

UNDERSTANDING PRODUCT ATTACHMENT AND EXPECTED PRODUCT LIFETIME  
BY EXTENDING TECHNOLOGY ACCEPTANCE MODEL (TAM) WITH PRODUCT  
PERSONALIZATION AND INNOVATION DIFFUSION THEORY (IDT)

By

Younghwa Yun

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## ABSTRACT

### UNDERSTANDING PRODUCT ATTACHMENT AND EXPECTED PRODUCT LIFETIME BY EXTENDING TECHNOLOGY ACCEPTANCE MODEL (TAM) WITH PRODUCT PERSONALIZATION AND INNOVATION DIFFUSION THEORY (IDT)

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Identifying and understanding consumers is fundamental, especially for quickly spreading new products. In recent years, the popularity of digital gadgets has sky rocketed; however, there has also been a growing tendency of relative obsolescence — replacement of a product regardless of the demise of its perfect functioning. Therefore, a question is raised concerning how the Product Attachment between a user and product can be formed and how this relationship can influence the Expected Product Lifetime, particularly in earlier adopters. Innovation of Diffusion Theory (IDT) is employed to categorized adopters. Among five adopter groups— innovators, early adopters, early majority, late majority, and laggards— the first two groups are a key to accelerating diffusion and spreading into the mainstream market.

This dissertation seeks to expand our understanding of consumer behavior in the relationship between Product Attachment and Expected Product Lifetime and also the role of Product Personalization in shaping Product Attachment using Technology Acceptance Theory (TAM). These factors were examined as they relate to media tablet ownership, which reached 34% penetration in May of 2013 (Zickuhr, 2013). According to Innovation Diffusion Theory (IDT), this includes three categories of adoption: innovators, early adopters, and the first half of early majority adopters. An online survey of tablet users (N=212) was conducted and also group comparisons between Early Adopter (innovator and early adopter, n=81) and Early Majority 2

(n=131) were investigated to define difference in early IDT categories. Further, an association between Product Attachment and Expected Product Lifetime was explored.

Findings indicate that earlier adopters feel more Product Attachment when a product is more useful and enjoyable; however, ease of use is not significant factor. The causal direction from Product Attachment to Product Personalization yields a bigger bigger explanatory power than does the opposite direction —Product Personalization to Product Attachment—with significance on both directions. In group comparison, Perceived Ease of Use is found as a key player. Early Adopter shows a significant negative impact on Product Attachment when a product is found to be exceedingly easy to use; whereas, Early Majority presents no significance. Another negative association is found between Product Attachment and Expected Product Lifetime in both groups.

This study contributes to the limited literature on Product Attachment by expanding TAM on how Product Attachment can be formed while considering Product Personalization and how Product Attachment predicts Expected Product Lifetime. In addition, this study also helps clarify the characteristic of high-tech product earlier adopters. Additional research is recommended to better and clear understanding on the different characteristics in each adopter group by including all adopter categories concerning Product Personalization.

A special thanks to all my family and friends for their love and support

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## CHAPTER 1

### INTRODUCTION

Product Attachment is a postpurchase behavior involving development of an emotion-laden bond between a person and a product. It can explain how people expand emotional attachment to their products through a process of meaning transfer and identity formation (Zimmerman, 2009). Earlier studies on emotional attachment can be ascribed as a derivation from psychological studies on the parent and child relationship (F. A. White, Hayes, & Livesey, 2005). It originates from attachment theory, which explains that one's early experience with at least one primary caregiver significantly influences his/her social and emotional development throughout life (Bowlby, 1969, 1973, 1980).

When there is an attachment between an individual and a specific product, that individual can endow special meanings in it, and then the product becomes unique. Therefore, people may want to keep the product if the attachment remains strong. Consequently, the person may be less likely to replace the product even when it no longer functions perfectly (Govers, 2004; Schifferstein, Mugge, & Hekkert, 2004).

Recently, there is a growing tendency to replace a product regardless of the demise of its perfect functioning (also known as "relative obsolescence"). Relative obsolescence refers to discard by the consumer based on evaluations of the product in comparison with new products, whereas absolute obsolescence refers to the physical wear down of the product (Granberg, 1997). Relative obsolescence can be further categorized by psychological, economic, and technological factors that determine product lifetime (Cooper, 2004). In the consumer's evaluation process,

Product Attachment can play a role to determine Expected Product Lifetime from the psychological considerations.

In addition, new personal tech-products which may be used 24/7 leads owners to feel more attachment with them than with other products and accessory purchase for these products has been encouraged to consolidate that intimacy. Big growth and expansion of the aftermarket accessory industry for personal tech- products is a notable response to the demand for Product Personalization.

High-tech companies benefit from frequent replacement of high-tech products with newest model and thus they benefit from encouraging consumers' perception of relative obsolesces. On the other hand, Product Personalization and Product Attachment relate to a reluctance to replace the product. These new consumer behaviors regarding high-tech Product Personalization may alter traditional models of technology acceptance, yet they have been largely ignored by academic research.

Therefore, this dissertation seeks to expand our understanding of consumer behavior in the relationship between Product Attachment and Expected Product Lifetime and also the role of Product Personalization in shaping Product Attachment. These factors are examined as they relate to media tablet ownership, which reached 34% penetration in May of 2013 (Zickuhr, 2013). According to Innovation Diffusion Theory (IDT), this includes three categories of adoption: innovators, early adopters, and the first half of early majority adopters.

## **Dissertation Structure and Goals**

The dissertation examined how Product Personalization affects Product Attachment, and whether such personalization contributed to increase Expected Product Lifetime. Today, a high-tech product can easily become obsolete even before the demise of its proper functioning capability. Previous studies have found that Product Attachment helped to postpone product replacement, and thus consequently expanded the product lifespan. On the other hand, innovators and early adopters value innovation may be more likely to want to own the latest model. Very limited research has addressed the effect of Product Personalization, especially for personal digital products, where personalization can be different than for other consumer products.

This dissertation had two objectives. First, using the theoretical framework of the extended Technology Acceptance Model (TAM) along with Perceived Enjoyment (PE), the study tests which attributes could affect Product Attachment (PA) in tablet use. Second, the association between Product Personalization (PP) and Product Attachment (PA) is investigated. Third, the Product Attachment - Expected Product Lifetime relationship is also tested. Finally, this study addresses adopter categories adapted from Innovation Diffusion Theory (IDT) can affect to Product Attachment and Expected Product Lifetime. The tablet was chosen as a domain of this study because of the huge expansion of the accessory market and the stage of adoption for that technology.

The dissertation was structured as follows. First, previous studies are reviewed to determine how to propose a new model applicable to the relationship between Product Attachment and Expected Product Lifetime by extended TAM with Product Personalization.

Next, the research questions and hypotheses are presented. Then, the methodology use to collect data is discussed, and analysis is offered accordingly. Finally, the paper concludes with a discussion of the result, including their theoretical and the practical implications.

### **Tablet Ownership Market Trends and User Profiles**

In recent years, the popularity of digital gadgets has sky rocketed, especially among young people who have grown up with personal computers, the Internet, mobile phones, video games, iPods, and digital cameras near at hand. The rapid proliferation of such personal digital products has greatly contributed to changes in our daily lives in many ways. Not too long ago, people relied solely on desktop computers and laptops to access media content or connect with others; today, on-the-go Internet consumption has grown remarkably with the increased presence of smartphones, media tablets, and other similar mobile connected devices.

Media tablets (hereinafter referred as a tablet) have shown a similar trend as mobile phone adoption but with a much faster adoption rate. Tablet is the fastest spreading product and substantially changed the way of consuming digital content in this decade and the current penetration reached 34% in May 2013 (Zickuhr, 2013). In that regard, tablet was chosen as a subject of this study particularly to examine earlier adopters' behaviors. A tablet is a wireless, portable personal computer usually with a touchscreen (sized between smart phones and laptops) or a pen-enabled interface and excluding e-book readers. Along with smartphones, tablets were currently the most preferred mobile media device (Fidler, June 4, 2012).

Research from Business Insider Intelligence indicated that U.S. smartphone penetration in 2013 stood at 58% of mobile phone owners age 13 and above, up from 54% at the end of 2012 (Cocotas, May 15, 2013). After smartphone penetration surpassed 50%, the speed of further

adoption slowed slightly. Innovation Diffusion Theory (IDT) clarified that these “late majority” consumers tended to be resistant toward adopting new technology and are more price sensitive than the average consumer (comScore, 2013).

According to the 2013 RJI Mobile Media News Consumption Survey, nearly 80% of U.S. adults used at least one Internet-enabled mobile media device during the first quarter of 2013. This use represented a 13% increase from two-thirds who did (67%) in the survey conducted the previous year (Fidler, April 25, 2013). More than half (56.6%) of those surveyed owned a smartphone, one third (32.4%) had media tablets, and another 7.8% possess e-readers (Fidler, April 25, 2013). Indeed, in every age group, the number of mobile media users has increased, and older groups 45-54 in age and older than 65 showed the most dramatic increase (Fidler, April 25, 2013).

In general, the characteristics of tablets and their demographic profile paralleled that of smart phone. However, tablets have disrupted the markets and outperformed sales predictions from the beginning. Tablet ownership grew twice as fast as smartphone adoption did in the first eight months of 2012 (Ballvé, 2012). According to the Consumer Electronics Association, tablet ownership reached a record high in the first quarter of 2013 (Clabaugh, April 30, 2013). A trade group study indicated that 40% of online U.S. adults owned a tablet, up from 38%, at the end of the fourth quarter 2012 and the Consumer Electronics Association predicted that nearly half of U.S. households would own a tablet in the next 12 to 18 months (Clabaugh, April 30, 2013).

In its early days, Apple’s iPad led with the fastest-growing tablet market penetration of that product until 2011, dominating the market with a 72% rate of adoption. However, the competition was quite balanced as follows: Apple (52%), Android (47%), and Others (14%)

(Online Publishers Association, 2012). The Kindle Fire was by far the most popular “Android” tablet, with a 28% of market share among Android tablets, followed by Samsung Galaxy (13%) (Online Publishers Association, 2012). In the first quarter of 2013, Amazon took second place (24%) after Apple (43%) (comScore, 2013).

The tablet has demonstrated tremendous growth and an adoption curve that is faster than any other mobile device in history (Morgan Stanley, 2011). The Online Publishers Association (OPA) released a report showed that tablet users are becoming older, and the gender gap for tablet use is disappearing (Online Publishers Association, 2012). Tablet users also skewed toward more affluent households and individuals with higher education (Rainie, 2012).

## CHAPTER 2

### THEORETICAL FRAMEWORK AND HYPOTHESES

#### **Technology Acceptance Model (TAM)**

Information Systems (IS) researchers have expended great effort to build and examine theories to explain the determinants of information technology (IT) acceptance (Agarwal & Prasad, 1998). Various models have been used to explore and verify the determinants of the adoption of advanced technology. The research on individual-level Information Technology (IT) adoption is already mature and has provided rich theories and explanations of the precise determinants of both adoption and use decisions (Venkatesh, Morris, Davis, & Davis, 2003).

The Technology Acceptance Model (TAM) was developed by Davis and Bagozzi (Bagozzi, Davis, & Warshaw, 1992; Davis, 1989) to explain computer usage behavior, while its theoretical basis was Fishbein and Ajzen's Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975). The goal of TAM is "to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (Davis, Bagozzi, & Warshaw, 1989, p. 985).

Among a number of offered theories, TAM has emerged as one of the most widely accepted and the most influential model to explain the high prediction of IT adoption and usage (Davis, 1989; Davis et al., 1989; Robey, 1996). Yousafzai, Foxall and Pallister (2010) indicated the strengths and the effectiveness of TAM in predicting consumer adoption of new technology over other theories, for example, the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) and their derivatives. TAM has been tested in considerable empirical

research and proven to be one of quality and yielded statistically reliable results (Legris, Ingham, & Colletette, 2003). TAM has thus qualified as a remarkable accomplishment, even reaching the higher status of a paradigm (Bagozzi, 2007).

The original TAM model suggested that a person's behavioral intention was determined primarily by two influential and theoretical constructs—Perceived usefulness (PU) and Perceived ease of use (PEOU) —which were both theorized to be fundamental determinants of system use, in contrast to the TRA and the TPB, which used situation-specific beliefs (Yousafzai, Foxall, & Pallister, 2010). Moreover, these specific constructs had important implications for quality measurement from the viewpoint of individual users. Mathieson (1991) indicated that TAM had better predicted intention and better explanatory power due to its being able to incorporate specific beliefs.

Since TAM was introduced, solid empirical support appeared that favored TAM through validations, applications, and replications throughout the diverse range of information technology-related studies (Adams, Nelson, & Todd, 1992; Agarwal & Karahanna, 2000; Karahanna, Agarwal, & Angst, 2006; Venkatesh, Davis, & Morris, 2007; Venkatesh et al., 2003). Numerous empirical studies have also found that approximately 40% of the variance in individual intention to use an IT and actual usage can be explained by TAM (Venkatesh & Bala, 2008; Venkatesh & Davis, 2000).

TAM has been widely applied and proven its prediction power for IT use understanding such as web site use (Moon & Kim, 2001; Teo, Lim, & Lai, 1999); online shopping (Barkhi & Wallace, 2007; Chen, Gillenson, & Sherrell, 2002; Childers, Carr, Peck, & Carson, 2002; Koufaris, 2002; Vijayasarathy, 2004); mobile devices (Cheong & Park, 2005; Liao, Tsou, &



Huang, 2007; Wang, Lin, & Luarn, 2006); mobile chats (Nysveen, Pedersen, & Thorbjørnsen, 2005); mobile multimedia use (Sung & Yun, 2010); and television commerce (Yu, Ha, Choi, & Rho, 2005).

Over the last two decades, the initial TAM framework has been expanded to TAM2 (Venkatesh & Davis, 2000), TAM3 (Venkatesh & Bala, 2008), and UTAUT (Unified Theory of Acceptance and Use of Technology) (Venkatesh et al., 2003) to deliver more effective prediction of technology acceptance. While TAM2 added the multiple variables of social influence and cognitive instrumental determinants as antecedents to PU on the organization level, TAM3 showed a comprehensive model of determinants for PU and PEOU on the individual-level of IT adoption and use. Further, TAM3 first introduced two intrinsic determinants— computer playfulness and Perceived Enjoyment—thus influencing PEOU (Venkatesh & Bala, 2008).

Pervious TAM-related studies focused on three areas. First, certain studies replicated TAM and evaluated the psychometric properties of ease of use and usefulness scales (Adams et al., 1992; Hendrickson, Massey, & Cronan, 1993; Segars & Grover, 1993). Second, some studies indicated the relative importance of TAM constructs by examining key variables across the theories during the adoption process (Karahanna, Straub, & Chervany, 1999). Finally, other studies extended TAM by adding additional constructs to the theory to provide better explanatory power in the/each/a given context (Karahanna & Straub, 1999; Koufaris, 2002; Venkatesh, 2000; Venkatesh & Davis, 2000).

Two theoretical constructs derived from TAM—PU and PEOU—have clearly been accepted as fundamental salient belief in IT adoption and usage. Researchers found that TAM could be applicable in the pre-adoption stage as well as in the repurchase stage, while PU and

PEOU had significant effects on adoption in both stages (Bhattacharjee, 2001; Thong, Hong, & Tam, 2006). In order to increase its predictive power in the various domains, researchers have examine new variables that incorporate prior factors that could influence PU and PEOU (King & He, 2006), for example, emotional factors (Saadé & Kira, 2006), and perceived playfulness (Moon & Kim, 2001).

Despite researchers having investigated and agreed that PU and PEOU are valid constructs for predicting an individual acceptance of various IT adoptions from workplaces, certain specific contexts may need additional variables beyond these two existing constructs. One factor that makes TAM incomplete is the absence of any accounting for intrinsic motivation in the theory. Applying resonating numerous studies to point out this weakness, this paper adopts three constructs: Perceived Usefulness (PU), Perceived Ease of Use (PEOU) from original TAM, and Perceived Enjoyment (PE) as an intrinsic variable from extended TAM.

#### Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)

PU and PEOU are the two most important determinants in technology adoption and Information System usage, and used in the original TAM. The number of studies presented PU and PEOU as a significant predictor on Attitude (A) or Intention to use (IU), or actual use (U) in various domains. In general, PU showed a bigger explanatory power than PEOU. Table 1 summarizes past research incorporating these two original TAM variables.

Table 1: Summary of past studies incorporating original TAM variable; Perceived Usefulness (PU) & Perceived Ease of Use (PEOU)

Article	Domain	Major IVs from TAM	DV	Statistical Method	Important Findings (coefficient)
Adams et al. (1992)	<u>Study 1</u> Electronic and Voice Mail  <u>Study 2</u> WordPerfect, Lotus 1-2-3, and Harvard Graphics	PU, PEOU	Usage (U)	LISREL	<u>Study 1 (e-mail)</u> PU → U (.36) PEOU → U (.05) <u>Study 1 (V-mail)</u> PU → U (.31) PEOU → U (.13) <u>Study 2 (Word)</u> PU → U (-.03) PEOU → U (.21) <u>Study 2 (Lotus)</u> PU → U (.85) PEOU → U (-.39) <u>Study 2 (Graphics)</u> PU → U (.07) PEOU → U (.49)
Taylor & Todd (1995)	Computer Resource Center	PU, PEOU	Attitude (A)	LISREL	PU → A (.79) PEOU → A (.24)
Karahanna & Straub (1999)	E-mail system	PU, PEOU	Use (U)	LISREL	PEOU → PU (.24) PU → Use (.45)
Venkatesh & Davis (2000)	Systems in organizations	PU, PEOU	Intention to use (IU)	Not mentioned	PU → IU (.55) PEOU → IU (.17) PEOU → PU (.30)
Gefen & Straub (2000)	Book selling website	PU, PEOU	PU	Not mentioned	PEOU → PU (.62)
Chen et al. (2002)	Virtual store	PU, PEOU	Attitude (A)	SEM	PU → A (.30) PEOU → A (.32)
O'cass & Fenech (2003)	Web retailing	PU, PEOU	Attitude (A)	PLS	PU → A (.48) PEOU → A (.19)
Chen & Tan (2004)	Virtual Store	PU, PEOU	Attitude (A)	SEM	PU → A (.29) PEOU → A (.18)

Table 1 (cont'd)

Vijayasarathy (2004)	Online shopping	PU, PEOU	Attitude (A)	Regression	Model1 (only PU & PEOU) PU → A (.57) PEOU → A (.24)
Guriting & Ndubisi (2006)	Online banking	PU, PEOU	Behavioral Intention (BI)	Regression	PU → BI (.51) PEOU → BI (.38)
McKechnie, Winklhofer, & Ennew (2006)	Internet use for financial services	PU, PEOU	Attitude - positive (P) - insecurity (I)	LISREL	PU → P (.33) PEOU → P (.12) PU → I (-.19) PEOU → I (-.18) PEOU → PU (.60)
Choi (2010)	Mobile TV	PU, PEOU	Intention to use (IU)	LISREL	PU → IU (.57) PEOU → IU (.13)

\* Perceived ease of use (PEOU), Perceived usefulness (PU)

\* Method: Partial Least Squares (PLS), Structural equation modeling (SEM), Ordinary Least-Squares (OLS)

### Perceived Usefulness (PU)

PU is defined as the degree to which a person believes a certain technology will help him or her perform a particular task (Davis et al., 1989). It has long been proven and widely agreed that PU is the most prominent factor utilized by innovators to justify the adoption of new products (Chtourou, 2010). Especially in a workplace setting, PU has been the primary initiator of most technology adoption (Bruner II & Kumar, 2005). PU is a straightforward theoretical construct in TAM because it directly refers to job performance. Since TAM originated from studies in organizational settings and also was easy to use to make decisions based on user-performance and performance-outcome expectancies (Davis, 1985). Davis (1985) examined

related studies to define the measurement for PU referring to “relevance to job” or “importance” due to conceptual similarity.

Davis (1985) compared similar constructs from related three study fields; Management Information Systems (MIS), the Human Factor (HF) and other related study fields including: operator productivity (Barber & Lucas, 1983), sales performance (Fudge & Lodish, 1977), Perceived accuracy and relevancy (Fuerst & Cheney, 1982), information systems use and performance (Lucas, 1975), use of medical research information systems (Lucas, 1978), relevancy, perceived utility and job effect (Bailey & Pearson, 1983), and perceived importance and perceived usability (Larcker & Lessig, 1980).

There was little research on how Perceived Usefulness was developed, whereas much research has been done on why PU and PEOU led to system use (Karahanna & Straub, 1999). Especially in utilitarian systems, the adoption decision would more likely be guided by the expectation of potential benefits/harms to job performance (Sun & Zhang, 2006a). To clarify the antecedents or psychological origin of PU, Karahanna and Straub (1999) conducted a study using an e-mail system and found that PU was affected by perceptions of the social presence of the medium as well as by the social influence brought about by one's supervisor, but no impact occurred from the availability of training and support.

Larcker and Lessig (1980) revealed two common aspects from the prior research. The first dimension was labeled as perceived importance because PU relates to whether the given attributes were relevant, informative, meaningful, important, helpful, or significant. The second dimension was related to unambiguity, clearness, or readability and was labeled perceived usability. These two dimensions provided a logical relationship to PU, and perceived

usableness could be easily transformed and tended to increase Perceived Usefulness (Larcker & Lessig, 1980).

PU has been proven to have a significant impact on attitudes toward adoption in various studies, such as those on online retailers (Chen et al., 2002; Chen & Tan, 2004; Kim & Forsythe, 2007; Koufaris, 2002; Lee, Fiore, & Kim, 2006; O'cass & Fenech, 2003; Vijayasarathy, 2004), mobile data services (Pousttchi & Goeke, 2011), intention to use mobile TV (Choi, 2010), e-learning (Lee, 2010), SNS adoption (Leng, Lada, Muhammad, Ibrahim, & Amboala, 2011), online mass customization (Lee & Chang, 2011), and mobile multimedia services (Sung & Yun, 2010). Based on Davis's (1993) arguments regarding research on job-related productivity, performance, and effectiveness, PU showed a direct effect on intention to use over its influence via attitudes (Taylor & Todd, 1995). Due to its theoretical and practical clarity, there has been little argument over the weaknesses or different understandings regarding the PU construct.

#### Perceived Ease of Use (PEOU)

PEOU is defined as the degree to which prospective users expect a new technology to be free of effort (Davis et al., 1989). There have been theoretical and empirical support indicating that PEOU is a core determinant in Information System (IS) use (Adams et al., 1992; Guriting & Ndubisi, 2006; McKechnie, Winklhofer, & Ennew, 2006; Ndubisi, Gupta, & Massoud, 2003). Simply speaking, PEOU refers to how difficult users think using the technology or system will be (Davis, 1986, 1989; Davis et al., 1989). What makes PEOU a key variable in TAM is that the construct of PEOU has been associated with both a behavior and PU in the original TAM model (Davis, 1989).

PEOU has been confirmed to be immediately related to PU and help the productive use of system for its users (Davis et al., 1989; Mathieson, 1991). Namely, individuals can finish more tasks within the same amount of time if they feel that the system is easy to use. While PU has been more valued in utilitarian systems, PEOU has been viewed as a critical variable in both utilitarian and hedonic systems (Van der Heijden, 2004). In addition, Venkatesh (2000) argues that PEOU was not a simple single construct. He indicated that an individual's formation of PEOU to a computer system might be based on a couple of different elements such as computer self-efficacy, computer anxiety, computer playfulness, and perceptions of external control (Venkatesh & Davis, 2000).

The results for the significance of PEOU in previous studies have also been inconsistent (Bruner & Kumar, 2005). This inconsistency was mainly caused by individual differences in the understandings of information or a system as well as the learning curve. For instance, Pric (2006) showed that the learning curve in using mobile devices was relatively short due to repeated, frequent use in daily life. Accordingly, some other studies found that PEOU showed only an indirect effect on the behavior, but a moderate effect via Perceived Usefulness (Bruner & Kumar, 2005; Niklas & Strohmeier, 2011).

Venkatesh and Davis (2000) clarified this PEOU inconsistency across studies applying three reasons; 1) a minimal effect on the behavioral intention (Bagozzi, Davis, & Warshaw, 1987; Karahanna & Straub, 1999; Venkatesh & Davis, 2000); 2) various levels of influence by user's degree of experience with the technology (Karahanna & Straub, 1999; Venkatesh & Davis, 1996); and 3) the influence on behavioral intention when PEOU was mediated by PU (Gefen & Straub, 2000; Venkatesh & Davis, 1996, 2000).

PEOU is a dynamic construct playing various roles in TAM. Table 1 also indicates that PEOU shows not only a direct effect on Attitude (A) or Intention to use (IU) but also indirect effect on A or IU via PU. Some studies argue that the research has not tested how PEOU affects PU in the consumer domain because consumers tend to perceive that a system is useful when they believe that system is easier to use (Childers et al., 2002; Dabholkar & Bagozzi, 2002). Some studies also presented that PEOU influenced Perceived Enjoyment (PE) in various domains, shown in Table 2 (Anandarajan, Igbaria, & Anakwe, 2000; Ha, Yoon, & Choi, 2007; Lee, Cheung, & Chen, 2005, 2007; Niklas & Strohmeier, 2011; Sun & Zhang, 2006a; Tseng & Lo, 2011; Van der Heijden, 2003).

#### Perceived Enjoyment (PE)

While TAM has been largely and widely accepted as a robust and parsimonious model, the simplicity of having a model with only two variables has been the most frequently criticized (Bagozzi, 2007). Therefore, numerous studies have applied TAM to different contexts and adopted other probable constructs and/or variables from related models, and other studies have examined new antecedents or other determinants to strengthen the original TAM (Venkatesh & Bala, 2008; Wixom & Todd, 2005).

Among the criticisms of TAM, one of the most widely agreed upon is the failure to consider intrinsic motivations. TAM originated in the workplace context, and therefore, extrinsic motivation—the performance of an activity— was a primary consideration because extrinsic motivation led directly to instrumental rewards (Zhang, Zhao, & Tan, 2008). To the contrary, intrinsic motivation refers to “the performance of an activity for no apparent



reinforcement other than the process of performing the activity per se” (Davis, Bagozzi, & Warshaw, 1992, p. 1112).

