behaviour. One of the more widely employed immediate predictors of behaviour is BI. Prior studies proposed theoretical frameworks where BI mediates the attitude–behaviour relationship (Ajzen, 1985, 1991; Ajzen & Fishbein 1974, 1980). Nevertheless, as discussed earlier, BI has certain limitations that may contribute to the supposed gap that exists between attitude and the enactment of pro-environmental behaviour. An alternative predictor of pro-environmental behaviour is therefore required to overcome the limitations of BI. This study proposes BE as a better immediate predictor of pro-environmental behaviour than BI. Venkatesh et al. (2006) performed a factor analysis to examine the convergent and discriminant validity between BE and BI items, and found that all loadings were greater than 0.70, while cross-loadings were less than 0.30. This result shows that BE and BI are indeed two distinct constructs.

The role of behavioural expectation

BE was introduced by Warshaw and Davis (1984) as a distinct construct, although some researchers confuse it with BI. Warshaw and Davis (1985a; 1985b) observed that some BI measurement items in previous studies (e.g. Ajzen & Fishbein, 1974, 1980) are actually measuring BE. Items that measure BI such as *"do you intend to…"* or *"do you plan to…"* should be differentiated from items that measure BE such as *"do you expect to…"* or *"are you going to…".* For example, a young scholar is likely to answer "yes" when asked whether s/he *intends* to publish in a top tier journal. On the other hand, s/he may well answer differently when being asked whether s/he *expects* to publish in a top tier journal. According to Warshaw and Davis (1985a), the formation of BI does not take into account impediments that may challenge a person's ability to actually perform the targeted behaviour.

In other words, BI reflects a person's *desire* to perform a targeted behaviour that does not take into account their resources or ability to actually perform that behaviour. Consider, for example, an individual who has been asked: *"do you intend to purchase a pro-environmental product?"* The response will frequently be "yes" as it is becoming a widely accepted social norm that people should be concerned about the environment. However, s/he is not taking into consideration whether there will be foreseeable events that challenge this intention, such as having the necessary resources and ability to carry it out. For example, a person may report a high intention to convert her/his car fuel system from gasoline to gas for pro-environmental reasons. However, in reality, most people do not actually convert their car's fuel system even though they know that gasoline is more expensive than gas and is more detrimental to the environment. Conversely, in the formation of BE, a person will take into account impediments that may challenge her/his ability to actually perform the targeted behaviour (Warshaw & Davis, 1985a). As such, BE reflects a careful analysis about whether performing the targeted behaviour is *feasible*. For example, when answering the question *"do you expect to convert your car fuel system from gasoline to gas?"* a person will first analyse whether there will be foreseeable events that challenge her/his expectation (e.g. available resources and ability). The BE will be high if the person thinks that the foreseeable impediments can be overcome, and will be low if otherwise.

Habitual pro-environmental behaviour

Any discussion on the predictive utility of BE versus BI should not overlook the fact that many behaviours with critical environmental impacts are developed through repetition and habit (Kollmuss & Agyeman, 2002). For purposes of comparison, habitual behaviour offers further insight into the formation of BE versus BI when behaviour is subject to impediment, in this case: habits (i.e. Hines et al., 1987). Habitual pro-environmental behaviour is a form of automatic and routine behaviour, which is being repeated without conscious thought since it is rewarding (i.e. economic reason; Dahlstrand & Biel, 1997). Moreover, it is later performed without deliberation about impediments by people who do not possess such habits. Warshaw and Davis (1985b) contend that in the formation of BE, a person takes into account whether s/he has a habit that relates to the targeted behaviour. For example, a person will be less likely to switch off the light each time s/he exits an empty room if such an action is not habitual. BE measures will likely trigger the subject's awareness of having this habit; thus, BE should be greater for someone who possesses this habit than for someone who does not possess it. On the other hand, BI measures may be less likely to trigger such awareness (whether s/he has formed a habit to switch-off the light). In this case, there will be no difference in BI estimation between someone who possesses this habit and someone who does not. Study 2 aims to empirically validate this hitherto untested proposition.

3.2.2 The temporal stability of behavioural expectation

As discussed earlier, one of the key limitations of BI is that it changes over time such that its predictive ability diminishes as the time interval between the measurement of BI and behaviour increases (Sheeran & Orbell, 1998). In this sense, BI will be more predictive when the actual behaviour is measured as soon as a person forms her/his BI judgments (Ajzen, 1985; 1991). Sheeran and Abraham (2003) defined the temporal stability of BI as the extent to which BI persists over time regardless of whether there are impediments or whether it is challenged. For example, the stability of a person's BI toward adopting a pro-environmental lifestyle over time will be determined by his/her ability to foresee factors, such as commitment, that

may preclude the adoption of such lifestyle. Thus, the temporal stability of BI decreases as the time interval between BI formation and pro-environmental action increases.

The temporal stability of BI may also determine its predictive ability (Armitage & Conner, 2001). Prior studies, for instance, have examined the role of temporal stability in defining BI's predictive ability (e.g. Sheeran et al., 1999; Conner et al., 2000) and found that the temporal stability of BI moderates the strength of the relationship between BI and behaviour such that higher temporal stability leads to greater predictive ability. On the other hand, the formation of BE judgments is based on anticipated changes in behavioural determinants, such as changes in intention due to impediments (Venkatesh et al. 2006; 2008). In this sense, BE should be more stable over time, increasing its predictive utility relative to BI. Indeed, Gordon (1989) observed that BE is a better predictor than BI when the interval between BE/BI and actual behaviour increases. Thus, longer time intervals would appear to have a more detrimental effect on BI's predictive ability than BE's. Moreover, Venkatesh et al. (2006) reported that a longer time interval (higher anticipation) led to a stronger BE-behaviour relationship, but a weaker BI-behaviour relationship. These findings suggest that an individual who forms BI judgments has a limited ability to foresee impediments to behavioural action, whereas a person who forms BE judgments has a higher ability to foresee the impediments (Venkatesh et al. 2006). However, both Gordon (1989) and Venkatesh et al. (2006) did not explore the notion of temporal stability of BE versus that of BI in their studies. Consequently, Gordon (1989) and Venkatesh et al's. (2006) conceptual proposition remains unverified– until now that is. Thus, ours is potentially the first study to empirically verify the conceptual proposition regarding the temporal stability of BE versus BI.

3.3 Hypotheses

BI has been employed as an immediate predictor of pro-environmental behaviour by Hines et al. (1987) in their widely used *Model of Responsible Environment Behaviour* (MREB). According to Kollmus and Agyeman (2002), MREB is an extension of the TPB which, although touted as more sophisticated, also has a limited ability to

explain pro-environmental behaviour. The limitations of BI inherent in TPB are also found in MREB, specifically BI's weak predictive ability of pro-environmental behaviour. Bamberg and Möser (2007) conducted a meta-analysis of 57 pro-environmental behaviour studies that used BI as an immediate predictor of pro-environmental behaviour, and reported that BI is able to explain only 27% of the variance. One key explanations for this BI limitation is related to the subjects' tendency to overestimate their likelihood to perform certain pro-environmental behaviour when responding to BI questions (Bamberg & Möser, 2007) This overestimation could be explained by the tendency of respondents to take into account social norms when responding to BI measures (Ajzen, 1985). In the case of BE, respondents' tendency to take into account social norms is lower since the expectation focuses on her/himself rather than others (Warshaw and Davis, 1985b). Therefore, subjects who respond to BE questions should have a more modest (and probably more accurate) estimation of their likelihood to demonstrate pro-environmental behaviour. The difference lies in the magnitude of social norms that are taken into account by subjects who form BE *or* BI judgments. This study contends that subjects who respond to BE measures will demonstrate *less* desire to conform to social norms compared to subjects who respond to BI measures. Therefore, subjects' estimation of their BE to perform pro-environmental behaviour will be lower than their BI.

Moreover, Warshaw and Davis (1985b) contend that the formation of a person's BI judgments are generally based on the 'desirability' of the targeted behaviour, whereas BE judgments are generally based on the 'feasibility' of the targeted behaviour. In making an evaluation about whether or not a pro-environmental behaviour is desirable, subjects' behaviour is often influenced at least in part by others (social norms; Bamberg & Möser, 2007; ethical obligation: Shaw, Shiu, & Clarke, 2000). On the other hand, when examining whether or not the demonstration of a pro-environmental behaviour is 'feasible', a person may take into account her/his available resources (self) or impediments to actual performance. For example, pursuing a more pro-environmental lifestyle can be considered as a 'desire', if induced by motivation to be a 'better person' (i.e. conforming to moral norms), or can be considered as 'feasible or unfeasible', if induced by a careful

calculation of the availability of resources enabling one to actually adopt the lifestyle. Accordingly, we hypothesize that:

> H_1*: The estimation of behavioural intention is higher than behavioural expectation for pro-environmental behaviour.*

Consumers can be categorized with respect to their pro-environmental orientation (Dunlap et al., 2000). Ideally, a person with high pro-environmental orientations should have a more consistent relationship between their pro-environmental attitude and their actual pro-environmental behaviour compared with a person with low pro-environmental orientations. The formation of a person's pro-environmental orientation is based on different values that s/he acquires (Fransson & Gärling, 1999; Stern, 1992) . According to these values, a person who attains a high pro-environmental orientation should believe that: (1) there are cause-effect relationships between humans and the ecosystems, such that human activity should not exceed the capacity of the biophysical environment (Stern, 1992; Hopper & Nielsen, 1991); (3) one should anticipate any negative consequences of having deteriorated the environment (Fransson and Gärling, 1999); and (4) environmental concern is a part of religious beliefs or post-materialistic values (Fransson & Gärling, 1999; Dunlap & Van Liere, 1978). Meanwhile, a person who has a low pro-environmental orientation is less likely to acquire the aforementioned values. In addition, the relationship between BI and behaviour in TPB is found to bond to cultural difference (Hassan & Shiu, 2013). This includes a person's tendency to conform to social values and norms, which in turn shapes her/his pro-environmental orientation.

By examining the differences between people with high and low pro-environmental orientations, this study seeks to explain the effects of pro-environmental orientation on the formation of BE versus BI. Subjects who respond to BE questions will think in terms of the feasibility (probability) of performing the targeted behaviour rather than in terms of social norms. This leads to a more modest estimation by BE subjects, which will be consistent between subjects with high or low pro-environmental orientation. Therefore:

H_{2a}*: Consumers' pro-environmental orientation has no effect on their behavioural expectation estimation. Therefore, consumers who have low pro-environmental orientation will have similar BE estimation compared to consumers with high pro-environmental orientation.*

On the other hand, social norms prevent individuals with low pro-environmental orientation from making an honest estimation of their likelihood (BI) to perform a targeted pro-environmental behaviour (Newhouse, 1990). Fransson and Gärling (1999) contend that BI predicts pro-environmental behaviour better when the influence of social norms on individuals is limited. Michaelidou and Christodoulides (2011) found that a person's perception toward ethical obligation affects her/his BI to perform the targeted behaviour. In this sense, subjects who respond to BI questions tend to be bound by the generally accepted ethical obligation (norms) to behave in the interests of environment. They will try to conform to the social norms first, without taking into account the probability of actually performing the targeted behaviour. This mental process may lead to an inaccurate estimation of their actual intention to perform the behaviour. Specifically, the effect is stronger for subjects with low pro-environmental orientation, since high pro-environmental orientation consumers will have lower estimation of their BI to perform certain pro-environmental behaviours. Therefore, this study hypothesizes that:

H_{2b}*: Consumers who have low pro-environmental orientation will overstate their behavioural intention estimation - in that their estimation will be higher compared to consumers who have high pro-environmental orientation.*

Steg and Vleg (2009) contend that not all pro-environmental behaviours are preceded by a subject's cognitive elaboration (reasoned behaviour), since there are cases where behaviour is habitual and formed through automated cognitive judgment. One of the key characteristics of habit is that it is driven by goal achievement (Aarts, Verplanken, & Knippenberg, 1998). Behaviour is considered as a goal if the person who is going to perform it foresees impediments to this performance (Bagozzi & Warshaw, 1990). In order to overcome the foreseeable impediments to behavioural performance, a person may choose to strengthen the mental association with the targeted goal behaviour through repetitive action

(Dunlap & Van Liere, 1978). The repetitive action is likely to lead to the formation of habit. Hence, an encounter with a goal achievement situation will more likely activate habit compared to an encounter with a reasoned behaviour situation. Warshaw and Davis (1985a) reported that BE is a more robust predictor of goal than is BI, which in hindsight also indicates that BE is a better predictor of habitual behaviour than is BI. The authors contend that BI has a limited ability to take habit into account because BI questions are less likely to activate a person's awareness or consciousness about whether her/his habits conform to the targeted behaviour. In contrast, BE questions are more likely to activate an individual's awareness or consciousness about having a habit that conforms to the targeted behaviour being examined. Therefore, this study hypothesizes that:

> H_3*: Behavioural expectation is a better predictor of habitual pro-environmental behaviour than is behavioural intention.*

In adoption of new pro-environmental product context, time can be a key factor that being considered by consumers making decision toward adopting new pro-environmental products (Thorsnes, Williams, & Lawson, 2012). Warshaw and Davis (1985b) contend that the effects of time are greater toward BI than BE, in such that BI is more unstable overtime compared to BE. Since BE has a higher ability than BI to account for impediments to behavioural performance, BE should be more stable over time and thus more predictive of behaviour than is BI (Konerding, 2001). Indeed, Gordon (1989) observed that at two time points (short and long intervals), subjects who responded to BE questions gave more consistent responses than subjects who responded to BI questions; thus, BE may be more stable over time than BI. Moreover, Venkatesh et al. (2006), who compared the role of anticipation in moderating the relationship between BE or BI and behaviour, found that a longer time interval (higher anticipation) increased the BE-behaviour relationship and reduced the BI-behaviour relationship, which explains why BE should be more stable over time than BI. Both studies imply that BE is more stable over time than BI, and thus is a better predictor of behaviour. Therefore this study hypothesizes that:

H_4*: Behavioural expectation is more stable over time than behavioural intention, and thus behavioural expectation is more predictive than behavioural intention on pro-environmental behaviour.*

3.4 Study 1

Participants, design and procedure

One hundred and twenty-six respondents (71 female) from an online panel participated in a 1x2 Dependent Variable (BE, BI) between subjects experiment. The respondents were paid for their participation. Seventy-one participants were allocated to the BI condition, while 55 were allocated to the BE condition. In both conditions, participants responded to questions assessing the likelihood of their purchasing six pro-environmental products: *water saving shower head, recycled plastic grocery bag, biodegradable AAA battery, energy saving light bulb, electricity from environmentally friendly power generator, gas converter installation for car.* These six pro-environmental products were selected by following the guidelines from prior studies (e.g. Barr et al., 2005; Gupta and Ogden, 2009). Participants in the BI condition completed questions pertaining to their BI to purchase these products, while those in the BE condition completed the equivalent BE questions. Participants also completed the New Environmental Paradigm (NEP) Scale (Dunlap, et al., 2000) so as to gain a measure of their pro-environmental orientation.

Measures

BI and BE items were operationalized using guidelines proposed by Warshaw and Davis (1985b). BI and BE were measured on 7-point Likert scales and were adapted to fit the context of each of the six pro-environmental purchase behaviours examined. The three items ($\alpha = 0.94$) used to assess BI were: *"Please indicate whether you intend to purchase a water saving shower head at $100", "please indicate whether you plan to purchase a water saving shower head at $100"* and *"please indicate your prediction that you actually will purchase a water saving shower head at $100".* Similarly, The equivalent 4-item BE scales ($\alpha = 0.96$) were: *"Please indicate whether*

you expect to purchase a water saving shower head at $100", "please indicate whether you will purchase a water saving shower head at $100", "please indicate whether you are going to purchase a water saving shower head at $100" and *"please indicate how likely that you actually will purchase a water saving shower head at $100".*

A factor analysis was conducted to examine the convergent and discriminant validity between BE and BI items, and it was found that the internal consistency reliabilities for all BE and BI items employed in our study were greater than .70 (high). The results are consistent with those of three studies that are presented in this study.

Results

Table 1 shows that for all six purchases, the mean scores of subjects' BE judgment are lower than subjects' BI judgment. Four of the six product categories showed significant differences as follows: *"water saving shower head at $100"* ($M_{BI}$= 4.48 >$M_{BE}$= 3.65; p<.05), *"recycled plastic bag for groceries at $1"* ($M_{BI}$ = 4.69 >M_{BE} = 3.40; p<.05), *"biodegradable AAA battery for price 50% more expensive than non-biodegradable battery"* (M_{BI} = 4.33 >M_{BE} = 3.63; p<.10) and *"energy saving light bulb at price 30% higher than conventional light bulb"* (M_{BI} = 5.47 >M_{BE} = 4.89; p<.10). The two product categories where BE and BI judgments were not significantly different were: *"electricity from environmentally friendly power generator at price 20% more expensive than normal price"* and *"gas converter installation for your car at price $1,500".* These products are more likely to be categorized as high-involvement purchase decisions in that they involve considerable financial commitment. Consequently, when responding to BI questions about the likelihood of their purchasing these pro-environmental products, subjects made a more careful estimation and did not overstate their BI judgments as they generally did with less expensive products. Nevertheless, it should also be noted that not all participants have a car or are responsible for selecting their electricity provider, potentially biasing these results. The results presented in Table 1 support Hypothesis 1, which predicts that BI will be higher than BE for pro-environmental behaviour.

Results presented in Table 1 suggest that subjects who respond to BI questions are generally bound to the social norms to behave in the interests of the environment.

Sometimes this leads to overestimation, or more specifically, inaccurate estimation of their BI judgments. Therefore, as predicted, the estimation of BI is significantly different between subjects with high and those with low pro-environmental orientation. On the other hand, social norms seem to have a more limited influence on the formation of BE judgments since subjects prioritize when calculating the feasibility (probability) of performing the targeted pro-environmental behaviour. This leads to a more modest estimation by BE subjects, which is reflected in their lower means scores compared to those of BI subjects.

Table 1: Comparison of purchases' mean score: BE versus BI

Purchases	**Mean score**		**BI>BE?**	**t**	**H1 supported?**
	BI	**BE**			
	(n = 71)	**(n = 55)**			
Purchase electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price	3.41	3.13	Yes	0.83	No
Purchase gas converter installation for your car at price $1,500	2.91	2.76	Yes	0.47	No
Purchase water saving shower head at price $100	4.48	3.65	Yes**	2.23	Yes
Purchase recycled plastic bag for groceries at price $1 each	4.69	3.40	Yes**	3.43	Yes
Purchase bio-degradable AAA battery at price 50% more expensive than non-bio-degradable battery	4.33	3.63	Yes*	2.02	Yes
Purchase energy saving light bulb at price 30% more expensive than conventional light bulb	5.47	4.89	Yes*	1.76	Yes

[a]Significant differences between BI and BE mean scores are based on independent sample t-test.
** $p<.05$
* $p<.10$

Table 2 shows that in absolute terms, participants who have high pro-environmental orientation have lower BI judgments in five product categories compared to subjects who have low pro-environmental orientation (Hypothesis 2b). Subjects were categorized according to high pro-environmental orientation and low pro-environmental orientation based on their response to the New Environmental Paradigm (NEP) scale, following guidelines from Dunlap et al. (2000). The NEP scale consists of 15 items that have been randomized so that agreement with the eight odd-numbered items and disagreement with seven even-numbered items indicate high pro-environmental orientation. Of these five product categories, three show significant mean differences between the high and low pro-environmental orientation groups: AAA battery (M_{BIHO} = 3.79 <M_{BILO}= 4.71; p<.05); gas converter (M_{BIHO} = 2.35<M_{BILO} = 3.52; p<.05), and electricity from environmentally friendly power plant (M_{BIHO} = 2.99 <M_{BILO}= 3.87; p<.10). Two product categories were not significant, as follows: *"energy saving light bulb"* and *"recycled plastic bag for groceries at $1"*, which may be due to the fact that these pro-environmental products have been widely adopted by consumers.

On the other hand, Table 3 indicates that subjects with high pro-environmental orientation form higher BE judgments in five product categories compared to subjects with low pro-environmental orientation (Hypothesis 2a). Of these five products, only one showed significant mean differences between high pro-environmental orientation and low pro-environmental orientation consumers contrary to that which was hypothesized, as follows: *"purchasing energy saving light bulb"* (M_{BEHO} = 5.24 >M_{BELO} = 4.35; p<.10). This finding may be explained by the fact that for many participants, the purchasing of energy-saving light bulbs has become habitual.