To more clearly address the role of intrinsic motivation in TAM, Davis, Bagozzi and Warshaw (1992) introduced the concept of Perceived Enjoyment (PE) to explain computer usage in the workplace and found that Perceived Enjoyment had a small, but significant effect in the workplace environment. As a role of intrinsic motivation, In contrast to Perceived Usefulness (PU), of Perceived Enjoyment is defined as “the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated” (Davis et al., 1992, p. 1113).

The intrinsic motivation factor has provided a better explanation of IT adoption than applying only extrinsic motivations (Zhang et al., 2008). David and his research colleagues (1992) found that an individual’s intention to use a system in a workplace was determined by both extrinsic and intrinsic motivations. While extrinsic motivations are related to utilitarian outcomes, such as Perceived Usefulness, intrinsic motivations are more closely connected to hedonic outcomes (Lin & Bhattacharjee, 2010). Further, van der Heijden (2003) empirically investigated this extension of the TAM using an intrinsic variable and indicated that PE showed a significant effect on attitude toward use on a portal website. A number of studies have found a strong association between PE and Attitude (A) or Intention to Use (IU). Table 2 shows previous research adding PE or an equivalent intrinsic variable to the extended TAM.

Table 2: Summary of previous studies adding Perceived Enjoyment (PE) (or an equivalent intrinsic variable)

Article	Domain	Major IVs from extended TAM	DV	Statistical Method	Important Findings (coefficient)
Davis (1985)	Business graphics system	PU, PEOU, Expected Enjoyment (EE)	Attitude (A)	Regression	PEOU → PU (.15) PU → EE (.62) EE → A (.15) PU → Act (.84)
Teo et al. (1999)	Internet Usage	PU, PEOU, PE	Usage (U)	Multiple OLS Regression	<u>Daily Usage</u> PU → U (.16) PEOU → U (.12) PE → U (.09)
Anandarajan, Igbaria & Anakwe (2000)	Microcomputer usage	PU, PEOU, PE	Usage (U)	PLS	PU → U ( <i>n.s</i> ) PEOU → U (.29) PE → U ( <i>n.s</i> ) PEOU → PU (.62) PEOU → PE (.05)
Venkatesh (2000)	Interactive online help desk system	PU, PEOU	Behavioral Intention (BI)	PLS	<u>Study T3 (3 months use)</u> PU → BI (.54) PEOU → BI (.17) PE → PEOU (.24) PEOU → PU (.30)
Childers et al. (2002)	Online retail shopping	PU, PEOU, PE	Attitude (A)	LISREL	PU → A (.47) PEOU → A (.18) PE → A (.30)
Dabholkar & Bagozzi (2002)	Technology-based self-service	PEOU, Performance (P), Fun (F)	Attitude (A)	SEM	PEOU → A (.36) P → A (.12) F → A (.52)
Yi & Hwang (2003)	Web-based information systems	PU, PEOU	Behavioral Intention (BI)	PLS	PU → BI (.46) PEOU → BI (.22) PEOU → PU (.02) PE → PEOU (.41)
Van der Heijden (2003)	Portal website	PU, PEOU, PE	Attitude	Regression	PU → A (.17) PEOU → A (.23) PE → A (.23) PEOU → PU (.49) PEOU → PE (.31)

Table 2 (cont'd)

Van der Heijden (2004)	Hedonic systems	PU, PEOU, PE	Intention to use (IU)	SEM	PU → IU (.15) PEOU → IU (.32) PE → IU (.25) PEOU → PU (.48) PEOU → PE (.59)
Bruner & Kumar (2005)	handheld Internet devices (lab simulation)	PU, PEOU, Fun	Attitude (A)	SEM	PEOU → PU (.73) PU → Fun (.69) Fun → A (.31)
Lee, Cheung, & Chen (2005)	Internet-based learning medium	PU, PEOU, PE	Attitude (A)	SEM	PU → A (.39) PEOU → A (.07) PE → A (.53) PEOU → PU (.51) PEOU → PE (.52)
Li, Chau, & Lou (2005)	instant messaging	PU, PE	Behavioral Intention (BI)	LISREL	PU → BI (.35) PE → BI (.35) PE → PU (.53)
Nysveen et al. (2005)	Mobile chat	PU, PEOU, PE	Attitude (A)	SEM	<u>Male</u> PU → A (.46) PEOU → A (.01) PE → A (.45) PEOU → PU (.43) <u>Female</u> PU → A (.42) PEOU → A (.16) PE → A (.32) PEOU → PU (.48)
Lee, Fiore, & Kim (2006)	Online retailing website	PU, PEOU, PE	Attitude (A)	LISREL	PU → A (.23) PEOU → A (.15) PE → A (.54)

Table 2 (cont'd)

Sun & Zhang (2006a)	<u>Study1</u> employees' use of search engines  <u>Study 2</u> students' use of university website	PU, PEOU, PE	Behavioral Intention (BI)	PLS	<u>Study1</u> PEOU → PU (.29) PEOU → PE (.73) PE → PEOU (.73) PU → BI (.62) PEOU → BI (.30) PE → BI (-.13)  <u>Study2</u> PEOU → PU (.37) PEOU → PE (.37) PE → PEOU (.37) PU → BI (.53) PEOU → BI (.09) PE → BI (-.09)
Ha, Yoon, & Choi (2007)	Mobile games	PU, PEOU, PE	Attitude (A)	SEM	PU → A ( <i>n.s</i> ) PEOU → A (.23) PE → A (.46) PEOU → PU (.40) PEOU → PE (.79)
Kim & Forsythe (2007)	<u>Study1</u> 3D and Virtual Try-on  <u>Study2</u> 3D rotation view	PU, Perceived Entertainment (PE)	Attitude (A)	SEM	<u>Study1</u> PU → A (.34) PE → A (.48) <u>Study2</u> PU → A (.40) PE → A (.44)
Lee, Cheung, & Chen (2007)	Multimedia Messaging Services (MMS)	PU, PEOU, PE	Behavioral Intention (BI)	PLS	PU → BI (.36) PEOU → BI (.42) PE → BI (.14) PEOU → PU (.48) PEOU → PE (.47)
Hong, Thong, Moon, & Tam (2008)	Mobile data services	PU, PEOU, PE	Attitude (A)	PLS	PU → A (.23) PEOU → A (.34) PE → A (.22)
Chtourou (2010)	mobile devices	PU, PEOU, Fun	Action (Act)	SEM	<u>Model 1</u> PEOU → PU (.44) PU → Act(.40) <u>Model 2</u> PU → Fun(.90) Fun → Act (.31) PU → Act ( <i>n.s</i> )

Table 2 (cont'd)

Rouibah & Abbas (2010)	camera mobile phones	PU, PEOU, PE	Social Usage (SU)	Regression	PU → SU (.10) PEOU → SU (.04) PE → SU (.14) PEOU → PU (.80) PEOU → PE (.11)
Sung & Yun (2010)	mobile multimedia service	PU, PEOU, PE	Intention to use (IU)	LISREL	PU → IU (.45) PEOU → IU (.34) PE → IU (.20) PEOU → PU ( <i>n.s</i> ) PE → PEOU (.33)
Brahmana & Brahmana (2011)	e-recruitments	PU, PEOU, PE	Intention to use (IU)	Regression	PU → IU (.31) PEOU → IU (.16) PE → IU (.20) PE → PU (.32)
Lee & Chang (2011)	Online Mass Customization	PU, PEOU, PE	Attitude (A)	LISREL	PU → A (.31) PEOU → A ( <i>n.s</i> ) PE → A (.41) PEOU → PU (.41)
Leng, Lada, Muhammad, Ibrahim, & Amboala (2011)	Social networking sites	PU, PEOU, PE	Attitude (A)	SEM	PU → A (.40) PEOU → A ( <i>n.s</i> ) PE → A (.56)
Niklas & Strohmeier (2011)	Mobile job search	PU, PEOU, PE	Behavioral Intention (BI)	PLS	PU → BI (.30) PE → BI ( <i>n.s</i> ) PEOU → PU (.35) PEOU → PE (.27)
Pousttchi & Goeke (2011)	Mobile data services	PU, PEOU, PE	Intention to use (IU)	PLS	PU → IU (.21) PEOU → IU (.10) PE → IU (.03)
Tseng & Lo (2011)	Mobile upgrade	PU, PEOU, PE	Intention to upgrade (IU)	LISREL	<u>3G users</u> PU → IU ( <i>n.s</i> ) PE → IU (.26) PEOU → PU (.90)

Table 2 (cont'd)

Van der Heijden (2004)	Hedonic systems	PU, PEOU, PE	Intention to use	SEM	PU → IU (.15) PEOU → IU (.32) PE → IU (.25) PEOU → PU (.48) PEOU → PE (.59)
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\* Perceived ease of use (PEOU), Perceived usefulness (PU), Perceived Enjoyment (PE)

\* Method: Partial Least Squares (PLS), Structural equation modeling (SEM), Ordinary Least-Squares (OLS)

Early studies regarding the role of PE in computer usage have mainly been undertaken in computer games (Holbrook, Chestnut, Oliva, & Greenleaf, 1984; Malone, 1981a, 1981b). Numerous of studies have investigated and found empirical support for the importance of PE in various domains: Internet use (Moon & Kim, 2001; Teo et al., 1999; Van der Heijden, 2003), mobile chatting (Nysveen et al., 2005), Internet-based learning mediums (Lee et al., 2005), mobile internet use (Liu & Li, 2010), instant messaging, (Li, Chau, & Lou, 2005), online shopping (Childers et al., 2002), innovative products (Bruner & Kumar, 2005; Dabholkar & Bagozzi, 2002), Social Networking Sites (SNS) adoption in Malaysia (Leng et al., 2011), blogging (Wang, Lin, & Liao, 2010), attitude toward mobile games (Ha et al., 2007), intention to use e-recruitments (Brahmana & Brahmana, 2011), acceptance of camera mobile phones (Rouibah & Abbas, 2010), attitude toward online video games (Lin & Bhattacharjee, 2010), and attitudes toward online mass customization (Lee & Chang, 2011).

To explain the importance of emotional consideration, similar concepts have been examined in the context of the adoption of a new product/technology in terms of Fun (Bruner & Kumar, 2005; Chtourou, 2010; Dabholkar & Bagozzi, 2002; Pagani, 2004), Enjoyment (Curran

& Meuter, 2007; Davis, 1985; Pagani, 2004), Perceived Entertainment (Kim & Forsythe, 2007) and Perceived Playfulness (Fang, Chan, Brzezinski, & Xu, 2006). Studies found that these variables demonstrated the significance in gaming tasks (Fang et al., 2006), self-service technology in the banking context (Curran & Meuter, 2007), mobile information and entertainment service (Hong, Thong, Moon, & Tam, 2008), mobile applications (Verkasalo, 2008), and multimedia messaging service (MMS) (Lee et al., 2007).

On the other hand, some researchers have tried to figure out what determines PE. Wang, Lin and Liao (2010) tested Big Five personality and found that Extraversion and Agreeableness had a positively significant influence and Conscientiousness has a significant negative influence on PE. They also found that the level of individual's innovativeness in Information Technology (IT) produced the strongest direct effect on perceived enjoyment (Wang, Lin, & Liao, 2010). In a mobile phone upgrade context, Tseng and Lo (2011) verified that perceived price positively affected the Perceived Enjoyment. Other studies also found other determinants that impact on PE; perceived attractiveness (Ha et al., 2007), personal innovativeness (Rouibah & Abbas, 2010), and fashion involvement (Lee & Chang, 2011).

### **Product Personalization (PP)**

Product Personalization is defined as “the process of tailoring products to the individual needs and preferences of customers or users” (Thirumalai & Sinha, 2009, p. 8). Generally, personalization promises to deliver what people need with higher relevance and contributes to the eventual combination of what is primarily given and what the individual can add to a product. Personalization encompasses all human activities—decoration, re-configuration, modification,

customization, and the tailoring—of everything that can express both individual taste and character of the person (Oulasvirta & Blom, 2008). Simply put, the process is sometimes called a *cosmetic change* whereby companies produce a standardized product, which a customer can then modify, alter, or decorate mostly on the surface level (Gilmore & Pine II, 1997).

### Research in Academia

In consumer research, there has long been the concept that people can be defined by the products they acquire or use (Tucker, 1957). Holman (1981) described three necessary conditions for how a product communicates a self-image differentially, namely, visibility in use, variability in use, and personalizability. According to Holman (1981), products can be purchased and/or used conspicuously or visibly, and variability in use allows consumers to experience difference in product use. The personalizability of the product denotes that frequent users can bring to mind a stereotypical image (Holman, 1981) and also resonates Levy's argument (1959) that the consumer is not only functionally oriented but also significantly affected by the symbolic meanings of products.

A series of early studies by Blom and Monk (Blom, 2000; Blom & Monk, 2003; Monk & Blom, 2007) provided a grounded theory used to approach to Product Personalization, especially for Information and Communication Technology (ICT) products. With a sky-rocketing penetration of product and related services, the ICT-related research field has boomed. Blom and Monk (2003) investigated what affected the personalizing of behaviors for PCs and mobile phones and found three distinctive factors among consumers: Cognitive (e.g., ease of use,



aesthetics); Social (personal and group identity); and Emotional (e.g., familiarity, control, ownership, and attachment).

To date, relatively little research has been directed to explore Product Personalization and most of existing studies employed qualitative research methods to understand the effects or motivations of Product Personalization. Furthermore, only a few studies examined causal relationships using product personalization as a variable. Table 3 shows a summary of past studies in personalization.

Table 3: Summary of past studies in Personalization

Article	Domain	Research Method	Important Findings
Sung, Grinter & Christensen (2009)	Domestic vacuuming robot	Interview	personalization can facilitate positive experiences with a product
Scheiberg (1990)	Work space	Observation	The importance of expressing emotions through personalization of work space was presented
Wells (2000)	Office	Interview & Survey	An indirect relationship between office personalization and employee well-being via satisfaction with the physical work environment and job satisfaction as intervening variables was revealed. More women reported that personalization improved the feel in the workplace than men.
Blom & Monk (2003)	PC and mobile phones	Group discussion	A theory of personalization of appearance identified cognitive, social, and emotional effects of personalization on users
Mugee, Schoormans & Schifferstein (2004)	Bicycles	Survey	A person invested energy in the product by personalizing its appearance, and the product was used to express his/her self.

Table 3 (cont'd)

Payton, Hurn, Carswell, & Webb (2006)	Computer desktop	Interview & Observation	Desktop layout personalization was almost as likely to be for aesthetic as for functional reasons
Cui, Chipchase, & Ichikawa (2007)	Mobile phones	Interview	Phone straps and decorative stickers were prevalent in some cities due to cultural differences. Phone carrying styles can be summarized as ease of access vs security reasons
Monk & Blom (2007)	Personal homepages	Survey & Observation	A positive correlations between the extent of personalization and cognitive effects and enduring emotional effects was found
Mugge, Schoormans & Schifferstein (2008)	Generic products	Theoretical review	Personalization was a determinant of product attachment through self-expression
Oulasvirta & Blom (2008)	Information and communication technology (ICT) product	Theoretical review	The motivations of personalization behaviors were driven by autonomy (mastery), competence (effectiveness), and relatedness (emotional, identity expression, and territory marking).
Mugge, Schoormans & Schifferstein (2009)	Bicycles	Survey	Personalization (effort invested) had a direct and an indirect (through self-expression) effect on emotional bonding with a product
Mugge, Schoormans & Schifferstein (2009b)	Diverse products	Lab experiment	The study found seven dimensions in product personalization to provide designers with options: Mental effort, Physical effort, Flexibility, Initiation, Goal of product personalisation, Personalisation moment, and Deliberateness.
Fidzani (2010)	Bedrooms	Observation & Interview	Participants used decorative and personal objects to explore and expressed their identities and feel place attachment
Turkay & Adinolf (2010)	Online games	Survey	Customization of game settings affected gamers' enjoyment

Most post-purchase behavior studies have focused on initial satisfaction and complaints (Ball & Tasaki, 1992). The personalization can be for the same product over time comes from different motivations. Previous studies have identified four comprehensive psychological motivations for personalization behavior: Identity formation, perceived uniqueness, emotional value, and rewarding process.

### Identity Formation

Identity formation is the most robust and well-supported motivation for personalization. Jean-Paul Sartre (1943), a French Existentialist philosopher, stated that the very reason people want to have something is to increase their sense of self, and further, they can find themselves by observing what they possess. William James (1981) argued that the possession and use of physical objects played a role in describing the self; therefore, people become the totality of their possessions. Belk (1988) also suggested that one's being can be determined by having and doing and that a person's possessions hold a symbolic meaning of the extended self. Sirgy (1982) argued that consumers tend to prefer products and their appearances to have congruity with one's self-concept. In brief, possession as a part of the incorporated self is the most basic and influential concept in consumer behavior research.

Early studies on personalization have broadly been undertaken from the standpoint of environmental psychology because people show strong tendencies to personalize their environments when they transition into new surroundings, like dormitory rooms (Vinsel, Brown, Altman, & Foss, 1980), office space (Schelberg, 1990; Wells, 2000), hospital wards (Holahan & Saegert, 1973), and extremely isolated environments like polar stations (Carrere & Evans, 1994). The personalization of a space is one's behavior toward "self-externalization" (Heidmets, 1994,

p. 57). Other studies also have defined personalization as deliberate decoration or modification of surroundings by consumers to reflect their identities (Heidmets, 1994; Sommer, 1974; Sundstrom, 1986).

In her study of bedroom personalization by urban adolescents, Fidzani (2010) stated that ornaments and personal items play an influential role in expressing identity and commitment. These items can show one's past self, present self, and future self by revealing personal interests, goals, and values (Fidzani, 2010). Wells (2000), in his office personalization study, clarified the position that over half (56%) of the respondents indicated that they personalized their workspaces to express their identity and individuality, followed by improving the feel of their workplace and expressing their emotions, their sense of belonging, and their status within the organization. The majority of office workers also commonly decorated their office spaces with items to show personal relationships, i.e., trinkets, favorite artworks, plants, cartoons, sports, and entertainment (Wells, 2000). Niederland and Sholevar (1981) indicated that automobiles were also regarded as a part of the extended self and ego ideals for many young American males.

This tendency of personalization can easily be observed in other personal products because many people are not fully satisfied with standard goods (Piller & Müller, 2004). An example is the purchase of personalized vehicle plates to reflect a personal or a group identity (such as a college or sport team), aesthetic preferences, and personally meaningful text. Previous research also revealed other reasons that consumers personalized their products, such as individual preferences for functions and aesthetics, identity, ownership, uniqueness, and even the actual enjoyment of personalizing their activities (Franke & Piller, 2003; Schreier, 2006; Weightman & McDonagh, 2003). The majority of previous research indeed found that

expressing identities or individuality was one of the key motivations for Product Personalization (Blom & Monk, 2003; Mugge, Schifferstein, & Schoormans, 2004).

### Needs for Uniqueness

In a mass production society, people mostly consume standardized and duplicated products made on assembly lines, which limits individual choices (Jencks & Silver, 1972). There is also definitely a tendency to possess unique items to show one's sense of individuality. In addition to functional features, the behavior of purchase also includes the acquisition of a symbolic meaning from the bought products (Ligas, 2000). Consumers want to feel different from others, so some possessions can help them express their individuality, and people generally will put greater value on unique products than on common ones (Brock, 1968; Fournier, 1991; Fromkin, 1970). Schreier (2004) found that unique self- designed products can increase the willingness to pay (WTP), associated with a value increase of 64% likelihood of watch purchase behavior. In addition, Franke and Philler's research (2004) supported the idea that personalization with a given watch toolkit increased its average value up to 100% on an interpersonal level.

Uniqueness is the need to make oneself have a different and separate identity from others (Fromkin, 1970). The concept is also regarded as "a positive striving for abnormality relative to other people" (Snyder & Fromkin, 1977, p. 518). People with higher self-uniqueness will pursue their dissimilarity from others and want to show their own individuality in spite of the risk of social disfavor (Fromkin & Lipshitz, 1976). Kang and Kim (2012) found a clear and positive

association between the desire for a unique product and personalized product purchase when apparel shopping.

Previous studies also revealed that customer who sought self-uniqueness had a more favorable attitude toward apparel and new Product Personalization (Halepete, Littrell, & Park, 2009; Workman & Kidd, 2000). In addition, researchers found that the need for uniqueness significantly and positively correlated with consumer innovativeness and negatively associated with susceptibility and normative influence (Lynn & Harris, 1997). On the other hand, Dabic, Schweiger, and Strebinger (2008) found that complexity had a negative effect on the vehicle personalization (Dabic, Schweiger, & Strebinger, 2008).

Mass customization is defined as “the mass production of individually customized goods and services” (Pine, 1993, p. 48). This step-by-step, pre-prepared process of choosing possible personalization options has been widely accepted as a middle ground to use to achieve personal touches and also reliable product quality. Mass customization can be a good alternative, even though customers will generally experience a negative feeling from exposure to complexity in spite of their strong desire for unique products (Schreier, 2006).

Mass customization is also driven by the business necessity of finding a new market or a niche market and customer demands and are produced by a balance of custom-made and mass-produced items (Apeagyei & Otieno, 2007; Kang & Kim, 2012). Examples are easily found in online apparel websites, where customers can choose their favorite colors and patterns for existing products. In this context, personalization contributes to both consumers and product providers by adding specific touch-ups to mass produced goods. Mass customization is a way of compromising high cost or risk-taking and become a safer choice among given options because

many customers are not confident about their ability to design (Anderson-Connell, Ulrich, & Brannon, 2002).

### Emotional Value

Product Personalization allows end users to feel more intimacy while meeting their individual needs and tastes (Dellaert & Stremersch, 2005; Franke & Piller, 2003; Schreier, 2006). Accordingly, Product Personalization can increase personal value and help “companies with a competitive advantage” (Mugge, Schoormans, & Schifferstein, 2009a, p. 3), as well as offering other benefits like stronger feelings of personal achievement (Bendapudi & Leone, 2003; Fiore, Lee, & Kunz, 2004; Franke & Piller, 2004; Schreier, 2006).

Blom and Monk (2003) examined why people in the U.S. and Finland personalized their PCs and mobile phones and clarified what impacted their Product Personalization. This study found three dispositions to explain the personalization of products, namely, the cognitive, social, and emotional effects (Blom & Monk, 2003). The researchers found that familiarity with products, personal feelings, a feeling of control, ownership, relief from boredom, fun, and positive association were the key emotional effects. For example, having a personalized vehicle plate has no effect on the functionality of a vehicle, but still, notwithstanding that aspect, is valued by the owner.

Oulasvirta and Blom (2008) also determined that Product Personalization can play a role in revealing emotional feelings, ego-involvement, identity expressions, and territory marking. Blom and his colleagues stated that personalization can lead to an increase in ownership

satisfaction and Perceived Ease of Use, and interestingly, can be influenced by both peers and the media (Blom, 2000; Blom & Monk, 2003). Fox (2001) found that a feeling of control and a certain level of design authority motivated personalization. Other studies reported that the personalization of an environment helped its residents deal with stress, provided relaxation, and also maintained the feeling of personal control needed to increase satisfaction, reduce stress, achieve higher work performance, and relax (Edney & Buda, 1976; Heidmets, 1994; Wells, 2000).

Cui, Chipchase, and Ichikawa (2007) investigated mobile phone personalization by conducting a series of street interviews with 1549 participants from 11 cities in 9 countries. They found that covers, straps, and stickers were the most commonly used personalization items for mobile phones, and the same items could be used differently for both practical and emotional purposes. For example, phone covers were used to protect phones from scratches, dust, and sweat, but covers showed personal aesthetic preferences or group affiliations. Finally, Cui, Chipchase, and Ichikawa (2007) categorized two aspects of mobile phone personalization: Non-instrumental (Identity, Sociability, and Aesthetics) and Instrumental (Easiness and Security). Olander (2008) identified two distinctive motivations for mobile devices. One was work-related motivation to improve efficiency and effectiveness, and the other was socially related motivation, such as a feeling of familiarity and the expression of one's identity.

People commonly personalize their surroundings to represent an emotional bond, value, aesthetic orientation, event and schedule, penchant, and interest (Hansen & Altman, 1976). Several researchers observed that the primary purpose of environmental personalization was control or territory marking (Blom & Monk, 2003; Fidzani, 2010; Marcus & Sarkissian, 1984;



Oulasvirta & Blom, 2008). Rodin (1986) examined the causal link between one's environmental controls and positive emotional responses from elderly nursing home residents. However, Heidmets (1994), a leading scholar in this area of environmental personalization, more clearly pointed out that the primary purpose of personalization was the control accompanied by individualization, i.e., to show one's own externalized self. Personalized products can be used to express an owner's personal feelings and current emotional state and can become a symbolic keepsake object that evokes certain memories.

### Rewarding Experience

Product Personalization can be implemented in diverse ways, but it generally requires investing time, effort, and/or money by its customers/users. With such additional cost and effort, personalization makes products more unique by adding aesthetics touches and also may contribute to certain “do-it yourself” effects and active engagement (Schreier, 2006). A task may provide an enjoyable experience with a feeling of competence (Fisher, 1978). According to White (1959), people are motivated to be effective or competent in managing their environment. When people feel to successfully control their environment, they are boosted by a feeling of efficacy, which encourages a task to be experienced as enjoyable and it is commonly called intrinsic reward (Fisher, 1978).

Previous studies in organizational behaviors have categorized reward as two types: Extrinsic reward such as monetary benefits, or promotion and intrinsic rewards, which satisfy higher order needs like self-esteem or self-actualization (Anderson & Chambers, 1985; Maslow, 1943). An intrinsic reward is generally associated with a satisfaction of curiosity, opportunities

to experience and achieve mastery of a particular topic, entertainment value, and simply novelty (Kruglanski, 1975). It has been observed that people regard doing personalization themselves as a reward because they are more intrinsically motivated (Schreier, 2006). The behavior of designing itself can be a rewarding experience; it benefits the value of outcomes (Freitas & Higgins, 2002). In addition, the customer's behavior as a designer can provide clear feelings of pride, which is called the "pride of authorship effect" (Schreier, 2006, p. 323).

Further parallels to empirical work can be shown in open-source software. People voluntarily have participated in developing software for their own pure enjoyment; it was both creative and a fun task (Gabriel & Goldmann, 2001; Shah, 2003). Mass customization can also be an example of a rewarding process because customers get involved in the mass process of design by choosing options from many possible combinations based on their own tastes (Freitas & Higgins, 2002; Oulasvirta & Blom, 2008).