Table 2: Comparison of BI mean score: high pro-environmental orientation versus low pro-environmental orientation

Purchases	Behavioural Intention (BI) Mean Score		HO<LO?	t	H2b supported?
	High Environment Orientation (HO) (n = 37)	Low Environment Orientation (LO) (n = 34)			
Electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price	2.99	3.87	Yes*	1.92	Yes
Gas converter installation for your car at price $1,500	2.35	3.52	Yes**	2.77	Yes
Water saving shower head at price $100	4.13	4.87	Yes	1.54	No
Recycled plastic bag for groceries at price $1 each	4.57	4.83	Yes	0.52	No
Bio-degradable AAA battery at price 50% more expensive than non-degradable battery	3.79	4.91	Yes**	2.49	Yes
Energy saving light bulb at price 30% more expensive than conventional light bulb	5.50	5.44	No	0.13	No

[a] Significant differences between HO and LO mean scores are based on independent sample t-test.
** $p<.05$
* $p<.10$

Table 3: Comparison of BE mean score: high pro-environmental orientation versus low pro-environmental orientation

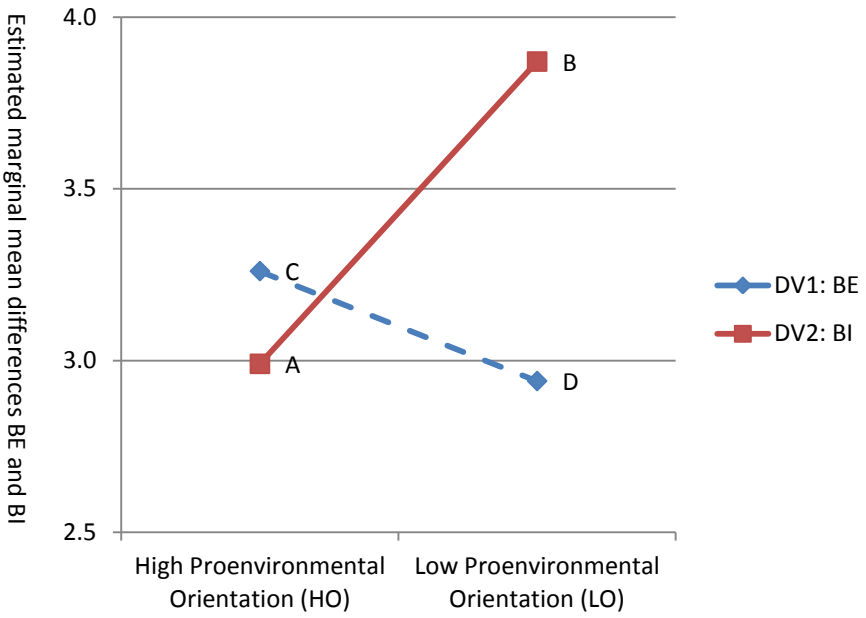
Purchases	Behavioural Expectation (BE) Mean Score		HO>LO?	t	H2a supported?
	High Environment Orientation (HO) (n = 33)	Low Environment Orientation (LO) (n = 22)			
Electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price	3.26	2.94	Yes	0.63	Yes
Gas converter installation for your car at price $1,500	2.64	2.93	No	0.59	Yes
Water saving shower head at price $100	3.89	3.30	Yes	1.05	Yes
Recycled plastic bag for groceries at price $1 each	3.54	3.20	Yes	0.59	Yes
Bio-degradable AAA battery at price 50% more expensive than non-degradable battery	3.80	3.39	Yes	0.79	Yes
Energy saving light bulb at price 30% more expensive than conventional light bulb	5.24	4.35	Yes*	1.69	No

[a] Significant differences between HO and LO mean scores are based on independent sample t-test.
** $p<.05$
* $p<.10$

Additionally, Figures 1-3 show the estimated marginal means differences between BE and BI for subjects with high pro-environmental orientation versus subjects with low pro-environmental orientation. The graphical illustration clearly indicates that estimation of BE judgments for high and low pro-environmental orientation subjects were not significantly different. In contrast, BI estimation is significantly different between subjects with high and low pro-environmental orientation. Interestingly, subjects with low pro-environmental orientation consistently made higher estimations for BI judgments compared to the high pro-environmental group.

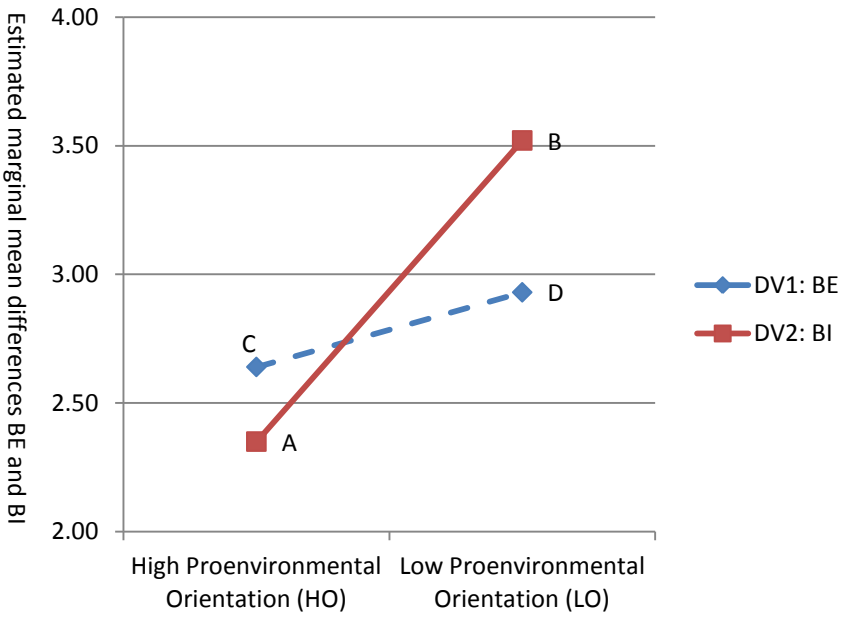
In Study 1, we examined subjects' estimation of their BE and BI judgments to perform certain pro-environmental behaviours. This study provides a baseline for comparing the different conceptualization of BE versus BI. The results show that subjects who respond to BE questions made more modest estimations of their likelihood to purchase pro-environmental products, whereas subjects who respond to BI questions made higher estimations of their likelihood to purchase the said products. The modest estimation for BE subjects was consistent between subjects with high and low pro-environmental orientation. On the other hand, the higher estimation for BI subjects was not consistent between high and low pro-environmental orientation groups. However, in Study 1 we examined only the difference in the estimation of subjects' BE and BI judgments. Therefore, in Study 2 we examined whether this different means of estimation will influence the predictive ability of BE and BI.

Figure 1: Subjects' BE vs. BI estimation on eco-friendly electricity purchase



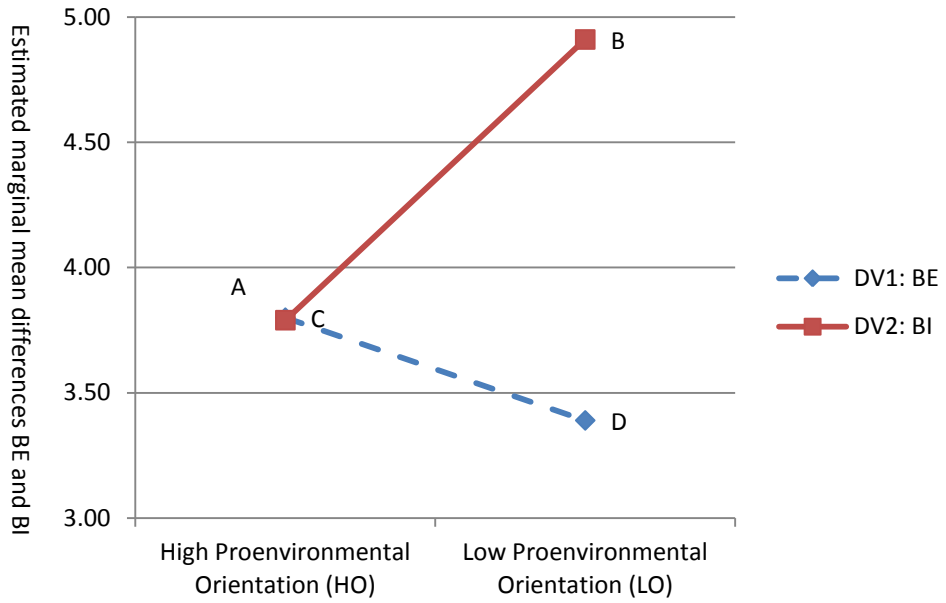
- A–B:(M_{BIHO} = 2.99 < M_{BILO}= 3.87; p<.10)
- C – D: (M_{BEHO} = 3.26> M_{BELO}= 2.94; not significant)
- A –C: (M_{BIHO} = 2.99< M_{BEHO}= 3.26; not significant)
- B – D: (M_{BILO} = 3.87> M_{BELO}= 2.94; p<.10)

Figure 2: Subjects' BE vs. BI estimation on car gas converter purchase



- A–B:(M_{BIHO} = 2.35< M_{BILO}= 3.52; p<.05)
- C – D: (M_{BEHO} = 2.64< M_{BELO}= 2.93; not significant)
- A –C: (M_{BIHO} = 2.35< M_{BEHO}= 2.64; not significant)
- B – D: (M_{BILO} = 3.52> M_{BELO}= 2.93; not significant)

Figure 3: Subjects' BE vs. BI estimation on bio-degradable battery purchase



- A–B:(M_{BIHO} = 3.79< M_{BILO}= 4.91; p<.05)
- C – D: (M_{BEHO} = 3.80> M_{BELO}= 3.39; not significant)
- A –C: (M_{BIHO} = 3.79< M_{BEHO}= 3.80; not significant)
- B – D: (M_{BILO} = 4.91> M_{BELO}= 3.39; p<.05)

3.5 Study 2

Participants, measures, design and procedure

One hundred and one respondents (32 female) from an online panel participated in a 1x2 Dependent Variable (BE, BI) between subjects longitudinal experiment. The respondents were paid for their participation and were assigned to one of two conditions. Specifically, 52 valid respondents received BI questions and 42 valid respondents received BE questions. BI and BE items were operationalized using guidelines proposed by Warshaw and Davis (1985b). BI and BE were measured on 7-point Likert scales and were adapted to fit the context of prediction of habitual pro-environmental behaviour. Respondents completed a questionnaire at two time points. The questionnaire contained questions regarding respondents' likelihood of performing five habitual pro-environmental behaviours over the course of a weekend: (1) *unplug electronic devices that are not used;* (2) *purchase environmentally friendly product;* (3) *use own bag for groceries;* (4) *switch off light before leaving a room;* and (5) *reduce water usage*. The first questionnaire was distributed before the weekend (Tuesday, Wednesday, or Thursday) and the second questionnaire, which measured their actual behaviour, was distributed after the weekend (Monday, Tuesday, or Wednesday of the following week). The 3 items (α = 0.88) used to assess BI to perform habitual pro-environmental behaviour on the weekend were: *"Please indicate whether you intend to use own bag for groceries sometimes this weekend", "please indicate whether you plan to use own bag for groceries sometimes this weekend"* and *"please indicate your prediction that you actually will use own bag for groceries sometimes this weekend".* Similarly, The equivalent 4-item BE scales (α = 0.93) were: *"Please indicate whether you expect to use own bag for groceries sometimes this weekend", "please indicate whether you will use own bag for groceries sometimes this weekend", "please indicate whether you are going to use own bag for groceries sometimes this weekend"* and *"please indicate how likely that you actually use own bag for groceries sometimes this weekend".*

Results

The between-subjects correlation of BE- Behaviour and BI-Behaviour is presented in Table 4. The correlation differences between BE-Behaviour and BI-Behaviour were

tested using the Fisher z transformation test. The BE-Behaviour correlation was found to be stronger than the BI-Behaviour correlation for four behaviours, as follows: *"unplug electronic devices that are not used"* (r_{BE}= .504>r_{BI} = .273, t = 1.34, p < .10, one-tailed), *"purchase environmentally friendly product"* (r_{BE}= .719>r_{BI} = .442, t = 2.10, p < .05, one-tailed), *"use own bag for groceries"* (r_{BE}= .507>r_{BI} = .184, t = 1.81, p < .05, one-tailed) and *"switch off light before leaving a room"* (r_{BE}= .748 >r_{BI} = .297, t = 3.23, p < .01, one-tailed). However, significant differences in correlation magnitude were not observed for "*reduce water usage"*.

Table 4: Comparison between correlations of BI-Behaviour and BE-Behaviour

No	Behaviour	Correlation (Spearman) T_1 - T_2		BE-B>BI-B? [a]	H3 supported?
		BI-B	BE-B		
		N = 52	N = 49		
1	Unplug electronic devices that are not used	.273	.504	Yes*	Yes
2	Purchase an environmentally friendly product at supermarket	.442	.719	Yes**	Yes
3	Use own bags for groceries shopping	.184	.507	Yes**	Yes
4	Switch off light before leaving a room	.297	.748	Yes***	Yes
5	Reduce water usage	.445	.572	Yes	No

[a] Significant differences between BI and BE correlations are based on Fisher z transformation test.
*Significant at .10
**Significant at .05
*** Significant at .001

In an overall comparison of the five behaviours, BI-Behaviour correlations ranged from .184 to .445 with a mean value of .328, whereas BE-Behaviour correlations ranged from .504 to .748 with a mean value of .610. The average total correlation for all five behaviours is significantly different based on the Fisher z transformation test ($t(4)$ = 1.79, p < .05, one-tailed). Based on the aforementioned results, Hypothesis 3,

which predicts that the BE-Behaviour correlation will be stronger than the BI-Behaviour correlation, is consequently supported.

In Study 2, we examined the predictive ability of BE versus BI and confirmed that BE had greater predictive utility than BI. However, we did not examine the temporal stability of BE versus BI, and whether temporal stability enhances the predictive utility of either construct. Study 3 will examine this notion in the following section.

3.6 Study 3

Participants, design and procedure

Ninety participants (49 female) from an online panel participated in an online experiment and were assigned to one of two conditions. Specifically, 45 participants received BI questions and 45 participants received BE questions. Participants were asked to indicate their intention or expectation that they would donate 10 percent of their participation reward money to a pro-environmental cause ("Compostable Shopping Bags"). This question was posed to participants at three separate time points. The purpose of this design is to test the stability of BE versus BI over time. The stability of BE and BI was challenged by giving additional information specific to a pro-environmental cause being used. Each set of information was designed in a way that it will gradually improve subjects' awareness toward the importance of the cause. As previously discussed, subjects' awareness toward pro-environmental issues affects the formation of their BE and BI. Therefore, subjects' BE and BI may vary across time based on the level of their awareness. In order to represent actual decision making situations, in which distractions sometimes exist within the time interval between two set of BE/BI formation, participants were asked to perform a cognitive task irrelevant to the pro-environmental cause.

The sequence of the experiment follows a repeated measures design. In Time 1, participants were given short information regarding the pro-environmental cause, and then participants were asked to indicate their willingness to donate (i.e. BE and BI items) to the cause: *"Before proceeding to STUDY 1, we would like to ask you whether you are willing to donate 10 cents of your payment from this study to support*

'Free Compostable Plastic Bags Campaign'. With 10 cents that you will donate, we can purchase 100 compostable plastic bags to be distributed for free in various supermarkets throughout the country. Please indicate your likelihood to donate below."

Between time 1 and Time 2, we asked participants to perform a cognitive test. They were instructed to arrange a store layout, and were also asked to review different types of layouts. The cognitive exercise takes 3-5 minutes to complete.

Next, in Time 2, participants were provided with more information about the pro-environmental cause. Specifically, a detailed explanation about the benefits of using compostable plastic bag to save the environment. It was followed by the same question as in Time 1, whether participants are willing to donate 10 cents of their payment from this study to support 'Free Compostable Plastic Bags Campaign' or not. Their willingness to donate was measured by BE or BI items.

Between time 2 and Time 3, participants performed a cognitive test. They were instructed to create a layout plan that enhances store traffic. In addition, they were asked to review the ability of different type of layouts in enhancing visitor traffic.

In Time 3, participants were given information about the company that produces the compostable bag. The mission to save environment and other good practices of this company were provided to be reviewed by participants. The role of the company in the abovementioned pro-environmental cause was also explained. After reviewing the information, participants were again asked to indicate their willingness to donate 10 cents of their payment to support the cause. Their willingness to donate was measured by BE or BI items.

Between time 2 and Time 3, participants performed a cognitive test. They were instructed to create a store checkout plan. Participants were also asked to review different type of store checkout plans.

Finally, in Time 4, participants' actual behaviour (i.e., whether they ultimately donated 10 cents of their participation fee) was observed.

Measures

Measures of BE (α = 0.99) and BI (α = 0.98) were taken for the three time periods. These items follow the guidelines of Warshaw and Davis (1985b) and Venkatesh et al. (2008). BI was measured using three items, each on a 9-point bipolar (+4 to -4) scale as follows: *"I intend to donate 10 cents to the pro-environmental campaign", "I plan to donate 10 cents to the pro-environmental campaign",* and *"I predict I will donate 10 cents to the pro-environmental campaign"*. In contrast, the four BE items were: *"I expect to donate 10 cents to the pro-environmental campaign, "I will donate 10 cents to the pro-environmental campaign", "I am going to donate 10 cents to the pro-environmental campaign"* and *"I am likely to donate 10 cents to the pro-environmental campaign".* In addition, BE and BI stability was measured based on the within-participants Pearson correlation between repeated items employed at the three time points based on the guidelines advanced by Sheeran et al. (1999).

Results

The results indicate that BE is more stable than BI and thus more predictive (Hypothesis 4). An ANOVA was employed to test mean changes in BE and BI across the three time periods. Results indicated that BI responses varied significantly across the three time points ($M_{BITime1}$= 4.392, $M_{BITime2}$= 5.081, $M_{BITime3}$= 4.829, F = 5.467 (*df*=2), $p<0.05$), confirming that BI changes over time. Conversely, no significant difference was identified between subjects' responses to the BE questions across the three time periods ($M_{BETime1}$= 4.111, $M_{BETime2}$= 4.289, $M_{BETime3}$= 4.311, F = 1.171 (*df*=2), $p<0.5$), suggesting that BE does not change over time. The temporal stability of BE and BI was also analyzed using within-participants correlations (see Table 5 and 6). The results from both tables indicate that BE is more stable than BI. Specifically, BE correlations between T1-T2, T2-T3 and T1-T3are significantly higher than BI correlations ($r_{BE1\text{-}BE2}$= .96>$r_{BI1\text{-}BI2}$ = .86, $p < .05$, one-tailed; $r_{BE2\text{-}BE3}$= .98>$r_{BI2\text{-}BI3}$ = .88, $p < .01$, one tailed; $r_{BE1\text{-}BE3}$= .94>$r_{BI1\text{-}BI3}$ = .85, $p < .05$, one-tailed). Finally, the results confirm that BE is a better predictor of donation behaviour than BI. BE correlations between T1-T4, T2-T4 and T3-T4 are significantly higher than BI correlations ($r_{BE1\text{-}BE4}$= .79>$r_{BI1\text{-}BI4}$ = .61, $p < .05$, one-tailed; $r_{BE2\text{-}BE4}$= .80>$r_{BI2\text{-}BI4}$ = .68, $p < .10$, one tailed; $r_{BE3\text{-}BE4}$= .83>$r_{BI3\text{-}BI4}$ = .73, $p < .15$, one-tailed).

Within-participants correlations between BE/BI and behaviour across the three time periods were examined using the Fisher z transformation test. Interestingly, Table 5 also indicates that the strength of relationship between BI and behaviour increases as the time interval between BI and behaviour decreases (r_{BI3}= .73>r_{BI2} = .68 >r_{BI1} = .61), and Table 6 shows similar results for BE (r_{BE3}= .83>r_{BE2} = .80 >r_{BI1} = .79). However, the gap between the first observation (T1) and the last observation (T3) is wider for BI compared to BE. Hence, subjects who responded to the BE questions were less affected by the new information that was given in Time 2 and Time 3 than were those subjects who responded to BI questions.

Table 5: Intercorrelations for BI (N = 45)

Variables	1	2	3	4
(1) BI Time 1	nil	0.86**	0.85**	0.61**
(2) BI Time 2	0.86**	nil	0.88**	0.68**
(3) BI Time 3	0.85**	0.88**	nil	0.73**
(4) Behaviour (Time 4)	0.61**	0.68**	0.73**	nil
Mean	1.60	4.39	5.08	4.83
SD	0.50	3.41	3.33	3.14

*p<0.05; **p<0.01

Table 6: Intercorrelations for BE (N = 45)

Variables	1	2	3	4
(1) BE Time 1	nil	0.96**	0.94**	0.79**
(2) BE Time 2	0.96**	nil	0.98**	0.80**
(3) BE Time 3	0.94**	0.98**	nil	0.83**
(4) Behaviour (Time 4)	0.79**	0.80**	0.83**	nil
Mean	1.67	4.11	4.29	4.31
SD	0.48	3.45	3.45	3.41

*p<0.05; **p<0.01

3.7 Discussion

Results from Study 1 provided support for the hypothesis that participants generally over-estimate their environmental concern when responding to BI questions. In contrast, when responding to BE questions, participants are able to make more accurate estimations about their likelihood of performing the targeted pro-environmental behaviour. From these results, it can be inferred that the underlying process behind BE formation is based largely on participants' careful estimation of the feasibility of performing the targeted behaviour. A comparison between consumers with high and low pro-environmental orientations confirmed our prediction that different processes underlie the formation of BI and BE. As predicted, subjects with high pro-environmental orientations appeared to make more modest estimations about their environmental concern, exhibiting more stable responses to BI and BE questions. Specifically, they did not overestimate their likelihood of performing the targeted pro-environmental behaviour when responding to BI questions; nor did they underestimate it when responding to BE questions. Conversely, participants with low pro-environmental orientations tended to overestimate (underestimate) their likelihood of performing the targeted pro-environmental behaviour when responding to BI (BE) questions. It is clear that participants with low pro-environmental orientations were not taking into account the feasibility of performing the pro-environment behaviour.

Results from Study 2 indicate that BE is more predictive of habitual pro-environmental behaviours than is BI. These results imply that BE has a greater ability to activate participants' awareness about having a pro-environmental habit than does BI. In addition, the results demonstrate that subjects may be relying more on conscious cognitive judgment in performing the habitual pro-environmental behaviour. Fishbein and Ajzen (1974) contend that people are rational, even for simple behaviours (e.g. subconscious habits), and therefore they tend to resist the influence of desires on their mental judgments. In this study, the results indicate that subjects form conscious mental judgments of habitual pro-environmental behaviour more intensively when responding to BE questions than when responding to BI questions. Specifically, BI has a limited ability to take habit into account

because BI questions are less likely to activate a person's consciousness about whether her/his habits conform to the targeted behaviour, whereas BE questions are more likely to activate an individual's consciousness about having a habit that conforms to the targeted behaviour being examined (Warshaw & Davis, 1985a).

Finally, the results from Study 3 support the notion that the temporal stability of BE determines its predictive ability. Moreover, the three-time-period longitudinal study confirmed that BE was more stable over time than BI, and therefore more predictive. Specifically, participants who responded to BI questions changed their BI judgments across the three periods, whereas subjects who responded to the BE questions did not. Moreover, BI was found to be influenced by the emergence of new information, whereas BE judgments were influenced to a lesser extent. Moreover, the correlations between BE items over the three periods were significantly stronger than the correlations between BI items, confirming that BE is more stable over time than is BI. From these results, it can be inferred that the formation of BE judgments is based on foreseeing impediments to behavioural action, which in turn gives rise to a more accurate estimation of future action. Donating 10% of their participation fee in this case can be seen as an impediment since the value of the donation is relatively significant in proportion to the fee. Hence, subjects who responded to the BE questions had already taken this impediment into account in Time 1 and did not change their BE in the following periods (T2 and T3). Conversely, subjects who responded to BI questions did not foresee the 10% donation as an impediment and therefore were more likely to answer BI questions based on the social norms that one should donate to pro-environmental causes. When more information became available, however, subjects who responded to the BI questions changed their BI judgments. However, the tendency to conform to the generally accepted norm still influenced their BI judgments in the last two periods (T2 and T3). Thus, those who said that they intended to donate (BI) at Times 1-3 did not actually donate at Time 4.

Theoretical implications. This study offers alternate discussion on the longitudinal application of TRA/TPB by comparing to immediate predictor of behaviour, BE versus BI. Overall, the present results show that BE is indeed more stable overtime compared to BI, and therefore a more accurate predictor of pro-environmental

behaviour. More specifically, findings from Study 1 provide a baseline for comparing the different conceptualisation of BE versus BI. It is found that subjects who responded to BE made relatively more consistent estimations than did those subjects who responded to BI questions. This consistency is further examined in Study 2, where we found the modest estimations in the BE group leads to better predictive ability. The findings have important implications for social marketers in understanding the barriers to adopting pro-environmental behaviours. Prior research suggests that influencing consumer awareness is a key element in behavioural change (Alan, 2002). In the context of pro-environmental behaviour, consumers' awareness involves their ability to accurately calculate the costs and benefits of adopting a pro-environmental lifestyle and to take into account any foreseeable events that may impede the adoption of that lifestyle. BE enables social marketing researchers to measure consumers' awareness more consistently compared to BI, across various pro-environmental behaviours. In addition, results from Study 3 show that external factors such as information have a limited influence on BE but a significant influence on BI. Further research should look into the role of other external factors such as norms and culture, as well as internal factors such as experience and self-efficacy, in the formation of BE judgments.

Managerial implications. Findings from this study provide a number of key social marketing implications. First, consumers appear to be better able to accurately predict habitual pro-environmental behaviour when responding to BE questions. Hence, to promote behavioural change for habitual pro-environmental behaviour, an intervention should be designed with a focus on consumers' BE judgments rather than on their BI judgments. In this context, interventions need to focus on giving key information that helps to reduce consumers' perceived uncertainty or to clarify the extent of the impediments that may prevent consumers from performing the targeted pro-environmental behaviour.

Second, consumers who have a low pro-environmental orientation need to be approached differently from those consumers with a high pro-environmental orientation. Indeed, the former tend to overestimate their environmental concern when responding to BI questions since they are not aware of impediments that may

challenge their eventual performance of the targeted pro-environmental behaviour. Since they made overestimation, the consistency of their BI with actual behaviour will likely to be lower. In order to increase consumers' awareness, social marketers can provide relevant information that will alert consumers to potential obstructions that may deter them from adopting pro-environmental behaviour (Grieve, Lawson, & Henry, 2012). It is particularly to help them to make a better decision, which includes searching for information and making sense of the offer. In addition, social marketers need to bring consumers 'back to earth' to make them realize that adopting pro-environmental behaviour will require some resources and commitment. Subsequently, social marketers need to provide some guidance as to how these barriers can be minimized to increase the consistency between BI-Behaviour and BE-Behaviour for consumers who have low pro-environmental orientation.

Another key social marketing implication is related to the intervention strategy for at-risk consumers or consumers who are vulnerable to the environmental problem being examined, such as those who are affected by polluted water but are unable or unwilling to respond to this issue. Pechmann et al. (2011) define at-risk consumers as "marketplace participants who, because of historical or personal circumstances or disabilities, may be harmed by marketers' practices or may be unable or unwilling to take full advantage of marketplace opportunities." In the formation of their cognitive judgments toward adopting specific pro-environmental behaviours, at-risk consumers are likely to take into account the environmental problem that they are experiencing in addition to the costs and benefits of adopting those behaviours. This in turn may influence their BI judgments in that at-risk consumers will no longer feel pressured to comply with the social norms about the environment as they see themselves as victims instead of agents of pro-environmental behaviour change.

Study limitations and future research. Like all studies of a similar nature, the present research is not without limitations. One of most notable limitations is the use of self-report behaviour as a proxy to actual behaviour. Self-report questions *may* give rise to response bias in that respondents may feel pressured to comply with generally accepted environmental norms. Prior research (e.g. Kollmus & Agyeman, 2002) found inconsistency between subjects' self-report behaviour and their actual

behaviour. Study 2 may subject to this limitation as participants' behaviour were not actually observed, rather that it was self-reported. In addition, although Study 3 developed an experimental design to capture actual behaviour (actual donation), the online questionnaire setting is still relatively artificial. Since these are the main limitations of this paper, we need to discuss how to improve the research design for future project.

In order to address the limitation of self-report behaviour, future research could therefore seek to determine whether the current study findings persist in actual purchase or energy consumption behaviour (e.g. electricity or water bill) is examined. The design could take advantage of the need to understand the pattern of energy consumption for household that opt to use environmentally friendly energy sources, such as solar panel. Switching from conventional energy sources to solar panel is a big commitment for some households, and therefore will elicit different BE and BI judgments of these households. A longitudinal field experiment embedded in solar panel changeover program will be an ideal avenue to observe consumers' actual behaviour. By manipulating their BE or BI across different points in time, we can compare the predictive ability and the temporal stability of these immediate predictors of pro-environmental behaviour.

Second, not all individual correlations between BI-Behaviour and BE-Behaviour are significant. This could limit the generalizability of the results. It can be due to inaccurate self-reporting (Study 2) or unfamiliarity with the green products being observed (Study 1). In Study 2, participants may have had difficulties recalling whether they performed habitual pro-environmental behaviours over the previous weekend. An alternate approach would therefore be to use diaries to record all pro-environmental behaviours that took place each day over a one-week period. Another issue relates to the measurement of the temporal stability of BE and BI. This study employed a within-participation Pearson correlation, which has some potential limitations (Conner et al., 2000). Specifically, using within-participation Pearson correlations to measure stability can be problematic when the number of data points is fewer than five, for there is a tendency for all items to repeatedly receive the same

value. In addition, the time interval used in study 3 to assess BE and BI stability was very short, thereby imposing an additional study limitation.

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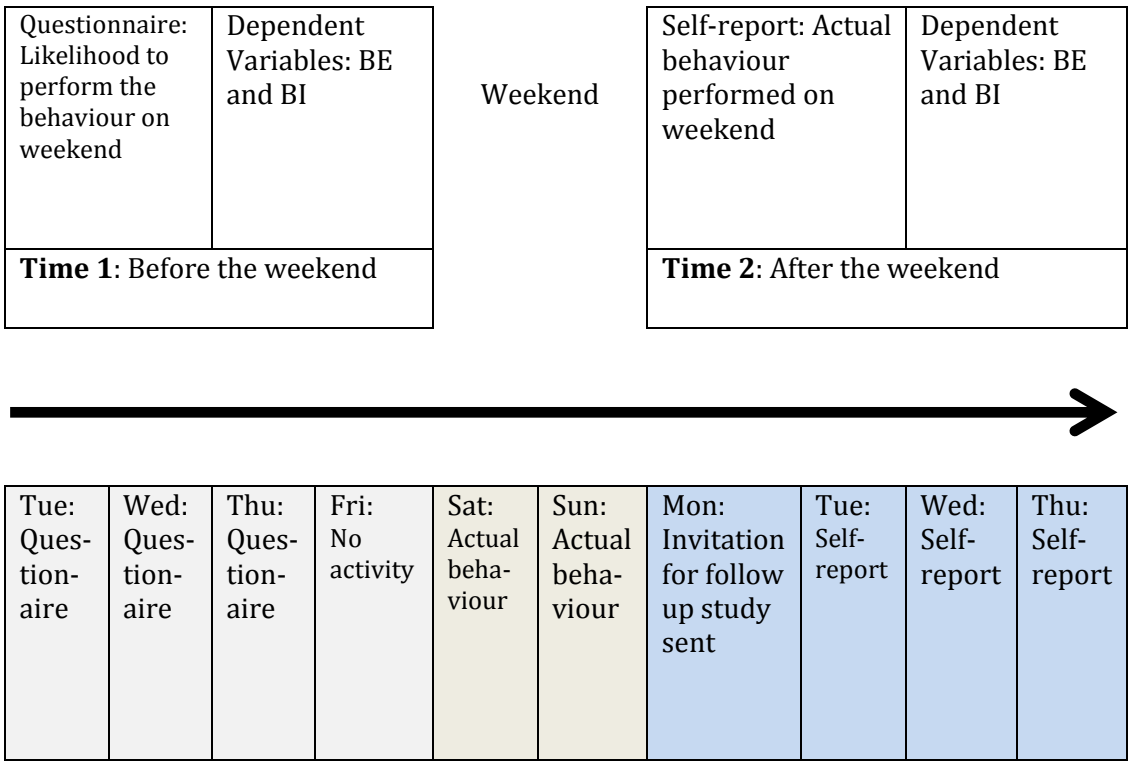
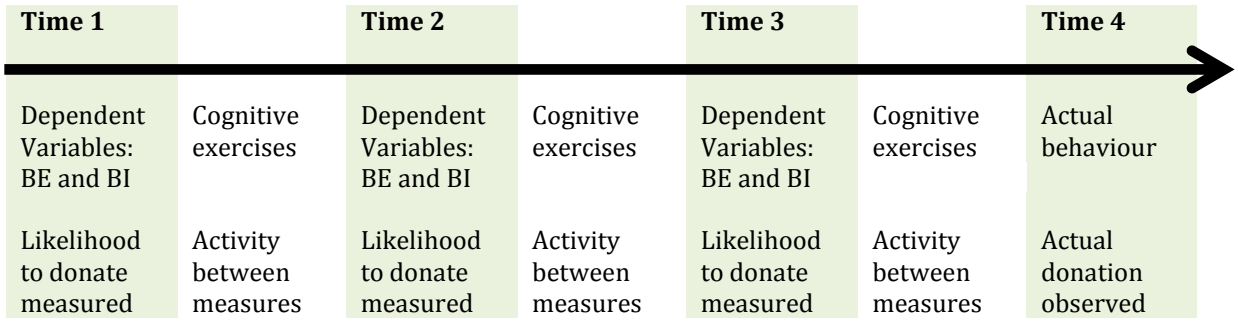
Figure 4: Summary of Study 2 design



Respondents were recruited from a US-based online panel, and they were paid for their participation. The experiments were conducted in two waves. In the first wave, 222 respondents (142 female) were recruited. Respondents from the first wave of the experiment were invited to participate in the follow-up experiment. Of the 222 respondents from the first wave, 101 respondents (32 female) agreed to participate in the follow-up study (second wave). Hence, the drop rate between the two waves is 54%. Of 101 valid respondents, 79.2% are in the 18 – 35 years age group and 20.8% are over 35 years of age. In addition, 76.2% of the respondents have a monthly expenditure of less than USD 2,500, whereas 23.8% of the respondents have a monthly expenditure of more than USD 2,500.

Figure 5: Summary of Study 3 design



Respondents were recruited from a US-based online panel, and they were paid for their participation. In total, 90 respondents (49 female) were recruited. Of the 90 valid respondents, 63.3% are in the 18 – 35 years age group and 36.7% are over 35 years of age. In addition, 72.2% of the respondents have a monthly expenditure of less than USD 2,500, whereas 27.8% of the respondents have a monthly expenditure of more than USD 2,500.

Chapter Four

Essay 3: Experience and Facilitating Conditions as Impediments to New Technology Adoption

4.1 Abstract

The recent proliferation of new technologies and impediments to their adoption has made predicting new technology adoption/use even more challenging. This study aims to compare the predictive ability of behavioural expectation and behavioural intention given such impediments. An online longitudinal experiment was designed to examine the effects of two contrasting sources of impediments to new technology adoption: experience and facilitating conditions. Experience, as the internal impediment in this context, is where consumers perceive they have more control over new technology adoption. Whereas, facilitating conditions, an external impediment, is where consumers perceive they have less control over adoption/use. The results confirm our predictions that behavioural expectations have a greater predictive ability than do behavioural intentions when subjects encounter impediments to their adoption/use of new technology, particularly when internal impediments (experience) and external impediments (facilitating conditions) are low. This is explained by the tendency of subjects, who responded to BI measures, to make overestimations when they think they have more control over the (internal) impediments, and to make exaggerated underestimations when they think they have less control over the (external) impediments. Moreover, it is found that subjects who responded to BE measures have a stronger Adoption-Use correlation compared to subjects who responded to BI measures regardless of the type of impediments encountered.

4.2 Introduction

Technology has now become a significant part of consumers' everyday lives. Technology assists in most of the key interactions between consumers and companies, from information search to payment. In addition, the technology-related products and services themselves have proven to be a profitable yet competitive market. Inevitably, marketers need to understand the way consumers adopt and use new technology. For example, the rapid advancement of mobile applications offers an enticing new front for marketers. As a new technology, mobile applications simultaneously provide both opportunities and challenges. Online application (App) stores provided by Apple, Google, Nokia and others offer abundant prospects for anyone interested in a particular organisation. These application stores have transformed the marketing landscape such that small or individual application entrepreneurs now can be as competitive as large application companies. So far the result has been dramatic, with the number of available mobile applications in the market having grown to over 300,000 applications for iOS and over 170,000 for Android OS in 2011 (Davidsson & Moritz, 2011). The major mobile application marketplaces, Apple App Store and Android AppsStore received around $4.1 billion in revenue in 2009 and are expected to receive $17.5 billion in revenue in 2012 (Sharma, 2010). Despite this forecast, the mobile applications market is still a relatively uncharted territory for marketers. With the rapid increase in the number of mobile applications, marketers are facing increasing challenges in predicting consumers' adoption and use of mobile applications.

Against this backdrop, this study considers it important to revisit the literature discourse on the predictor of new technology adoption in consumer setting. As discussed previously, during the last three decades, marketing researchers have employed a widely popular construct: *behavioural intentions* (BI; Fishbein & Ajzen, 1975), as an immediate predictor of consumers' adoption of new technology. Despite its popularity, prior research indicates that the measurement of BI demonstrated only a modest ability to predict the adoption/use of new technology (e.g. Bagozzi, 2007). In particular, BI has a limited predictive ability when the adoption/use of new

technology is subject to impediments (Bagozzi, Davis, & Warshaw, 1992). Inevitably, the identification of BI's boundary conditions in the prediction of new technology adoption remains a critical research gap, in particular when the adoption/use of the new technology is subject to various impediments.

In order to overcome the limitations of BI's predictive ability, another construct that qualifies as an immediate predictor of new technology adoption/use is needed. Venkatesh et al. (2008) contend that behavioural expectation (BE; Warshaw & Davis, 1985a) may be a better predictor of technology adoption/use than BI in certain conditions. BE itself has been overlooked in the marketing literature, even though it has showed a greater predictive ability than BI in various contexts, including in new technology adoption (e.g. Venkatesh et al. 2008). Unlike BI, BE takes into account foreseeable impediments that may challenge behavioural performance (Warshaw and Davis, 1985b). BE measures offer different conceptualization from BI measures, and therefore may be able to better predict the adoption/use of new technology that is subject to impediments. A typical BE measure such as "do you expect to adopt X?" should have a higher likelihood of activating a person's awareness of foreseeable impediments compared to a typical BI measure such as "do you intend to adopt X?" Prior researches (e.g. Warshaw & Davis 1985b; Courneya & McAuley, 1994) has provided empirical evidence that BE has a greater predictive ability than BI when the behaviour is subject to impediments.

This study aims to extend the aforementioned findings by examining the underlying process behind the predictive ability of BE versus BI, particularly in situations where the adoption/use of new technology is subject to impediments. We will focus on two such sources of impediments, namely experience (internal impediments) and facilitating conditions (external impediments). In doing so, this study adopts an experimental design to compare the predictive ability of BE versus BI in situations where a person encounters: high experience versus low experience, and high facilitating conditions versus low facilitating conditions. The adoption of mobile application will be the context for this study. Specifically, this study considers at the adoption/use of 2D barcode readers, Apps that enable rewarding interactions between marketers and consumers. Since the application is novel for some

consumers, understanding the process of adopting/using 2D readers could help to explain the adoption process of mobile apps in general. Ultimately, this study contributes to the marketing literature discourse by identifying the boundary conditions to the predictive ability of behavioural expectations and behavioural intentions in the context of mobile applications adoption/use.

4.2.1 Impediments to the adoption/use of new technology

BI is incorporated in the Technology Acceptance Model (TAM; Davis, 1986) as a sole immediate predictor of technology adoption. TAM presumes that when a person forms BI estimations to adopt/use new technology, s/he anticipates no impediments between BI formation and actual behaviour, such as ability limitations, time constraints, facilitating conditions, or unconscious habits (Bagozzi et al., 1992). TAM appears to be inconsistent in its ability to predict new technology adoption/use, and BI has been considered as the main source of this inconsistency (Bagozzi, 2007). In particular, BI tends to have lower predictive ability when the behaviour is subject to impediments (Warshaw & Davis, 1985b). For example, BI is more predictive when subjects have prior experience with the technology items since they believe that they have a high degree of control over adopting/using the technology (Bagozzi et al. 1992). On the other hand, Warshaw and Davis (1985b) found that BE has a better ability than BI to predict behaviours that are subject to impediments. According to the authors, their study found that BE is significantly more predictive than BI (r_{BE} = .307 > r_{BI} = .091) when the behaviour is subject to impediments. Moreover, the authors contend that BE measures can activate subjects' awareness of foreseeable impediments to behavioural performance, while BI measures have a lower ability to activate such awareness.

In the context of new technology adoption, the accuracy of a person's estimation of their likelihood to adopt/use the technology might also be influenced by their awareness of impediments (Venkatesh et al., 2008). Among the various types of impediments to the adoption/use of new technology, two are particularly relevant when comparing and contrasting the predictive ability of BE and BI: 'experience' and 'facilitating conditions'.

Experience often describes certain feelings or emotions after an encounter with technology-related stimuli (Smith et al., 1999). Smith et al. (1999) contend that experience can be a source of impediments when interactions with computer-related stimuli are unable to provide satisfactory information that reduces a person's anxiety toward adoption/use of the targeted new technology. Although experience can be a result of marketer designed technology-related interaction, consumers could also actively seek for stimuli or information that can increase their experience with the new technology. Hence, experience is an internal mental process which is largely determined by the effort. In this sense, a person might perceive that s/he has more control over the experience with new technology regardless of marketers' efforts to design the consumers' new technology interaction. For example, mobile applications offer various options to consumers who would like to have a trial (experience) before adopting/purchasing the application. Consumers have full control over the type of trial/experience that they would like to have, from reading reviews to downloading the trial version of the application. This perception of control is important in explaining the accuracy of consumers' BE versus BI predictions of new technology adoption/use.