Sometimes, personalization also provides ease of use. For instance, a personalized ringtone for a particular number can help one a person identify who the caller is (Mugge et al., 2009a). Personalization can also show group identity at a glance by a sticker or a flag displayed in the office, a room, or a car. Furthermore, it can serve as a quick identifier for one's possessions (Mugge, Schifferstein, & Schoormans, 2010; Mugge et al., 2009a). For example, decorating a bicycle or a mobile phone with a prominent color or an ornament to make it more noticeable can help the owner distinguish his/her belongings from the many similar items of their friends (Mugge et al., 2010; Mugge et al., 2009a). Mugge, Schoormansa, and Lange (2007) found that the more creative involvements that were provided, the more that people were willing

to personalize their products. Such personalization behavior can thus be regarded as “a process of creating and nurturing extended self” (Belk, 1988, p. 7).

Automobiles and personal spaces, such as bedrooms, dorm rooms, and office spaces, are common subjects for personalization studies. Recently, considerable research has come from studying personal media products because those products are regarded as more like a half-self, i.e., 24/7 carried items like laptops, mobiles phones, and tablets. Sometimes, personalization of high-technology products requires knowledge of technology and self-efficacy. This type of personalization has also been observed in online environments, e.g., avatars for multiplayer games and outfit changes in on-line meeting rooms (Oulasvirta & Blom, 2008). Especially in games, personalization provides feelings of control and continued engagement (Wise & Reeves, 2009). In addition, the process of personalizing avatars and a game environment gives enjoyment.

Owners have generally shown more protective, caring behaviors when they have spent greater effort and consequently will have greater emotional difficulty in accepting the demise of certain products (Ball & Tasaki, 1992). Therefore, the process of personalization itself can give meaning to a product. Mugge and her colleagues (2009) found that there was a direct effect between the effort invested in personalization (mental, physical, and financial) and emotional bonding.

## Market Trend

The surging trend toward ownership a new personal digital products is expected to earn the aftermarket accessory industry \$20 billion (USD) in 2012 and projected then to rise to \$84.6 billion (USD) by 2018 (Graziano, June 22, 2012; PR Web, July 26, 2012). Smartphone owners

spend an average of \$56.18 on accessories per device, consumers of feature phones spend an average of \$28.17 (Graziano, June 22, 2012). Previously, accessories for feature phones focused on expanding functions or improving the quality of communication, i.e., Bluetooth sets and adapters, memory cards, amplifiers of weak signals, and in-car solutions. The current surge toward/urge to buy phone accessories is primarily driven by not only a growing desire to enhance functionality and performance, but also the increasing trend toward personalization of mobile phones and the development of engaging, innovative accessories (Graziano, June 22, 2012; PR Web, July 26, 2012).

This exploding trend of accessory markets implies a change in consumer attitudes toward products, especially for personal technological products and personalizing those products. Owners carry their smartphones and other personal digital gadgets all the time, and they feel greater intimacy with these gadgets than with other products. Hence, its owners are regularly encouraged to buy accessories to consolidate their sense of intimacy. Yun (2010) found that 52.9% of smartphone users owned mobile phone accessories like phone covers (94.4%), stickers (10.2%), straps or charms (6.5%), and Others (2.8%) in multiple choice questionnaires.

A small online survey on tablet accessories found that 63.7% of iPad owners had one case, 23% had more than two, and 13.3% owned no cases (Bankhead, 2011a). Bankhead (2011b) also found that the most popular type of case was the folio case, which provides all-over protection and flips open, followed by the skin case. Despite its globally high popularity and the increasing demand in this market segment, academic studies on the role of Product Personalization behavior are still largely unattempted.

## **Product Attachment (PA)**

Product attachment is “an emotion-laden target specific bond between a person and a specific object” (Thomson, MacInnis, & Park, 2005, p. 79). Consumers want to buy a product not only that is well functioning but also is able to deliver stories, experiences, lifestyles, and emotions to meet their changing needs (Jensen, 1996; Van Nes & Cramer, 2005). A product can ultimately be a companion in one’s life experience and enrich the product through an active life presence (Turkle, 2007).

Attachment theory has successfully been applied to describe variations in mental health, emotion regulation, and interpersonal relations (Bowlby, 1969, 1973). Bowlby (1979) illustrated that view by saying that emotional attachment was proven by psychological and behavioral outcomes such as proximity-seeking behaviors (being pleased from being together with no need to interact), separation anxiety (distress from separation or the fear of separation), and mourning a loss. It can also explain the tendency to form an affective bond with others and manage anger, depression and emotional detachment (Bowlby, 1969, 1973).

The strength of attachment varies with other ongoing feelings, such as connection, affection, love, and passion (Bowlby, 1979; Brennan, Clark, & Shaver, 1998; Collins & Read, 1994). Such attachments develop at a very early stage, and more than 70 percent of six-month-old babies show a preference for their favorite objects (Furby & Wilke, 1982). Seeking attachment is a persistent basic human need, beginning with children’s attachment to their caregivers through an adult’s desire for and seeking of romantic relationships (Hazan & Shaver, 1994), kinships, and friendships (Trinke & Bartholomew, 1997).

Schouten and McAlexander (1995) indicated that emotional attachment could be applied to the consumer context through their ethnographic study on the relationship between bikers and their vehicles. Product Attachment is defined as “the degree of consumer-Product Attachment as the strength of the emotional bond a consumer experiences with a product” (Schifferstein et al., 2004, p. 328). It is sometimes called consumer-Product Attachment and is a multi-faceted property of the relationship between an individual or a group of individuals and a specific object, which is distinguished through this person-object interaction (Kleine & Baker, 2004).

Such an attachment is formed with specific possessions, not with a full product category or brand. Mostly, these possessions are ordinary objects with special meanings that have been built up through the experiences the person has had involving that object (Kleine & Baker, 2004). Research has also shown that attachment can be found in collectibles (Slater, 2000), places of residence (Hill & Stamey, 1990), brands (Schouten & McAlexander, 1995), celebrities (O'Guinn, 1991), and sports teams (Babad, 1987).

Even though these attachments might differ from Product Attachment, the primary concept and behavioral impacts are similar (Park, MacInnis, & Priester, 2006). Product Attachment is distinguished from the general possessiveness element of materialism or from attachment to other people, and it requires additional contextual analysis, more than just generalized possessiveness including a shared history between the owner and the product (Wallendorf & Arnould, 1988).

Schifferstein and Zwartkruis-Pelgrim (2008) define consumer-product attachment as “the strength of the emotional bond a consumer experiences with a product” (p.1). After years of use, a symbolic association arises between the owner and the product, and the product becomes

“decommodified and singularized” for the individual (Kopytoff, 1986, p. 65). In economics, commodities are things that are produced, that exist, and that are circulated in the economic exchange system, usually in exchange for money (Kopytoff, 1986).

When an individual buys a product, it becomes a commodity having exchangeable monetary value. However, after days and years of use, other counterpart values —uncommon, incomparable, unique, singular equivalent —accumulates. Some items like gifts can have both values from the very beginning of their possession. Hassenzahl (2004) noted that attachment can have both hedonic and pragmatic aspects by offering effective and efficient ways to achieve behavioral goals from a pragmatic perspective and by delivering identification through the product's ability to have certain important individual values correspond to relevant others. His study also indicated that pragmatic attributes can be affected by experience, whereas hedonic attributes remain over time.

Studies have shown that a number of other factors also influence Product Attachment. Some are inherent in the actual product, such as functions and market values, whereas other factors are more dependent on the products' owners like showing the owner's identity, goals and memories (Gerber, 2011). Choi (2010) found four dimensions that affected the mobile phone attachment: Symbolism (reflecting personality or identity), fashion (audio and visual aesthetics), possession (the feeling of belonging), and needs. The most prominent characteristic of attachment is proximity maintenance to the object; people experience anxiety and threatened separation of loss from the attached object, which can result in distress. Previous studies are summarized in Table 4.

Table 4: Summary of past studies in Product Attachment (PA)

Article	Domain	Research (Statistical) Method	Important Findings
Mugge, Schifferstein & Schoormans (2010)	Cameras and mobile phones	Survey (LISREL)	Product's utility and its appearance positively affect Product Attachment and satisfaction, Pleasure played a mediator role and memories moderated the effects of utility and appearance.
Mugge, Schifferstein & Schoormans (2006b)	women's watches	Survey (ANOVA)	Consumers had a stronger attachment with the product that had a congruent personality with their own. The relationship between Product Attachment and longer product lifetime was found only for introvert people
Schifferstein & Zwartkruis-Pelgrim (2008)	Some durable products	Survey (LISREL)	Memories (old products) and enjoyment (new products) contributed positively to the degree of attachment
Wallendorf & Arnould (1988)	Favorite objects	Survey & focus group interviews	Personal memories (U.S.) and social status(Niger) were a contributor for favorite objects and U.S samples showed greater proximity to objects
Schultz, Kleine & Kernan (1989)	Self-reported items with high attachment	Questionnaire & Content analysis	A strong attachment was influenced by frequency, linkage, valence, emotion, proximity, and gift
Ball & Tasaki (1992)	Items planning to acquire	Questionnaire with sample stimuli	A conceptual definition of the construct was proposed and measurement items (ownership, emotional significance, materialism) were developed
Sivadas & Venkatesh (1995)	Car, Music System, Pet, Least Favorite Possession	Survey	Consumers were more likely to be satisfied and attached with possessions that were part of their extended self
Kleine, Kleine III, & Allen (1995)	Gifts that a participant received	Questionnaire with sample stimuli	Gift receivers felt more attachment when a gift presented receiver's me and symbolize the relationship between a giver and a receiver



Table 4 (cont'd)

Kleine & Baker (2004)	Material possessions.	Theoretical review	Possession attachment included, 1) emotions, 2) self-extensions, 3) a personal history, 4) property of strength, and 5) evolvement over time
Mugge, Schifferstein & Schoormans (2006a)	backpack	Survey	Product Attachment is positively affected by the self-expression, memories, and pleasure
Wehmeyer (2007)	mobile devices	Theoretical review (factor analysis)	Symbolism, aesthetics, and perceived necessity were presented as elements of user-device attachment
Choe, Liao & Sun (2012)	Mobile phone	Survey	Easiness of use was the most prominent reason for mobile phone followed by cost of durability and cost of information

Irreplaceability is an important factor to use to describe Product Attachment. It is an essential precondition that delivers the feeling of a long-lasting relationship (Schifferstein & Zwartkruis-Pelgrim, 2008). Schifferstein and Zwartkruis-Pelgrim (2008) found a strong association between irreplaceability and attachment and only a moderate relationship between irreplaceability and self-extension. Additionally, much of the previous research has shown that the attachment has a close relationship to self-extension (Ball & Tasaki, 1992; Belk, 1988; Kleine, Kleine III, & Allen, 1995; Wallendorf & Arnould, 1988).

Sometimes, such irreplaceability can be confused with indispensability, but indispensability often comes from functional necessity with utilitarian products, whereas irreplaceability is measured mostly for emotional attachment (Schifferstein & Zwartkruis-Pelgrim, 2008). Irreplaceability delivers symbolic meaning, which can be achieved in a special and unique context, like a souvenir from a trip or a birthday gift; consequently it is unique to its

owner (Belk, 1988; Grayson & Shulman, 2000). From the point of adding emotion, memories are the enhancement of attachment formation. Schifferstein and Zwartkruis-Pelgrim (2008) found that any product that raised memories was positively associated with the degree of Product Attachment.

Product Attachment is conceptually distinct from involvement (Costley, 1988; Kleine & Baker, 2004; Laurent & Kapferer, 1985), satisfaction (Mugge et al., 2010), and brand attitude (Park, MacInnis, Priester, Eisingerich, & Iacobucci, 2010; Thomson et al., 2005). Involvement is defined as a state of mental readiness that influences the distribution of cognitive resources to an object, decision, or action upon consumption (Park & Mittal, 1985). It is basically understood as the important, personal feeling toward an entire product category based on a consumer's needs, values, and interests (Ball & Tasaki, 1992; Laurent & Kapferer, 1985; Mittal, 1995). Involvement focuses more on the acquisition and pre-purchase stages of buying than on ownership, consumption behavior, and meaning to the consumer (Wallendorf & Arnould, 1988). Some researchers have addressed the issue of regarding involvement using the meaning of consumption and cultural brandscapes, which is a blending of brand and landscape (Csikszentmihalyi & Rochberg-Halton, 1981; Sherry, 1986).

Satisfaction is also a concept separately distinctive from attachment, even though there seems to be some correlation when an individual who is emotionally attached to a product is satisfied with that product. Satisfaction can be delivered when the product successfully fulfills a basic necessity and can be seen as one step towards attachment (Thomson et al., 2005). It is an evaluation judgment, primarily influenced by a product's utility and appearance (Mano & Oliver, 1993). Satisfaction does not imply any behavioral manifestations for security seeking like

proximity anxiety and separation distress, and even though satisfaction can lead to an immediate purchase, satisfaction is still different from attachment because attachment develops over time requiring multiple interactions (Thomson et al., 2005).

Further still, Mugge, Hendrik, Schifferstein and Schoormans (2010) found that Product Attachment shows no direct effect on satisfaction and no memories are related to satisfaction. They explained that average performance can lead consumers only to the experience of satisfaction, not to attachment itself because the performance provided does not elicit pleasure or emotional bonding (Mugge et al., 2010). Hence, Product Attachment focuses more on an emotion-laden bond, developed by a product having special meanings for the owner (Wallendorf & Arnould, 1988).

Even though strong positive brand attitude naturally includes a certain degree of attachment, it is a different construct in several ways. First, favorable brand attitude can be obtained without direct contact, such as advertisements, viral marketing, or word of mouth. Basically, brand attitude can lead consumers to the trial purchase of a brand, and satisfaction with that product can boost the chance of repeat purchase because of a sense of confidence and familiarity. On the other hand, Product Attachment more strongly relates to memories or links between the object and the buyer and presents a specific behavior like proximity anxiety and separation distress (Thomson et al., 2005).

The level of Product Attachment can be also affected by the stage of ownership. Ball and Tasaki (1992) revealed five stages in the development of attachment for a particular product: Preacquisition, early ownership, mature ownership, predisposal, and postdisposal. For some products, a favorable feeling forms even before purchase through a sense of high expectation or

at the moment of acquisition, such as with a gift. Consumer emotions with regards to a specific product are very important to that product's acceptance, and they generally change over time because of several reasons that combine, namely, by the product (e.g., loss of function, broken, worn out), by the consumer (e.g., getting old, changes in family life cycle, moving), and by the situational context (e.g., fashion changes, technological improvements, regulation changes at work) (Schifferstein & Zwartkruis-Pelgrim, 2008).

Finally, the experience of Product Attachment allows customers to hang on to certain products while they can easily throw away or replace others (Schifferstein & Zwartkruis-Pelgrim, 2008). Schultz, Kleine, and Kernan (1989) indicated that our most preferred possessions are “things which we would loath to give up, things which would be difficult to replace—in short, things to which we have become strongly attached” (p. 359). Therefore, product lifetime is logically connected to Product Attachment. Mugge, Schifferstein, and Schoormans (2006b) also demonstrated a direct relationship between Product Attachment and product lifetime.

Today, product lifetime is primarily determined by the consumer, not by the manufacturer (Stahel, 1986). Especially, high technology products are replaced with newer ones with better functions and reasonable prices, while the older products are still functioning properly. Only 22% of these products do not function at the time of replacement (Van Nes, 2003). Therefore, increased Product Attachment can positively impact a product's lifespan by lengthening it. Mugge, Schifferstein, and Schoormans (2006b) also demonstrated a direct relationship between Product Attachment and product lifetime.

## **Expected Product Lifetime**

Products are destined to be discarded because they lose their value at some point. The lifecycle of any product can briefly be divided into three stages: Its production from natural resources, utilization of its useful life, and disposal of the discarded good (Stahel, 1986). The stage of utilization is regarded as a product lifespan or lifetime. Product lifetime is its duration, starting from acquisition (whether new or used) to the end moment of replacement or discard (Van Nes & Cramer, 2006). The lifetime of a product for some products has increased due to the improvement of technology whereas there is a tendency for the life expectancy of some other products to have decreased.

Cooper (1994b) pointed out five possible pressures to prevent longer product lifetime beyond just technological obstacles: 1) manufacturer's intention to design products for shorter life spans to sustain sales volumes; 2) the result of volume-based processes (not always producing a product which is durable and easy to repair); 3) high labor cost for repair; 4) consumer demand for satisfaction from buying and possessing a new product; and 5) a company's positioning to have a longer lifetime for luxury or high-end models. The previous studies also indicated that the product lifetime is determined by a complex blend of various details such as design, technological change, cost of repair and parts availability, aesthetic and functional quality, trends, advertising, and social pressure (Cooper, 1994a; Falkman, 1996; Granberg, 1997; Heiskanen, 1996; Kostecki, 1998; Stahel & Jackson, 1993; Van Hinte, 1997; Van Nes, 2003).

Along with the understanding of these complex determinants of product lifetime, Packard (1960) distinguished the aspect of obsolescence of function, quality, and desirability. He

described obsolescence of function for an outmoded product and obsolescence of quality for products either broken or worn out (Packard, 1960). The obsolescence of desirability, also termed ‘psychological obsolescence’, is the status where “a product that is still sound in terms of quality or performance becomes ‘worn out’ in our minds because a styling or other change makes it seem less desirable.” (Packard, 1960, pp. 58-59)

Technological and fashion obsolescence have been prominent trend over the past decades, especially for high technology products. Technology obsolescence can result from a technology product no longer working, or by customers being attracted to more technologically advanced functions (also known as upgrade desirability) (Rai & Terpenney, 2008), whereas fashion obsolescence is driven more so from individuals’ changing aesthetic concerns (Guiltinan, 2009). Clearly, technological and fashion obsolescence are more significant factors driving in replacement timing than is physical obsolescence (Guiltinan, 2009).

Products are discarded when there are: 1) high service costs; 2) unavailability of replacement parts; 3) a high number of second owners; and 4) consumer affluence (Lund, 1977). However, recent studies also show that obsolescence is not just motivated by a defect, wear and tear, and/or function failure, but by new desires of consumers (Ramirez, Ko, & Ward, 2010; Van Nes & Cramer, 2005, 2006). Product replacement is also influenced by product characteristics, situational influences, or consumer characteristics, or a combination of these factors (Van Nes & Cramer, 2005).

Cooper (2005) clarified two types of product obsolescence, namely, relative or absolute obsolescence. In relative obsolescence, the consumer makes a decision based on economic depreciation, technology change, new situation, and psychological reasons such as aesthetic

quality and fashion; absolute obsolescence refers only to product failure. Packard (1982) argued that designers and manufacturers tend to promote both functional obsolescence and psychological obsolescence, and Park (2010) discussed the factors that describe product obsolescence, which can range from micro to macro, including product (features), individual (behavior) and societal (socio/economic).

Brooks Stevens, an American industrial designer, declared that the concept “planned obsolescence”—the practice of shortening product lifecycle influencing the buying patterns of consumers in favor of manufacturers—was popularized in the 1950s (Adamson, 2003). He defined the concept as “instilling in the buyer the desire to own something a little newer, a little better, a little sooner than is necessary” (Adamson, 2003, p. 4). On the contrary, other studies have argued that the frequency of product replacement can be delayed by building a strong emotional attachment between the user and the product (Ball & Tasaki, 1992; Cooper, 2005; Mugge et al., 2004; Mugge, Schoormans, & Schifferstein, 2005; Schifferstein & Zwartkruis-Pelgrim, 2008).

Another categorization of product obsolescence is relative/absolute obsolescence. Absolute obsolescence is simply the demise of product functioning, a product failure, whereas relative obsolescence is driven by different kinds of consumer decisions (Cooper, 2004). Therefore, absolute obsolescence is primarily the manufacturer’s responsibility, while relative obsolescence is driven by the consumer’s psychological evaluation of that product (Granberg, 1997).

In our modern affluent society, “product lifetime is primarily determined by the user, not by the manufacturer” (Stahel, 1986, p. 186). Fast replacement has been a persistent trend in a

fashion-based consumer society —“the syndrome of bigger better- faster new products” (Stahel, 1986, p. 185). Especially in technological product markets, replacement purchase becomes more increasingly a portion of sales. More than 60% of a mobile phone (feature phones and smartphones) sales are for replacement, and 90% of phone is still functioning at the time of purchase for replacement (Geyer & Vered Blass, 2010; Gordon, 2009; Hanks, Odom, Roedl, & Blevins, 2008). Mobile phones indeed have the shortest product lifetime of any electronic consumer product with 18 months of lifespan in the U.S and U.K (Madden & Smith, 2010).

### **Adopter Categories for the Innovation Diffusion Theory (IDT)**

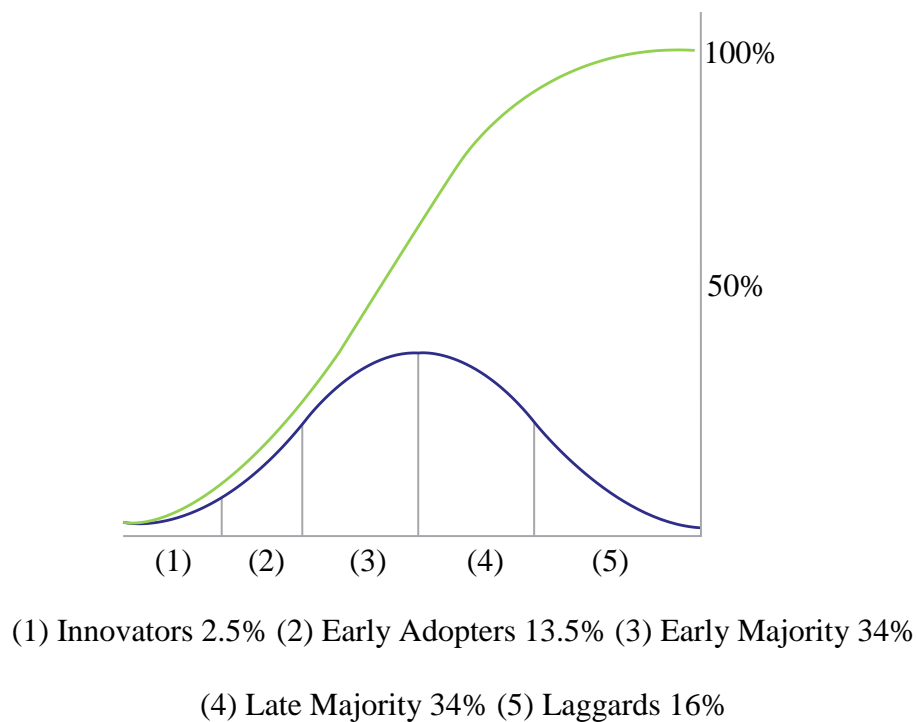
No new product or service can get wide spread acceptance at its introduction. Typically, a new product or service is first adopted by a relatively small group of people who then can influence later categories of people (Robertson, 1971; Rogers, 2003). It was Rogers (2003) who first indicated that consumers did not adopt innovations simultaneously using the Innovation Diffusion Theory (IDT). IDT explains how innovations— new ideas and technology—can be adopted and spread into a social system.

Adoption is “the result of increasing network pressure from others” (Jin, 2013, p. 1913). Therefore, understanding the target population is the influential starting point for spreading products or services. The theory has also been used to assign consumers to several adopter categories based on time of adoption. This consumer categorization has been widely explored for more tangible products (Dickerson & Gentry, 1983; Martinez & Polo, 1996; Martinez, Polo, & Flavian, 1998).



Adopter distributions follow a bell-shaped curve, while the diffusion of an innovation typically follows an S-shaped curve. The adoption curve can be segmented into an identifiable five groups: 1) innovators (2.5%), 2) early adopters (13.5%), 3) early majority (34%), 4) late majority (34%), and 5) laggards (16%). These are based on the time when they accepted the innovation (Rogers, 2003). The distribution of each group is not even, as is shown as Figure 1.

Figure 1: Diffusion of Innovation and Adopter Categories (Rogers, 2003)



For interpretation of the references to color in this and all other figures, the reader is referred to the electronic version of this dissertation.

A very small subset of population, only 2.5%, can be interpreted as innovators, and they are risk takers who have the characteristic of venturesomeness—the “desire for the rash, daring, and the risky” (Rogers, 2003, pp. 282-283). They tend to show a favorable attitude toward a new idea, have no inhibitions pertaining to perceived risk, and enjoy being on the cutting edge position in the market (Mann & Sahni, 2012; Rogers, 2003). These innovators explore products and ideas which are “new, first, original, futuristic, distinctively different” (Uhl, Andrus, & Poulsen, 1970, p. 54).

Early adopters are the second group with 13.5% of population and are futurists. They look forward for novel products (Mann & Sahni, 2012). As information seekers, they are confirmed and make their own adoption decision mainly based on observing the innovators (Rogers, 2003). This group is where most opinion leaders reside in a society, and their adoption of a product is a good indicator when observing the spread of innovation (Rogers, 2003).

Innovators and early adopters are the most studied categories among the five groups that noted here because they often represent the primary target market for new products and services (Mahajan, Muller, & Srivastava, 1990). Even though they are not a targeted market segment, understanding their behavior, preferences, and reasoning can provide benefits because they do influence the behavior of later adopters (Rogers, 2003). Most studies agreed that demographic and socio-economic variables significantly relate to adoption behavior and innovators; early adopters are young, more qualified, and in the higher income group (Dickerson & Gentry, 1983; Im, Bayus, & Mason, 2003; Mahajan et al., 1990; Martinez et al., 1998; Robertson & Kennedy, 1968)

Early and late majority represent 68% of total population, 34% for each category. Early majority are those pragmatists' having a 'wait-and-see' attitude toward an innovation and needing concrete orientation before adoption. Late majority are traditionalist and look to the early majority and wait until there is an established standard (Mann & Sahni, 2012; Park & Kim, 2010). Mature customers usually belong to the late majority or even the laggard group based on adoption rates for innovation (Oumlil & Williams, 2000).

Laggards as the last group in diffusion will initially and continuously reject a certain innovation for the very reasons that innovators adopt it, but eventually, they adopt (Uhl et al., 1970). Laggards are significantly more brand loyal (less brand switching) than innovators because they prefer not to take any risks with their limited money and thus will stay with established brands (Uhl et al., 1970).