Meanwhile, in the context of new technology adoption/use, facilitating conditions refer to consumers' beliefs about whether or not the necessary computer-related resources can be easily accessed to facilitate adoption/use (Venkatesh et al, 2008). Facilitating conditions become a source of impediments when access to the necessary resources is limited or scarce. For example, computer-related resources may include operators' resources (i.e. network coverage), manufacturers' resources (i.e. platform and operating systems), developers' resources (i.e. applications) and users' resources (mobile device). The accessibility of most of these resources are generally not under consumers' control. For example, consumers may not have control over the quality of network reception in certain areas since it depends on the services provided by their mobile operator. In that particular situation, facilitating conditions become external impediments, over which consumers perceive that they have less control. When consumers perceive that they have less or no control at all over the impediments, this could influence the accuracy of their BE versus BI estimations toward new technology adoption/use.

From the above discussion, experience (internal impediments) and facilitating conditions (external impediments) play an important role in the predictive ability of BE versus BI. Prior research has identified that BE has a greater predictive ability than BI when the behaviour is subject to impediments (e.g. Warshaw & Davis, 1985b; Venkatesh et al., 2008). However, it remains unclear how perceived control over the impediments affect the predictive ability of BE versus BI. Does a person's degree of control over the impediments determine the accuracy of her/his BE (versus BI) estimations of new technology adoption/use? It is the aim of this study to address these questions.

Internal impediments: experience

A person's likelihood of adopting/using new technology can be influenced by the results of an interaction between her/him and the said new technology, i.e. experience. Experience, in the adoption of technology context, is often described as ''specific feelings or emotions that are engender by technology-related stimuli'' (Smith et al. 1999; p. 241). For example, interaction with new technology may take place through trial, reading reviews and experience with similar or related technology (Mao & Palvia, 2008). The interaction between a person and technology-related stimuli then determines her/his attitude toward adopting/using the new technology. However, the effects of interaction with technology-related stimuli on a person's feelings/emotions may vary in different situations. It may depend on the amount of usage, opportunities to use the technology, and the diversity of experience when using it (Jones & Clarke, 1995).

Venkatesh et al. (2006; 2008) investigated the role of experience in the formation of BE and BI by measuring the amount of computer use or accumulation of experience with the targeted technology. The authors found that the effects of BE and BI on technology adoption are fully moderated by experience (Venkatesh et al. 2006), in that increasing experience strengthens the relationship between BI and actual adoption but weakens the relationship between BE and actual adoption. According to Venkatesh et al. (2008), the amount of computer-use provides information that allows subjects to estimate their perceived control over performing the behaviour. Moreover, the authors contend that an increase in experience significantly improves

the sense of control in relation to BI judgments to adopt new technology, but it is insignificant for BE. This may be due to the fact that increasing experience with new technology reduces perceived uncertainty and thus increases anticipation of impediments to actual adoption. In an effort to extend these findings, we seek to further explain the effects of experience as an internal impediment (in which consumers tend to perceive that they have more control over technology adoption)t, on the accuracy of BE versus BI estimations. The degree of experience (high/low) may motivate consumers to understate or overstate their BE or BI estimations, and thus increase or reduce the consistency between BE (versus BI) and adoption/use.

As experience with new technology is internally processed in consumers' minds, they tend to perceive that they can make accurate estimations based on any information that has been acquired from the interaction with technology-related stimuli, even when the information is incomplete or abstract. This leads to an overestimation of their likelihood to adopt/use the new technology, particularly for those who respond to BI measures. The consistency between BI and actual behaviour is greater for high experience (i.e. a direct experience) consumers than for low experience(indirect) experience consumers (Fazio & Zanna, 1981). This is because direct (high) experience offers more complete information than indirect (low) experience that is required in the formation of a cognitive judgment (Hamilton & Thompson, 2007). This notion is supported by the Smith and Swinyard (1983) study which reported that product trial produces a stronger effect on attitude compared to a description presented by an advertisement. According to the authors, a product trial generates non-verbal information that stimulates cognitive judgment more comprehensively than verbal information generated by advertisement exposure. In the context of new technology adoption/use, consumers who have direct experience (i.e. through trying a free version of a mobile application) form a different mental judgments from those consumers whose experience is indirectly derived (i.e. from reading reviews or ads). A direct encounter with the application provides more concrete information and more diverse experience from different types of stimuli (Jones & Clarke, 1995). Consequently, a high experience with the application strengthens the consumers' ability to identify, and thus anticipate, foreseeable impediments to adopting/using it. On the other hand, a low experience provides

more abstract information and a homogenous experience, which is less likely to improve consumers' ability to identify and anticipate foreseeable impediments to adoption/use.

Warshaw and Davis (1985b) contend that BE has a greater predictive ability than BI when the behaviour is subject to uncertainty and when information about the behaviour is limited. According to the authors, subjects who respond to BE measures tend to have greater awareness of impediments than those who respond to BI measures. Such awareness was activated regardless of the types of experience (i.e. low or high experience), since different information from the experience has little effect on BE estimations (Venkatesh et al., 2008). As a result, a person will have more moderate BE estimations about intention to adopt/use new technology regardless of the types of experience encountered, and thus s/he has a more consistent BE – adoption-use relationship. On the other hand, low experience is less likely to activate anticipation of impediments in a person who responds to BI measures. Such awareness is more likely to be triggered when a person who responds to BI measures encounters a high experience. As a result, *a person who has a low experience with new technology tends to overestimate their BI*, and therefore the consistency between BI and actual adoption/use is decreased.

Based on the aforementioned discussion, this study therefore proposes the following hypotheses:

> Hypothesis 1: *When experience is low, behavioural expectation of new technology adoption/use will be more predictive than behavioural intention*
>
> Hypothesis 2: *When experience is high, behavioural expectation and behavioural intention will be equally predictive of new technology adoption/use.*

External impediments: facilitating conditions

In the context of new technology adoption/use, facilitating conditions refer to consumers' beliefs about whether necessary resources can be easily accessed to facilitate adoption/use (Venkatesh et al, 2008). (Taylor & Todd, 1995) reported that

facilitating conditions constitute a key determinant in the formation/assessment of subjects' BI to perform certain behaviour. (Venkatesh & Morris, 2003) contend that facilitating conditions should be measured by various factors including users' knowledge, resources and availability of advice from marketers or peers. This study focuses in particular on the resources since here users have a more concrete mental representation of whether or not they have control. For example, the level of facilitating conditions can be based on resources such as network coverage or mobile devices operating system, where consumers may perceive that they have less control over them.

Warshaw and Davis (1985b) reported that BE has a greater predictive ability than BI when subjects have low perceived control over the behaviour. Specifically in the context of new technology adoption/use, facilitating conditions influence the formation of a person's BE and BI estimations (Venkatesh et al. 2008). Since facilitating conditions are external factors that are generally not under a person's control, high facilitating conditions tend to increase both BE and BI estimations, while low facilitating conditions lead to lower BE and BI estimations. However, low perceived control over the behaviour has a different effect on BE and BI estimations (Warshaw & Davis, 1985b). For someone who responds to BE measures with low perceived control over the behaviour, s/he tends to have more moderate estimations of her/his BE (Mahardika, et al., 2011). For example, in the situation where facilitating conditions are low, those who respond to BE measures see it as part of foreseeable challenges of adopting/using new technology. Hence, their BE estimations reflect their careful prediction of whether they can improve the facilitating conditions (i.e. by getting technical support) to adopt/use the technology. On the other hand, as BI measures have a limited ability to capture foreseeable impediments, *a person will make exaggerated underestimations* of her/his BI when the behaviour is not fully under their control (Mahardika et al, 2011). If the reasons for the resources not facilitating adoption/use are not clearly explained (e.g. why an application is not compatible with certain operating systems), a person tends to rely on her/his preconceived desire for the targeted application to form her/his BI estimations. As BI measures reflect desirability for the behaviour, it will be less likely to activate a careful prediction of whether or not the facilitating conditions can be

improved. This overstated underestimation leads to a lower consistency between BI and actual behaviour.

From aforementioned discussion, this study hypothesizes:

> Hypothesis 3: *In low facilitating conditions, behavioural expectation will be more predictive of new technology adoption/use than will behavioural intention.*
>
> Hypothesis 4: I*n high facilitating conditions, behavioural expectation and behavioural intention will be equally predictive of new technology adoption/use.*

It is known from prior research (e.g. Warshaw & Davis, 1985a) that BE should have a greater predictive ability than BI when the behaviour is subject to impediments. However, when the impediments are further categorized as internal and external impediments, the effect on the predictive ability of BE compared with BI remains unexplained. This study hypothesizes that BE will have a greater predictive ability than BI when internal impediments (experience) are few (H1), as well as when the external impediments (facilitating conditions) are few (H3). Although it was hypothesized that the effects of internal versus external impediments on BE/BI will be similar, the underlying processes are different for each type of impediment. In the situation where experience is low, a person may intend (or expect) to overcome the impediments by seeking additional technology-related stimuli before actual adoption/use. A person who responds to BI measures is likely to overstate the intention (BI) since s/he perceives to have greater control over seeking additional technology-related stimuli to increase the experience, even when in reality s/he has limited control over it. Meanwhile, in the situation where facilitating conditions is low, a person may not intend (or expect) to overcome the impediments since it is greatly determined by resources beyond her/his control (i.e. company resources). Hence, BI measures are likely to produce an underestimation of intention (BI) to adopt/use, because the potential consumer perceives that s/he has limited control over company resources, even when company resources may be accessible (i.e. call to customer service for troubleshooting).

In sum, BI measures perform differently in the presence of internal impediments as opposed to external impediments, and therefore this study hypothesizes:

> Hypothesis 5*: Behavioural intention under low experience condition is greater than behavioural intention under low facilitating condition since people who have little experience with new technology tend to overestimate their behavioural intentions, whereas they tend to underestimate their behavioural intention when facilitating conditions are low.*

4.3 Experiment 1 (Pre-Test)

Participants, design and procedure

One hundred and sixty-one undergraduate students (103 female) from an Australian university agreed to voluntarily participate in a lab experiment. They were randomly assigned to conditions of a 2 (high, low) experience x 2 (high, low) facilitating conditions in the context of 2D barcode reader adoption. The participants in the high experience group were instructed to try to scan 2D barcodes using mobile phones pre-installed with a 2D barcode reader application supplied by researcher. In addition, participants from this group were instructed to generate their own 2D barcodes using an online 2D barcodes generator, and scan the generated code with the researcher's mobile phone where the app had been pre-installed. Conversely, the low experience group was instructed to watch an instructional video on how to generate a 2D barcode reader and how to use a 2D barcodes reader application. The participants in this group did not engage in an actual trial with the application. Meanwhile, in order to manipulate the facilitating conditions, participants were asked to self-report their mobile phone model and brand or manufacturer to check its compatibility with 2D barcode reader application being offered. Participants in the low facilitating conditions group found that their mobile devices were not compatible with the application. Then they were informed that since their mobile devices were not compatible with the application, they would need to install the application through a long and complex process. On the other hand, participants in high facilitating conditions found that their mobile devices were compatible with the

application, and therefore they were informed that the installation of the application on their mobile device would be easy and quick.

The study was conducted in a laboratory setting. The product trial (high experience) and video instructions (low experience) were given to the participants at the beginning of the study. This was then followed by the manipulation of facilitating conditions. Accordingly, participants responded to a questionnaire containing BI or BE measures. Participants were asked to indicate their expectations or intentions to adopt the 2D barcode reader application.

Measures

Both BI (α = .90) and BE (α = .96) 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 2D barcodes reader", "I predict I will adopt 2D barcodes reader", and "I plan to adopt 2D barcodes reader". The 4-item expectation (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".

Results and Discussion

As a pre-test, the objective of Experiment 1 was to examine the effectiveness of the manipulation design for experience and facilitating conditions and whether this was working. The results were used to refine the manipulation design for Experiment 2.

Findings from Experiment 1 indicate that subjects' BE estimations to adopt/use 2D barcode reader application were indeed similar regardless of the type of experiment they have encountered. The means of BE for high experience group ($M_{BE.HE}$ = 5.10) is not significantly different to BE for low experience group ($M_{BE.LE}$ = 4.69). On the other hand, subjects' BI estimations to adopt/use the application shows a significant means difference between the high experience group and the low experience group ($M_{BI.HE}$ = 5.36 > $M_{BI.LE}$ = 4.48, p<.10, two-tailed). Results from the manipulation check

are in line with our expectations. It is also reflected in the BE and BI estimations, where high experience manipulation produces higher BE/BI estimations, whereas low experience manipulation produces lower BE/BI estimations. Additionally, as predicted in the discussion, the effects of high versus low experience on subjects' BE estimation were insignificant. An actual experience will not significantly change subjects' estimation of their 'expectations' to adopt the application since they have take into account foreseeable impediments to behavioural performance (e.g. unable to actually try the app). Conversely, the type of experience matters for subjects who respond to BI measures. As predicted, subjects who have little experience with the application will have a significantly lower estimation of their 'intention' to adopt it—compared to subjects who have had more experience with the application.

However, the manipulation design for facilitating conditions did not perform according to our expectations. The results show that subjects should have lower BE estimations when facilitating conditions are low compared to BE estimations when facilitating conditions are high; yet the results show the mean differences are not significant ($M_{\text{BE.HFC}} = 4.88 > M_{\text{BE.LFC}} = 4.87$). Furthermore, the means difference between the two groups of facilitating conditions are also found to be not significant for subjects who responded to BI measures, and the effects were reversed ($M_{\text{BI.HFC}} = 4.61 < M_{\text{BI.LFC}} = 5.31$). These results indicate a limitation in the design of manipulation for facilitating conditions. In manipulating subjects' perception of facilitating conditions, they were instructed to check a list of mobile device brands and models that are compatible with the application being offered. This list is quite long, containing over 30 mobile device brands and models. Some subjects may pay scant attention and fail to locate their mobile device on the list. Another possibility is that they were not conscientiously following the instruction and proceeded to the next section of the questionnaire without checking the list, or checking it thoroughly. The results from the manipulation check also confirm this.

Overall, results from Experiment 1 provide an initial examination of the manipulation design for experience and facilitating conditions. Specifically, the results suggest that we need to refine the manipulation design for facilitating conditions as it has some flaws. In addition, results from Experiment 1 could not

explain whether subjects made an accurate estimation regarding their BE or BI under different conditions since the actual adoption/use was not observed. Therefore, Experiment 2 was developed to address the limitations of Experiment 1.

4.4 Experiment 2

Participants, design and procedure

Two hundred and fifty-five participants (92 female) from a US online panel participated in an online longitudinal experiment and were randomly assigned to one of a 2 (high, low) experience x 2 (high, low) facilitating conditions in the context of the adoption and usage of a 2D barcodes reader. Specifically, 120 participants received BI questions and 135 participants received BE questions. This study employed screening questions to check whether participants were familiar with 2D barcode technology and whether they had installed a 2D barcode reader in their mobile device. Only those who were not familiar with the technology and those who had not installed a 2D barcode reader in their mobile device were selected as participants for this experiment.

The longitudinal experiment recorded subjects' responses and/or actual behaviour at four points of observation (Time 1 – 4). At Time 1, participants were asked to indicate their BI and BE to adopt a 2D barcodes reader application. There was no manipulation and no conditions were given to participants at Time 1. On the other hand, at Time 2, participants were randomly given one of a 2 (high, low) experience x 2 (high, low) facilitating conditions manipulation before responding to the BE or BI questions. At Time 3, participants' actual adoption of the application was observed. Finally, at Time 4, the actual use of the application was observed.

At Time 2 observation, participants in two 'experience' conditions (high/low) received written and visual information about 2D barcodes, including benefits and operation. 'High experience' participants were given an interactive questionnaire, in which they could create their own 2D barcodes using an online 2D barcodes generator. Meanwhile, 'low experience' participants were given a static questionnaire with no access to a 2D barcodes generator to create their own

barcodes. In order to manipulate facilitating conditions, participants were asked to report the brand and model of their mobile devices. The system randomly indicated whether their mobile devices were compatible with the 2D barcode reader application being offered. Participants encountered 'high facilitating conditions' when the system indicated that their mobile devices were compatible with 2D barcodes reader application. On the other hand, participants encountered 'low facilitating conditions' when the system indicated that their mobile devices were not compatible with the application.

Actual adoption was observed in Time 3. Participants were asked to confirm whether they would like to install a 2D barcode reader application in their mobile devices. Those who agreed to install the application were given a URL that led to installation instructions, and their selections were recorded. Having installed the application, they were then offered an online coupon (bonus) in the form of a 2D barcode. If the participants accepted the offer, they were asked to scan the coupon and copy paste the unique number inside the coupon to the system to validate their usage.

Measures

Measures of BE (α = .996) and BI (α = .987) items followed the guidelines of Warshaw and Davis (1985b) and Venkatesh et al. (2008). BI was measured using three items, each on a 9-point bipolar (+4 to -4) scale as follows: "I intend to adopt 2D Barcodes Reader Application", "I plan to adopt 2D Barcodes Reader Application", and "I predict I will adopt 2D Barcodes Reader Application". In contrast, the four BE items were: "I expect to adopt 2D Barcodes Reader Application", "I will adopt 2D Barcodes Reader Application", "I am going to adopt 2D Barcodes Reader Application" and "I am likely to adopt 2D Barcodes Reader Application". Adoption and use were observed from actual participant behaviour. In addition, the predictive ability of BE and BI toward adoption and usage were measured based on the within-participants Pearson correlation based on the guidelines advanced by Sheeran et al. (1999).

Results and Discussion

Findings from Experiment 2 provide a more accurate explanation than do the results from Experiment 1 (pre-test), specifically in regard to the role of 'experience' and

'facilitating conditions' in the formation of BE versus BI estimations. Experiment 2 measured subjects' BE and BI estimations at two time points: Time 1 (before manipulation) and Time 2 (after 'experience' manipulation). The longitudinal design of Experiment 2 allowed a comparison between subjects' BE/BI estimations before and after manipulation. Table 1 indicates that subjects' BE estimations are stable over time, regardless of the type of experience. Meanwhile, Table 2 shows that BI estimation is stable only when subjects encounter a high experience. When experience is low, BI estimations are significantly lower on Time 2 ($M_{\text{BI-Time1}} = 6.03 > M_{\text{BI-Time2}} = 5.53$, $p<.10$, two-tailed). Indeed, the results confirm that internal impediments (low experience) have little effect on subjects' BE estimations. When responding to BE measures at Time 1, subjects took into account foreseeable internal impediments, including the possibility that they might not be able to obtain adequate information (i.e. not be able to try the application). Then, whatever conditions that the subjects encountered in Time 2, these would have only limited effects on BE estimations. On the other hand, when responding to BI questions, subjects might not take into account the possibility that they may or may not be able to try the application before making an adoption decision. Hence, BI estimations at Time 2 became significantly lower as subjects did not realize that such impediments could arise (i.e. inadequate interaction/information with the application).

Table 1 also shows that subjects' BE estimations were greatly influenced by facilitating conditions. It was found that BE estimations were not stable between Time 1 and Time 2 regardless of the level of facilitating conditions. BE estimations became higher at Time 2 for those who encountered high facilitating conditions ($M_{\text{BE-Time1}} = 5.98 > M_{\text{BE-Time2}} = 6.65$, $p<.01$, two-tailed), while lower for those who encountered low facilitating conditions ($M_{\text{BE-Time1}} = 6.04 < M_{\text{BE-Time2}} = 5.29$, $p<.01$, two-tailed). A similar result is also indicated by Table 2, where subjects' BI estimations were strongly influenced by facilitating conditions. BI estimations became higher at Time 2 for those who encountered high facilitating conditions ($M_{\text{BI-Time1}} = 5.80 > M_{\text{BI-Time2}} = 6.39$, $p<.01$, two-tailed), while lower for those who encountered low facilitating conditions ($M_{\text{BI-Time1}} = 6.29 < M_{\text{BI-Time2}} = 4.87$, $p<.01$, two-tailed). This result is in line with Venkatesh et al.'s (2008) findings in which BE

negates the effects of facilitating conditions once it is introduced into the predictive model.

Table 1: The stability of BE estimations

No	Conditions	BE Mean score		Time 1 > Time 2? [a]	t
		Time 1 (before manipulation)	Time 2 (after manipulation)		
1	High Experience (N=68)	5.76	5.89	No	.62
2	Low Experience (N=67)	6.26	6.10	Yes	.46
3	High Facilitating Conditions (N=69)	5.98	6.65	No**	.001
4	Low Facilitating Conditions (N=66)	6.04	5.29	Yes**	.007
5	ALL (N=135)	6.01	5.98	Yes	.88

[a] Significant differences between BI and BE mean scores are based on independent sample t-test.

** $p<.05$

* $p<.10$

Table 2: The stability of BI estimations

No	Conditions	BI Mean score		Time 1 > Time 2? [a]	t
		Time 1 (before manipulation)	**Time 2 (after manipulation)**		
1	High Experience (N=58)	6.04	5.79	Yes	.45
2	Low Experience (N=62)	6.03	5.53	Yes	.08
3	High Facilitating Conditions (N=62)	5.80	6.39	No**	.007
4	Low Facilitating Conditions (N=58)	6.29	4.87	Yes**	.000
5	ALL (N=120)	6.03	5.66	Yes*	.08

[a] Significant differences between BI and BE mean scores are based on independent sample t-test.