To date, relatively little research has been directed toward investigating the mediating role of adopter categories. Most previous research have been grounded within an understanding of the characteristics and behaviors of each category and confirmed the influences of demographic and socio-economic variables (Dickerson & Gentry, 1983; Mahajan et al., 1990; Martinez et al., 1998). Past studies are summarized in Table 5.

Table 5: Summary of past studies in group categories in Innovation Diffusion Theory (IDT)

Article	Domain	Statistical Method	Important Findings
Jin (2013)	Internet content filtering Software (ICFS)	Survey	Innovators and early adopters reported more favorable perceptions of and greater user satisfaction with ICFS. There were clear group differences in Ease of use, usefulness, information quality between earlier and later adopters

Table 5 (cont'd)

Mann & Sahni (2012)	Internet Banking	Survey	Four adopter categories were presented based on Perceived Ease of Use, Perceived Security Risk, Demographic Variables, and Adoption Behavior
Liu & Li (2010)	Mobile internet use	Survey	significant differences in the users' perceptions of mobile internet usage were found in each adopter category
Park & Kim (2010)	e-purchasing, GPS	Survey	Adopters categories effected on IT adoption behaviors regardless of IT types and demographic differences
Mattila, Karjaluoto & Pento (2003)	Internet Banking	Survey	Perceived difficulty in using computers and the lack of personal service were found to be a barrier among mature customers, mostly late majority
Stafford (2003)	Internet Services	Survey	Internet laggards will showed lower degrees of content gratifications for online service than innovators
Agarwal, Ahuja, Carter & Gans (1998)	Web registration system	Survey	Early adopters demonstrated a greater personal innovativeness and have more positive attitudes toward use of the IT innovation than later adopters
Ram & Jung (1994)	VCR, PC	Field study	Early adopters had higher use innovativeness and product involvement than the early Majority. Use innovativeness and involvement mediated the relationship between purchase innovativeness and usage variety
Dickerson & Gentry (1983)	Home computers	Survey	Adopters of home computers were contrasted to non-adopters in demographics, psychographics, and experiences with technical consumer products and experience played a major role

Table 5 (cont'd)

Uhl, Andrus & Poulsen (1970)	Grocery buying	Survey	Laggards had lower house income and more brand loyal than innovators
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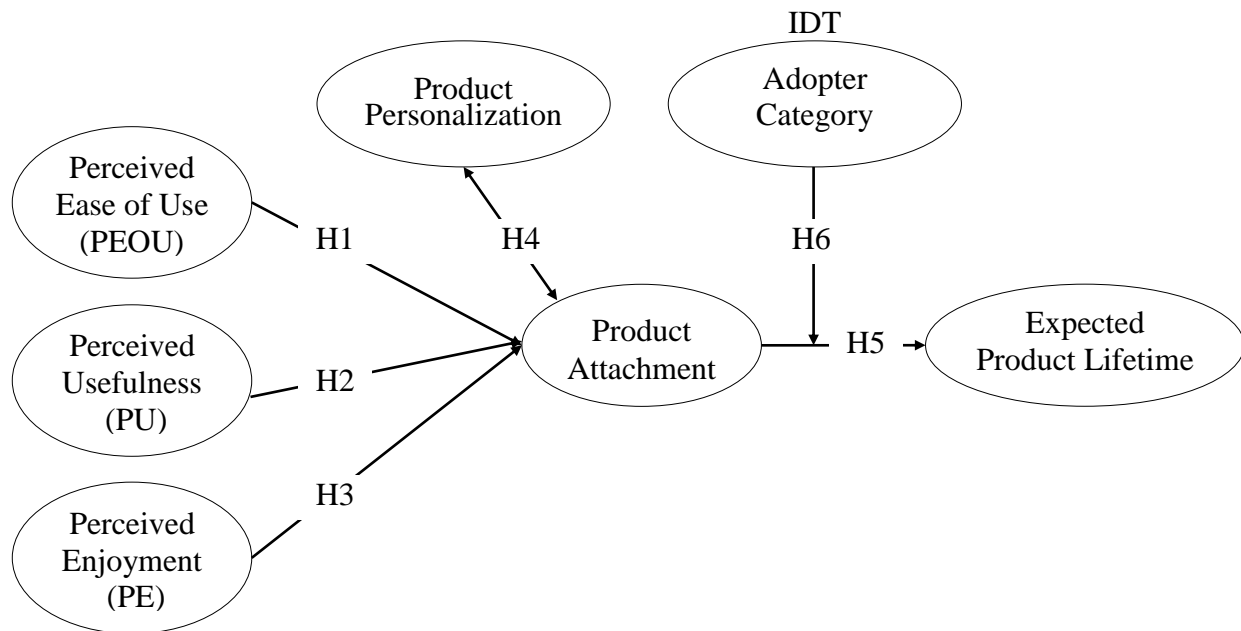
Past research has shown clear distinctions in demographic variables. Mann and Sahni (2012) indicated that the majority of male adopters were innovators (82.4 %) and early majority (84.8), whereas females were late majority (24%) and laggards (26%) in Internet banking adoption in India. This study also showed that nearly half of early adopters were graduates in education variable levels (Mann & Sahni, 2012). In general, the demographic characteristics of age and income are regarded as playing an influential role in adoption behavior. On the contrary, innovators in online games are young, low educated with relatively low income due to the special characteristics of online games (Cheng, Kao, & Lin, 2004). Females are more likely to be later adopters in online games (Cheng et al., 2004) and also in online shopping (Brown, Pope, & Voges, 2003).

Early adoption studies place more interest on 'acceptance' and 'rejection' of an innovation. The majority of empirical studies gained understanding of the characteristics of each group. Another important concept that has expanded from the Innovation Diffusion Theory is Chasm. Moore (2002) argues there is a chasm between early adopters (technology enthusiasts and visionaries) and the early majority (pragmatists). If any new product can cross this chasm, then that product becomes a de facto standard.

## Research Model and Hypotheses

The main focus of this study is what determines Product Attachment and how that Product Attachment affects expected product lifetime. Additionally, it tests to test if there is any group difference in Product Attachment and the Expected Product Lifetime for the adopter categories in Innovation Diffusion Theory (IDT). To understand these antecedents and their consequence, this study starts by examining three attributes derived from the modified Technology Acceptance Model (TAM), which includes Perceived Enjoyment (PE) as an intrinsic variable and related Product Personalization studies. A conceptual model of Product Attachment toward Expected Product Lifetime with modified TAM variables and the role of Product Personalization and adopter categories as shown in Figure 2.

Figure 2: A Proposed Research Model



## TAM and Product Attachment (PA)

Most of the TAM research has been achieved by adding new independent variables having the intention to use/adopt a new technology or system or sometimes actual adoption behavior as a dependent variable. However, the adoption of a new product is only a starting point in the recent technological product lifecycle. Over the last few decades, consumer studies have begun to be concerned on postpurchase behavior other than the recognized attributes of the primary decision to purchase (Ball & Tasaki, 1992).

The attachment to an everyday product is dynamic compared to the attachment to heirlooms, which generally have deep and symbolic meanings (Mugge, Schifferstein, & Schoormans, 2006a). Mugge and her colleagues developed the model for Product Attachment over time by integrating two factors: (a) determinants and the degree of each factor on Product Attachment, and (b) the importance of each determinant of Product Attachment and improved measurement in related studies (Mugge et al., 2006a, 2010; Mugge et al., 2009a).

Mugge, Schifferstein, and their colleagues were interested in why people hung on to certain products but easily disposed of other products. Hence they conducted a series of studies on the nature of Product Attachment (Mugge et al., 2004, 2010; Mugge, Schoormans, & de Lange, 2007; Mugge et al., 2005, 2009a; Schifferstein et al., 2004; Schifferstein & Zwartkruis-Pelgrim, 2008). Past research on Product Attachment had focused more on the degree of attachment, especially a specific moment in time (Ball & Tasaki, 1992; Kleine et al., 1995; Wallendorf & Arnould, 1988).

Schifferstein and Zwartkruis-Pelgrim (2008) identified and tested seven possible determinants of Product Attachment—enjoyment; memories for persons; places and events; support of self-identity; life-vision; utility; and reliability and market value—and found that

memories and enjoyment had a positive association with attachment. Recently acquired products (owned less than one year) and old products owned more than 20 years showed the highest level of attachment. Therefore, enjoyment may be the major driver for new products, while memories are more valuable for old products in terms of enhancing Product Attachment (Schifferstein & Zwartkruis-Pelgrim, 2008).

Another study also indicated that memories could moderate the effects of utility and the appearance of a product (Mugge et al., 2010). Memories can be formulated in two ways: (a) memory of when the product was acquired (e.g., as a gift, or as an award) and (b) emotional bonding during the possession and use of the products. In Product Attachment, sometimes a product can be regarded as a companion and part of one's life. To my knowledge, no studies have directly addressed the relationship between Product Attachment and modified TAM variables, including additional Perceived Enjoyment as a basic intrinsic attribute. Therefore, the following three hypotheses are formulated here for a specific product, a tablet:

- H1. There is a positive association between Perceived Ease of Use and Product Attachment in tablet use.
- H2. There is a positive association between Perceived Usefulness and Product Attachment in tablet use.
- H3. There is a positive association between Perceived Enjoyment and Product Attachment in tablet use.



## Product Personalization and Product Attachment

Consumer behavior research indicates that attachment includes the concept of having internal consistency when maintaining one's self-concept and attachment is dependent on ownership (planned, current, or past) (Ball & Tasaki, 1992). The relationship between a customer and a product varies based on several milestones. One such milestone is the moment of purchase, and it might be the reason why customer behavior studies are divided into pre-purchase and post purchase.

Personalization is a post-purchase behavior and often observed in the early stage of ownership. Häkkinen and Chatfield (2006) indicate that the act of personalization for mobile phones is achieved during first use (13.5%), first day (19.2%), and first week (19.4%). Strahilevitz and Loewenstein (1998) found that the feeling of ownership and its evaluation of value were both stronger when the individual owned the product for a longer period of time. As ownership duration increases, the product not only gathers instrumental value, but also psychological value, for its owner (Belk, 1988; Csikszentmihalyi & Rochberg-Halton, 1981; Kleine & Baker, 2004; Mittal, 2006).

In spite of the increasing popularity of personalization in both academia and the aftermarket accessory industry, studies on the relationship between Product Personalization and Product Attachment have largely gone unattempted. There has been a series of research studies on personal possessions and spaces; however these studies cannot capture user Product Attachment via personalization behavior for technological products, especially for those "Digital Natives" who have grown up overloaded with IT products (Palfrey & Gasser, 2010). Consequently, the following hypothesis is developed to examine a relationship between Product Personalization

and Product Attachment. However, its path direction is not clearly suggested from previous studies. Hence this study will test two models with a PP→ PA relationship and also the PA→ PP relationship to see which direction pattern predicts better for the overall model.

H4. There is a relationship between Product Personalization and Product Attachment in tablet use.

#### Product Attachment (PA) compared to Expected Product Lifetime

Ultimately, Product Attachment does deliver special and symbolic meaning to its owners (Csikszentmihalyi & Rochberg-Halton, 1981; Kleine et al., 1995; Richins, 1994a, 1994b). If a person has an attachment to a certain product, consequently, that person also shows more protective behaviors, such as a reluctance toward detaching from the product, product care, and postponing replacement (Mugge, 2007). Therefore, strong Product Attachment is reflected in more careful behaviors and can eventually delay actual product replacement (Ball & Tasaki, 1992; Belk, 1988; Mugge et al., 2005; Schultz, Kleine, & Kernan, 1989). Mugge (2007) found a positive relationship between Product Attachment and product lifetime.

Van Nes and Cramer (2006) declared that the product retention period before being replaced or discarded is primarily the result of consumer purchasing behavior and motivation. In the same vein, the frequency of product replacement can be delayed by having a strong emotional relationship between the user and the product (Ball & Tasaki, 1992; Cooper, 2005; Mugge et al., 2004; Mugge et al., 2005; Schifferstein & Zwartkruis-Pelgrim, 2008). Repeated pleasurable experiences with a product can build a psychological attachment, and consequently that attachment may result in greater product longevity (Ko, Ward, & Ramirez, 2011).

There has been a limited amount of literature on this subject. The available literature includes conceptual design proposals (Knot, 2000; Van Hinte, 1997), discussion on environmental desirability (Cooper, 1994a, 1994b), and conceptual thinking studies (Hinterberger, Kranendonk, Welfens, & Schmidt-Bleek, 1994; Stahel, 1986, 1994, 1998; Stahel & Jackson, 1993). Therefore, the following hypothesis is proposed.

H5. There is a positive association between Product Attachment and Expected Product Lifetime for tablet use.

#### Differences in adopter categories for Product Personalization and Product Attachment

While there has been a considerable amount of research on which attributes of the Innovation Diffusion Theory (IDT) can predict user adoption of a certain product or service, far fewer studies have been done to attempt to understand the characteristics of each adopter category. Some studies have provided evidence of significant differences between different adopter categories. Liu and Li (2010) found that innovators (earliest users) tend to use the mobile Internet for enjoyment and early adopters for use context, while late majority had more concerns with complexity. This study argues that it is important to investigate the differences in each adopter group so as to achieve a more complete view of the diffusion process. Adopters are not a homogenous entity (Liu & Li, 2010).

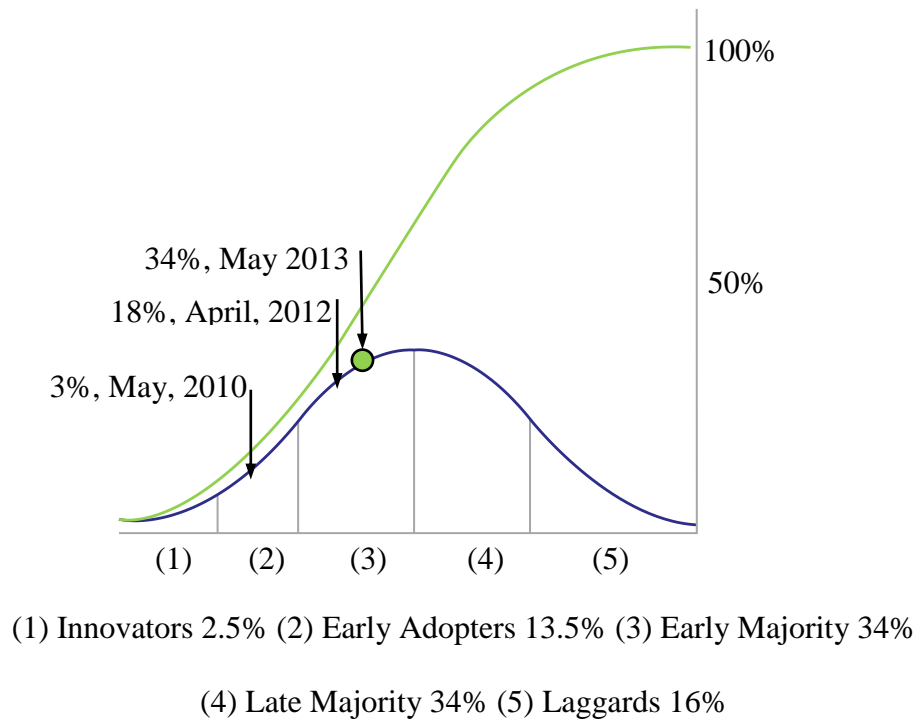
It has long been known and accepted that the classification regarding adopter social status could be the weakest point due to a lack of theoretical justification as indicated in the previous IDT literature (Liu & Li, 2010). Rogers and Shoemaker (1971) reviewed hundreds of publications and empirical studies, regardless of their support of the theory, and clarified that

earlier adopters did not differ from later adopters in age and personality generalization. However, Rollins (1993) suggested that early adopters had more contact with change agents compared to later adopters in terms of communication behavior.

In Jin's study on the Internet, content filtering software, and attitudes toward children's Internet use (2013), he found no significant differences between innovators and early adopters for all the variables (ease of use, usefulness, information, satisfaction, interest, product quality and control), but significant differences in a comparison between innovators and early majority and between innovators and late majority. Chau and Hui (1998) indeed argued that the identification of first customers was a key success factor for any given product.

Current tablet owners can fall into 3 groups (Innovators, Early adopters, Early majorities) based on when they purchase their tablet. CDI dashboard (2013) has provided tablet penetration since 2010 and shows that it reached 3% (approximately categorized as innovators) in May of 2010 and 18% in April of 2012 (early adopters), shown in Figure 3. Those customers who bought their tablets after April of 2012 fall into the early majority group.

Figure 3: Tablet Penetration (May of 2013)



Although its importance is seen for understanding earlier adopters, little research has been attempted, and limited knowledge is available to examine the difference in adopter categories. For earlier adopters study, the tablet can be a good subject because the current tablet penetration is just over the early adopter group at 32% and has spread to the early majority group. Thus, the following hypothesis will be tested in the current study.

H7. There is a significant group difference on Product Attachment and Expected Product Lifetime between Innovators/Early Adopters and Early Majority in tablet use.

## CHAPTER 3

### METHOD

#### Measures

The final questionnaire employed multiple items to measure each construct in the proposed research model. The pre-validated measurement scales were adopted from previous studies with modified wording to fit the specific context of this current study. All four theoretical constructs from the modified Technology Acceptance Model (TAM) and Product Attachment were measured using a 5-point Likert-type scale; hence the responses delivered were in the form of a range of agreement, where 1 meant strongly agree and 5 meant strongly disagree.

The five items for each construct of Perceived Usefulness and Perceived Ease of Use (PEOU) were taken from past studies (Hsu & Lu, 2004; Nysveen et al., 2005) and modified for the context of tablet use. Reliability for PU ( $\alpha = .93$ ) and PEOU ( $\alpha = .89$ ) were offered from Sheng and Teo's study (2012), and five items were taken from previous studies to measure perceived enjoyment (PE) ( $\alpha = .94$ ) (Nysveen et al., 2005; Sung & Yun, 2010; Van der Heijden, 2003; Yu et al., 2005). To measure Product Attachment, four items ( $\alpha = .88$ ) were taken from a previous study (Mugge, Schifferstein, & Schoormans, 2006b), and one item was added from two other studies (Kleine et al., 1995; Tractinsky & Zmiri, 2006). All of the measurement items are shown in Appendix.

Product Personalization was operationalized with an open ended question on how much money was spent on buying accessories of tablets in USD. In addition to this question, the possession of tablet accessories was also asked for various images of tablet accessories in seven categories—bags, cases/cover/sleeves/pouches, stickers/decals, keyboard/styluses, stand/mounts,

and others. These seven categories were gathered from several large stationary and electronic commerce websites. To define adopter categories, purchase time was asked and the participant was requested to identify the older time if a respondent owned multiple tablets. Finally, demographic questions were also included, such as gender, birth year, ethnicity, level of education, and household income.

### **Sampling and Data Collection**

The data set for this study was collected to test the hypotheses using an online survey administered in April and May of 2013. A survey link was distributed through email invitations and sharing of the link on social network sites. The consent form on the first page stated that having a tablet was a requirement for participation. Participants were assured of anonymity and privacy and allowed to skip any questions and stop the survey at anytime. A chance to join a random draw for one of four \$20 Amazon gift cards as an incentive was offered in a separate survey to ensure that all answers had no link to their identifiable information, i.e., email addresses, for privacy of respondents.

The population of this study was tablet users over 18 and residing in U.S. It was not a very large population and thus difficult to obtain samples due to only approximately 34% of current tablet penetration (Zickuhr, 2013). Half of samples were collected through the snowball sampling, i.e., Social Network Sites' postings, and half of the responses were purchased from Survey Sampling International LLC (<http://www.surveysampling.com>) so as to collect data from diverse groups. The participants were recruited from Survey Sampling International's panel pool, which consisted of various groups of people who had willingly registered to participate in the survey.

An online survey was designed for the study using WebSurveyor (<http://research.adv.msu.edu/ss>) and posted for approximately one month. The approximate time to complete the survey was ten to fifteen minutes. A total of 261 responses were collected; however, 19 were disqualified because they were not tablet users. Another 30 samples were also excluded because these participants could not remember when they purchased or gifted the tablet. The remaining usable samples for analysis totaled 212. The collected data were analyzed using the SPSS statistical software package (SPSS 16) and Smart PLS (version 2.0.M3).

## **Data Analysis**

The average age of the participants was 30, and the largest age in this group was between 30 and 49 (54.2%), followed by 18-29 (22.2%) and 50-64 (19.3 %). There was no significant difference in gender, as it was almost evenly split male (47.2%) and female (52.8%). Most respondents were Caucasian/White (67.9%) and Asian (16%). In terms of household income, 39.2% of respondents indicated incomes of more than \$75,000 followed by a group with incomes between \$50,000 and \$49,999 (24.5%). More detailed demographic statistics of all participants and the adopter groups are listed in Table 6.



Table 6: Participant Demographic Information (N=212)

		%		
		All (N=212)	Innovator & Early Adopter (n=81)	Early Majority (n=131)
<b>Gender</b>	Male	47.2	45.7	48.1
	female	52.8	54.3	51.9
<b>Age</b>	18-29	22.2	21.0	22.9
	30-49	54.2	56.8	52.7
	50-64	19.3	18.5	19.8
	65+	4.2	3.7	4.6
<b>Education</b>	Rather not say	7.5	1.2	11.5
	High school	17.9	18.5	17.6
	Some college	30.2	25.9	32.8
	Graduate degree	44.3	54.3	38.2
<b>ethnicity</b>	Rather not say	.9	1.2	.8
	African American	6.1	6.2	6.1
	Caucasian/White	67.9	67.9	67.9
	Hispanic or Latino	5.7	4.9	6.1
	Asian	16.0	17.3	15.3
	All others*	3.2	2.5	8.4
<b>Income</b>	Rather not say	7.5	8.6	6.9
	Less than \$30,000	10.4	7.4	12.2
	\$30,000-\$49,999	18.4	18.5	18.3
	\$50,000-\$74,999	24.5	28.4	22.1
	\$75,000+	39.2	37.0	40.5

\* All others included American Indian, Native Hawaiian /Pacific Islander, Multiracial, and Member of race not listed above

Along with demographic information, this study also collected data on tablet experience with the number of tablets used (currently used and no longer used), and the operating systems for the current tablet. This information is shown in Table 7 where 56.6% of the people answered

that they had experienced only one tablet, followed by two tablets (32.5%), three tablets (6.6%).

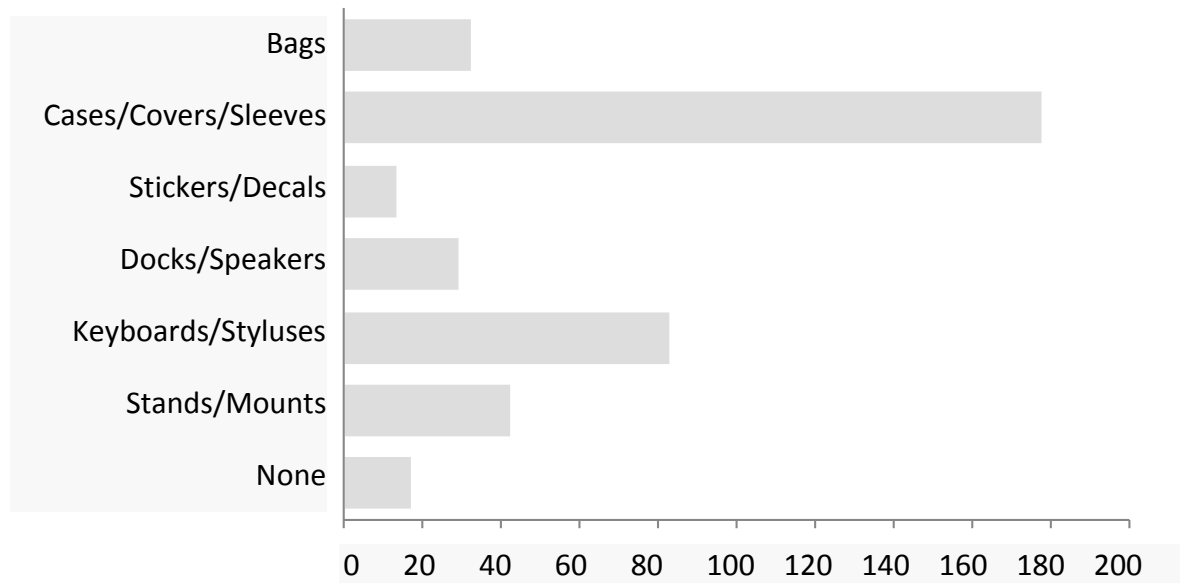
In terms of the tablet operating systems, almost half (49%) of the respondents used iOS-operated tablets, followed by Android (43.2%) and Windows (5.8%).

Table 7: Tablet Possession Experience and Operating System of Current Tablet (N=212)

		%		
		All (N=212)	Innovator & Early Adopter (n=81)	Early Majority (n=131)
<b># of tablets</b>	1	56.6	66.7	50.4
	2	32.5	29.6	34.4
	3	6.6	3.7	8.4
	4	0.9	0	1.5
	5	2.8	0	4.6
	6 or more	0.5	0	0.8
<b>Operating System</b>	iOS	49.0	55.2	45.4
	Android	43.2	38.5	46.0
	Windows	5.8	4.2	6.7
	Other	1.9	2.1	1.8

In terms of tablet accessory purchase experience, two questions were asked regarding the types of accessories purchased and the amount of money spent on them. Tablet accessories were categorized into seven types, given from e-commerce websites and previously mentioned in the other surveys and included Bags, Cases/Covers/Sleeves, Stickers/Decals, Docks/Speakers, Keyboards/Styluses, and Stand/Mounts. Example images for each category were also provided in the survey. In the second question, the respondents were asked how much money they had spent to buy tablet accessories for their current tablet as an open-ended question. Figure 4 indicates the types of accessories purchased.

Figure 4: Types of Tablet Accessories Purchased



Total responses for accessory purchased were 395 based on multiple choices, and the most popular accessory purchased was cases/covers chosen by nearly half of the respondents (45%), followed by keyboards/styluses (21%), and stands/mounts (11%). Only 4% answered that they had purchased no accessories. As for the amount of money spent on a tablet accessory purchase, 17 respondents spent no money and, one respondent spent more than \$1,000. The average of money spent was \$90 ( $SD=133.228$ ), and 70% of respondents spent less than \$100. That detail is given in Table 8.