** $p<.05$

* $p<.10$

Table 3 compares the predictive ability of BE and BI under four conditions using within-participants correlations. The difference between BE and BI correlations were examined using the Fisher z transformation test. Hypotheses 1 and 3 expect BE to be more predictive than BI when the behaviour is subject to impediments, such as when experience with the applications is low (H1) and facilitating conditions are low (H3). On the other hand, Hypothesis 2 and 4 expect that BE and BI will be equally predictive when subjects perceive that impediments to performing the behaviour are limited by having more experience with the applications (H2) and/or by getting high facilitating conditions (H4). Results presented in Table 3 indeed support the notion that BE is more predictive than BI when the behaviour is subject to impediments. In low experience conditions, the correlation between BE and actual use is significantly higher than BI and actual use correlations ($r_{\text{BE-Use}}$= .71 > $r_{\text{BI-Use}}$ = .53, p < .10, z = 1.62, one-tailed). In line with this result, BE-Use correlation is higher than BI-Use correlation when subjects encounter low facilitating conditions ($r_{\text{BE-Use}}$= .68 > $r_{\text{BI-Use}}$ = .56, p < .15, z = 1.1, one-tailed). Meanwhile, Table 3 also confirms that there is no significant difference between the predictive ability of BE and BI when behaviour is not subject to impediment. For subjects with high experience, the BE-Use correlation is not significantly different from BI-Use correlation ($r_{\text{BE-Use}}$= .76 > $r_{\text{BI-Use}}$ = .68, z = 0.25, one-tailed). In high facilitating conditions, the BE-Use correlation and BI-Use correlation are not significantly different ($r_{\text{BE-Use}}$= .76 > $r_{\text{BI-Use}}$ = .68, z = 0.95, one-tailed).

These results support the notion that subjects who responded to BE measures with low perceived control over the behaviour tend to have more accurate estimations toward adopting/using new technology. Their BE estimations reflect their careful prediction whether they can improve the facilitating conditions (i.e. by getting technical support) to adopt/use the technology. On the other hand, as BI measures have a limited ability to capture foreseeable impediments, people will make exaggerated underestimations of their BI when the behaviour is not fully under their control (Mahardika et al, 2011). Results presented in Table 4 confirm Hypothesis 5 that a person who has a low experience with new *technology tends to overestimate her/his BI*, whereas *s/he tend to underestimate* her/his BI when facilitating conditions are low. Table 4 compares BI estimations between Time 1 and Time 2

correlations in each of 2 (high, low) experience x 2 (high, low) facilitating conditions. BI Time 1 – Time 2 correlations is higher for low experience than high experience ($r_{BI\text{-}T1T2\text{-}HE}$= .65 > $r_{BI\text{-}T1T2\text{-}LE}$ = .76, p < .15, z = 1.19, one-tailed), while it is lower for low facilitating conditions than high facilitating conditions ($r_{BI\text{-}T1T2\text{-}HFC}$= .84 > $r_{BI\text{-}T1T2\text{-}LFC}$ = .68, p < .05, z = 2.11, one-tailed). This overstated (or understated) estimation, leads to a lower consistency between BI and actual behaviour (use), as indicated in Table 3.

Warshaw and Davis (1985b) contend that BE has a greater predictive ability than BI when the behaviour is subject to uncertainty and when information about the behaviour is limited. According to the authors, subjects who respond to BE measures tend to have greater awareness of impediments than those who respond to BI measures. Such awareness is activated regardless of the type of experience (i.e. low or high experience), since different information from the experience has little effect on BE estimations (Venkatesh et al., 2008). Hence, a person will have more moderate BE estimations about adopting/using new technology regardless of the types of experience being encountered, and thus s/he has a more consistent BE – adoption/use relationship. On the other hand, low experience is less likely to activate anticipation of impediments in a person who responds to BI measures. Such awareness is more likely to be triggered when a person who responds to BI measures encounters a high experience. As a result, a person who has little experience with new technology tends to overestimate their BI, and thus reduces the consistency between BI and actual adoption/use. Nevertheless, it can be speculated from the results that BI estimations reflect subjects' preconceived desire to adopt/use new technology and their tendency to ignore any relevant new information of any type. On the other hand, subjects who responded to BE measures relied heavily on the type of information when calculating the feasibility of adopting/using the technology.

Ultimately, Table 3 also shows that the subjects who responded to BE measures have a more consistent adoption-use relationship than subjects who responded to BI measures under all conditions. In a high experience condition, the adoption-use correlation for BE is higher than adoption-use correlation for BI ($r_{BE.Adopt\text{-}Use}$= .94 >

$r_{BI.Adopt-Use}$ = .66, p < .00, z = 5.16, one-tailed). Similarly, BE correlations are higher than BI correlations for: low experience ($r_{BE.Adopt-Use}$= .82 > $r_{BI.Adopt-Use}$ = .62, p < .01, z = 2.39, one-tailed), high facilitating conditions ($r_{BE.Adopt-Use}$= .91 > $r_{BI.Adopt-Use}$ = .67, p < .00, z = 4.00, one-tailed), and low facilitating conditions ($r_{BE.Adopt-Use}$= .85 > $r_{BI.Adopt-Use}$ = .58, p < .01, z = 3.22, one-tailed). This indicates that subjects who responded to BE measures formed a more accurate estimation of their likelihood to adopt, and then use, the application. On the other hand, subjects who responded to BI measures tended to overstate or understate their intentions to adopt, and then use, the application. Hence, the relationship between adoption and actual use for BI is less consistent compared to that of BE. Another reason can be related to the action initiation of using the application after adopting it. BE measures may have greater ability to induce subjects' to initiate action to use the application once they adopt it. Meanwhile, BI measure may have lower ability to do so.

Table 3: Correlations of BE versus BI: Predictive accuracy toward actual use

No	Conditions	Correlations (Spearman)		z	P (one-tailed)[a]	Correlations (Spearman)		z	P (one-tailed)[a]	Supported Hypothesis
		BE Adopt-Use	BI Adopt-Use			BE-Use	BI-Use			
1	High Experience	.94 (N=68)	.66 (N=58)	5.16	0.00	.75 (N=68)	.73 (N=67)	0.25	0.40	H2
2	Low Experience	.82 (N=67)	.62 (N=62)	2.39	0.01	.71 (N=67)	.53 (N=62)	1.58	0.06	H1
3	High Facilitating Conditions	.91 (N=69)	.67 (N=62)	4.00	0.00	.76 (N=69)	.68 (N=62)	0.93	0.18	H4
4	Low Facilitating Conditions	.85 (N=66)	.58 (N=58)	3.22	0.01	.68 (N=66)	.56 (N=58)	1.06	0.14	H3
5	ALL	.88 (N=135)	.62 (N=120)	5.13	0.00	.73 (N=135)	.62 (N=120)	1.60	0.05	

[a] Significant differences between BI and BE correlations are based on Fisher z transformation test.

Table 4: Correlations between Time 1 and Time 2 estimations: Overestimations and underestimations on BI

No	Conditions	Time1 – Time 2 Correlations (Spearman)		z	P (one-tailed)[a]	Time1 – Time 2 Correlations (Spearman)		z	P (one-tailed)[a]	Supported Hypothesis
		High Experience	Low Experience			High Facilitating Conditions	Low Facilitating Conditions			
1	Behavioural Intentions (BI)	.65 (N=61)	.76 (N=62)	1.19	0.12	.84 (N=62)	.68 (N=60)	2.11	0.02	H5
2	Behavioural Expectations (BE)	.77 (N=69)	.79 (N=68)	0.29	0.39	.84 (N=69)	.76 (N=66)	1.28	0.11	

[a] Significant differences between BI and BE correlations are based on Fisher z transformation test.

4.5 Conclusion

These results extend the literature discourse on the boundary conditions of BE versus BI predictive ability for new technology adoption/use in consumer settings. Specifically, this study aims to further current understandings of two sources of impediments in the new technology adoption/use, namely 'experience' and 'facilitating conditions', on the predictive ability of BE and BI. This study seeks to explain why the predictive ability of BE is greater than BI in situations when internal or external impediments are low. Subjects who responded to BI measures overstated their estimations of adopting/using the new technology when they foresaw internal impediments (low experience). Meanwhile, BI measures induce underestimations when subjects foresee external impediments (low facilitating conditions). In addition, it is confirmed that BI's predictive ability is weaker when the adoption/use of new technology is subject to impediments. On the other hand, the predictive ability of BE remains strong/stable regardless of whether or not there are impediments that may challenge the adoption/use of new technology. Findings confirm that it is particularly important to identify the best predictor of adopt/use in certain situations, and to provide a basis for designing an intervention to increase new technology adoption/use. Table 3 and Table 4 provide a summary of the results and indicate whether the hypotheses have been supported.

Theoretical implications

Empirical findings from the two experiments have confirmed the efficacy of our hypotheses, and thus provide important contributions to the literature discourse as follows:

The empirical support in this study indicates that BE has a greater and more stable predictive ability than BI in the presence of internal and external impediments. Specifically, BE is more predictive than BI regarding new technology adoption/use when internal impediments (i.e. experience) is low and external impediments (facilitating conditions) is low. Although the results show no difference between internal versus external impediments, their underlying mechanisms are different. With low internal impediments, the consistency between BI and adoption/use is low

because subjects overstate their BI estimations, whereas with low external impediments, the consistency of BI adoption/use is low since subjects understate their BI estimations.

It is the perceived control of internal and external impediments that induce such overestimations (or underestimations) of BI. Subjects could be thinking that they can easily access additional technology-related information and stimuli to overcome the default low-experience situation. In reality, this may require resources (such as time) that, if scarce, could prevent the effort from being made. However, BI measures have a limited ability to activate subjects' awareness of this reality. Instead, subjects who responded to BI measures form an estimation of their desire rather than the feasibility of obtaining additional technology-related stimuli or information. For external impediments, subjects may be thinking that they have no chance of intervening in a company's process and resources (i.e. compatibility with other technology); thus, they exaggerate their underestimations of their BI to adopt/use the technology.

A comparison of the effects of internal as opposed to external impediments on the formation of BE and BI estimations needs to be extended to ensure the generalizability of the results. Marketing scholars should attempt to identify other factors that are relevant as internal and external impediments to new technology adoption/use in consumer settings. For example, it could be productive to investigate the effects of self-efficacy (internal impediments) and subjective norms (external impediments) on the predictive ability of BE and BI. Self-efficacy determines a person's perception of whether s/he can perform technology-related tasks; thus a person with high self-efficacy is more likely to perceive s/he can perform such tasks (Olivier & Shapiro, 1993). Self-efficacy becomes an impediment when a person does not possess the necessary skills to perform technology-related tasks. It would be interesting to examine whether BI measures lead to an exaggerated overestimation of a person's ability to overcome the disadvantage of having limited skills. On the other hand, subjective norms often describe a person's motivation to act in accordance with behaviours approved by others (Karahanna & Straub, 1999). Subjective norms become impediments when a person perceives that

people important to her/him do not approve of her/his technology-related decision. It would be worthwhile to investigate whether subjects who respond to BI measures will understate their estimations to adopt/use new technology when social/peer approval is low.

This study also advocates that BE should not be overlooked by marketing scholars. Instead, incorporating BE into well-regardedmodels, such as the Technology Adoption Model (TAM; Davis 1986) will increase our ability to predict consumers' adoption/use of new technology. This study identifies the strengths and weaknesses of the BE's and BI's predictive ability under four conditions (high/low experience x high/low facilitating conditions). This is important information for researchers who seek a better predictor of new technology adoption/use in certain situations. BE is significantly more predictive than BI when the new technology adoption/use is subject to impediments. Both BE and BI are equally predictive when the adoption/use is not subject to impediments. As consumers are presented with numerous new technology options that are easy to obtain, such as by downloading applications directly to mobile devices, their options increase dramatically. Thus, consumers face increasing challenges and uncertainty in their decision-making, which in turn makes it more difficult for researchers to predict behaviour. In this particular situation, BE may be a better predictor as well as providing marketers with a basis for the design of an intervention strategy.

Next, the longitudinal experimental design in this study helps to explain the stability of BE versus BI estimations. The results show that BE estimations are more stable than BI when perceived control over the behaviour is high. When perceived control over the behaviour is low, both BE and BI are not stable. However, subjects who responded to BE measures made more accurate estimations than for BI regardless of the perception of control over the behaviour. Results also show that subjects who responded to BE measures have a more consistent adoption-use relationship than subjects who responded to BI measures under all conditions. This is important since it explains why someone who adopts a mobile application might not necessarily use it (Straub & Burton-Jones, 2007). A person's intention to adopt a new technology is sometimes based more on desire, rather than a careful calculation of whether s/he

actually needs the technology. On the other hand, subjects' BE or expectations are based more on careful estimations toward the utility of the targeted application.

Finally, BE can be employed along with BI as a predictor of new technology adoption/use rather than BI alone in both consumer and organizational settings. Venkatesh et al. (2008) explained the different roles of BE and BI in organizational settings. Technology adoption in consumer and organizational settings involves varying degrees of uncertainty in the decision-making process. Organizations adopt new technology that suits their needs and resources, not necessarily adapting to the individual user's needs, which limits the number of options available to users. This limitation reduces uncertainty in their decision-making, since some factors that influence users' decisions are already controlled by the organization. In contrast, consumers encounter the more uncertainty when they attempt to deal with anticipated or unanticipated impediments that challenge their actual adoption. BE is found to be a better predictor of technology adoption than BI when the degree of uncertainty is high (Venkatesh et al. 2008). Thus, it should be particularly effective in consumer settings but also in organizational settings marked by high uncertainty.

Managerial Implications

The present research provides several key managerial implications and suggestions for future research on consumers' adoption/use of new technology, presented below.

Findings from this study offer a basis for marketers to increase the rate of consumers' adoption/use of new technology such as mobile applications. Marketers could reformat the approach for designing the interaction between consumers and technology. It is found in this study that subjects overstate their intentions to adopt/use new technology when they have had limited experience with the targeted new technology. It is important to minimize this overestimation, which will potentially improve the ability to predict their actual behaviour. In so doing, marketers should make available to consumers as many technology-related stimuli as possible, and at the same time motivate them to actively try/seek the stimuli being presented. Moreover, this study found that subjects understate their intentions to adopt/use new technology when facilitating conditions are low, thereby

decreasing the consistency between intentions and actual adoption/use. The consistency could be improved if marketers allow consumers to have easy access to the information regarding technology-related resources such as information on network coverage and signal reception quality in covered areas; guidelines for system and technical troubleshooting, etc.

In addition, the results suggest that marketers should intervene in consumers' expectations, instead of their intentions, when the adoption/use of mobile applications is subject to impediments. Based on the results, intervention in terms of expectations should be more effective to increase adoption/use than intervention on intentions. It is found that subjects who responded to BE measures made a more accurate estimation compared to those who responded to BI measures when experience and facilitating conditions are low. Subjects' 'expectations' are relatively stable regardless of the type of experience that they encountered. Therefore, marketers who have a limited ability to offer different types of experience, can focus on intervening in subjects' expectations rather than intentions. Similarly, marketers who have a limited ability to offer easy access over technology-related resources, can instead try to regulate/moderate consumers' expectations.

Study limitations

As have been previously mentioned, the present research is not without limitations. The first notable limitation is the manipulation design for facilitating conditions for Experiment 1. Subjects were instructed to check a long list of mobile device brands and models and indicate whether they could find their mobile device in the list. If they did, they were required to self-report it in the questionnaire. As the list was quite long and consisted of more than 30 mobile device brands and models, some subjects might have experienced selective attention and failed to locate their mobile device on the list. There is also the possibility that they consciously neglected the instruction and proceeded to the next section of the questionnaire without checking the list. Second, Experiment 1 recruited student participants, some of whom are international students for whom English is not their first language. It is particularly important to have participants with a high level of English comprehension in this study since we test two constructs (BE and BI) the items of which may appear to be

similar to non-native speakers. Finally, this study employed a within-participation Pearson correlation to examine the predictive ability of BE in comparison with BI and to examine the consistency between actual adoption and use. According to Conner et al. (2000), using within-participation Pearson correlations to measure stability may have some potential limitations. In particular, if the number of data points is fewer than five, there is a strong tendency for all items to obtain the same value.

Directions for future research

Finally, this study contributes to future research on the application of 2D barcode reader in marketing activities, including mobile-coupons (M-coupons). The transition from adoption to actual use of a mobile application could be difficult for some consumers and may depend on how marketers facilitate the adoption/use. Those who have limited access to application-related resources and limited information about the application will be less likely to adopt or utilize the service. Consumers' efforts to overcome the aforementioned impediments have to be compared with the economic value that they will receive, in order to increase their BI (or BE) to use M-coupons (Dickinger & Kleijnen, 2008). Since M-coupons using 2D barcode represents a relatively new type of M-marketing tool, other key determinants of BE and BI may be important in the formation of consumers' estimation to adopt/use it. Marketers thus should employ BE and BI selectively when developing designs for their new mobile application. However, any approach ultimately depends on the various factors and antecedents involved in the new technology adoption process.

Chapter Five

Conclusion

The contributions of this dissertation are summarised in this final section. As mentioned in chapter one, the overall research objective was to identify the constraints on the predictive ability of BE in comparison with BI. In achieving this objective, this dissertation presented three essays that, together, provide interlinking explanations. The first link of the explanation is presented in Essay 1, a conceptual review of the efficacy of BE as a potentially superior predictor than BI of behaviour that is subject to impediments. An extensive review of the literature on BE and a meta-analysis of key papers that considered BE as a key construct, support the proposition that scholars and practitioners should not overlook BE. In addition, essay oneoffers a conceptual model that incorporates key antecedents of BE. The discussion in Essay 1 addresses Research Question 1, which seeks to identify the differences between BE and BI as the sole immediate predictors of the adoption of new products. The next link in the explanation is presented in Essay 2, an empirical examination on the temporal stability of BE versus BI. The findings indeed support the notion that BE is more stable over time than BI, and therefore more predictive. More importantly, findings from Essay 2 answer Research Question 2 - that seeks to explain the differences between BE and BI, and how these differences influence the predictive ability of BE compared with that of BI in terms of the adoption of new products. The final explanatory link is presented in Essay 3. It examines the predictive ability of BE versus BI of behaviour that is subject to two sources of impediments: experience and facilitating conditions. The findings show that BE is significantly more predictive than BI when the new technology adoption/use is subject to impediments. Both BE and BI are equally predictive when the adoption/use is not subject to impediments. Empirical findings from Essay 3 address Research Question 3 that seeks to examine the predictive ability of BE versus BI in different situations. Ultimately, these interlinking explanations provide overall implications for both theory and practice.

5.1 Overall Theoretical Implications

Taken together, these three sequential essays offer several theoretical implications. Among them, three in particular constitute salient contributions to the extant marketing discourse. First, this research offers a solid basis for extending the theoretical framework that has been used extensively by marketing scholars to predict behaviour. In particular, findings from this research suggest that BE should be incorporated as a sole immediate predictor of technology trial/adoption/use in widely used frameworks, such as TAM (Davis, 1986). Second, this dissertation suggests that desirability versus feasibility are two key distinctions of BI and BE respectively. Third, this research compares and contrasts the predictive ability of BE and BI in the adoption/use of new technology settings in different situations. Lastly, this research demonstrates that superior temporal stability is a main strength of BE relative to BI. Therefore, for an extended run of prediction, BE should be more stable as well as more predictive than BI. Each of the research implications is discussed below.

The results in this dissertation support suggestions from prior research (e.g. Bagozzi, 2007) that a more robust sole predictor of adoption/use of new technology is needed to overcome the limitations of BI. The predictive ability of widely used conceptual models (i.e. TAM) could be improved by incorporating BE, instead of BI, as a sole predictor of behaviour that is subject to impediments. Davis (1986, 1989) proposed TAM as an adaptation of the more general TRA and TPB, to explain and predict individual acceptance of information technology in organizational settings. TAM inherited the limitations of TRA and TPB, in particular when it considered BI as an immediate predictor of technology adoption/use (Bagozzi, 2007). TAM's modest predictive ability invited scholars to address the problem by introducing additional constructs into the original TAM, for example: Combined TAM and TPB (C-TAM-TPB, Taylor & Todd, 1995), Unified Theory of Acceptance and Use of Technology (UTAUT, Venkatesh et al. 2003), TAM2 (Venkatesh & Davis, 2000), and TAM3 (Venkatesh & Bala, 2008). However, Bagozzi (2007) noted that the attempts to extend TAM have typically focused on broadening TAM by introducing additional determinants of

perceived usefulness, perceived ease of use or BI without trying to re-conceptualize existing variables or introduce new variables to address the shortcomings of existing variables (i.e. BI). The intention-behaviour linkage has become a major issue in both TRA and TPB (Sutton, 1998), and is inherent in TAM (Bagozzi, 2007). In particular, there are three issues regarding the intention-behaviour predicament: First, the intention-behaviour linkage in TAM focused only on explaining utilization (use) as the ultimate objective of technology adoption, instead of as means to more fundamental objective (such as satisfaction, improvement, or interaction). Second, a link between BI and action initiation is needed as BI changes over time because of anticipated or unanticipated impediments, which become greater as time lag increases. Third, intention has limited ability to explain uncertainty that increases as impediments and temptations arise before taking an action. In order to address these issues, this research reviews and tests the efficacy of BE as a potentially effective (sole) predictor of consumers' initial trials/adoption/use of new technology. The first essay in this dissertation reviews BE's greater ability than BI to take into account anticipated or unanticipated impediments that may challenge behavioural performance, including in new technology adoption/use settings (e.g. Venkatesh et al., 2008). The review found that marketing scholars have largely been relying on BI to predict new technology adoption/use, yet the TAM presumes that when a person forms BI judgments, he or she expects no impediments (Bagozzi et al., 1992). In situations where consumers clearly foresee impediments to adopt/use new technology, BE should be a far more robust predictor than BI (Bagozzi & Warshaw, 1990). Intuitively, if the behaviour is subject to impediments, BE should be a better immediate predictor of behaviour (Warshaw & Davis, 1985b). Counter-intuitively, BE could also be a better predictor than BI even if the behaviour is not subject to impediments. Therefore, Essay 1 recommends that marketing scholars consider BE as a reliable predictor when new technology adoption/use is subject to impediments. Furthermore, Essay 3 offer empirical evident that BE is a more robust predictor than BI, specifically when the behavior is subject to impediments.

Based on Essay 2 results, this dissertation also recommends that the formation of BI estimations should be described as a person's desirability toward performing the targeted behaviour, whereas BE is described as the feasibility of performing the

targeted behaviour (Fishbein & Stasson 1990). However, the notion of desirability versus feasibility as distinctive features of BI and BE respectively, has not yet been empirically established. Results from Essay 2 indicate that responding to BI questions; subjects are basically determining whether or not it is desirable to adopt/use the new technology. If a researcher asks BE questions instead, subjects will consider whether it is feasible or unfeasible to adopt/use the new technology, on the basis of the available resources and foreseeable impediments. Desirability ultimately leads to subjects' over-estimation toward their likelihood to perform the targeted pro-environmental behaviour when impediments were foreseen, and under-estimation when impediments were unforeseen. The underlying motive behind this mental process can be explained when Essay 2 compared subjects with high pro-environmental orientations versus subjects having low pro-environmental orientations. Subjects with high pro-environmental orientations appeared to make more modest estimations about their environmental concern, exhibiting more stable responses to both BI or BE questions. Meanwhile, subjects with low pro-environmental orientations tend to overstate their BI estimations, or understate their BE estimations. Clearly, subjects who have low pro-environmental orientations were not taking into account the feasibility of performing the pro-environment behaviour (whether or not there will impediments that challenge their behaviour) when responding to BI measures, thereby overstating their BI estimations. On the other hand, they are being overly cautious when responding to BE measures, thereby understating their BE estimations.

Another theoretical implications of this dissertation focuses on the key determinants of BE in various technologies adoption/use situations proposed in Essay 1. As consumers confront abundant new technology options that are easy to obtain, they face increasing challenges and uncertainty in their decision-making. Marketers thus should employ BE and BI selectively when developing designs for their new technology or product. The determination ultimately depends on the various factors and antecedents involved in the new technology adoption/use process. The key determinants proposed in Essay 1 includes: experience, facilitating conditions, perceived behavioural control, attitude, self-efficacy, subjective norms and availability of information. The efficacy of two selected key determinants of BE,

experience and facilitating conditions, were further examined in Essay 3. These two key determinants of BE represents two distinct type of impediments. Particularly, experience represents internal impediments, while facilitating conditions represents external impediments. The role of internal and external impediments on predictive ability of BE versus BI was examined, and the results indeed suggest that BE is a better predictor of BI regardless the type of impediments (internal impediments or external impediments). In addition, this dissertation also examined another key determinants of BE in Essay 2, namely habit. It was hypothesized in Essay 2 that habit is a key factor in determining the boundary conditions of the predictive ability of BE versus BI. Warshaw and Davis (1985b) contend that BI measures are less likely to activate a person's consciousness about whether her/his habits conform to the targeted behaviour, whereas BE measures are more likely to activate her/his consciousness about having a habit that conforms to such behaviour. Findings indeed confirm that BE has a greater ability to activate participants' awareness about having a pro-environmental habit than does BI. Specifically, subjects seem to form conscious mental judgments of habitual pro-environmental behaviour more intensively when responding to BE measures than when responding to BI measures. Therefore, for predicting habitual behaviour, scholars should employ BE as sole immediate predictor, instead of BI.

Finally, regarding the temporal stability of BE in comparison with BI, findings from the Essay 2 suggest that BE is more stable over time than BI, and therefore has better predictive accuracy. It is confirmed that BI changes over time, while BE is more stable. BI was found to be influenced by the emergence of new information, whereas BE estimations were influenced less. In an experiment on pro-environmental donation, subjects BE estimations toward making a donation are stable, regardless of the new information that was provided at each time of observation. On the other hand, BI estimations on making a donation fluctuate in accordance with the different types of new information being given. Meanwhile, findings from the Essay 3 show that BE estimations remain stable, regardless of the type of information that is being encountered by the subjects from their direct/indirect trial of the new applications. On the other hand, BI changes according to the type of information. Since BI estimations reflect subjects' preconceived notions about the new technology, any

relevant new information could potentially change the estimation, whereas the effects of new information on BE estimations is insignificant. Hence, subjects who responded to BE questions formed a more accurate estimation toward their likelihood to adopt, and then use, the application. On the other hand, subjects who responded to BI questions tend to overstate or understate their intentions to adopt, and then use, the application. Hence, the relationship between adoption and actual use for BI is less consistent compared to BE. Therefore, in an extended period of prediction, scholars should employ BE rather than BI, as sole immediate predictor of behaviour.

5.2 Overall Managerial Implications

From the managerial perspective, this research has numerous implications for marketing practitioners who are interested in new product development in the contexts of both social marketing and mobile marketing.

In the social marketing context, BE could be an important factor in designing and promoting behavioural change for habitual pro-environmental behaviour. In certain situations, identified by this research, it should be more effective to design an intervention on consumers' BE judgments rather than on their BI judgments. Interventions need to focus on giving key information that helps to reduce consumers' perceived uncertainty or to clarify the extent of the impediments that may prevent consumers from performing the targeted pro-environmental behaviour. In addition, to increase consistency between environmental concern and actual pro-environmental lifestyle, marketing practitioners should provide relevant information that could increase an awareness of foreseeable or unforeseeable impediments. Consumers need to be brought 'back to earth' to make them realize that the adoption of a pro-environmental lifestyle will require considerable resources and commitment. Subsequently, social marketers need to provide some guidance as to how the impediments can be minimized.

In the context of adoption of new technology, this research recommends that understanding the different conceptualization between BE and BI can potentially be valuable to increase the rate of consumers' adoption/use of new technology. First,

marketers should consider rethinking their approach when designing consumer-technology experience. For example, instead of giving options on how consumers can try/experience new mobile applications (i.e. free version), marketers should give all consumers full and free access to the application for a limited period of time. This will allow consumers to take advantage of the full experience of using the application, allowing them to make a more accurate estimation of their intentions to purchase the full license. Second, marketers should redesign their approach to the access of information regarding technology-related resources. For example, instead of letting consumers know only about the compatibility of the application with their device operating system, marketers should give additional information regarding the future plans of the developer/marketer, and whether they will work to make the application compatible with the operating system.

Moreover, the results suggest that intervention in terms of expectations should be more effective to increase adoption/use rather than intervention on intentions. It was found that subjects who responded to BE measures made a more accurate estimation compared to those who responded to BI measures when experience and facilitating conditions are low. Subjects' 'expectations' are relatively stable regardless of the type of experience that they encountered. Therefore, marketers who have a limited ability to offer different types of experience, can focus on applying intervention to subjects' expectations rather than intentions. Similarly, marketers who have a limited ability to offer easy access over technology-related resources, can instead try to regulate/moderate consumers' expectations. Hence, intervention measures intended to affect consumers' BE judgment should be more effective in increasing adoption/use than intervention in terms of their BI. In particular, when the source of impediments is internal (i.e. low experience), additional information could help to reduce anxiety toward adoption/use. Meanwhile, when the source of impediments is external (i.e. low facilitating conditions), additional information will be less likely to help reduce anxiety toward adoption/use. Instead, marketers need to ensure that they provide easy accesses to computer-related resources to reduce the anxiety resulting from low facilitating conditions.

5.3 Study Limitations and Directions for Future Research

This dissertation is not without limitations which are discussed in this section with a view to making future improvements and research extensions.

First, this dissertation was focused on contrasting and comparing the temporal stability and the predictive ability of BE versus BI in consumer settings. This limits our ability to explain the efficacy of BE as sole immediate predictor of behaviour in other situations, such as in organizational (B2B) settings. To increase the generalizability of the findings, future study should therefore be extended beyond consumer settings, i.e. to organizational settings, since consumer and organizational adoption/use of new technology involve varying degrees of uncertainty in the decision-making processes. Individual consumers have more control over their decisions than users in an organization, and they enjoy the freedom to seek new technology that suits their personal needs. Organizations adopt new technology that suits their own collective needs and resources, not necessarily those of the individual user, which limits the number of options available to users. This limitation reduces uncertainty in users' decision-making, since some factors that influence decisions already are controlled by the organization. In contrast, consumers encounter more uncertainty as they attempt to deal with anticipated or unanticipated impediments that challenge their actual adoption. Since BE is a better predictor of behaviour than BI when the degree of uncertainty is high (Warshaw & Davis, 1985b), it should be particularly effective in consumer settings but also in organizational settings marked by high uncertainty. Therefore, an extended conceptual model incorporating BE, could be a more robust model in such situations.

Another source of limitation is the design of experiments that were employed in this dissertation. In particular, Essay 2 and 3 conducted online and lab experiments, which limit our ability to capture the dynamics of actual encounters between consumers and marketers' offerings. The ability to capture the dynamics of actual encounter is important to validate that BE items are indeed have a different effects toward consumers' mental judgments compared to BI items. Therefore, further

research should conduct the empirical examination using field experiment with actual new product offerings. In addition, to capture the actual process of new product adoption, it will also offer more opportunity to examine various aspects and antecedents that important in the formation of BE judgments. In the context of new technology adoption/use, the key antecedents of BE that should be further discussed (as being proposed in Essay 1) includes: perceived behavioural control, attitude, self-efficacy, subjective norms and availability of information.

This dissertation also identified self-report scales as a limitation. When participants were asked to self-report their pro-environmental behaviour, they may succumb to response bias in that respondents may feel pressured to comply with generally accepted social norms. Also, self-reporting can be subject to selective attention, in which relevant activities may not be reported since it is not within the participants' memory recollection set. For example, participants might have had difficulty recalling whether they had performed habitual pro-environmental behaviours over the previous weekend, since these might have been performed subconsciously, perhaps as a matter of habit. An alternate approach would therefore be for participants to use diaries to record all pro-environmental behaviours that took place each day over a one-week period. In addition, future research could seek to determine whether the Essay 2 findings persist when actual purchase or consumption behaviour (e.g., use of electricity or water) is examined. Similar issues were encountered in Essay 3, where subjects were instructed to check a list of mobile device brands and models and indicate whether they could find their mobile device on the list, which determines the level of facilitating conditions that they will encounter. Those whose mobile device was not in the list should have felt low facilitating conditions. If they found their mobile device on the list, they were required to self-report it in the questionnaire. As the list was quite long and consisted of more than 30 brands and models of mobile devices, some subjects might have paid only scant attention and failed to locate their mobile device on the list. There is also some possibility that they consciously neglected the instructions and proceeded to the next section of the questionnaire without checking the list. This limitation of Experiment 1 was used to revise manipulation design of Experiment 2, whereby participants received automatic confirmation about the compatibility of

their mobile device with the application once they enter the brand name/model of the device into the online form in the questionnaire. In addition, Experiment 1 in Essay 3 recruited students as participants, some of whom are international students for whom English is not their first language. For the purposes of this study, it is particularly important to use participants with competent English comprehension skills since it contrasts two constructs (BE and BI), the items of which may appear to be similar to non-native speakers.

Finally, some parts of analysis in this dissertation employed a within-participation Pearson correlation to examine the predictive ability of BE versus BI and to examine the consistency between actual adoption and use. According to Conner et al. (2000), using within-participation Pearson correlations to measure stability may have some potential limitations. In particular, if the number of data points is fewer than five, there is a strong tendency for all items to obtain the same value. Future research should therefore employ a longer interval between observations and additional data points.

References

Aarts, H., Verplanken, B., & Knippenberg, A. (1998). Predicting behavior from actions in the past: Repeated decision making or a matter of habit? *Journal of Applied Social Psychology, 28*(15), 1355-1374.

Ajzen, I. (1971). Attitudinal vs. normative messages: An investigation of the differential effects of persuasive communications on behavior. *Sociometry, 34*(2), 236-280.

Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. *Action Control, from Cognition to Behavior: From Cognition to Behavior*, 11.

Ajzen, I. (1988). From intentions to actions. *Attitudes, Personality, and Behavior*, 112–145.

Ajzen, I. (1989). Attitude structure and behavior. *Attitude structure and function*, 241-274.

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior & Human Decision Processes, 50*(2), 179.

Ajzen, I., & Fishbein, M. (1974). Factors Influencing Intentions and the Intention-Behavior Relation. *Human Relations, 27*(1), 1.

Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*: Prentice-Hall.

Ajzen, I., & Madden, T. J. (1986). Prediction of goal-directed behavior: attitudes, intentions, and perceived behavioral control. *Journal of experimental social psychology(Print), 22*(5), 453-474.

Albarracin, D., Fishbein, M., Johson, B. T., & Muellerleile, P. A. (2001). Theories of Reasoned Action and Planned Behavior as Models of Condom Use: A Meta-Analysis. *Psychological Bulletin, 127*(1), 142.

Andreasen, A. R., & Tyson, C. (1994). Applying social marketing to ecological problems through consumer research. *Asia Pacific advances in consumer research, 1*, 22-27.

Armitage, C., & Conner, M. (2001). Efficacy of the Theory of Planned Behaviour: A meta-analytic review. *British Journal of Social Psychology, 40*(4), 471-499.

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.

Bagozzi, R. P., Davis, F. D., & Warshaw, P. R. (1992). Development and test of a theory of technological learning and usage. *Human Relations, 45*(7), 659-686.

Bagozzi, R. P., & Warshaw, P. R. (1990). Trying to consume. *Journal of Consumer Research*, 127-140.

Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology, 27*(1), 14-25.

Barr, S., Gilg, A. W., & Ford, N. (2005). The household energy gap: examining the divide between habitual-and purchase-related conservation behaviours. *Energy Policy, 33*(11), 1425-1444.

Burgess, J. A., Spence, J. C., & Wild, T. C. (2010). Reducing overestimated intentions and expectations for physical activity: The effect of a corrective entreaty. *Psychology and Health, 25*(3), 383-400.

Cohen, J. (1992). A Power Primer. *Psychological Bulletin, 112*(1), 155-159.

Conner, M., Sheeran, P., Norman, P., & Armitage, C. J. (2000). Temporal stability as a moderator of relationships in the theory of planned behaviour. *British Journal of Social Psychology, 39*(4), 469-493.

Courneya, K., & McAuley, E. (1994). Factors affecting the intention-physical activity relationship: intention versus expectation and scale correspondence. *Research quarterly for exercise and sport, 65*(3), 280.

Dahlstrand, U., & Biel, A. (1997). Pro-Environmental Habits: Propensity Levels in Behavioral Change1. *Journal of Applied Social Psychology, 27*(7), 588-601.

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., & Warshaw, P. R. (1992). What do intention scales measure? *Journal of General Psychology, 119*(4), 391.

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.

de Vries, P., Aarts, H., & Midden, C. J. H. (2011). Changing Simple Energy-Related Consumer Behaviors: How the Enactment of Intentions Is Thwarted by Acting and Non-Acting Habits. *Environment and Behavior*.

Devellis, B., Blalock, S., & Sandler, R. (1990). Predicting Participation in Cancer Screening: The Role of Perceived Behavioral Control 1. *Journal of Applied Social Psychology, 20*(8), 639-660.

Dickinger, A., & Kleijnen, M. (2008). Coupons going wireless: Determinants of consumer intentions to redeem mobile coupons. *Journal of Interactive Marketing, 22*(3).

Dunlap, R. E., & Van Liere, K. D. (1978). The new environmental paradigm: a proposed instrument and preliminary results. *Journal of Environmental Education, 9*(4), 10-19.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New trends in measuring environmental attitudes: measuring endorsement of the new ecological paradigm: a revised NEP scale. *Journal of Social Issues, 56*(3), 425-442.

Eagly, A., & Chaiken, S. (1993). *The psychology of attitudes*: Harcourt Brace Jovanovich College Publishers Fort Worth.

Fazio, R. H., & Zanna, M. P. (1981). Direct experience and attitude-behavior consistency. *Advances in Experimental Social Psychology, 14*, 161-202.

Fishbein, M. (1967). Attitude and the prediction of behavior. *Readings in attitude theory and measurement*, 477-492.

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*: Addison-Wesley Pub. Co.

Fishbein, M., & Stasson, M. (1990). The Role of Desires, Self-Predictions, and Perceived Control in the Prediction of Training Session Attendance 1. *Journal of Applied Social Psychology, 20*(3), 173-198.

Fransson, N., & Gärling, T. (1999). Environmental concern: Conceptual definitions, measurement methods, and research findings. *Journal of Environmental Psychology, 19*(4), 369-382.

Gary, E. (2007). Marketers take note: Women are more green. *Furniture Today, 31*(50), 43.

Gatersleben, B., Steg, L., & Vlek, C. (2002). Measurement and determinants of environmentally significant consumer behavior. *Environment and Behavior, 34*(3), 335.

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.

Grieve, C., Lawson, R., & Henry, J. (2012). Understanding the non-adoption of energy efficient hot water systems in New Zealand. *Energy Policy, 48*(0), 369-373.

Gupta, S., & Ogden, D. T. (2009). To buy or not to buy? A social dilemma perspective on green buying. *Journal of Consumer Marketing, 26*(6), 376-391.

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.

Hassan, L. M., and Shiu, E. (2013). "The influence of national cultural values on the theory of planned behaviour." *Unpublished manuscript.*

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *The Journal of environmental education, 18*(2), 1-8.

Hopper, J. R., & Nielsen, J. M. C. (1991). Recycling as altruistic behavior. *Environment and Behavior, 23*(2), 195-220.

Jones, T., & Clarke, V. A. (1995). Diversity as a determinant of attitudes: A possible explanation of the apparent advantage of single-sex settings. *Journal of Educational Computing Research, 12*(1), 51-64.

Karahanna, E., & Straub, D. W. (1999). The psychological origins of perceived usefulness and ease-of-use. *Information & Management, 35*(4), 237-250.

Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly*, 183-213.

Kim, E., Lin, J. S., & Sung, Y. (2013). To App or Not to App: Engaging Consumers via Branded Mobile Apps. *Journal of Interactive Advertising*, *13*(1), 53-65.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental education research, 8*(3), 239-260.

Konerding, U. (2001). Theory and methods for analyzing relations between behavioral intentions, behavioral expectations, and behavioral probabilities. *Methods of Psychological Research Online, 6*(1), 21-66.

Krosnick, J. A., & Petty, R. E. (1995). Attitude strength: An overview.

Lu, J., Yu, C. S., Liu, C., & Yao, J. E. (2003). Technology acceptance model for wireless Internet. *Internet Research, 13*(3), 206-222.

Lusk, J. L., McLaughlin, L., & Jaeger, S. R. (2007). Strategy and response to purchase intention questions. *Marketing Letters, 18*(1), 31-44.

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.*

Mao, E., & Palvia, P. (2008). Exploring the effects of direct experience on IT use: An organizational field study. *Information & Management, 45*(4), 249-256.

Melillo, W., Miller, S., & Solman, G. (2006). Companies find it's not easy marketing green. *Brandweek, 47*(28).

Michaelidou, N., & Christodoulides, G. (2011). "Antecedents of attitude and intention towards counterfeit symbolic and experiential products." *Journal of Marketing Management*, *27*(9-10), 976-991.

Morojele, N., & Stephenson, G. (1994). Addictive behaviours: Predictors of abstinence intentions and expectations in the Theory of Planned Behaviour. *Social psychology and health: European perspectives*, 47-70.

Morwitz, V. (1997). Why consumers don't always accurately predict their own future behavior. *Marketing Letters, 8*(1), 57-70.

Newhouse, N. (1990). Implications of attitude and behavior research for environmental conservation. *The Journal of environmental education, 22*(1), 26-32.

Okazaki, S. (2005). New perspectives on m-commerce research. *Journal of Electronic Commerce Research, 6*(3), 160-164.

Olivier, T. A., & Shapiro, F. (1993). Self-Efficacy and Computers. *Journal of Computer-Based Instruction, 20*(3), 81-85.

Pickett-Baker, J., & Ozaki, R. (2008). Pro-environmental products: marketing influence on consumer purchase decision. *Journal of Consumer Marketing, 25*(5), 281-293.

Pomery, E., Gibbons, F., Reis-Bergan, M., & Gerrard, M. (2009). From willingness to intention: Experience moderates the shift from reactive to reasoned behavior. *Personality and Social Psychology Bulletin, 35*(7), 894.

Rhodes, R., & Matheson, D. (2005). Discrepancies in exercise intention and expectation: theoretical and applied issues. *Psychology & Health, 20*(1), 63-78.