Table 8: Money Spent on Tablet Accessory Purchases

Money Spent	# of respondents	%
0	17	8
5-50	100	47
51-100	49	23
101-150	17	8
151-200	13	6.1
201-300	6	2.8
301-400	5	2.4
401-500	2	0.9
500+	3	1.4

## CHAPTER 4

### RESULTS

The Partial Least Squares (PLS) 2.0 M3 was used to test Hypotheses 1~4 for clarifying the determinants of Product Attachment, and Hypothesis 5 for understanding the relationship between Product Attachment and Expected Product Lifetime. PLS was chosen to analyze data due to it having two advantages over other methods. First, PLS has been shown that it is suitable for theory-building research to emphasize the predictive power of a model (Chin & Newsted, 1999; Gefen & Straub, 2003). Second, PLS enables the identification of the relationships between constructs (structure model) and between items and corresponding constructs (measurement model).

In addition, there were two more additional advantages for using PLS over other methodologies. First, PLS provides more accurate estimates by allowing multiple measures for each construct (Chin & Gopal, 1995; Khalifa & Liu, 2002). Second, PLS can access the model well due to its ability to deal with a small sample size. Carrascal, Galván and Gordov (2009) found that PLS was more reliable than other approaches “when identifying relevant variables and their magnitudes of influence, especially in cases of small sample size and low tolerance” (p.681).

The minimum sample size for PLS analysis requires 1) 10 times the number of items for the most complex construct, or 2) 10 times the largest number of independent variables, which impact on a dependent variable (Chin & Newsted, 1999). In this study, all three modified TAM constructs as independent variables had five items each; therefore the minimum sample size was 50. The number of samples collected was 212, more than the needed sample size of 50 for PLS analysis.

To ensure an effective sample size, a post-hoc power analysis was also performed using G\*Power (3.1.0) software. Based on the medium effect size of 0.15 by convention, alpha error probability of 0.05, and a power of 0.8 (Cohen's *d* for large effect size), the G\*Power calculated a total sample size as 85. Therefore, the collected samples of 212 achieved further statistical support and confidence as an adequate sample size.

### **Scale Reliability and Validity**

All measurement items of the two constructs (PU and PEOU) from the Technological Acceptance Model (TAM), Perceived Enjoyment (PE), and Product Attachment construct were evaluated using various tests to validate the instrument for the survey. All means, standard deviation, and item-total correlation are listed in Table 9. The majority of items showed high reliability with factor loadings well above .50, except for one item from Product Attachment. The measurement items loaded more on the latent variable than other variables did, resulting in satisfaction of the discriminant validity (Gefen, Straub, & Boudreau, 2000). Factor loadings for all the items are shown in Table 10.

Table 9: Descriptive Statistics (Item Statistics)

Construct	item	Mean	Standard Deviation	item –total correlations
PEOU	PEOU1	4.52	.725	.824
	PEOU2	4.33	.800	.757
	PEOU3	4.39	.839	.741
	PEOU4	4.31	.853	.805
	PEOU5	4.42	.790	.850
PU	PU1	4.04	.880	.828
	PU2	4.19	.768	.748
	PU3	3.97	.936	.862
	PU4	3.81	1.074	.850
	PU5	4.28	.705	.702
PE	PE1	4.57	.639	.726
	PE2	4.48	.705	.794
	PE3	4.04	.925	.668
	PE4	4.36	.764	.823
	PE5	4.42	.721	.823
PA	PA1	3.71	1.024	.804
	PA2	3.54	1.149	.841
	PA3	3.25	1.238	.783
	PA4	3.11	1.279	.355
	PA5	3.73	.978	.676

Table 10: CFA Loadings Matrix (Item statistics)

	PU	PEOU	PE	PA
PU1	<b>0.8866</b>	0.3559	0.5418	0.5332
PU2	<b>0.8393</b>	0.3653	0.5828	0.5472
PU3	<b>0.9109</b>	0.3385	0.5532	0.5854
PU4	<b>0.9032</b>	0.2748	0.5200	0.5675
PU5	<b>0.8116</b>	0.3539	0.6123	0.5665
PEOU1	0.2881	<b>0.8796</b>	0.4094	0.1920
PEOU2	0.4154	<b>0.8702</b>	0.4719	0.3407
PEOU3	0.2811	<b>0.8280</b>	0.4132	0.2522
PEOU4	0.3496	<b>0.8704</b>	0.3146	0.2354
PEOU5	0.3173	<b>0.9073</b>	0.4611	0.2791
PE1	0.4705	0.4434	<b>0.8091</b>	0.4169
PE2	0.4967	0.5217	<b>0.8695</b>	0.5158
PE3	0.6420	0.3268	<b>0.8121</b>	0.6420
PE4	0.5834	0.3637	<b>0.8936</b>	0.5504
PE5	0.5262	0.4374	<b>0.8897</b>	0.5058
PA1	0.5362	0.2905	0.4999	<b>0.8929</b>
PA2	0.5958	0.2574	0.5731	<b>0.9255</b>
PA3	0.5796	0.2054	0.5447	<b>0.8994</b>
PA4	0.2438	0.1501	0.2785	<b>0.4524</b>
PA5	0.5900	0.3408	0.6059	<b>0.8314</b>

The results for tests for internal consistency, convergent validity, discriminant validity, and Cronbach's  $\alpha$  are shown in Table 11. Cronbach's alphas for all the constructs were in a very good range over 0.8. De Vellis's (2003) guidelines were used to interpret Cronbach's alpha as follows: Below 0.60: unacceptable; between 0.60 and 0.65: undesirable; between 0.65 and 0.70: minimally acceptable; between 0.70 and 0.80: respectable; between 0.80 and 0.90: very good; much above 0.90. All other values also exceeded the recommended rule of thumb for values.



Internal consistency showed well above the 0.7 threshold, and constructs' AVE exceeded the 0.5 guideline for convergent validity (Fornell & Larcker, 1981). Convergent validity requires that measures that should be related are in reality actually related. For overall item validation, one item from Product Attachment was removed due to low item –total correlation and CFA Loading (See Tables 4, 5 and 6). Based on the exploratory nature of this study, validity and reliability of the scales were also all adequate.

Table 11: Item Loadings for Related Factor

Construct	item	Loading	Composite Reliability (Internal Consistency)	Convergent Validity (AVE)	Discriminant Validity ( $\sqrt{\text{AVE}}$ )	Cronbach's Alpha
PEOU	PEOU1	0.8798	0.9404	0.7595	0.8715	.921
	PEOU2	0.8702				
	PEOU3	0.8277				
	PEOU4	0.8704				
	PEOU5	0.9074				
PU	PU1	0.8866	0.9402	0.7590	0.8712	.920
	PU2	0.8394				
	PU3	0.9109				
	PU4	0.9032				
	PU5	0.8116				
PE	PE1	0.8092	0.9317	0.7321	0.8556	.908
	PE2	0.8696				
	PE3	0.8118				
	PE4	0.8937				
	PE5	0.8899				
PA	PA1	0.8915	0.9073	0.6719	0.8197	.866
	PA2	0.9249				
	PA3	0.8964				
	PA4	0.4622				
	PA5	0.8311				

Discriminant validity was also evaluated using the conservative approach by comparing the average variance extracted (AVE) for each factor with the squared inter-construct correlations (Hair, Anderson, Tatham, & Black, 1998). The discriminant validity refers to measures that should not be related and are in reality not related. The discriminant validity is proven if the latent variable AVE is larger than common variances (squared correlation) of any other of the model constructs (Götz, Liehr-Gobbers, & Krafft, 2010). Simply put, the value along the diagonal of the correlation matrix in Table 12 should be greater than the values in each row or column. Table 12 showed that all cases satisfied this condition, and thus discriminant validity was proven.

Table 12: AVE and Squared Correlations\*

	PA	PE	PEOU	PU
PA	0.6717			
PE	0.3935	0.7321		
PEOU	0.0955	0.2328	0.7595	
PU	0.4146	0.4167	0.1501	0.7590

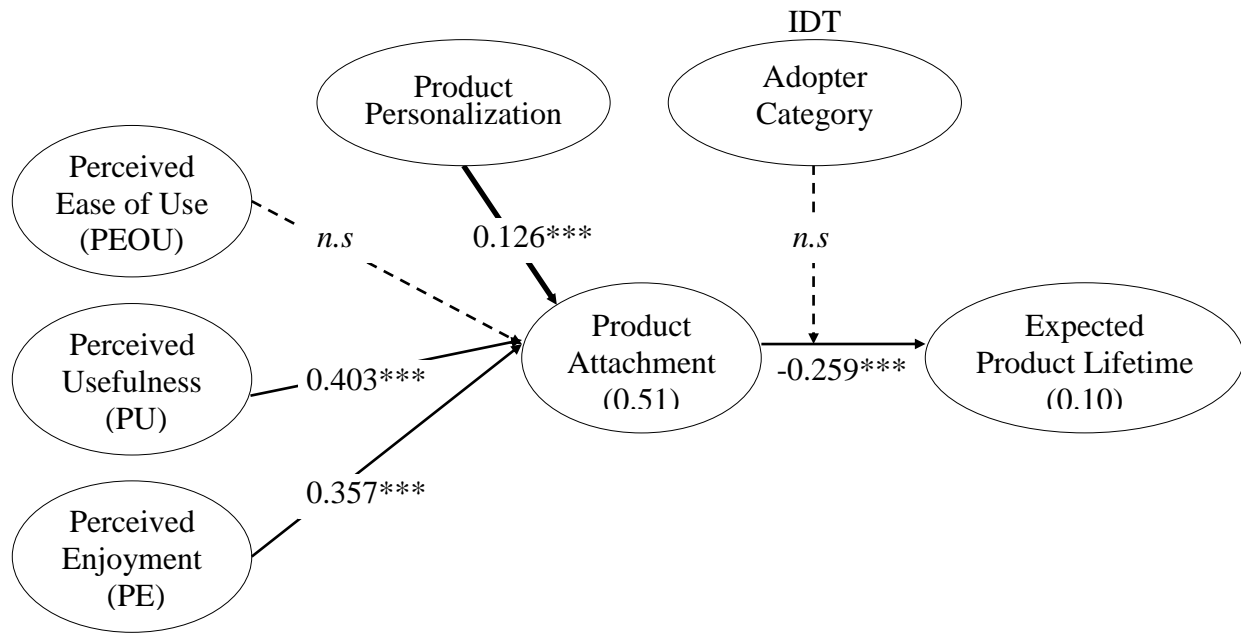
\*Diagonal shows the AVE and the values below the diagonal are squared correlations

## Hypothesis Testing

All hypotheses were tested using PLS 2.0. Little research has studied the relationship between Product Personalization and Product Attachment. Consequently, the two models were analyzed with the same constructs to observe which causal direction showed a bigger explanatory power, the one with the direction from Product Personalization to Product Attachment (PP→PA in Model 1) or, the other with a direction from Product Attachment to

Product Personalization (PA→PP in Model 2). These results are shown in Figure 5 and Table 13 (Model 1), and Figure 6 and Table 14 (Model 2).

Figure 5: Model 1 Path Model Result/Outcome

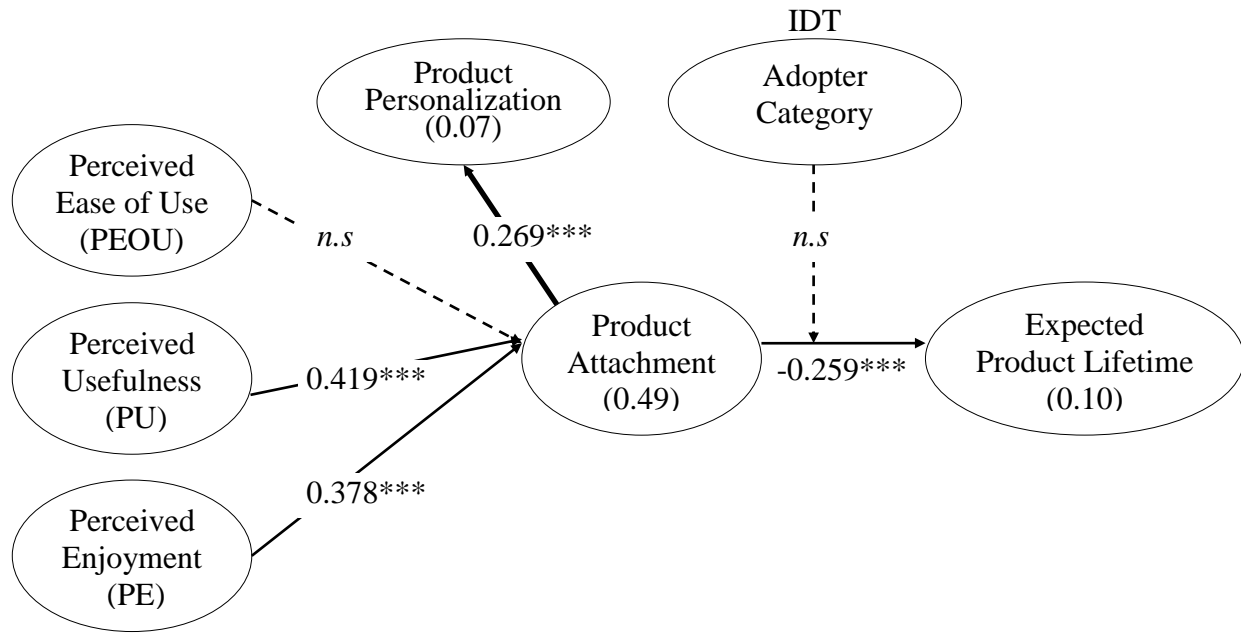


\*\*\*p < .001

Table 13: Model 1 Hypotheses Validation

		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics ( O/STERR )	Sig
<b>H1</b>	PEOU → PA	-0.0250	-0.0252	0.0217	0.0217	1.1521	<i>n.s</i>
<b>H2</b>	PU → PA	0.4029	0.4030	0.0266	0.0266	15.1376	<.001***
<b>H3</b>	PE → PA	0.3566	0.3577	0.0308	0.0308	11.5971	<.001***
<b>H4</b>	PP → PA	0.1251	0.1255	0.0144	0.0144	8.7041	<.001***
<b>H5</b>	PA → Expected Product Lifetime	-0.2586	-0.2558	0.0308	0.0308	8.3932	<.001***

Figure 6: Model 2 Path Model Result/Outcome



\*\*\* $p < .001$

Table 14: Model 2 Hypotheses Validation

		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics ( O/STERR )	Sig
<b>H1</b>	PEOU → PA	-0.0420	-0.0441	0.0204	0.0204	2.0562	<i>n.s.</i>
<b>H2</b>	PU → PA	0.4192	0.4198	0.0318	0.0318	13.1738	<.001***
<b>H3</b>	PE → PA	0.3782	0.3792	0.0369	0.0369	10.2534	<.001***
<b>H4</b>	PP → PA	0.2691	0.2693	0.0200	0.0200	13.4813	<.001***
<b>H5</b>	PA → Expected Product Lifetime	-0.2577	-0.2588	0.0303	0.0303	8.5196	<.001***

The statistically significant path model results are detailed in Tables 8 and 9. Model 1, in which Product Personalization (PP) was expected to influence Product Attachment, indicated

that Perceived Usefulness, (PU), Perceived Enjoyment (PE), and Product Personalization (PP) had a strong influence on product attachment, which supported H2 ( $\beta = .403, p < .001$ ), H3 ( $\beta = .357, p < .001$ ), and H4 of PP→PA direction ( $\beta = .126, p < .001$ ). Interestingly, Perceived Ease of Use (PEOU) had no significant effect on Product Attachment; therefore, H1 was rejected. Product Attachment showed a negative relationship with Expected Product Lifetime and also supported ( $\beta = -.259, p < .001$ ).

Model 2, in which Product Attachment (PA) helps to explain Product Personalization (PP), showed almost the same results for supporting H1 (*n.s*), (no significant impact of Perceived Ease of Use (PEOU) on PA). In Model 2, both H2 ( $\beta = .419, p < .001$ ), and H3 ( $\beta = .378, p < .001$ ) (the impact of PU and PE on PA) were supported. The PA→PP direction (H4) showed a higher  $\beta$  ( $\beta = .269, p < .001$ ) than PP→PA direction ( $\beta = .126, p < .001$ ). The PA → PP direction also indicated a negative relationship between Product Attachment and Expected Product Lifetime ( $\beta = -.259, p < .001$ ). In other words, more Product Attachment was associated with shorter Expected Product Lifetime.

As shown in Figure 5 and 6, the explanatory power for Product Attachment and Expected Product Lifetime were almost identical in explaining 49% (Model 1) or 51% (Model 2) of variance in Product Attachment, and 10% of variance in Expected Product Lifetime (Model 1 & 2), however, the  $\beta$ s for PU and PE were higher in Model 2 (Table 15). Especially, the relationship between Product Personalization and Product Attachment in Model 2 [H4:  $\beta = .269, p < .001$ ] was almost twice as large as that in Model 1 [H4:  $\beta = .126, p < .001$ ]. In Model 2, Product Attachment explained 7% of the variance in Product Personalization, so overall, Model

2 can be regarded as a better model to use to explain Product Attachment and Product Attachment can provide a better explanation for Product Personalization than vice versa.

Table 15: All  $\beta$ s Comparisons for Model 1 and 2

		$\beta$ in Model 1	$\beta$ in Model 2
H1	PEOU $\rightarrow$ PA	<i>n.s</i>	<i>n.s</i>
H2	PU $\rightarrow$ PA	0.403***	<b>0.419***</b>
H3	PE $\rightarrow$ PA	0.357***	<b>0.378***</b>
H4	PP $\rightarrow$ PA	0.126***	-
	PA $\rightarrow$ PP	-	<b>0.269***</b>
H5	PA $\rightarrow$ Expected Product Lifetime	-0.259***	<b>-0.259***</b>

Reviewing the results shown in Tables 8 & 9, Hypotheses 2~4 were supported with a significance of .001, except H1 for the relationship between Perceived Ease of Use (PEOU) and Product Attachment (PA). This result clearly indicated that Product Attachment was explained by Perceived Usefulness (PU), and Perceived Enjoyment (PE), and Product Personalization (PP). The higher level of Perceived Usefulness, Perceived Enjoyment, and Product Personalization that users showed indicated that higher Product Attachment could be found. However, the PA $\rightarrow$ PP causal relationship was higher than the PP $\rightarrow$ PA relationship. Interestingly enough, a negative association was found in the relationship between the Product Attachment and the Expected Product Lifetime.

Detailed examination of Perceived Ease of Use data yielded a possible explanation for the lack of support for H1. Descriptive analysis of PEOU shows a high mean value (mean=4.6)

and median value (median=4.4) on a 5-point Likert scale. Floor effects were analyzed using SPSS to understand the given highly skewed and monotonous responses. The given skewness was presented for -1.6, which was twice or three times higher than PU (-0.561), PE (-0.783) and PA (-0.213) (See Figure 7 and Table 16). The floor effect of PEOU is considered present if more than 15% of respondents achieved the highest possible score (Terwee et al., 2007). A percentile analysis showed that 35.4% of the respondents had the highest score possible; hence there was a ceiling effect on PEOU.

Figure 7: Histogram for Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Perceived Enjoyment (PE), and Product Attachment (PA)

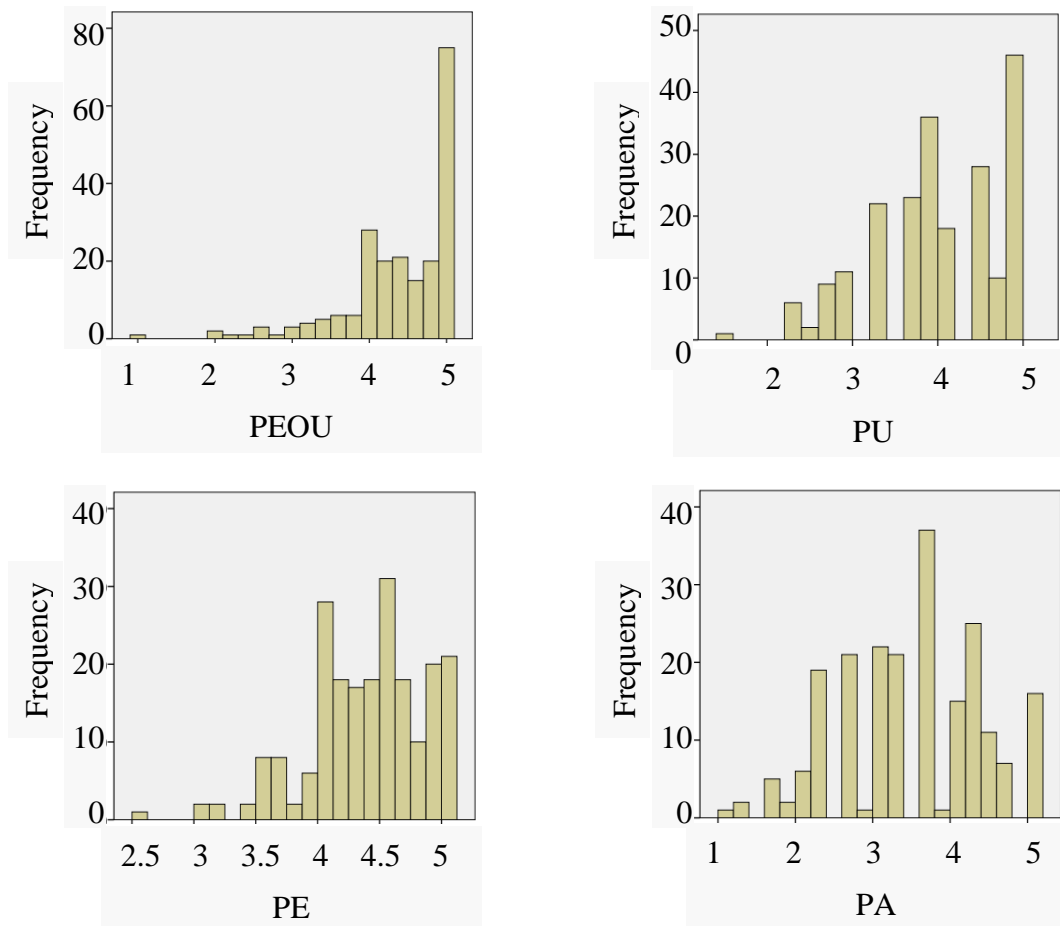


Table 16: Descriptive Statistics for Perceived Ease of Use, Perceived Usefulness, Perceived Enjoyment, and Product Attachment

	PEOU	PU	PE	PA
Mean	4.40	4.06	4.37	3.47
Median	4.60	4.00	4.40	3.60
Std.Dev.	0.698	0.763	0.46	0.91
Skewness	-1.61	-0.561	-0.783	-0.213
Kurtosis	3.4	-0.215	0.716	-0.551

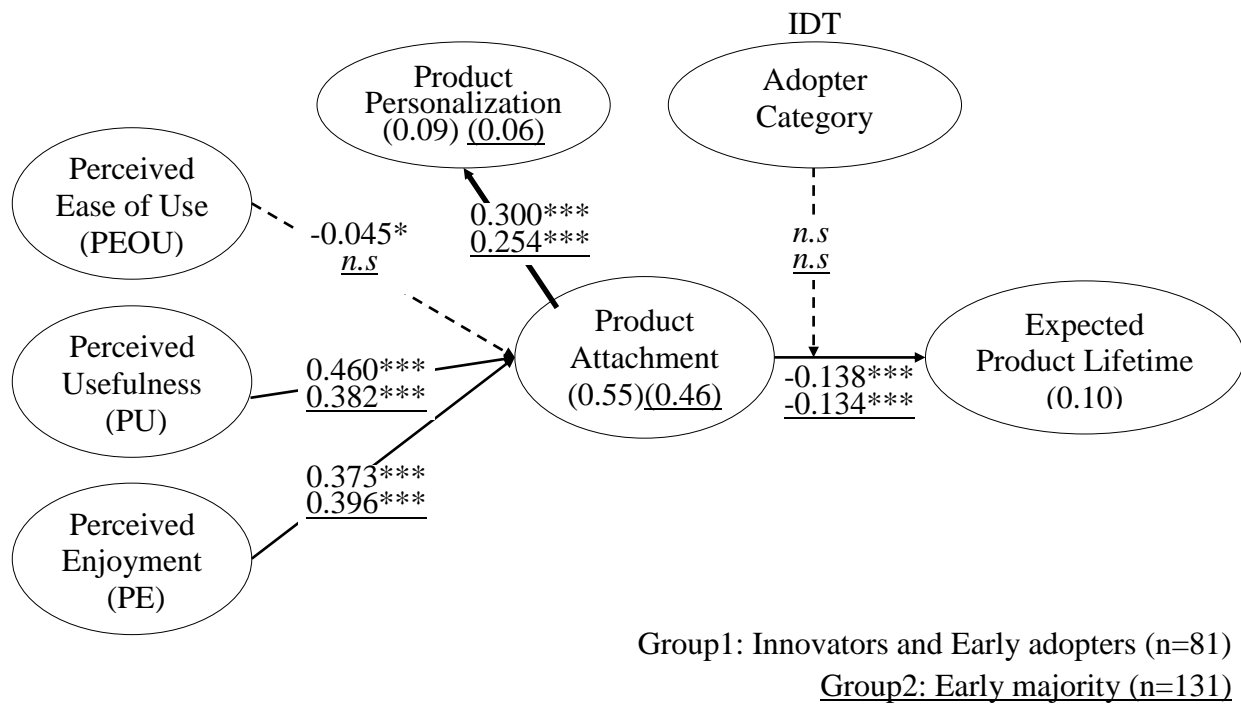
Next, adopter group differences implied by Innovation Diffusion Theory (IDT) were examined. Rogers (2003) identified five successive groups (Innovator, Early adopter, Early majority, Late majority, and Laggard) based on the time when they adopted the innovation. These five groups corresponded to 2.5%, 13.5%, 34%, 34%, and 16% of total consumers of innovation, respectively (Rogers, 2003). As of May, 2013, tablet penetration was 34%, so consequently current owners fell into the first three groups (Zickuhr, 2013).

Study participants were asked to estimate the month and year when they purchased (or were gifted with) their first media tablet. Based on the statistics provided by CDI dashboard (2013), five respondents were categorized as innovators who bought the tablet before May of 2010; 76 respondents were grouped as early adopters' acquiring the product before April of 2012; and other 131 participants bought the tablets after that time period and were thus classified as early majority. By definition, the innovator category is relatively very small, and past studies have shown that there was not much difference between innovators and early adopters in terms of behavior (Beaudoin, Lachance, & Robitaille, 2003; Jin, 2013), so both innovators and early adopters combined into a single group for data analysis purposes. The first group consisted of a



total of 81 innovators and early adopters, and the second group consisted of 131 that were early majority.

Figure 8: Group Comparisons (Model 2)



\*p < .05, \*\*p < .01, \*\*\*p < .001

Table 17: Hypotheses Testing for Group comparisons for Model 2

<b>Group 1 Innovator &amp; Early Adopters (n=81)</b>		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics ( O/STERR )	Sig
<b>H1</b>	PEOU → PA	-0.0448	-0.0449	0.0174	0.0174	2.5718	<b>&lt;.05*</b>
<b>H2</b>	PU → PA	0.4595	0.4598	0.0302	0.0302	15.2361	<b>&lt;.001***</b>
<b>H3</b>	PE → PA	0.3727	0.3724	0.0339	0.0339	10.9776	<b>&lt;.001***</b>
<b>H4</b>	PA → PP	0.2997	0.3012	0.0198	0.0198	15.1138	<b>&lt;.001***</b>
<b>H5</b>	PA → Expected Product Lifetime	-0.1857	-0.1910	0.0339	0.0339	5.4735	<b>&lt;.001***</b>
<b>Group 2 Early Majority (n=131)</b>		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics ( O/STERR )	Sig
<b>H1</b>	PEOU → PA	-0.03898	-0.04257	0.02487	0.02487	1.567382	<b><i>n.s</i></b>
<b>H2</b>	PU → PA	0.382293	0.38216	0.02827	0.02827	13.52271	<b>&lt;.001***</b>
<b>H3</b>	PE → PA	0.396342	0.401237	0.029736	0.029736	13.328639	<b>&lt;.001***</b>
<b>H4</b>	PA → PP	0.253578	0.254856	0.018017	0.018017	14.073986	<b>&lt;.001***</b>
<b>H5</b>	PA → Expected Product Lifetime	-0.335379	-0.332907	0.031498	0.031498	10.647642	<b>&lt;.001***</b>

Two separate group data sets —innovators and early adopters listed as Group 1 (Early Adopters, n=81) and early majority listed as Group 2 (Early Majority, n=131)—were separately analyzed and compared as shown in Figure 8 and Table 17 above. The results of this group comparison presented a similar output to a research model with all participants. Whereas Perceived Usefulness had a bigger impact on Product Attachment among Early Adopters ( $\beta = .460$ ,  $p < .001$ ) than among the Early Majority ( $\beta = .382$ ,  $p < .001$ ), Perceived Enjoyment showed a slightly bigger impact on the Early Majority Group ( $\beta = .396$ ,  $p < .001$ ) than on the Early Adopters Group ( $\beta = .373$ ,  $p < .001$ ).

Another finding in the group comparison was that Perceived Ease of Use had a significant negative effect on Product Attachment in Early Adopter group ( $\beta = -.045$ ,  $p < .05$ ), whereas the Early Majority Group did not show that significance. It can be understood thusly that innovators and early adopters had less Product Attachment if they perceived that the product required little effort or was free of effort. For Early Adopters, more effort was associated with more attachment. Still, more investigation is needed to understand why Perceived Ease of Use was not affecting the Early Majority.

A one-way ANOVA was also performed to identify any group differences between Early Adopters and Early Majority for other variables, including all five demographic variables (gender, age, education, ethnicity, and household income). The level of education was the only variable to show a significant group difference, shown in Table 18. No difference between adopter groups was found in how much money was spent on personalization accessories, Expected Product Lifetime, and the four demographic variables (gender, age, ethnicity, and household income).

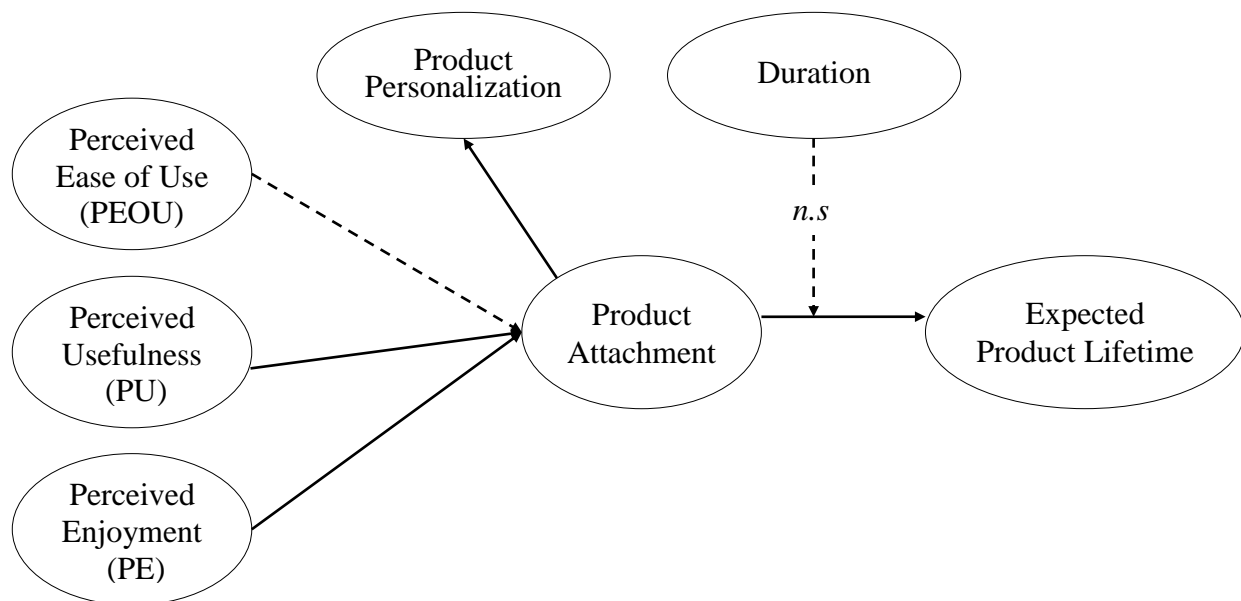
Table 18: Results of ANOVA in Group Differences

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
<b>Education</b>	Between Groups	13.418	1	13.418	7.064	.008
	Within Groups	398.903	210	1.900		
	Total	412.321	211			

Additionally, IDT group recoded as a continuous variable—duration of possession—to test if duration variable could play a mediating role, like shown Figure 9. The purchase moment

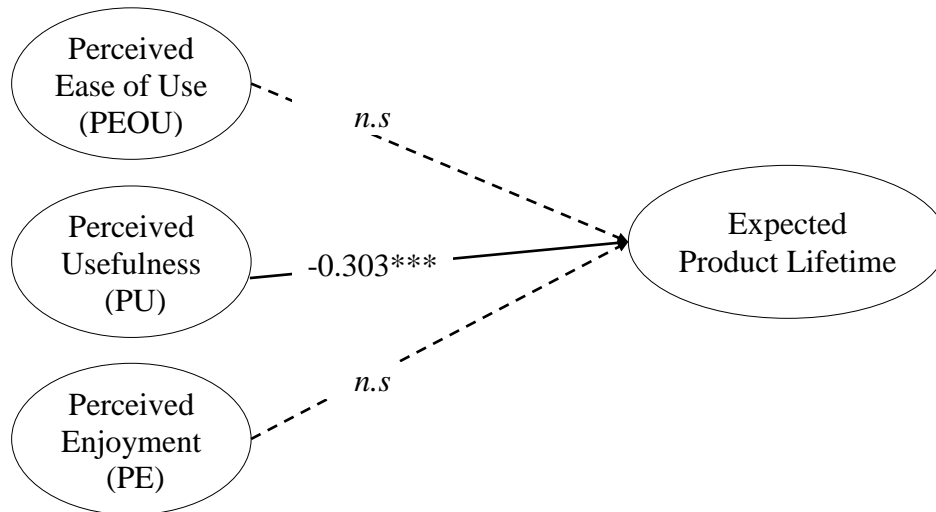
(Month/Year) was recoded how long the participant possessed the current tablet. Baron and Kenny (1986) argued several requirements that must be met before claiming a mediating relationship. There are two significant relationships; 1) between the independent variable and the mediator, and 2) the mediator and between the independent and dependent variable (Baron & Kenny, 1986). In the previous test, the relationship between the independent and dependent variable was significant but the relationship between the independent variable and the mediator did not show significance. Therefore, the duration did not play a role as a mediator.

Figure 9: A test of duration as a mediating variable



Finally, a direct relationship from the three variables from modified Technology Acceptance Model (TAM) to the Expected Product Lifetime was examined and found that only Perceived Usefulness had a significant negative relationship on Expected Product Lifetime. Perceived Ease of Use and Perceived Enjoyment did not indicate significance.

Figure 10: A test from PEOU, PU and PE to Expected Product Lifetime



## CHAPTER 5

### DISCUSSION

In an era of easily discarded technological products, regardless of whether those products still work, understanding behavior in terms how consumers form Product Attachment and how that attachment affects Expected Product Lifetime would be beneficial for manufacturers. Product Attachment and Expected Product Lifetime have largely not been explored by either academic researchers or practitioners in the industry. Whereas existing academic studies using the Technology Acceptance Model (TAM) have heavily focused on adoption, this study employed Product Attachment as a dependent variable, moving TAM's outcome focus beyond a simple dichotomous adoption decision.

This research clarified the determinants of Product Attachment from modified TAM. The results clearly showed that 50% of variance on Product Attachment can be explained by modified TAM variables; Perceived Ease of Use, Perceived Usefulness, and Perceived Enjoyment. Perceived Enjoyment had a slightly bigger predictive power (41.4%) than did Perceived Usefulness (37.6%) in Model 2 (both in  $p > .001$ ) with the whole sample. In a group comparison, Early Adopters (Combining innovators and early adopters) was affected more by Perceived Usefulness than Perceived Enjoyment, whereas Early Majority Adopters were influenced more by Perceived Enjoyment than Perceived Usefulness.

Since TAM originated from a work-related environment, Perceived Usefulness is regarded as the strongest antecedent of attitude and intention and adopted in most TAM research (Moon & Kim, 2001). Pedersen's study on early adopters for mobile commerce (2005) indicated that the adoption decisions of innovators and early adopters came from more functional and instrumental

perspectives with their own knowledge and experience. He also expected that user friendliness (same as Perceived Ease of Use) might be much more important in terms of explaining the decision to adopt a certain mobile service for late adopters or laggards (Pedersen, 2005).

Perceived Enjoyment was added later to overcome the weakness of the theory— the lack of intrinsic variables— and so less studied than other two variables (Perceived Ease of Use and Perceived Usefulness). However, a study on Internet messaging found no significant difference between early adopters and late adopters in terms of hedonic beliefs, including Perceived Enjoyment, whereas they did find a significant difference in utilitarian belief (Perceived Usefulness) (Premkumar, Ramamurthy, & Liu, 2008). Perceived Enjoyment seems potentially rich for further study, but it has received little attention from the research community. Further, the understanding of how Perceived Enjoyment can affect to Product Attachment is also largely explored.

Interestingly, the effect of Perceived Ease of Use was found to be not significant on the Product Attachment. Perceived Ease of Use is the level of perceived difficulty that consumers think about when using the technology (Davis, 1985, 1989; Davis et al., 1989). The current tablet adopters are a very small subset of the total population with 34% of penetration, and they can be placed into three early categories: Innovator (2.5%), early adopters (13.5%) and a leading group of earlier adopters (currently accounting for 15% out eventual 34% who will be classified as early majority group). This study found a ceiling effect on Perceived Ease of Use and it can be assumed that the current tablet is easy enough for those three groups.

On the contrary, and more interestingly, both the Early Adopters group (Innovators and Early adopters) and Early Majority indicated there was a significant negative association

between Perceived Ease of Use and Product Attachment. Usually, they have more related experience and retain favorable attitudes toward a new idea, so they may feel less attracted to products that they can use with no challenges.

In general, prior experiences are likely to have an important influence on the intention to use certain technology applications, such as microcomputers and Internet banking services (Igbaria, Guimaraes, & Davis, 1995; Tan & Teo, 2000) and accept Internet banking adoption (Soh, Mah, Gan, Chew, & Reid, 1997). Other studies also have indicated that the degree of user experience (Adams et al., 1992) and user experience levels (Venkatesh & Davis, 1996) were important explanatory antecedents for PEOU. The more users experienced with other related products, the easier users feel to use a given product (Sun & Zhang, 2006b).

Few studies have examined modified TAM variables for product attachment; no study has been done for a group of earlier adopters. It is a reasonable assumption that earlier adopters have higher experience and self-efficacy in related fields and products; therefore, they are not likely to feel any huge difficulty when using tablets. No prior TAM related studies on the general population claimed a ceiling effect for Perceived Ease of Use. Therefore, revisiting Perceived Ease of Use measurement with the whole population for all categories (from innovators to laggards) is strongly recommended for future research.

Another discussion point is the relationship between Product Personalization and Product Attachment. Simply put, it is a matter of what causes what—the owner spends more money when he or she feels more intimacy, or vice versa. This study tested both of these directions due to the scarce research available on Product Attachment and Product Personalization. The result showed that both directions (Product Personalization → Product Attachment and Product



Attachment → Product Personalization) had significant effects, and also total variance for the whole model was similar: 51% of variance for Product Attachment was explained with Perceived Ease of Use, Perceived Usefulness, Perceived Enjoyment and Product Personalization → Product Attachment, whereas 49% of variance for Product Attachment accounted for Perceived Ease of Use, Perceived Usefulness, Perceived Enjoyment and Product Attachment → Product Personalization.

The topic of this study mainly focuses on Product Personalization from the perspective of appearance personalization, sometimes called, accessorization. However, current multi-functional and versatile technology products like smart phones and tablets are no longer single-purpose products. Their primary activities are determined by users' motivations and driven by multiple personalized programs or applications (apps).

Recent technological products largely have provided the ability to personalize screens, including background images, sounds, fonts, and apps downloaded. Like Product Personalization (accessorization), users want to spend time and money for individual user interface personalization; hence, Product Attachment can be also largely determined and developed from individuals' app or user-interface personalization behavior. Consequently, adding user-interface personalization to future understanding of Product Attachment for tech products would be effective.

Like material possession attachment gleaned from Klein and Baker's study (2004), Product Attachment can also be understood as a complex and multi-faceted concept from the perspective of cognition, emotion, and behavior (Wehmeyer, 2007). Also, the Product Attachment needs to be distinguished from OS (Operating system /platform) attachment or brand

attachment. A recent research revealed that iOS users were more OS loyal (Ogg, July 26, 2013). Currently, OS is very much dependent on manufacturers, so it might be not easy to distinguish from brand attachment.

Also, accessories comparability needs to be considered. Some upgraded products allow carrying over accessories purchased for previous product because of same form factors whereas some do not. Due to relatively shorter product lifetime of high-tech products, the desire to keep their product accessories might deter from buying a new product which are not compatible with current accessories and intend to buy the next one. Therefore, a relationship with Product Personalization can play a role to extend the product lifetime, and further studies in various domains are indeed recommended.

This study also found a slightly negative relationship between Product Attachment and Expected Product Lifetime, which is contrary to the previous studies that expected that strong product attachment would result in more protective behavior toward product longevity (Mugge et al., 2005). However, Ko, Ward, and Ramirez (2011) argued that such attachment might only last until another product draws more attention. This result is well acceptable due to their risk-taking and uniqueness-seeking attitudes of earlier adopters. Hence, further research is recommended to examine whether this negative relationship exists in the later adopter group.

This negative association between Product Attachment and Expected Product Lifetime can be thought as a reflection of “Continuance Innovation”. Continuous innovation refers to alteration of a product rather than the establishment of a new product (Robertson, 1967). Therefore, continuous innovation includes new features, benefits, or improvements to the existing technology and it exists in the current markets (Garcia & Calantone, 2002; Robertson,

1971; Song & Montoya-Weiss, 1998). Therefore, purchasing the next version of the same product cannot be accepted as a new product purchase for some respondents and a question for Expected Product Lifetime needs to be more explicit.

Another purpose of this study was determining the group differences between earlier adopters, the early three groups among a total of five groups applying Innovation Diffusion Theory (IDT). Current tablet owners with a 34% adoption rate occupied the first two categories (Innovators with 2.5% of total market and early adopters with 13.5%) and nearly half of the third category (Early majority). This study found no clear difference, which remains consistent with the previous studies which clarified that there would be not much difference between Innovators and Early adopters (Beaudoin et al., 2003; Jin, 2013).

This study found an Early Adopter-Early Majority difference only in level of education. The higher level of education of earlier adopters was extensively in accordance with previous studies (Dickerson & Gentry, 1983; Greco & Fields, 1991). Also, previous studies showed a significant difference in income between earlier adopters and later adopters, but little research examined the difference only among innovators, early adopters, and early majority. PEW tablet research showed that 56% of current tablet owners make at least \$75,000 per year (Zickuhr, 2013). Accordingly, the sample population in this study fell that same income group, so it can be assumed that there is not much deviation within the group.

Adopters can be grouped into categories to reflect individuals “that are homogeneous one with another and heterogeneous with respect to all the other categories” (Martinez et al., 1998, p. 325). Many studies have concentrated on distinguishing adopter categories to characterize the behavior of the individuals within and between such categories. The majority of the literature

has concentrated on analyzing adopter behavior distinctively between innovators/early adopters compared to the rest (Martinez et al, 1998).

Ram and Jung (1994) found a group difference between the early adopters and the early majority for product involvement and usage variety for PC and VCR. Innovators are leading the trends and spreading new ideas and thoughts, whereas laggards tend to stay in a current status and be brand loyal to avoid any risk. The clear distinction when classifying these two groups is made because there is a big time gap for adoption between innovators and laggards. However, the intermediates—early majority and late majority— do not show any apparently noticeable behavioral characteristics even though they still occupy the biggest volume of the user population.

The collected data actually included three adopter groups, but was categorized into two groups —Group 1 with innovators and early adopters and Group 2 consisting of an early majority for analyzing purposes in this study because this study sampled only 5 innovators, and previous studies proved that innovators and early adopters were quite similar in their behaviors (Sarel & Marmorstein, 2003). Still further, Wright and Charlett (1995) argued that the adopter group categorization was not supported by enough empirical evidence, especially innovators and early adopters were not reliably predicted.

In the same vein, Brancheau and Wetherbe (1990) suggested two group classifications; namely, early adopters (innovators plus early adopters) and later adopters (the remaining three categories). Therefore, it can be recommended to do another survey with late adopters (beyond the 50% adoption rate) and laggards (beyond the 84% adoption rate). Uhl and his colleagues (1970) also distinguished three categories – innovators, intermediates and laggards.

Demographic groups in this study were consistent with a recently released PEW study indicating that individuals from higher household income and college graduate groups had more tablet ownership, and further there was no statistically significant differences between men and/or women, and or between members of different racial groups (Zickuhr, 2013). The PEW study focused more on ownership, while the current study concentrates on the comparison between earlier adopters (innovators and early adopters) and early majority. Both studies found a significant difference for the level of education. More educated people own more tablets and more educated people tend to buy tablets much earlier in time. This finding is consistent with a past study on Internet banking adoption (Mann & Sahni, 2012).

### **Implications for Theory**

This study provides contributions to the Technology Acceptance Theory (TAM) by extending TAM to understand both Product Attachment and Expected Product Lifetime through the addition of Product Personalization. First, this study successfully validated the impacts of two existing variables from modified TAM —Perceived Usefulness and Perceived Enjoyment— on Product Attachment. However, no significance was found on Perceived Ease of Use, which was a contrary finding to that in the previous studies.

As discussed, this different finding might be caused by the sample population, which is the early 34% of tablet market penetration, which usually will have considerable experience with related products. Consequently, Perceived Ease of Use cannot contribute the shaping of product attachment for Early Majority. Rather, Perceived Ease of Use showed a significant negative relationship to Product Attachment in Early Adopter group (innovators and early adopters). This

finding is a unique contribution for the future study for understanding the characteristics of Early Adopter and Early Majority.

Product Personalization was found to be a new variable by having a strong relationship to Product Attachment. Both of the causal directions between Product Personalization and Product Attachment, Product Personalization → Product Attachment and Product Attachment → Product Personalization were proposed and tested. Even though there are only scarce studies on both variables, and that circumstance made it difficult to propose one conclusive causal direction, this finding might be a valuable addition to the theory for future studies. In addition, expecting product lifetime through Product Attachment is a new challenge to examine within the Product Attachment theory research community.

There has been a dearth of literature that makes an explicit statement for how product is formed. This study contributed in that it consolidated how Product Attachment can be structured by examining TAM, including the Perceived Enjoyment and adding Product Personalization. It thus clarified the association with the Expected Product Lifetime. The research design employed the diffusion of innovation theory as a basis for defining innovators' categories as a psychometric construct, and then applied that construct to the model.

### **Implications for Practice**

This study suggests a research model for Product Attachment using the modified Technology Acceptance Theory (TAM) and Product Personalization as a new variable, and examines the relationship between Product Attachment and Expected Product Lifetime. Also, it explores how the earlier adopter categories (innovator, early adopter, and early majority) taken

from the Innovation Diffusion Theory (IDT) can affect the relationship between product attachment and expected product lifetime.

This study also determined that Perceived Usefulness and Perceived Enjoyment have significant effects on Product Attachment. Since, the earlier adopters have been identified as persuaders and influencers for later adopter groups, the recommendation is to focus on providing useful features, enjoyable content and experiences in product and advertising at the beginning when launching a new technology-driven product. However, it is also important to pinpoint and be aware that later adopters may have different requirement sets for forming Product Attachment. The industry experts need to focus their efforts on providing positive impressions for seamless experience of usefulness and enjoyment to these groups of earlier adopters.

On the other hand, this study found there was a slightly negative association between Product Attachment and Expected Product Lifetime. Early adopters can be willing to switch or do not feel any obligation of keeping the old product even though they may feel attached to that product. This tendency of being attractive to a new product is also one of earlier adopters' characteristics, namely, sensation and uniqueness-seekers when they are adopting new products (Burns & Krampf, 1992).

Understanding consumers is the key success factor when introducing new products and ideas, especially when identifying first buyers and their influences on later adopters (Chau & Hui, 1998). In particular, these earlier groups of adopters need to be studied further with a priority placed on their role in spreading influences. From this perspective, this study sheds light on the understanding the characteristics of earlier adopters and the important factors in adopting new technological products for them.

## **Limitations and Future Research**

The findings of this study are subject to several limitations and these can convey potential new topics for future research. First, target population was very limited due to the current low tablet penetration, and respondents were thus recruited using convenience and snowball sampling. Therefore, the respondents were not representative of the general population, an element that could cause sampling biases. Almost half of the sample was drawn from a group of friends of friends from couple of education institutions, so there might be bias in that regard as well.

Post-hoc analysis revealed significant differences between the two sample groups (snowball sampling and the sample purchased) in age, ethnicity, and education. The snowball sample was younger, had higher education, and was more Asian samples. Nevertheless, the findings here are useful because the demographic profiles of respondents in this study remained consistent with the most recent PEW study on tablet users (Zickuhr, 2013).

Second, future study could ask more than a single question for Expected Product Lifetime, the importance of comparability to be able to keep using the current accessories as well as operating system or brand loyalty factors in product upgrade decisions. Therefore, improved questions would be 1) “if a new and improved version of your tablet was available now, and that is NOT compatible with the covers, cases, and peripherals used with your current tablet, how soon would you upgrade (or buy a new one)? 2) 1) “if a new and improved version of your tablet was available now, and that IS compatible with the covers, cases, and peripherals used with your current tablet, how soon would you upgrade (or buy a new one)? In addition, adding a question on the willingness to switching operating system is valuable to clarify responders’ intention.



Third, future study also could ask the product attachment more clearly. For high-tech products like tablets and computers, there might be confusion to distinguish product attachment from OS (platform) attachment. There is a tendency of OS loyalty, which stays with the current OS when they buy the next product. However, it needs to build a clear definition which is different from brand attachment.

Fourth, this study does not focus attention on the activities of those using the tablets, but the rather product itself. Earlier TAM research focused on the utilitarian aspects of information systems (Legris et al., 2003); however, but the very characteristic of tablets have both utilitarian and hedonic aspects. The Google AdMob tablet survey (2011) revealed that major tablet activities included playing games, searching for information, emailing, undertaking social networking, and consuming entertainment content, choices that more likely lean toward hedonic behaviors. However, this study did not collect enough samples for any grouping for utilitarian or hedonic attitudes that were based on consumers' primary usage. Future research is recommended to test TAM for the different attitudes toward use of the tablets to provide a deeper understanding of tablet user behavior in each of the adopter categories.

Next, the self-reported questionnaire can also be a limitation for this study. For instance, 30 respondents failed to give the moment of purchase (month and year) out of 242, approximately 12%, and there are also possibilities of receiving incorrect dates for tablet purchases or gifted. This incorrect information may also affect the results because they deliver the crucial information needed to classify adopter categories, especially since the self-report method is often regarded as delivering less valid results (Hindelang, Hirschi, & Weis, 1981).

In addition, there may be different technical properties or new tech words related to new products, which can imply different understandings of the product from different groups of people, or produce not yet clearly defined terms among the general population. For instance, the terms for tablet accessories such as mount or dock may be unfamiliar to some, so they may find it difficult to answer what OS (operating system) their tablets have.

Lastly, similar studies can replicate this effort using a sample from all five adopter categories to highlight whether there are any clear differences in forming Product Attachment and the effect of Product Personalization. These two constructs— Product Attachment and Product Personalization— have not yet been substantially explored. When the tablet penetration reaches late majority and laggards, there may be a different attitude appearing between earlier and following late adopters. This recommendation will expand the body of knowledge for understanding the true level of attachment between each of the adopter categories.