Richard, R., van der Pligt, J., & de Vries, N. (1996). Anticipated affect and behavioral choice. *Basic and Applied Social Psychology, 18*(2), 111-129.

Schepers, J., & Wetzels, M. (2007). A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects. *Information & Management*, *44*(1), 90-103.

Schifter, D., & Ajzen, I. (1985). Intention, perceived control, and weight loss: an application of the theory of planned behavior. *J Pers Soc Psychol, 49*(3), 843-851.

Sharma, C. (2010). Sizing up the global mobile apps market. *Report, Chetan Sharma Consulting, Issaquah, WA*.

Shaw, D., Grehan, E., Shiu, E., Hassan, L., & Thomson, J. (2005). An exploration of values in ethical consumer decision making. *Journal of Consumer Behaviour*, *4*(3), 185-200.

Shaw, D., Shiu, E., & Clarke, I. (2000). "The contribution of ethical obligation and self-identity to the theory of planned behaviour: an exploration of ethical consumers." *Journal of Marketing Management*, *16*(8), 879-894

Sheeran, P. (2002). Intention—Behavior Relations: A Conceptual and Empirical Review. *European review of social psychology, 12*(1), 1-36.

Sheeran, P., & Abraham, C. (2003). Mediator of moderators: Temporal stability of intention and the intention-behavior relation. *Personality and Social Psychology Bulletin, 29*(2), 205-215.

Sheeran, P., & Orbell, S. (1998). Do intentions predict condom use? Meta-analysis and examination of six moderator variables. *British Journal of Social Psychology, 37*, 231-252.

Sheeran, P., Orbell, S., & Trafimow, D. (1999). Does the temporal stability of behavioral intentions moderate intention-behavior and past behavior-future behavior relations? *Personality and Social Psychology Bulletin, 25*(6), 724-734.

Sheppard, B., Hartwick, J., & Warshaw, P. (1988). The Theory of Reasoned Action: A Meta-Analysis of Past Research with Recommendations for Modifications and Future Research. *Journal of Consumer Research, 15*(3), 325.

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.

Smith, R. E., & Swinyard, W. R. (1983). Attitude-behavior consistency: The impact of product trial versus advertising. *Journal of Marketing Research*, 257-267.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology, 29*(3), 309-317.

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.

Straughan, R. D., & Roberts, J. A. (1999). Environmental segmentation alternatives: a look at green consumer behavior in the new millennium. *Journal of Consumer Marketing, 16*(6), 558-575.

Sutton, S. (1998). Predicting and Explaining Intentions and Behavior: How Well Are We Doing? *Journal of Applied Social Psychology, 28*(15), 1317-1338.

Taylor, S., & Todd, P. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research, 6*, 144-176.

Thorsnes, P., Williams, J., & Lawson, R. (2012). Consumer responses to time varying prices for electricity. *Energy Policy, 49*(0), 552-561.

Van Ittersum, K. (2011). The effect of decision makers' time perspective on intention–behavior consistency. *Marketing Letters*, 1-15.

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.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science, 46*(2), 186-204.

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., & Morris, M. (2003). User Acceptance of Information Technology: Toward a Unified View. *Management Information Systems Quarterly, 27*(1), 18.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 425-478.

Verplanken, B., Aarts, H., van Knippenberg, A., & Moonen, A. (1998). Habit versus planned behaviour: A field experiment. *British Journal of Social Psychology, 37*(1), 111-128. doi: 10.1111/j.2044-8309.1998.tb01160.x

Warshaw, P., & Davis, F. (1984). Self-Understanding and the Accuracy of Behavioral Expectations. *Personality and Social Psychology Bulletin, 10*(1), 111.

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.

Wicker, A. (1969). Attitudes Versus Actions: The Relationship of Verbal and Overt Behavioral Responses to Attitude Objects. *J Soc Issues*.

Appendices

APPENDIX 1 Questionnaire for Study 1 Essay 2

EXPLANATORY STATEMENT

Dear Sir/Madam,

My name is Harryadin Mahardika and I am a PhD student from the Department of Marketing at Monash University. I am conducting a research project for my Doctoral dissertation under the supervision of Prof. Michael Ewing and Dr. Dominic Thomas.

We are seeking participant aged between 18 and 55, to participate in this project. Participation involves the completion of a questionnaire, which will take approximately 2 to 5 minutes. This research aims to investigate consumer decision making process. The result will help to enhance the prediction of consumer behaviour in regards to environmental friendly products.

It is important that your participation be voluntary. You are free to withdraw or discontinue participation at any time, and for any reason even after you give consent. Furthermore, your participation in this research project is anonymous and any answers that provided by you will only be identified by a coded number. The data collected from this study will be retained in a secure location for 5 years and will then be deleted. Only averaged results will be reported (e.g. in a journal article or scientific meeting presentation), and no information that could be used to identify an individual participant will be collected, stored or released.

If you have any queries about the project please contact me: [redacted] or telephone [redacted]

Or contact my supervisors: Dr. Dominic Thomas: [redacted] or telephone [redacted] and Prof. Michael Ewing: [redacted] or telephone [redacted]

Should you have any complaint concerning the manner in which this research (project number CF10/0763 - 2010000363) is conducted, please do not hesitate to contact The Standing Committee on Ethics in Research Involving Humans at the following address: Human Ethics Officer Standing Committee on Ethics in Research Involving Humans (SCERH) Building 3e Room 111, Research Office Monash University VIC 3800 Tel: +61 3 9905 2052 Fax: +61 3 9905 1420 Email: scerh@adm.monash.edu.au

Thank you for your time and consideration

BI Group: You are a select group of people, who are elected to participate in this study. Your opinion is important to design an effective marketing strategy for environmentally friendly products.

Please indicate whether you intend to purchase the given product:

	NO, DEFINITELY DO NOT INTEND 1	2	3	4	5	6	YES, DEFINITELY DO INTEND 7
1. Electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price.	❍	❍	❍	❍	❍	❍	❍
2. Gas converter installation for your car at price $1,500.	❍	❍	❍	❍	❍	❍	❍
3. Water saving shower head at price $100.	❍	❍	❍	❍	❍	❍	❍
4. Recycled plastic bag for groceries at price $1 each.	❍	❍	❍	❍	❍	❍	❍
5. Bio-degradable AAA baterry at price 50% more expensive than non-degradable battery.	❍	❍	❍	❍	❍	❍	❍
6. Energy saving lightbulb at price 30% more expensive than conventional lightbulb.	❍	❍	❍	❍	❍	❍	❍

Please indicate whether you plan to purchase the given product:

	NO, DEFINITELY DO NOT PLAN 1	2	3	4	5	6	YES, DEFINITELY DO PLAN 7
1. Electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price.	❍	❍	❍	❍	❍	❍	❍
2. Gas converter installation for your car at price $1,500.	❍	❍	❍	❍	❍	❍	❍
3. Water saving shower head at price $100.	❍	❍	❍	❍	❍	❍	❍
4. Recycled plastic bag for groceries at price $1 each.	❍	❍	❍	❍	❍	❍	❍
5. Bio-degradable AAA baterry at price 50% more expensive than non-degradable battery.	❍	❍	❍	❍	❍	❍	❍
6. Energy saving lightbulb at price 30% more expensive than conventional lightbulb.	❍	❍	❍	❍	❍	❍	❍

Please indicate your prediction that you will purchase the given product:

	I PREDICT I WILL NOT PERFORM 1	2	3	4	5	6	I PREDICT I WILL PERFORM 7
1. Electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price.	❍	❍	❍	❍	❍	❍	❍
2. Gas converter installation for your car at price $1,500.	❍	❍	❍	❍	❍	❍	❍
3. Water saving shower head at price $100.	❍	❍	❍	❍	❍	❍	❍
4. Recycled plastic bag for groceries at price $1 each.	❍	❍	❍	❍	❍	❍	❍
5. Bio-degradable AAA baterry at price 50% more expensive than non-degradable battery.	❍	❍	❍	❍	❍	❍	❍
6. Energy saving lightbulb at price 30% more expensive than conventional lightbulb.	❍	❍	❍	❍	❍	❍	❍

BE Group: You are a select group of people, who are elected to participate in this study. Your opinion is important to design an effective marketing strategy for environmentally friendly products.

Please indicate whether you expect to purchase the given product:

	NO, DEFINITELY DO NOT EXPECT 1	2	3	4	5	6	YES, DEFINITELY DO EXPECT 7
1. Electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price.	❍	❍	❍	❍	❍	❍	❍
2. Gas converter installation for your car at price $1,500.	❍	❍	❍	❍	❍	❍	❍
3. Water saving shower head at price $100.	❍	❍	❍	❍	❍	❍	❍
4. Recycled plastic bag for groceries at price $1 each.	❍	❍	❍	❍	❍	❍	❍
5. Bio-degradable AAA baterry at price 50% more expensive than non-degradable battery.	❍	❍	❍	❍	❍	❍	❍
6. Energy saving lightbulb at price 30% more expensive than conventional lightbulb.	❍	❍	❍	❍	❍	❍	❍

Please indicate whether you will purchase the given product:

	NO, I DEFINITELY WILL NOT PERFORM 1	2	3	4	5	6	YES, I DEFINITELY WILL PERFORM 7
1. Electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price.	❍	❍	❍	❍	❍	❍	❍
2. Gas converter installation for your car at price $1,500.	❍	❍	❍	❍	❍	❍	❍
3. Water saving shower head at price $100.	❍	❍	❍	❍	❍	❍	❍
4. Recycled plastic bag for groceries at price $1 each.	❍	❍	❍	❍	❍	❍	❍
5. Bio-degradable AAA baterry at price 50% more expensive than non-degradable battery.	❍	❍	❍	❍	❍	❍	❍
6. Energy saving lightbulb at price 30% more expensive than conventional lightbulb.	❍	❍	❍	❍	❍	❍	❍

Please indicate how likely that you actually will perform the given behaviour

	EXTREMELY UNLIKELY 1	2	3	4	5	6	EXTREMELY LIKELY 7
1. Electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price.	❍	❍	❍	❍	❍	❍	❍
2. Gas converter installation for your car at price $1,500.	❍	❍	❍	❍	❍	❍	❍
3. Water saving shower head at price $100.	❍	❍	❍	❍	❍	❍	❍
4. Recycled plastic bag for groceries at price $1 each.	❍	❍	❍	❍	❍	❍	❍
5. Bio-degradable AAA baterry at price 50% more expensive than non-degradable battery.	❍	❍	❍	❍	❍	❍	❍
6. Energy saving lightbulb at price 30% more expensive than conventional lightbulb.	❍	❍	❍	❍	❍	❍	❍

Please indicate whether you are going to perform the given behaviour:

	NO, I DEFINITELY ARE NOT GOING TO PERFORM 1	2	3	4	5	6	YES, I DEFINITELY ARE GOING TO PERFORM 7
1. Electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price.	❍	❍	❍	❍	❍	❍	❍
2. Gas converter installation for your car at price $1,500.	❍	❍	❍	❍	❍	❍	❍
3. Water saving shower head at price $100.	❍	❍	❍	❍	❍	❍	❍
4. Recycled plastic bag for groceries at price $1 each.	❍	❍	❍	❍	❍	❍	❍
5. Bio-degradable AAA baterry at price 50% more expensive than non-degradable battery.	❍	❍	❍	❍	❍	❍	❍
6. Energy saving lightbulb at price 30% more expensive than conventional lightbulb.	❍	❍	❍	❍	❍	❍	❍

Listed below are statements about the relationship between humans and the environment. For each one, please indicate whether you are STRONGLY AGREE, MILDLY AGREE, UNSURE, MILDLY DISAGREE, or STRONGLY DISAGREE with it.

NEP (New Environmental Paradigm) Items	Strongly agree	Mildly agree	Unsure	Mildly disagree	Strongly disagree
We are approaching the limit of the number of people the earth can support.	❍	❍	❍	❍	❍
Humans have the right to modify the natural environment to suit their needs.	❍	❍	❍	❍	❍
When humans interfere with nature, it often produces disastrous consequences.	❍	❍	❍	❍	❍
Human ingenuity will insure that we do NOT make the earth unlivable.	❍	❍	❍	❍	❍
Humans are severely abusing the environment.	❍	❍	❍	❍	❍
The earth has plenty of natural resources if we just learn how to develop them.	❍	❍	❍	❍	❍
Plants and animals have as much right as humans to exist.	❍	❍	❍	❍	❍
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	❍	❍	❍	❍	❍
Despite our special abilities humans are still subject to the laws of nature.	❍	❍	❍	❍	❍
The so-called ecological crisis facing humankind has been greatly exaggerated.	❍	❍	❍	❍	❍
The earth is like a spaceship with very limited room and resources.	❍	❍	❍	❍	❍
Humans were meant to rule over the rest of nature.	❍	❍	❍	❍	❍
The balance of nature is very delicate and easily upset.	❍	❍	❍	❍	❍
Humans will eventually learn enough about how nature works to be able to control it.	❍	❍	❍	❍	❍
If things continue on their present course, we will soon experience a major ecological catastrophe.	❍	❍	❍	❍	❍

Please answer the following questions about yourself:

Gender

- ❍ Male
- ❍ Female

Age

- ❍ 18 - 24
- ❍ 25 - 35
- ❍ 36 - 49
- ❍ 50 - 65
- ❍ Over 65

Monthly expenditure (in US Dollar)

- ❍ Less than $1,500
- ❍ $1,500 - $2,499
- ❍ $2,500 - $3,499
- ❍ $3,500 - $4,500
- ❍ More than $4,500

APPENDIX 2 Time 1 Questionnaire for Study 2 Essay 2

EXPLANATORY STATEMENT

Dear Sir/Madam,

My name is Harryadin Mahardika and I am a PhD student from the Department of Marketing at Monash University. I am conducting a research project for my Doctoral dissertation under the supervision of Prof. Michael Ewing and Dr. Dominic Thomas.

We are seeking participant aged between 18 and 55, to participate in this project. Participation involves the completion of a questionnaire, which will take approximately 2 to 5 minutes. This research aims to investigate consumer decision making process. The result will help to enhance the prediction of consumer behaviour in regards to environmental friendly products.

It is important that your participation be voluntary. You are free to withdraw or discontinue participation at any time, and for any reason even after you give consent. Furthermore, your participation in this research project is anonymous and any answers that provided by you will only be identified by a coded number. The data collected from this study will be retained in a secure location for 5 years and will then be deleted. Only averaged results will be reported (e.g. in a journal article or scientific meeting presentation), and no information that could be used to identify an individual participant will be collected, stored or released.

If you have any queries about the project please contact me: [redacted] or telephone [redacted]

Or contact my supervisors:

Dr. Dominic Thomas: [redacted] or telephone [redacted] and Prof. Michael Ewing: [redacted] or telephone [redacted]

Should you have any complaint concerning the manner in which this research (project number CF10/0763 - 2010000363) is conducted, please do not hesitate to contact The Standing Committee on Ethics in Research Involving Humans at the following address: Human Ethics Officer Standing Committee on Ethics in Research Involving Humans (SCERH) Building 3e Room 111, Research Office Monash University VIC 3800 Tel: +61 3 9905 2052 Fax: +61 3 9905 1420 Email: scerh@adm.monash.edu.au

Thank you for your time and consideration

BI Group: You are a select group of people, who are elected to participate in this study. Your opinion is important to design an effective marketing strategy for environmentally friendly products.

Please indicate whether you presently intend to perform the given behaviour sometime this weekend:

	NO, DEFINITELY DO NOT INTEND 1	2	3	4	5	6	YES, DEFINITELY DO INTEND 7
1. Unplug the devices that are not used.	❍	❍	❍	❍	❍	❍	❍
2. Purchase an environmentally friendly product at supermarket	❍	❍	❍	❍	❍	❍	❍
3. Use own bags for groceries shopping.	❍	❍	❍	❍	❍	❍	❍
4. Switch off light before leaving a room.	❍	❍	❍	❍	❍	❍	❍
5. Reduce water usage.	❍	❍	❍	❍	❍	❍	❍

Please indicate whether you presently plan to perform the given behaviour sometime this weekend:

	NO, DEFINITELY DO NOT PLAN 1	2	3	4	5	6	YES, DEFINITELY DO PLAN 7
1. Unplug the devices that are not used.	❍	❍	❍	❍	❍	❍	❍
2. Purchase an environmentally friendly product at supermarket	❍	❍	❍	❍	❍	❍	❍
3. Use own bags for groceries shopping.	❍	❍	❍	❍	❍	❍	❍
4. Switch off light before leaving a room.	❍	❍	❍	❍	❍	❍	❍
5. Reduce water usage.	❍	❍	❍	❍	❍	❍	❍

Please indicate your prediction that you will perform the given behaviour sometime this weekend:

	I PREDICT I WILL NOT PERFORM 1	2	3	4	5	6	I PREDICT I WILL PERFORM 7
1. Unplug the devices that are not used.	❍	❍	❍	❍	❍	❍	❍
2. Purchase an environmentally friendly product at supermarket	❍	❍	❍	❍	❍	❍	❍
3. Use own bags for groceries shopping.	❍	❍	❍	❍	❍	❍	❍
4. Switch off light before leaving a room.	❍	❍	❍	❍	❍	❍	❍
5. Reduce water usage.	❍	❍	❍	❍	❍	❍	❍

BE Group: You are a select group of people, who are elected to participate in this study. Your opinion is important to design an effective marketing strategy for environmentally friendly products.

Please indicate whether you presently expect to perform the given behaviour sometime this weekend:

	NO, DEFINITELY DO NOT EXPECT 1	2	3	4	5	6	YES, DEFINITELY DO EXPECT 7
1. Unplug the devices that are not used.	❍	❍	❍	❍	❍	❍	❍
2. Purchase an environmentally friendly product at supermarket	❍	❍	❍	❍	❍	❍	❍
3. Use own bags for groceries shopping.	❍	❍	❍	❍	❍	❍	❍
4. Switch off light before leaving a room.	❍	❍	❍	❍	❍	❍	❍
5. Reduce water usage.	❍	❍	❍	❍	❍	❍	❍

Please indicate whether you will perform the given behaviour sometime this weekend:

	NO, I DEFINITELY WILL NOT PERFORM 1	2	3	4	5	6	YES, I DEFINITELY WILL PERFORM 7
1. Unplug the devices that are not used.	❍	❍	❍	❍	❍	❍	❍
2. Purchase an environmentally friendly product at supermarket	❍	❍	❍	❍	❍	❍	❍
3. Use own bags for groceries shopping.	❍	❍	❍	❍	❍	❍	❍
4. Switch off light before leaving a room.	❍	❍	❍	❍	❍	❍	❍
5. Reduce water usage.	❍	❍	❍	❍	❍	❍	❍

Please indicate how likely that you actually will perform the given behaviour sometime this weekend:

	EXTREMELY UNLIKELY 1	2	3	4	5	6	EXTREMELY LIKELY 7
1. Unplug the devices that are not used.	❍	❍	❍	❍	❍	❍	❍
2. Purchase an environmentally friendly product at supermarket	❍	❍	❍	❍	❍	❍	❍
3. Use own bags for groceries shopping.	❍	❍	❍	❍	❍	❍	❍
4. Switch off light before leaving a room.	❍	❍	❍	❍	❍	❍	❍
5. Reduce water usage.	❍	❍	❍	❍	❍	❍	❍

Please indicate whether you are going to perform the given behaviour sometime this weekend

	NO, I DEFINITELY ARE NOT GOING TO PERFORM 1	2	3	4	5	6	YES, I DEFINITELY ARE GOING TO PERFORM 7
1. Unplug the devices that are not used.	❍	❍	❍	❍	❍	❍	❍
2. Purchase an environmentally friendly product at supermarket	❍	❍	❍	❍	❍	❍	❍
3. Use own bags for groceries shopping.	❍	❍	❍	❍	❍	❍	❍
4. Switch off light before leaving a room.	❍	❍	❍	❍	❍	❍	❍
5. Reduce water usage.	❍	❍	❍	❍	❍	❍	❍

Listed below are statements about the relationship between humans and the environment. For each one, please indicate whether you are STRONGLY AGREE, MILDLY AGREE, UNSURE, MILDLY DISAGREE, or STRONGLY DISAGREE with it.