## APPENDIX

## **APPENDIX**

### **Measurements**

#### Perceived Ease of Use (PEOU)

- PEOU1      Using this tablet is easy for me
- PEOU2      Using this tablet to do things I want to do is easy
- PEOU3      The interface of this tablet is clear
- PEOU4      I have no trouble figuring out how to use this tablet
- PEOU5      I feel this tablet is easy to use

#### Perceived Usefulness (PU)

- PU1    This tablet can make me more efficient
- PU2    This tablet can improve my work or leisure activities
- PU3    This tablet can make me more effective
- PU4    This tablet can make me more productive
- PU5    This tablet can allow me to do things that are useful for me

#### Perceived Enjoyment (PE)

- PE1    I find using tablet entertaining
- PE2    I find using tablet pleasant

PE3 I find using tablet exciting

PE4 I found using the tablet fun

PE5 I find using the tablet enjoyable

#### Product Attachment (PA)

PA1 My tablet is very dear to me

PA2 I am very attached to my tablet

PA3 I have a bond with my tablet

PA4 My tablet has no special meaning to me (-)

PA5 My tablet fits my personality

#### Product Personalization

Approximately how much money have you spent on external accessories to use with this tablet? (Please enter a round number in USD)

#### Expected Product Lifetime

How soon are you likely to buy a new tablet, either in addition to or to replace your current one?

## BIBLIOGRAPHY

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- Adams, D. A., Nelson, R. R., & Todd, P. A. (1992). Perceived usefulness, ease of use, and usage of information technology: a replication. *MIS quarterly*, 16(2), 227-247.
- Adamson, G. (2003). *Industrial strength design: how Brooks Stevens shaped your world*. Cambridge: MIT Press.
- Agarwal, R., Ahuja, M., Carter, P. E., & Gans, M. (1998). *Early and late adopters of IT innovations: extensions to innovation diffusion theory*, *Proceedings of the DIGIT Conference*, (pp1-18).
- Agarwal, R., & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. *MIS Quarterly*, 665-694.
- Agarwal, R., & Prasad, J. (1998). A conceptual and operational definition of personal innovativeness in the domain of information technology. *Information Systems Research*, 9(2), 204-215.
- Anandarajan, M., Igbaria, M., & Anakwe, U. P. (2000). Technology acceptance in the banking industry: A perspective from a less developed country. *Information Technology & People*, 13(4), 298-312.
- Anderson-Connell, L. J., Ulrich, P. V., & Brannon, E. L. (2002). A consumer-driven model for mass customization in the apparel market. *Journal of Fashion Marketing and Management*, 6(3), 240-258.
- Anderson, P. F., & Chambers, T. M. (1985). A reward/measurement model of organizational buying behavior. *Journal of Marketing*, 49(2), 7-23.
- Apeageyi, P. R., & Otieno, R. (2007). Usability of pattern customising technology in the achievement and testing of fit for mass customisation. *Journal of Fashion Marketing and Management*, 11(3), 349-365.
- Babad, E. (1987). Wishful thinking and objectivity among sports fans. *Social Behaviour*, 2(4).
- 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. (1987). Management use of computer technology: A comparison of two theoretical models. Working paper 533, School of Business Administration, University of Michigan, Ann Arbor, MI.
- 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.

- Bailey, J. E., & Pearson, S. W. (1983). Development of a tool for measuring and analyzing computer user satisfaction. *Management science*, 29(5), 530-545.
- Ball, A., & Tasaki, L. H. (1992). The role and measurement of attachment in consumer behavior. *Journal of Consumer Psychology*, 1(2), 155-172.
- Ballvé, M. (2012). Chart of the day: U.S. Adults Acquiring Tablets At a Dizzying Rate, Dec. 24, 2012. from <http://www.businessinsider.com/chart-of-the-day-tablet-penetration-2012-12#ixzz2JhjnffqZ>
- Bankhead, J. (2011a). How Many Cases Do You Use? Retrieved Sep 17, 2012, from <http://ipad.appstorm.net/general/weekly-poll/how-many-cases-do-you-use/>
- Bankhead, J. (2011b). What Type of iPad Case Do You Use? Retrieved Sep 17, 2012, from <http://ipad.appstorm.net/general/weekly-poll/what-type-of-ipad-case-do-you-use/>
- Barber, R. E., & Lucas, H. C. (1983). System response time operator productivity, and job satisfaction. *Communications of the ACM*, 26(11), 972-986.
- Barkhi, R., & Wallace, L. (2007). The impact of personality type on purchasing decisions in virtual stores. *Information Technology and Management*, 8(4), 313-330.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173.
- Beaudoin, P., Lachance, M. J., & Robitaille, J. (2003). Fashion innovativeness, fashion diffusion and brand sensitivity among adolescents. *Journal of Fashion Marketing and Management*, 7(1), 23-30.
- Belk, R. W. (1988). Possessions and the extended self. *The Journal of Consumer Research*, 15(2), 139-168.
- Bendapudi, N., & Leone, R. P. (2003). Psychological implications of customer participation in co-production. *Journal of Marketing*, 67(1), 14-28.
- Bhattacharjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly*, 25(3), 351-370.
- Blom, J. O. (2000). *Personalization: a taxonomy*. Paper presented at the Conference on Human Factors in Computing Systems, New York, NY, USA.
- Blom, J. O., & Monk, A. F. (2003). Theory of personalization of appearance: Why users personalize their PCs and mobile phones. *Human-Computer Interaction*, 18(3), 193-228.
- Bowlby, J. (1969). *Attachment and loss: Attachment*. New York: Basic books.



- Bowlby, J. (1973). *Attachment and loss: Separation, anxiety and anger*. New York: Basic Books.
- Bowlby, J. (1979). *The making and breaking of affectional bonds*. London: Tavistock.
- Bowlby, J. (1980). *Attachment and loss: Sadness and depression*. New York: Basic Books.
- Brahmana, R. K., & Brahmana, R. (2011). *Determinants Of Jobs Seekers? Intention In Using E-Recruitments: Insight From Indonesia*. Paper presented at the Proceedings of The 1st International Conference on Information Systems For Business Competitiveness (ICISBC) 2011, Semarang, Central Java, Indonesia
- Brancheau, J. C., & Wetherbe, J. C. (1990). The adoption of spreadsheet software: testing innovation diffusion theory in the context of end-user computing. *Information Systems Research*, 1(2), 115-143.
- Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment. In S. W. S. Rholes (Ed.), *Attachment theory and close relationships* (pp. 46-76). New York: Guilford Press.
- Brock, T. C. (1968). Implications of commodity theory for value change. In Greewald A.G., Brock T.C. & O. T.M. (Eds.), *Psychological Foundations of Attitudes* (pp. 243-275): Academic Press, New York.
- Brown, M., Pope, N., & Voges, K. (2003). Buying or browsing?: An exploration of shopping orientations and online purchase intention. *European Journal of Marketing*, 37(11/12), 1666-1684.
- Bruner, G. C., & Kumar, A. (2005). Explaining consumer acceptance of handheld Internet devices. *Journal of Business Research*, 58(5), 553-558.
- Bruner II, G. C., & Kumar, A. (2005). Explaining consumer acceptance of handheld Internet devices. *Journal of Business Research*, 58(5), 553-558.
- Burns, D. J., & Krampf, R. F. (1992). Explaining innovative behavior: uniqueness-seeking and sensation-seeking. *International Journal of Advertising*, 11(3), 227-237.
- Carrascal, L. M., Galván, I., & Gordo, O. (2009). Partial least squares regression as an alternative to current regression methods used in ecology. *Ecology & Organismal Biology*, 118(5), 681-690.
- Carrere, S., & Evans, G. W. (1994). Life in an isolated and confined environment; A qualitative study of the role of the designed environment. *Environment and Behavior*, 26(6), 707-741.
- CDI dashboard. (2013). Tablet Penetration (2010-2013). Retrieved May 18, 2013, from <http://dashboard.digitalinfo.org/trends/view/tablet>

- Chau, P. Y. K., & Hui, K. L. (1998). Identifying early adopters of new IT products: a case of Windows 95. *Information & Management*, 33(5), 225-230.
- Chen, L., Gillenson, M. L., & Sherrell, D. L. (2002). Enticing online consumers: an extended technology acceptance perspective. *Information & Management*, 39(8), 705-719.
- Chen, L., & Tan, J. (2004). Technology Adaptation in E-commerce:: Key Determinants of Virtual Stores Acceptance. *European Management Journal*, 22(1), 74-86.
- Cheng, J. M. S., Kao, L. L. Y., & Lin, J. Y. C. (2004). An investigation of the diffusion of online games in Taiwan: an application of Roger's diffusion of innovation theory. *The Journal of American Academy of Business*, 5(1/2), 439-445.
- Cheong, J., & Park, M. (2005). Mobile internet acceptance in Korea. *Internet research*, 15(2), 125-140.
- Chesney, T. (2006). An acceptance model for useful and fun information systems. *Human Technology*, 2(2), 225-235.
- Childers, T. L., Carr, C. L., Peck, J., & Carson, S. (2002). Hedonic and utilitarian motivations for online retail shopping behavior. *Journal of retailing*, 77(4), 511-535.
- Chin, W. W., & Gopal, A. (1995). Adoption intention in GSS: relative importance of beliefs. *ACM SIGMIS Database - Special double issue: diffusion of technological innovation*, 26(2-3), 42-64.
- Chin, W. W., & Newsted, P. R. (1999). Structural equation modeling analysis with small samples using least squares. In R. Hoyle (Ed.), *Statistical Strategies for Small Sample Research* (pp. 307–341). Thousand Oaks, CA: Sage.
- Choe, P., Liao, C., & Sun, W. (2012). Providing customisation guidelines of mobile phones for manufacturers. *Behaviour & Information Technology*, 31(10), 983-994.
- Choi, S. (2010). Exploring intention to adopt mobile TV service in the United States: Toward a new model with cognitive-based and emotional-based constructs (Doctoral Dissertation), University of South Carolina, USA.
- Chtourou, M. S. (2010). Rethinking the TAM model: time to consider fun, *Journal of Consumer Marketing* (Vol. 27, pp. 336-344): Emerald Group Publishing Limited.
- Clabaugh, J. (April 30, 2013). Tablet ownership reaches 40%. Retrieved May 15, 2013, from <http://www.bizjournals.com/washington/blog/techflash/2013/04/tablet-ownership-reaches-40.html>
- Cocotas, A. (May 15, 2013). CHART OF THE DAY: Smartphone Penetration Reaccelerates In The U.S. Retrieved May 15, 2013, from <http://www.businessinsider.com/chart-of-the-day-smartphone-penetration-2013-5#ixzz2TPgIRQqH>

- Collins, N. L., & Read, S. J. (1994). Cognitive representations of attachment: The structure and function of working models. In K. Bartholomew (Ed.), *Attachment processes in adulthood* (pp. 53-90). London: Jessica Kingsley.
- comScore. (2013). Mobile future in focus 2013. Retrieved May, 15, 2013, from [http://www.comscore.com/Insights/Presentations\\_and\\_Whitepapers/2013/2013\\_Mobile\\_Future\\_in\\_Focus](http://www.comscore.com/Insights/Presentations_and_Whitepapers/2013/2013_Mobile_Future_in_Focus)
- Cooper, T. (1994a). *Beyond recycling: the longer life option*: New Economics Foundation.
- Cooper, T. (1994b). The durability of consumer durables. *Business Strategy and the Environment*, 3(1), 23-30.
- Cooper, T. (2004). Inadequate life? Evidence of consumer attitudes to product obsolescence. *Journal of Consumer Policy*, 27(4), 421-449.
- Cooper, T. (2005). Slower consumption: reflections on product life spans and the "throwaway society". *Journal of Industrial Ecology*, 9(1-2), 51=67.
- Costley, C. L. (1988). Meta analysis of involvement research. *Advances in Consumer Research*, 15(1), 554-562.
- Csikszentmihalyi, M., & Rochberg-Halton, E. (1981). *The meaning of things: Domestic symbols and the self*: Cambridge University Press.
- Cui, Y., Chipchase, J., & Ichikawa, F. (2007). *A cross culture study on phone carrying and physical personalization*. Paper presented at the the 2nd international conference on Usability and internationalization, Beijing, China.
- Curran, J. M., & Meuter, M. L. (2007). Encouraging existing customers to switch to self-service technologies: put a little fun in their lives. *Journal of Marketing Theory and Practice*, 15(4), 283-298.
- Dabholkar, P. A., & Bagozzi, R. P. (2002). An attitudinal model of technology-based self-service: moderating effects of consumer traits and situational factors. *Journal of the Academy of Marketing Science*, 30(3), 184-201.
- Dabic, M., Schweiger, G., & Strebinger, A. (2008). *A model of the customer's perceived costs and benefits of product customization in the car market*. Paper presented at the Educators' Conference of the American Marketing Association.
- Davis, F. D. (1985). *A technology acceptance model for empirically testing new end-user (Doctoral Dissertation)*, Massachusetts Institute of Technology, USA.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.

- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, 35(8), 982-1003.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology*, 22(14), 1111-1132.
- De Vellis, R. F. (2003). *Scale development: Theory and applications, second edition* (Vol. 26). Thousand Oaks: Sage Publications.
- Dellaert, B. G. C., & Stremersch, S. (2005). Marketing mass-customized products: Striking a balance between utility and complexity. *Journal of Marketing Research*, 42(2), 219-227.
- Dickerson, M. D., & Gentry, J. W. (1983). Characteristics of adopters and non-adopters of home computers. *Journal of Consumer Research*, 10(2), 225-235.
- Edney, J. J., & Buda, M. A. (1976). Distinguishing territoriality and privacy: Two studies. *Human Ecology*, 4(4), 283-296.
- Falkman, E. G. (1996). *Sustainable Production and Consumption: a business perspective*: World Business Council for Sustainable Development.
- Fang, X., Chan, S., Brzezinski, J., & Xu, S. (2006). Moderating effects of task type on wireless technology acceptance. *Journal of Management Information Systems*, 22(3), 123-157.
- Fidler, R. (April 25, 2013). 2013 Q1 Research Report 1: News consumption on mobile media surpassing desktop computers and newspapers. Retrieved May 26, 2013, from <http://www.rjionline.org/research/rji-dpa-mobile-media-project/2013-q1-research-report-1>
- Fidler, R. (June 4, 2012). 2012 RJI (Reynolds Journalism Institute) Mobile Media News Consumption Survey. Retrieved Sep 2, 2012, from <http://rjionline.org/news/2012-rji-mobile-media-news-consumption-survey-executive-summary>
- Fidzani, L. C. (2010). *Personalization of bedrooms by urban adolescents in Botswana : expressing identity and developing place attachment (Doctoral Dissertation)*, Oregon State University, USA.
- Fiore, A. M., Lee, S. E., & Kunz, G. (2004). Individual differences, motivations, and willingness to use a mass customization option for fashion products. *European Journal of Marketing*, 38(7), 835-849.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fisher, C. D. (1978). The effects of personal control, competence, and extrinsic reward systems on intrinsic motivation. *Organizational Behavior and Human Performance*, 21(3), 273-288.

- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 18(1), 39-50.
- Fournier, S. (1991). A meaning-based framework for the study of consumer-object relations. *Advances in Consumer Research*, 18(1), 736-742.
- Fox, S. (2001). Managing product personalisation. *Engineering Management Journal*, 11(4), 174-180.
- Franke, N., & Piller, F. T. (2003). Key research issues in user interaction with user toolkits in a mass customisation system. *International Journal of Technology Management*, 26(5/6), 578-599.
- Franke, N., & Piller, F. T. (2004). Value creation by toolkits for user innovation and design: The case of the watch market. *Journal of Product Innovation Management*, 21(6), 401-415.
- Freitas, A. L., & Higgins, E. T. (2002). Enjoying goal-directed action: The role of regulatory fit. *Psychological Science*, 13(1), 1-6.
- Fromkin, H. L. (1970). Effects of experimentally aroused feelings of undistinctiveness upon valuation of scarce and novel experiences. *Journal of Personality and Social Psychology*, 16(3), 521-529.
- Fromkin, H. L., & Lipshitz, R. (1976). *A Construct Validity Method of Scale Development: The Uniqueness Scale*: Institute for Research in the Behavioral, Economic, and Management Sciences, Krannert Graduate School of Management, Purdue University.
- Fudge, W. K., & Lodish, L. M. (1977). Evaluation of the effectiveness of a model based salesman's planning system by field experimentation. *Interfaces*, 8(1-Part-2), 97-106.
- Fuerst, W. L., & Cheney, P. H. (1982). Factors affecting the perceived utilization of computer-based decision support systems in the oil industry. *Decision Sciences*, 13(4), 554-569.
- Furby, L., & Wilke, M. (1982). Some characteristics of infants' preferred toys. *The Journal of Genetic Psychology: Research and Theory on Human Development*, 140(2), 207-219.
- Gabriel, R. P., & Goldmann, R. (2001). Collaborative Development Handbook: How a Company Can Participate in Open Source: California.
- Garcia, R., & Calantone, R. (2002). A critical look at technological innovation typology and innovativeness terminology: a literature review. *Journal of Product Innovation Management* 19(2), 110-132.
- Gefen, D., & Straub, D. W. (2000). The relative importance of perceived ease of use in IS adoption: a study of e-commerce adoption. *Journal of the Association for Information Systems*, 1(8), 1-30.

- Gefen, D., & Straub, D. W. (2003). Managing user trust in B2C e-services. *E-service Journal*, 2(2), 7-24.
- Gefen, D., Straub, D. W., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the association for information systems*, 4(7), 2-77.
- Gerber, E. (2011). *Tech break up: a research method for understanding people's attachment to their technology*. Paper presented at the 8th ACM conference on Creativity Atlanta, Georgia, USA.
- Geyer, R., & Vered Blass, D. (2010). The economics of cell phone reuse and recycling. *The International Journal of Advanced Manufacturing Technology*, 47(5), 515-525.
- Gilmore, J. H., & Pine II, B. J. (1997). The four faces of mass customization. *Harvard Business Review*, 75(1), 91-101.
- Google AdMob. (2011). Tablet Survey. Retrieved June 17, 2013, from <http://services.google.com/fh/files/blogs/AdMob%20-%20Tablet%20Survey.pdf>
- Gordon, B. R. (2009). A dynamic model of consumer replacement cycles in the PC processor industry. *Marketing Science*, 28(5), 846-867.
- Götz, O., Liehr-Gobbers, K., & Krafft, M. (2010). Evaluation of structural equation models using the partial least squares (PLS) approach. In V. E. Vinzi, W. W. Chin, J. Henseler & H. Wang (Eds.), *Handbook of Partial Least Squares: Concepts, Methods and Applications* (pp. 691-711). Berlin-Heidelberg: Springer.
- Govers, P. M., R. (2004). *'I love my Jeep, because its tough like me': The effect of product-personality congruence on product attachment*. Paper presented at the Fourth International Conference on Design and Emotion, Ankara, Turkey.
- Granberg, B. (1997). *The quality re-evaluation process: Product obsolescence in a consumer-producer interaction framework*. Stockholm: University of Stockholm, Department of Economic History.
- Grayson, K., & Shulman, D. (2000). Indexicality and the verification function of irreplaceable possessions: A semiotic analysis. *Journal of Consumer Research*, 27(1), 17-30.
- Graziano, D. (June 22, 2012). Smartphone sales estimated to surpass 1 billion by 2014. Retrieved Sep 2, 2012, from <http://www.bgr.com/2012/06/22/mobile-accessories-revenues-increase-smartphones/>
- Greco, A. J., & Fields, D. M. (1991). Profiling early triers of service innovations: A look at interactive home video ordering services. *Journal of Services Marketing*, 5(3), 19-26.

- Guiltinan, J. (2009). Creative destruction and destructive creations: environmental ethics and planned obsolescence. *Journal of business ethics*, 89(1), 19-28.
- Guriting, P., & Ndubisi, N. O. (2006). Borneo online banking: evaluating customer perceptions and behavioural intention. *Management Research News*, 29(1/2), 6-15.
- Ha, I., Yoon, Y., & Choi, M. (2007). Determinants of adoption of mobile games under mobile broadband wireless access environment. *Information & Management*, 44(3), 276-286.
- Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis, 5th edition*. Upper Saddle River, NJ: Pearson Education.
- Häkkinen, J., & Chatfield, C. (2006). *Personal customisation of mobile phones: a case study*. Paper presented at the Proceedings of the 4th Nordic conference on Human-computer interaction: changing roles, New York, NY, USA.
- Halepete, J., Littrell, M., & Park, J. (2009). Personalization of fair trade apparel. *Clothing and Textiles Research Journal*, 27(2), 143-160.
- Hanks, K., Odom, W., Roedl, D., & Blevis, E. (2008). *Sustainable millennials: attitudes towards sustainability and the material effects of interactive technologies*. Paper presented at the Proceedings of the twenty-sixth annual SIGCHI conference on Human factors in computing systems.
- Hansen, W. B., & Altman, I. (1976). Decorating personal places: A descriptive analysis. *Environment and Behavior*, 8(4), 491-504.
- Hassenzahl, M. (2004). The interplay of beauty, goodness, and usability in interactive products. *Human-Computer Interaction*, 19(4), 319-349.
- Hazan, C., & Shaver, P. R. (1994). Attachment as an organizational framework for research on close relationships. *Psychological Inquiry*, 5(1), 1-22.
- Heidmets, M. (1994). The phenomenon of personalization of the environment: A theoretical analysis. *Journal of Russian & East European Psychology*, 32(3), 41-85.
- Heiskanen, E. (1996). *Conditions for product life extension*. Helsinki: National Consumer Research Centre. Working Paper 23.
- Hendrickson, A. R., Massey, P. D., & Cronan, T. P. (1993). On the test-retest reliability of perceived usefulness and perceived ease of use scales. *MIS quarterly*, 17(2), 227-230.
- Hill, R. P., & Stamey, M. (1990). The homeless in America: An examination of possessions and consumption behaviors. *Journal of Consumer Research*, 17(December), 303-321.
- Hindelang, M. J., Hirschi, T., & Weis, J. G. (1981). *Measuring delinquency*. Beverly Hills, CA: Sage Publications

- Hinterberger, F., Kranendonk, S., Welfens, M. J., & Schmidt-Bleek, F. (1994). *Increasing resource productivity through eco-efficient services, Eco-Efficient Services Seminar*. . Wuppertal: Wuppertal Institute.
- Holahan, C. J., & Saegert, S. (1973). Behavioral and attitudinal effects of large-scale variation in the physical environment of psychiatric wards. *Journal of Abnormal Psychology*, 82(3), 454-462.
- Holbrook, M. B., Chestnut, R. W., Oliva, T. A., & Greenleaf, E. A. (1984). Play as a consumption experience: The roles of emotions, performance, and personality in the enjoyment of games. *Journal of Consumer Research* 11(2), 728-739.
- Holman, R. (1981). Product use as communication: a fresh appraisal of a venerable topic. In B. M. E. K. J. Roering (Ed.), *Review of Marketing* (pp. 106-119). Chicago, IL: American Marketing Association.
- Hong, S. J., Thong, J. Y. L., Moon, J. Y., & Tam, K. Y. (2008). Understanding the behavior of mobile data services consumers. *Information Systems Frontiers*, 10(4), 431-445.
- Igbaria, M., Guimaraes, T., & Davis, G. B. (1995). Testing the determinants of microcomputer usage via a structural equation model. *Journal of Management Information Systems*, 11(4), 87-114.
- Im, S., Bayus, B. L., & Mason, C. H. (2003). An empirical study of innate consumer innovativeness, personal characteristics, and new-product adoption behavior. *Journal of the Academy of Marketing*, 31(1), 61-73.
- James, W. (1981). *The principles of psychology* (Vol. 1): Harvard University Press.
- Jencks, C., & Silver, N. (1972). *Adhocism: the case for improvisation*. London: Secker & Warburg.
- Jensen, R. (1996). *The dream society: how the coming shift from information to imagination will transform your business* (Vol. 30). New York, NY: McGraw-Hill.
- Jin, C. (2013). The effects of individual innovativeness on users' adoption of Internet content filtering software and attitudes toward children's Internet use. *Computers in Human Behavior*, 29(5), 1904-1916.
- Kang, J. Y. M., & Kim, E. (2012). e-Mass customisation apparel shopping: effects of desire for unique consumer products and perceived risk on purchase intentions. *International Journal of Fashion Design, Technology and Education*, 1(1), 1-13.
- Karahanna, E., Agarwal, R., & Angst, C. M. (2006). Reconceptualizing compatibility beliefs in technology acceptance research. *MIS Quarterly*, 30(4), 781-804.



- 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 postadoption beliefs. *MIS Quarterly*, 23(2), 183-213.
- Khalifa, M., & Liu, V. (2002). *Explaining satisfaction at different stages of adoption in the context of internet-based services*. Paper presented at the International Conference on Information Systems (ICIS), 15-18 December, Barcelona, Spain.
- Kim, J., & Forsythe, S. (2007). Hedonic usage of product virtualization technologies in online apparel shopping. *International Journal of Retail & Distribution*, 35(6), 502-514.
- King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. *Information & Management*, 43(6), 740-755.
- Kleine, S. S., & Baker, S. M. (2004). An integrative review of material possession attachment. *Academy of Marketing Science Review*, 1(1), 1-39.
- Kleine, S. S., Kleine III, R. E., & Allen, C. T. (1995). How is a possession "me" or "not me"? Characterizing types and an antecedent of material possession attachment. *Journal of Consumer Research*, 22(8), 327-343.
- Knot, M. (2000). Sustainable clothing use and care in 2050. SusHouse Project Report. Clothing Care Function: Delft University of Technology: Delft, The Netherlands.
- Ko, K., Ward, S., & Ramirez, M. (2011). *Understanding long term product attachment with a view to optimizing product lifetime*. Paper presented at the eddBE(1st International Postgraduate Conference on Engineering, Designing and Developing the Built Environment for Sustainable Wellbeing), Brisbane, Australia.
- Kopytoff, I. (1986). The cultural biography of things: Commodization as Process. In A. Appadurai (Ed.), *The Social Life of Things: Commodities in Cultural Perspective* (pp. 64-95). Cambridge: Cambridge University Press.
- Kostecki, M. (1998). *The durable use of consumer products: new options for business and consumption*: Kluwer Academic Publishers Dordrecht, The Netherlands.
- Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behavior. *Information systems research*, 13(2), 205-223.
- Kruglanski, A. W. (1975). The endogenous-exogenous partition in attribution theory. *Psychological Review*, 82(6), 387-402.
- Larcker, D. F., & Lessig, V. P. (1980). Perceived Usefulness of Information: A Psychometric Examination\*. *Decision Sciences*, 11(1), 121-134.