NEP (New Environmental Paradigm) Items	Strongly agree	Mildly agree	Unsure	Mildly disagree	Strongly disagree
We are approaching the limit of the number of people the earth can support.	❍	❍	❍	❍	❍
Humans have the right to modify the natural environment to suit their needs.	❍	❍	❍	❍	❍
When humans interfere with nature, it often produces disastrous consequences.	❍	❍	❍	❍	❍
Human ingenuity will insure that we do NOT make the earth unlivable.	❍	❍	❍	❍	❍
Humans are severely abusing the environment.	❍	❍	❍	❍	❍
The earth has plenty of natural resources if we just learn how to develop them.	❍	❍	❍	❍	❍
Plants and animals have as much right as humans to exist.	❍	❍	❍	❍	❍
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	❍	❍	❍	❍	❍
Despite our special abilities humans are still subject to the laws of nature.	❍	❍	❍	❍	❍
The so-called ecological crisis facing humankind has been greatly exaggerated.	❍	❍	❍	❍	❍
The earth is like a spaceship with very limited room and resources.	❍	❍	❍	❍	❍
Humans were meant to rule over the rest of nature.	❍	❍	❍	❍	❍
The balance of nature is very delicate and easily upset.	❍	❍	❍	❍	❍
Humans will eventually learn enough about how nature works to be able to control it.	❍	❍	❍	❍	❍
If things continue on their present course, we will soon experience a major ecological catastrophe.	❍	❍	❍	❍	❍

Please answer the following questions about yourself:

Gender

- ❍ Male
- ❍ Female

Age

- ❍ 18 - 24
- ❍ 25 - 35
- ❍ 36 - 49
- ❍ 50 - 65
- ❍ Over 65

Monthly expenditure (in US Dollar)

- ❍ Less than $1,500
- ❍ $1,500 - $2,499
- ❍ $2,500 - $3,499
- ❍ $3,500 - $4,500
- ❍ More than $4,500

APPENDIX 3 Time 2 Questionnaire for Study 2 Essay 2

Please indicate whether you agree that you actually did perform the specified behaviour sometime last weekend (Saturday 25/06 and Sunday 26/06):

	DID PERFORM	DID NOT PERFORM
1. Unplug the devices that are not used.	❍	❍
2. Purchase an environmentally friendly product at supermarket	❍	❍
3. Use own bags for groceries shopping.	❍	❍
4. Switch off light before leaving a room.	❍	❍
5. Reduce water usage.	❍	❍

APPENDIX 4 Questionnaire for Study 3 Essay 2

EXPLANATORY STATEMENT

Dear Sir/Madam,

My name is Harryadin Mahardika and I am a PhD student from the Department of Marketing at Monash University. I am conducting a research project for my Doctoral dissertation under the supervision of Prof. Michael Ewing and Dr. Dominic Thomas.

We are seeking participant aged between 18 and 55, to participate in this project. Participation involves the completion of a questionnaire, which will take approximately 2 to 5 minutes. This research aims to investigate consumer decision making process. The result will help to enhance the prediction of consumer behaviour in regards to environmental friendly products.

It is important that your participation be voluntary. You are free to withdraw or discontinue participation at any time, and for any reason even after you give consent. Furthermore, your participation in this research project is anonymous and any answers that provided by you will only be identified by a coded number. The data collected from this study will be retained in a secure location for 5 years and will then be deleted. Only averaged results will be reported (e.g. in a journal article or scientific meeting presentation), and no information that could be used to identify an individual participant will be collected, stored or released.

If you have any queries about the project please contact me: [redacted] or telephone [redacted]

Or contact my supervisors:

Dr. Dominic Thomas: [redacted] or telephone [redacted] and Prof. Michael Ewing: [redacted] or telephone [redacted]

Should you have any complaint concerning the manner in which this research (project number CF10/0763 - 2010000363) is conducted, please do not hesitate to contact The Standing Committee on Ethics in Research Involving Humans at the following address: Human Ethics Officer Standing Committee on Ethics in Research Involving Humans (SCERH) Building 3e Room 111, Research Office Monash University VIC 3800 Tel: +61 3 9905 2052 Fax: +61 3 9905 1420 Email: scerh@adm.monash.edu.au

Thank you for your time and consideration

INTRO

Green Donation (BE questions only)

You are a select group of people, who are elected to participate in this study. Your opinion is important to design an effective marketing strategy for small retailers. There will be 3 STUDIES that need to be completed in this research.

Before proceeding to STUDY 1, we would like to ask you whether you are willing to donate 10 cents of your payment from this study to support "Free Compostable Plastic Bags Campaign" With 10 cents that you will donate, we can purchase 100 compostable plastic bags to be distributed for free in various supermarket throughout the country. Please indicate your likelihood to donate below:

STUDY 1

I expect to donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I will donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I am likely to donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I am going to donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

COGNITIVE EXERCISE (Store Layout Arrangement)

End of STUDY 1

STUDY 2

Before proceeding to STUDY 2, we need you to read the information below:

Compostable plastic bags will play an important role in promoting pro-environment lifestyle among shoppers.

Compostable plastic bags safely turn into healthy compost in just 12 weeks and it can be discarded within domestic food-waste bins. The bags ultimately turn into carbon dioxide, water, and non-toxic raw materials.

Compostable plastic bags use starch based material that allow them to breathe; without leaking. This unique benefit allows heat and moisture to evaporate, which

keeps food fresher; longer. Compostable plastic bags will not decompose until they are introduced to micro-organisms in a compost environment. However, extended heat can make the bags feel soft and may eventually cause splitting.

After reviewing above information, please indicate (again) whether you are willing to donate 10 cents of your payment from this study to support "Free Compostable Plastic Bags Campaign"

With 10 cents that you will donate, we can purchase 100 compostable plastic bags to be distributed for free in various supermarket throughout the country.

I expect to donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I will donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I am likely to donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I am going to donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

COGNITIVE EXERCISE (Store Traffic)

End of STUDY 2

STUDY 3

Before proceeding to STUDY 3, we need you to read information about BioPlastik, the company that support "Free Compostable Plastic Bags Campaign":

BioPlastik provides environmentally-friendly packaging solutions.

BioPlastik performs offer R&D to create most comprehensive range of bio based packaging materials.

BioPlastik goals is to influence change by promoting packaging made from annually renewable resources that seamlessly replace oil based packaging without adding cost or requiring people to think or act differently.

After reviewing above information, please indicate (again) whether you are willing to donate 10 cents of your payment from this study to support "Free Compostable Plastic Bags Campaign"

With 10 cents that you will donate, we can purchase 100 compostable plastic bags at discount rate from BioPlastik to be distributed for free in various supermarket throughout the country.

I expect to donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I will donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I am likely to donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I am going to donate 10 cents to the campaign

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

COGNITIVE EXERCISE (Store Checkout Plan)

End of STUDY 3

FINAL QUESTION (Actual Donation)

Before submitting this questionnaire, please indicate whether or not you are willing to donate 10 cents from your payment for this study to the "Free Compostable Plastic Bags Campaign"

- ❍ I do not want to donate -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Maybe 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ I want to donate 4

Please confirm your decision by clicking the following options. Once you click "Donate" we will deduct 10 cents from your payment, while If you click "No Thanks" we will not deduct anything.

- ❍ Donate
- ❍ No Thanks

Please answer the following questions about yourself:

Gender

- ❍ Male
- ❍ Female

Your native language: _____

Age

- ❍ 18 - 24
- ❍ 25 - 35
- ❍ 36 - 49
- ❍ 50 - 65
- ❍ Over 65

Monthly expenditure (in US Dollar)

- ❍ Less than $1,500
- ❍ $1,500 - $2,499
- ❍ $2,500 - $3,499
- ❍ $3,500 - $4,500
- ❍ More than $4,500

Monthly income (in US Dollar)

- ❍ Less than $1,500
- ❍ $1,500 - $2,499
- ❍ $2,500 - $3,499
- ❍ $3,500 - $4,500
- ❍ More than $4,500

APPENDIX 5 Questionnaire for Experiment 1 Essay 3

EXPLANATORY STATEMENT

Dear Sir/Madam,

My name is Harryadin Mahardika and I am a PhD student from the Department of Marketing at Monash University. I am conducting a research project for my Doctoral dissertation under the supervision of Prof. Michael Ewing and Dr. Dominic Thomas.

We are seeking English-speaking students, aged between 18 and 35, to participate in this project. Participation involves the completion of a questionnaire, which will take approximately 15 to 20 minutes.

My research aims to investigate how consumer decision making vary across different situations. Specifically, the research is designed to compare two drivers of behaviour: behavioural intention and behavioural expectation. The result will help to enhance the prediction of consumer behaviour in various situations.

It is important that your participation be voluntary. You are free to withdraw or discontinue participation at any time, and for any reason even after you give consent. Furthermore, your participation in this research project is anonymous and any answers that provided by you will only be identified by a coded number. The data collected from this study will be retained in a secure location for 5 years and will then be deleted. Only averaged results will be reported (e.g. in a journal article or scientific meeting presentation), and no information that could be used to identify an individual participant will be collected, stored or released.

If you have any queries about the project please contact me (Harryadin Mahardika): [redacted] or telephone [redacted]

Or contact my supervisors: Dr. Dominic Thomas: [redacted] or telephone [redacted] and Prof. Michael Ewing: [redacted] or telephone [redacted]

Q193 Should you have any complaint concerning the manner in which this research (project number CF10/0763 - 2010000363) is conducted, please do not hesitate to contact The Standing Committee on Ethics in Research Involving Humans at the following address: Human Ethics Officer Standing Committee on Ethics in Research Involving Humans (SCERH) Building 3e Room 111, Research Office Monash University VIC 3800 Tel: +61 3 9905 2052 Fax: +61 3 9905 1420 Email: scerh@adm.monash.edu.au

INTRO

You are a select group of people, who are elected to participate in the study regarding the introduction of a premium Quick Response (QR) Code reader application by a software company.

The software company seeks to explore some important factors for the users to adopt and use the application.

Your opinion is important to enhance the quality of the application.

MANIPULATION: Experience (direct x indirect)

Indirect Experience: **Please watch the introduction video about QR Code.**

- Video instruction on how to use QR Code reader.
- Video instruction on how to generate QR code.

Direct Experience: **The research assistant will provide a mobile device (pre-installed with QR Code reader) for each row.**

- Direct instruction on how to use QR Code reader

  Follow these steps:

  1. Load your QR Code reader and wait for it to get ready. When it is ready….

  2. With a steady hand, point the camera into the QR Code in the advertisement.

  3. Snap a picture of the QR Code.

  4. Bear in mind, you need to keep the whole QR Code inside the frame.

  5. The QR Code reader might take a few seconds to resolve the link for you. 6. When you finish, please pass the device to the next person. WAIT for the next instruction.

- Direct instruction on how to generate QR code

  Do you know that you can also create your own QR Code? NOW, you are given an opportunity to generate your own QR Code:
  Follow these steps:

  1. Please right click and open this link http://beqrious.com/generator in a new tab or window

  2. Generate a QR Code that contain a message text, phone number, email address or a web url (select one).

  3. Fill the desired information in the dialog box. Then, click "create code" button.

  4. You can see a new QR Code is created.

  5. To check whether the code is actually working, SCAN it with the device supplied by the research assistant. WAIT for the next instruction.

MANIPULATION: Facilitating Conditions (High x Low)

QR Code reader can be installed in your mobile device directly from the internet. However, not all devices are supported. See the following list to see if your device is supported:

List of Mobile Devices (Brand, Model)

iPhone: iPhone iPhone 3G iPhone 3GS

Motorola: KRZR K3 RAZR 2 V9 W395 RAZR V3XX V6 RAZR MAXX

Nokia: 5800 XpressMus 6110 Navigator 6120 Classic 6124 6210 Navigator 6220 Classic 6233 6280 6288 6290 6300 7610 Supernova E51 E61i E63 E65 E66 E70 E71 E90

Samsung: Player Star S7330 U900

Sony Ericsson: K800i K810i K850i S302 S500i T650i T700 T707 V630i V640i W200i W550i W580i W610i W660i W705 W715 W760i W810i W850i W880i W890i W900i W902 W910i W980 Z550i Z610iClick

Is your device on the list?

- ❍ Yes (High facilitating conditions)
- ❍ No (Low facilitating conditions)

If your device is in the list, you will be able to AUTOMATICALLY buy and install the premium QR Code reader application from the company website.

If your device is not in the list, you will still be able to buy and install the premium QR Code reader application. HOWEVER, you have to MANUALLY download, install, and setup the application.

BE and BI Questions

Based on the information about QR Code reader that has been provided to you, please answer the questions in the next pages.

The answers are in -4 to 4 scale format, where a '-4' implies you strongly disagree with the statement, a '0' means you have a neutral position towards the statement (you neither agree nor disagree), while a '4' implies you strongly agree with the statement. You may indicate to what extent you agree to the statement by clicking the appropriate number.

BE:

I expect to use QR Code reader

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I will use QR Code reader

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I am likely to use QR Code reader

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I am going to use QR Code reader

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

BI:

I intend to use QR Code reader

- Strongly Disagree -4
- -3
- -2
- -1
- Neutral 0
- 1
- 2
- 3
- Strongly Agree 4

I predict I will use QR Code reader

- Strongly Disagree -4
- -3
- -2
- -1
- Neutral 0
- 1
- 2
- 3
- Strongly Agree 4

I plan to use QR Code reader

- Strongly Disagree -4
- -3
- -2
- -1
- Neutral 0
- 1
- 2
- 3
- Strongly Agree 4

Manipulation checks

Based on the QR Code reader trial activity in the beginning of this study, please answer the following questions

The level of my experience with QR Code reader is

- ❍ Very Low -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Very High 4

The level of my familiarity with QR Code reader is

- ❍ Very Low -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Very High 4

The level of my know-how with QR Code reader is

- ❍ Very Low -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Very High 4

I have the resources necessary to use QR Code reader

- ❍ Very Low -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Very High 4

My device is compatible with QR Code reader

- ❍ Very Low -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Very High 4

A person I know is available for assistance if I have a difficulty with QR Code reader

- ❍ Very Low -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Very High 4

Please answer the following questions about yourself

Gender

- ❍ Male
- ❍ Female

Do you currently live with your parents?

- ❍ Yes
- ❍ No

Your monthly expenditure (in Australian Dollar)

- ❍ $500 and less
- ❍ $501 - $750
- ❍ $751 - $1000
- ❍ $1,001 - $1,500
- ❍ $1,501 - $2,500
- ❍ $2,501 and more

What kind of product or services do you spend MOST of your monthly income?

- ❍ Transportation
- ❍ Entertainment
- ❍ Clothing
- ❍ Groceries
- ❍ Food
- ❍ Telephone and internet
- ❍ Accomodation
- ❍ Other (specify) _____

Your monthly expenditure for telephone and internet (in Australian Dollar)

- ❍ $20 and less
- ❍ $21 - $40
- ❍ $41 - $60
- ❍ $61 - $80
- ❍ $81 - $100
- ❍ $101 and more

ACTUAL ADOPTION/USE

We would like to offer you a reward for participating in this study.

There are two types of reward: Premium QR Code reader application (value at $4) or Drink at Bubble Cup (value at $4)

You need to choose only ONE

If you decide to to get the reward (any), you need to write down your student ID, name and e-mail address in a form that will be distributed by the research assistant. Please note: Your personal detail will only be used for the purpose of getting the reward. Please select ONE:

- ❍ QR Code reader application
- ❍ Drink at Bubble Cup

Thank you for participating in this study.

We will send the instruction on how to obtain your reward to your e-mail on the 22nd of September 2010.

APPENDIX 6 Questionnaire for Experiment 2 Essay 3

EXPLANATORY STATEMENT

Dear Sir/Madam,

My name is Harryadin Mahardika and I am a PhD student from the Department of Marketing at Monash University. I am conducting a research project for my Doctoral dissertation under the supervision of Prof. Michael Ewing and Dr. Dominic Thomas.

We are seeking English-speaking participants, aged between 18 and 65, to participate in this project. Participation involves the completion of a questionnaire, which will take approximately 15 to 20 minutes.

My research aims to investigate how consumer decision-making varies across different situations. Specifically, the research is designed to compare two drivers of behaviour: behavioural intention and behavioural expectation. The result will help to enhance the prediction of consumer behaviour in various situations.

It is important that your participation be voluntary. You are free to withdraw or discontinue participation at any time, and for any reason even after you give consent. Furthermore, your participation in this research project is anonymous and any answers that provided by you will only be identified by a coded number. The data collected from this study will be retained in a secure location for 5 years and will then be deleted. Only averaged results will be reported (e.g. in a journal article or scientific meeting presentation), and no information that could be used to identify an individual participant will be collected, stored or released.

If you have any queries about the project please contact me (Harryadin Mahardika): [redacted] or telephone [redacted]

Or contact my supervisors: Dr. Dominic Thomas: [redacted] or telephone [redacted] and Prof. Michael Ewing: [redacted] or telephone [redacted]

Q193 Should you have any complaint concerning the manner in which this research (project number CF10/0763 - 2010000363) is conducted, please do not hesitate to contact The Standing Committee on Ethics in Research Involving Humans at the following address: Human Ethics Officer Standing Committee on Ethics in Research Involving Humans (SCERH) Building 3e Room 111, Research Office Monash University VIC 3800 Tel: +61 3 9905 2052 Fax: +61 3 9905 1420 Email: scerh@adm.monash.edu.au

INTRO

You are elected to participate in the study regarding the introduction of a mobile application by a software company.

The software company seeks to explore some important factors for the users to adopt and use the application.

Your opinion is important to enhance the quality of the application.

Are you familiar with the image/code below?

-2D Barcode image about here-

- ❍ Yes
- ❍ No

In your mobile device, have you installed an application that able to read the image/code above?

- ❍ Yes
- ❍ No

If Yes selected:

We understand that you have installed Quick Response (QR) Code reader in your mobile device. On the next pages, we would like to introduce a new type of 2D Barcode technology, which seems to offer more features and functionality than QR Code.

If No selected:

The image/code that we have shown to you in the previous page is 2D Barcode. It is used to take a piece of information from a transitory media and put it in to your mobile device. It can store (and digitally present) data, including url links, geo coordinates, and text.

Time 1 Measurement (before manipulation)

We would like to offer you $0.5 bonus on top of your HIT reward. You can claim the bonus if you are willing to install a 2D Barcode Reader into your mobile device. Please indicate your likelihood to take our offer and install the application in your mobile device:

(Only BI items show):

I intend to adopt 2D barcode reader on my mobile device

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I predict I will adopt 2D barcode reader on my mobile device

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I plan to adopt 2D barcode reader on my mobile device

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

Thank you, we have recorded your response. In the next few pages, we will provide you with additional information that may be useful before making a final decision whether you would like to take our offer or not.

Time 2 (MANIPULATION)

EXPERIENCE

Low Experience: **How 2D Barcode Works? Please observe two images below that illustrate how 2D Barcode works:**

- Image on how 2D barcode works.
- Image on how to use 2D barcode reader.
- Image on how to generate 2D barcode.

High Experience: **Direct trial with 2D barcode reader and generator.**

FACILITATING CONDITIONS

Compatibility with your mobile device? Since the application will not support ALL mobile device available in the market, we need to check the compatibility of the app with your mobile device first.

Please input your current mobile phone (if you have more than one then the one you use most often) brand and model to check its compatibility with the application:
*Brand first, followed by model (examples: iPhone 4, Samsung Galaxy S2)

High facilitating conditions:

CONGRATULATIONS! Your mobile device is compatible with the application. You will be able download and install the application on your device.

Low facilitating conditions:

UNFORTUNATELY, currently your mobile device is not compatible with the application. You may have to consult with your mobile phone manufacturer to (manually) install the application.

Time 2 Measurement (after manipulation)

Based on the information given in the previous pages, we (once again) would like to offer $0.5 bonus on top of your HIT reward if you are willing to adopt 2D Barcode Reader. Please indicate your likelihood to take our offer and install the application in your mobile device:

(Only BI items shown)

I intend to adopt 2D barcode reader on my mobile device

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I will adopt 2D barcode reader on my mobile device

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

I plan to adopt 2D barcode reader on my mobile device

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

Time 3 Measurement (Actual Adoption)

This is the last section of the study. We will make a FINAL confirmation about your decision to adopt or not to adopt the application.

If you elect to take the offer, you will be given instruction on how to install the application in your mobile device.

- ❍ Strongly Disagree -4
- ❍ -3
- ❍ -2
- ❍ -1
- ❍ Neutral 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ Strongly Agree 4

Final confirmation.If you click "Yes, Adopt" you will be guided to claim your $0.5 bonus.

- ❍ Yes, Adopt
- ❍ No Thanks

If Yes selected:

Thank you for your confirmation. In order to claim your bonus, you will need to follow the steps below to install the application:

To install 2D Barcode Reader in your device, please follow these steps:

1. Make sure you have an internet connection on your mobile device.

2. Point you mobile device internet browser to http://www.i-nigma.mobi/

3. I-nigma will automatically identify your handset type. Then, download and install i-nigma.

Time 4 Measurement (actual use)

After the application is successfully installed, use it to scan the following 2D barcode:

Copy and paste the unique NUMBERS inside the code into the form below AND into your HIT page at MTurk.

_____

Please indicate how you connect to internet on your mobile device.

- ❍ WiFi
- ❍ Free Data Plan
- ❍ Paid Data Plan
- ❍ No Internet
- ❍ Other

Please answer the following questions about yourself:

Gender

- ❍ Male
- ❍ Female

Your native language: _____

Age

- ❍ 18 - 24
- ❍ 25 - 35
- ❍ 36 - 49
- ❍ 50 - 65
- ❍ Over 65

Monthly expenditure (in US Dollar)

- ❍ Less than $1,500
- ❍ $1,500 - $2,499
- ❍ $2,500 - $3,499
- ❍ $3,500 - $4,500
- ❍ More than $4,500

Monthly income (in US Dollar)

- ❍ Less than $1,500
- ❍ $1,500 - $2,499
- ❍ $2,500 - $3,499
- ❍ $3,500 - $4,500
- ❍ More than $4,500