- Laurent, G., & Kapferer, J. N. (1985). Measuring consumer involvement profiles. *Journal of Marketing Research*, 22(1), 41-53.
- Lee, H., & Chang, E. (2011). Consumer attitudes toward online mass customization: an application of extended technology acceptance model. *Journal of Computer-Mediated Communication*, 16(2), 171-200.
- Lee, H., Fiore, A. M., & Kim, J. (2006). The role of the technology acceptance model in explaining effects of image interactivity technology on consumer responses. *International Journal of Retail & Distribution Management*, 34(8), 621-644.
- Lee, M. (2010). Explaining and predicting users' continuance intention toward e-learning: An extension of the expectation-confirmation model. *Computers & Education*, 54(2), 506-516.
- Lee, M. K. O., Cheung, C. M. K., & Chen, Z. (2005). Acceptance of Internet-based learning medium: the role of extrinsic and intrinsic motivation. *Information & Management*, 42(8), 1095-1104.
- Lee, M. K. O., Cheung, C. M. K., & Chen, Z. (2007). Understanding user acceptance of multimedia messaging services: An empirical study. *Journal of the American Society for Information Science and Technology*, 58(13), 2066-2077.
- Legris, P., Ingham, J., & Colletette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & management*, 40(3), 191-204.
- Leng, G. S., Lada, S., Muhammad, M. Z., Ibrahim, A., & Amboala, T. (2011). An exploration of social networking sites (SNS) adoption in Malaysia using Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB) and intrinsic motivation. *Journal of Internet Banking and Commerce*, 16(2), 1-27.
- Levy, S. J. (1959). Symbols for Sales. *Harvard Business Review* 37(4), 117-124.
- Li, D., Chau, P. Y. K., & Lou, H. (2005). Understanding individual adoption of instant messaging: An empirical investigation. *Journal of the Association for Information Systems*, 6(4), 102-129.
- Liao, C.-H., Tsou, C.-W., & Huang, M.-F. (2007). Factors influencing the usage of 3G mobile services in Taiwan. *Online Information Review*, 31(6), 759-774.
- Ligas, M. (2000). People, products, and pursuits: Exploring the relationship between consumer goals and product meanings. *Psychology and Marketing*, 17(11), 983-1003.
- Lin, C. P., & Bhattacharjee, A. (2010). Extending technology usage models to interactive hedonic technologies: a theoretical model and empirical test. *Information Systems Journal*, 20(2), 163-181.

- Liu, Y., & Li, H. (2010). Mobile internet diffusion in China: an empirical study. *Industrial Management & Data Systems*, 110(3), 309-324.
- Lucas, H. C. (1975). Performance and the use of an information system. *Management Science*, 21(8), 908-919.
- Lucas, H. C. (1978). unsuccessful implementation the case of a computer-based order entry system. *Decision Sciences*, 9(1), 68-79.
- Lund, R. T. (1977). Making products live longer. *Technology Review*, 79(3).
- Lynn, M., & Harris, J. (1997). Individual differences in the pursuit of self-uniqueness through consumption. *Journal of Applied Social Psychology*, 27(21), 1861-1883.
- Madden, M., & Smith, A. (2010). Reputation management and social media. Washington, DC: Pew Internet & American Life Project. Retrieved Mar 16, 2013, from [http://pewinternet.org/~media/Files/Reports/2010/PIP\\_Reputation\\_Management.pdf](http://pewinternet.org/~media/Files/Reports/2010/PIP_Reputation_Management.pdf)
- Mahajan, V., Muller, E., & Srivastava, R. K. (1990). Determination of adopter categories by using innovation diffusion models. *Journal of Marketing Research*, 27(1), 37-50.
- Malone, T. W. (1981a). Toward a theory of intrinsically motivating instruction. *Cognitive science*, 5(4), 333-369.
- Malone, T. W. (1981b). What makes computer games fun? *Byte*, 6, 258-276.
- Mann, B. J. S., & Sahni, S. K. (2012). Profiling Adopter Categories of Internet Banking in India: An Empirical Study. *Vision: The Journal of Business Perspective*, 16(4), 283-295.
- Mano, H., & Oliver, R. L. (1993). Assessing the dimensionality and structure of the consumption experience: evaluation, feeling, and satisfaction. *Journal of Consumer Research*, 20(December), 451-466.
- Marcus, C. C., & Sarkissian, W. (1984). *Housing as if people mattered: Site design guidelines for medium-density family housing* (Vol. 4). London: University of California Press.
- Marketing Chart. (2012). Tablet User Base Becoming Older; Gender Gap Disappearing. Retrieved Feb,2, 2013, from <http://www.marketingcharts.com/topics/behavioral-marketing/tablet-user-base-becoming-older-gender-gap-disappearing-22427/>
- Martinez, E., & Polo, Y. (1996). Adopter categories in the acceptance process for consumer durables. *Journal of Product & Brand Management*, 5(3), 34-47.
- Martinez, E., Polo, Y., & Flavian, C. (1998). The acceptance and diffusion of new consumer durables: differences between first and last adopters. *Journal of Consumer Marketing*, 15(4), 323-342.

- Maslow, A. H. (1943). A Theory of human motivation. *Psychological Review*, 50(4), 370-396.
- Mathieson, K. (1991). Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. *Information systems research*, 2(3), 173-191.
- Mattila, M., Karjaluoto, H., & Pento, T. (2003). Internet banking adoption among mature customers: early majority or laggards? *Journal of Services Marketing*, 17(5), 514-528.
- McKechnie, S., Winklhofer, H., & Ennew, C. (2006). Applying the technology acceptance model to the online retailing of financial services. *International Journal of Retail & Distribution Management*, 34(4/5), 388-410.
- Mittal, B. (1995). A comparative analysis of four scales of consumer involvement. *Psychology & Marketing*, 12(7), 663-682.
- Mittal, B. (2006). I, me, and mine—How products become consumers' extended selves. *Journal of Consumer Behaviour*, 5(6), 550-562.
- Monk, A. F., & Blom, J. O. (2007). A theory of personalisation of appearance: quantitative evaluation of qualitatively derived data. *Behaviour & Information Technology*, 26(3), 237-246.
- Moon, J., & Kim, Y. (2001). Extending the TAM for a World-Wide-Web context. *Information & Management*, 38(4), 217-230.
- Moore, G. A. (2002). *Crossing the chasm: Marketing and selling disruptive products to mainstream customers*: HarperBusiness.
- Morgan Stanley. (2011). Tablet Demand and Distribution: Mobile Users Come of Age. Retrieved Sep 8, 2012, from [http://www.morganstanley.com/views/perspectives/tablets\\_demand.pdf](http://www.morganstanley.com/views/perspectives/tablets_demand.pdf)
- Mugge, R. (2007). Product Attachment (Doctoral Thesis, Delft University of Technology).
- Mugge, R., Schifferstein, H. N. J., & Schoormans, J. P. L. (2004). *Personalizing product appearance: The effect on product attachment*. Paper presented at the Fourth International Conference on Design and Emotion, Ankara, Turkey.
- Mugge, R., Schifferstein, H. N. J., & Schoormans, J. P. L. (2006a). A longitudinal study on product attachment and its determinants. *European Advances in Consumer Research*, 7, 641-647.
- Mugge, R., Schifferstein, H. N. J., & Schoormans, J. P. L. (2006b). Product Attachment and Product Lifetime: The Role of Personality Congruity and Fashion. *European Advances in Consumer Research*, 7, 460-466.

- Mugge, R., Schifferstein, H. N. J., & Schoormans, J. P. L. (2010). Product attachment and satisfaction: understanding consumers' post-purchase behavior. *Journal of Consumer Marketing*, 27(3), 271-282.
- Mugge, R., Schoormans, J. P. L., & de Lange, A. (2007). Consumers' Appreciation of Product Personalization. *Advances in Consumer Research*, 34, 339-341.
- Mugge, R., Schoormans, J. P. L., & Schifferstein, H. N. J. (2005). Design strategies to postpone consumers' product replacement: The value of a strong person-product relationship. *The Design Journal*, 8(2), 38-48.
- Mugge, R., Schoormans, J. P. L., & Schifferstein, H. N. J. (2008). Product attachment: Design strategies to stimulate the emotional bonding to products. In P. Hekkert & H. N. J. (Eds.), *Product Experience* (pp. 425-440): Elsevier Amsterdam.
- Mugge, R., Schoormans, J. P. L., & Schifferstein, H. N. J. (2009a). Emotional bonding with personalised products. *Journal of Engineering Design*, 20(5), 467-476.
- Mugge, R., Schoormans, J. P. L., & Schifferstein, H. N. J. (2009b). Incorporating consumers in the design of their own products. The dimensions of product personalisation. *CoDesign*, 5(2), 79-97.
- Ndubisi, N. O., Gupta, O. K., & Massoud, S. (2003). Organizational learning and vendor support quality by the usage of application software packages: a study of Asian entrepreneurs. *Journal of Systems Science and Systems Engineering*, 12(3), 314-331.
- Niederland, W. G., & Sholevar, B. (1981). The Creative Process-A Psychoanalytic Discussion. *The Arts in Psychotherapy*, 8(1), 71-101.
- Niklas, S. J. B., & Strohmeier, S. (2011). *Exploring the impact of usefulness and enjoyment on mobile service acceptance: A comparative study*. Paper presented at the System Sciences (HICSS), 2011 44th Hawaii International Conference on.
- Nysveen, H., Pedersen, P. E., & Thorbjørnsen, H. (2005). Explaining intention to use mobile chat services: moderating effects of gender. *Journal of Consumer Marketing*, 22(5), 247-256.
- O'cass, A., & Fenech, T. (2003). Web retailing adoption: exploring the nature of internet users web retailing behaviour. *Journal of Retailing and Consumer services*, 10(2), 81-94.
- O'Guinn, T. C. (1991). Touching greatness: The central midwest Barry Manilow fan club. In R. W. Belk (Ed.), *Highways and Buyways: Naturalistic Research from the Consumer Behavior Odyssey* (pp. 102-111). Provo, UT: Association for Consumer Research.
- Ogg, E. (July 26, 2013). Mobile OS loyalty: how iOS, Android and others stack up. Retrieved May 15, 2013, from <http://gigaom.com/2013/07/26/mobile-os-loyalty-how-ios-android-and-others-stack-up/>

- Olander, C. (2008). *Tailorable applications for mobile devices*. Paper presented at the Umeå's 12th Student Conference in Computing Science, Umea, Sweden.
- Online Publishers Association. (2012). A Portrait of Today's Tablet User Wave II, June 2012. Retrieved Feb, 2, 2013, from [http://onlinepubs.ehclients.com/images/pdf/MMF-OPA --  
Portrait of Tablet User-Wave 2 -- Jun12 \(Public\).pdf](http://onlinepubs.ehclients.com/images/pdf/MMF-OPA_-_Portrait_of_Tablet_User-Wave_2_-_Jun12_(Public).pdf)
- Oulasvirta, A., & Blom, J. (2008). Motivations in personalisation behaviour. *Interacting with Computers*, 20(1), 1-16.
- Oumlil, A. B., & Williams, A. J. (2000). Consumer education programs for mature consumers. *Journal of Services Marketing*, 14(3), 232-243.
- Packard, V. (1960). *The waste makers*. Harmondsworth: Pelican.
- Packard, V. (1982). *The hidden persuaders*. London: Longmans.
- Pagani, M. (2004). Determinants of adoption of third generation mobile multimedia services. *Journal of interactive marketing*, 18(3), 46-59.
- Palfrey, J., & Gasser, U. (2010). *Born digital: Understanding the first generation of digital natives*. New York, NY, USA: Basic Books.
- Pankoff, L. D., & Virgil, R. L. (1970). On the usefulness of financial statement information: A suggested research approach. *The Accounting Review*, 45(2), 269-279.
- Park, C. W., MacInnis, D., Priester, J., Eisingerich, A., & Iacobucci, D. (2010). Brand attachment and brand attitude strength: Conceptual and empirical differentiation of two critical brand equity drivers. *Journal of Marketing*, 74(November ), 1-17.
- Park, C. W., MacInnis, D. J., & Priester, J. (2006). Beyond attitudes: attachment and consumer behavior. *Seoul Journal of Business*, 12(2), 3-35.
- Park, C. W., & Mittal, B. (1985). A theory of involvement in consumer behavior: Problems and issues. *Research in Consumer Behavior*, 1, 201 - 231.
- Park, J. S., & Kim, H. S. (2010). Impacts of Individual Innovativeness on the acceptance of IT-based Innovations in health care fields. *Healthcare informatics research*, 16(4), 290-298.
- Payton, G. M., Hurn, C. T., Carswell, C. M., & Webb, S. M. (2006). *How Tidy is Your Desktop? a Field Study of Organizational Strategies*. Paper presented at the Proceedings of the Human Factors and Ergonomics Society Annual Meeting, Vol. 50, No. 17, pp. 1821-1824. SAGE Publications.
- Pedersen, P. E. (2005). Adoption of mobile Internet services: An exploratory study of mobile commerce early adopters. *Journal of Organizational Computing and Electronic Commerce*, 15(3), 203-222.

- Piller, F. T., & Müller, M. (2004). A new marketing approach to mass customisation. *International Journal of Computer Integrated Manufacturing*, 17(7), 583-593.
- Pine, B. J. (1993). *Mass-customization: the new frontier in business competition*. Boston: Harvard Business School Press.
- Pirc, M. (2006). Mobile Service and Phone as Consumption System-the Impact on Customer Switching, Helsinki Mobility Roundtable. Sprouts: Working Papers on Information Systems, 6(33). <http://sprouts.aisnet.org/6-33> (Vol. 2006).
- Pousttchi, K., & Goeke, L. (2011). Determinants of customer acceptance for mobile data services: an empirical analysis with formative constructs. *International Journal of Electronic Business*, 9(1), 26-43.
- PR Web. (July 26, 2012). Robust Growth in Smartphone Sales Drives the Global Mobile Phone Accessories Market, According to New Report by Global Industry Analysts, Inc. Retrieved Sep 2, 2012, from [http://www.prweb.com/releases/mobile\\_phone\\_accessories/chargers\\_headsets\\_USB/prweb9737241.htm](http://www.prweb.com/releases/mobile_phone_accessories/chargers_headsets_USB/prweb9737241.htm)
- Premkumar, G., Ramamurthy, K., & Liu, H. N. (2008). Internet messaging: An examination of the impact of attitudinal, normative, and control belief systems. *Information & Management*, 45(7), 451-457.
- Rai, R., & Terpenney, J. (2008). Principles for managing technological product obsolescence. *IEEE Transactions on Components and Packaging Technologies*, 31(4), 880-889.
- Rainie, L. (2012). 25% of American Adults Own Tablet Computers, Pew Internet & American Life Project, Oct 4, 2012. Retrieved Feb, 2, 2013, from <http://pewinternet.org/Reports/2012/Tablet-Ownership-August-2012.aspx>
- Ram, S., & Jung, H. (1994). Innovativeness in product usage: a comparison of early adopters and early majority. *Psychology & Marketing*, 11(1), 57-67.
- Ramirez, M., Ko, K., & Ward, S. (2010). *Introducing industrial design students to long-term product attachment*. Paper presented at the CONNECTED 2010 – 2nd international conference on design education
- Richins, M. L. (1994a). Special possessions and the expression of material values. *Journal of Consumer Research*, 21(December), 522-533.
- Richins, M. L. (1994b). Valuing things: the public and private meanings of possessions. *Journal of consumer research*, 21(December), 504-521.
- Robertson, T. S. (1967). The process of innovation and the diffusion of innovation. *The Journal of Marketing*, 31(January), 14-19.

- Robertson, T. S. (1971). *Innovative behavior and communication*. New York: Holt, Rinehart and Winston.
- Robertson, T. S., & Kennedy, J. N. (1968). Prediction of consumer innovators: application of multiple discriminant analysis. *Journal of Marketing Research*, 5(1), 64-69.
- Robey, D. (1996). Research commentary: diversity in information systems research: threat, promise, and responsibility. *Information Systems Research*, 7(4), 400-408.
- Rodin, J. (1986). Aging and health: Effects of the sense of control. *Science* 233(4770), 1271-1276
- Rogers, E. M. (2003). *Diffusion of innovations (5th edition)*. New York: The Free Press.
- Rogers, E. M., & Shoemaker, F. F. (1971). *Communication of Innovations; A Cross-Cultural Approach*. New York: Free Press.
- Rollins, T. (1993). Using the innovation adoption diffusion model to target educational programming. *Journal of Agricultural Education*, 34(4), 46-54.
- Rouibah, K., & Abbas, H. A. (2010). Effect of personal innovativeness, attachment motivation and social norms on the acceptance of camera mobile phones: An empirical study in an Arab country. *International Journal of Handheld Computing Research*, 1(4), 41-62.
- Saadé, R. G., & Kira, D. (2006). The emotional state of technology acceptance. *Issues in Informing Sciences and Information Technology*, 3, 529-539.
- Sarel, D., & Marmorstein, H. (2003). Marketing online banking services: the voice of the customer. *Journal of Financial Services Marketing*, 8(2), 106-118.
- Sartre, J. P. (1943). *Being and nothingness: A Phenomenological Essay on Ontology*. New York: Philosophical Library.
- Schelberg, S. (1990). Emotions on display: the personal decoration of workspace. *American Behavioral Scientist*, 33(3), 330-338.
- Schifferstein, H. N. J., Mugge, R., & Hekkert, P. (2004). Designing consumer-product attachment. In D. McDonagh, P. Hekkert, J. Van Erp & D. Gyi (Eds.), *Design and emotion: The experience of everyday things* (pp. 327-331). London: Taylor & Francis.
- Schifferstein, H. N. J., & Zwartkruis-Pelgrim, E. P. H. (2008). Consumer-product attachment: Measurement and design implications. *International Journal of Design*, 2(3), 1-14.
- Schouten, J. W., & McAlexander, J. H. (1995). Subcultures of consumption: An ethnography of the new bikers. *Journal of Consumer Research*, 22(1), 43-61.



- Schreier. (2006). The value increment of mass-customized products: an empirical assessment and conceptual analysis of its explanation *Journal of Consumer Behaviour*, 5(4), 327–331.
- Schultz, S. E., Kleine, R. E., & Kernan, J. B. (1989). "These are a few of my favorite things??" Toward an explication of attachment as a consumer behavior construct. *Advances in Consumer Research*, 16(1), 359-366.
- Segars, A. H., & Grover, V. (1993). Re-examining perceived ease of use and usefulness. *MIS quarterly*, 17(4), 517-526.
- Shah, S. (2003). Understanding the nature of participation & coordination in open and gated source software development communities. Working Paper, MIT Sloan School of Management.
- Sherry, J. F. (1986). *Cereal monogamy: brand loyalty as secular ritual in consumer culture*. Paper presented at the Annual Conference of the Association for Consumer Research.
- Sirgy, M. J. (1982). Self-concept in consumer behavior: A critical review. *Journal of consumer research*, 9(3), 287-300.
- Sivadas, E., & Venkatesh, R. (1995). An examination of individual and object-specific influences on the extended self and its relation to attachment and satisfaction. *Advances in consumer research*, 22, 406-412.
- Slater, J. S. (2000). *Collecting brand loyalty: A comparative analysis of how Coca-Cola and Hallmark use collecting behavior to enhance brand loyalty*. Paper presented at the the Annual Conference of the Association of Consumer Research.
- Snyder, C. R., & Fromkin, H. L. (1977). Abnormality as a positive characteristic: The development and validation of a scale measuring need for uniqueness. *Journal of Abnormal Psychology*, 86(5), 518-527.
- Soh, C., Mah, Q. Y., Gan, F. J., Chew, D., & Reid, E. (1997). The use of the Internet for business: the experience of early adopters in Singapore. *Internet Research*, 7(3), 217-228.
- Sommer, R. (1974). *Tight spaces; hard architecture and how to humanize it*. Englewood Cliffs, NJ: Prentice Hall.
- Song, X. M., & Montoya-Weiss, M. M. (1998). Critical development activities for really new versus incremental products. *Montoya-Weiss*, 15(2), 124-135.
- Stafford, T. F. (2003). Differentiating between adopter categories in the uses and gratifications for Internet services. *IEEE Transactions on Engineering Management*, 50(4), 427-435.
- Stahel, W. R. (1986). Product life as a variable: the notion of utilization. *Science and Public Policy*, 13(4), 185-193.

- Stahel, W. R. (1994). The impact of shortening (or lengthening) of life-time of products and production equipment on industrial competitiveness, sustainability and employment, research report for the European Commission Brussels, DG III (Unpublished).
- Stahel, W. R. (1998). Product durability and re-take after use. In M. Kostecki (Ed.), *The Durable Use of Consumer Products* (pp. 29-39). Kluwer:Dordrecht: Springer.
- Stahel, W. R., & Jackson, T. (1993). Durability and optimal utilisation: Product-life extension in the service economy. In T. Jackson (Ed.), *Clean production strategies* (pp. 262–291). Boca Raton, FL: Lewis.
- Strahilevitz, M., & Loewenstein, G. (1998). The effect of ownership history on the valuation of objects. *Journal of Consumer Research*, 25(3), 276-289.
- Sun, H., & Zhang, P. (2006a). Causal relationships between perceived enjoyment and perceived ease of use: An alternative approach. *Journal of the Association for Information Systems*, 7(9), 618-645.
- Sun, H., & Zhang, P. (2006b). The role of moderating factors in user technology acceptance. *International Journal of Human-Computer Studies*, 64(2), 53-78.
- Sundstrom, E. D. (1986). *Work places: The psychology of the physical environment in offices and factories*. New York: Cambridge University Press.
- Sung, J., & Yun, Y. (2010). Toward a More Robust Usability concept with Perceived Enjoyment in the context of mobile multimedia service. *International Journal of Human Computer Interaction (IJHCI)*, 1(2), 12.
- Sung, J. Y., Grinter, R. E., & Christensen, H. I. (2009). *Pimp my Roomba: designing for personalization*. Paper presented at the CHI 2009, Boston, MA, USA.
- Tan, M., & Teo, T. S. H. (2000). Factors influencing the adoption of Internet banking. *Journal of Association for Information Systems*, 1(5), 1-42.
- Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information Systems Research*, 6(2), 144-176.
- Teo, T. S. H., Lim, V. K. G., & Lai, R. Y. C. (1999). Intrinsic and extrinsic motivation in Internet usage. *Journal of Management Studies*, 27(1), 25-37.
- Terwee, C. B., Bot, S. D. M., de Boer, M. R., van der Windt, D. I. A. W. M., Knol, D. L., Dekker, J., et al. (2007). Quality criteria were proposed for measurement properties of health status questionnaires. *Journal of Clinical Epidemiology*, 60(1), 34-42.
- Thirumalai, S., & Sinha, K. K. (2009). Customization strategies in electronic retailing: Implications of customer purchase behavior. *Decision Sciences*, 40(1), 5-36.

- Thomson, M., MacInnis, D. J., & Park, C. W. (2005). The ties that bind: Measuring the strength of consumers' emotional attachments to brands. *Journal of Consumer Psychology*, 15(1), 77-91.
- Thong, J. Y. L., Hong, S.-J., & Tam, K. Y. (2006). The effects of post-adoption beliefs on the expectation-confirmation model for information technology continuance. *International Journal of Human-Computer Studies*, 64(9), 799-810.
- Tractinsky, N., Katz, A. S., & Ikar, D. (2000). What is beautiful is usable. *Interacting with computers*, 13(2), 127-145.
- Tractinsky, N., & Zmiri, D. (2006). Exploring attributes of skins as potential antecedents of emotion in HCI. In P. Fishwick (Ed.), *Aesthetic Computing* (pp. 405-422). Cambridge, MA: MIT press.
- Trinke, S. J., & Bartholomew, K. (1997). Hierarchies of attachment relationships in young adulthood. *Journal of Social and Personal Relationships*, 14(5), 603-625.
- Tseng, F. M., & Lo, H. Y. (2011). Antecedents of consumers' intentions to upgrade their mobile phones. *Telecommunications Policy*, 35(1), 74-86.
- Tucker, W. T. (1957). *Foundations for a theory of consumer behavior*. New York, NY: Holt, Rinehart and Winston.
- Turkay, S., & Adinolf, S. (2010). Free to be me: a survey study on customization with World of Warcraft and City Of Heroes/Villains players. *Procedia-Social and Behavioral Sciences*, 2(2), 1840-1845.
- Turkle, S. (2007). Introduction: The Things That Matter. In S. Turkle (Ed.), *Evocative Objects: Things We Think With* (pp. 3-10). Cambridge, MA: The MIT Press.
- Uhl, K., Andrus, R., & Poulsen, L. (1970). How are laggards different? An empirical inquiry. *Journal of Marketing Research*, 7(1), 51-54.
- Van der Heijden, H. (2003). Factors influencing the usage of websites: the case of a generic portal in The Netherlands. *Information & Management*, 40(6), 541-549.
- Van der Heijden, H. (2004). User acceptance of hedonic information systems. *MIS quarterly*, 28(4), 695-704.
- Van Hinte, E. (1997). *Eternally Yours: visions on product endurance*. Rotterdam: 010 Publishers.
- Van Nes, N. (2003). *Replacement of durables: Influencing product lifetime through product design (Doctoral Dissertation)*, Erasmus University of Rotterdam, Netherlands.
- Van Nes, N., & Cramer, J. (2005). Influencing product lifetime through product design. *Business Strategy and the Environment*, 14(5), 286-299.

- Van Nes, N., & Cramer, J. (2006). Product lifetime optimization: a challenging strategy towards more sustainable consumption patterns. *Journal of Cleaner Production*, 14(15), 1307-1318.
- Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information systems research*, 11(4), 342-365.
- Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision sciences*, 39(2), 273-315.
- Venkatesh, V., & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: Development and test\*. *Decision Sciences*, 27(3), 451-481.
- 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., Davis, F. D., & Morris, M. G. (2007). Dead or alive? The development, trajectory and future of technology adoption research. *Journal of the Association for Information Systems*, 8(4), 267-286.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 27(3), 425-478.
- Verkasalo, H. (2008). Dynamics of mobile service adoption. *International Journal of E-Business Research*, 4(3), 40-63.
- Vijayasarathy, L. R. (2004). Predicting consumer intentions to use on-line shopping: the case for an augmented technology acceptance model. *Information & Management*, 41(6), 747-762.
- Vinsel, A., Brown, B. B., Altman, I., & Foss, C. (1980). Privacy regulation, territorial displays, and effectiveness of individual functioning. *Journal of Personality and Social Psychology*, 39(6), 1104-1115.
- Wallendorf, M., & Arnould, E. J. (1988). " My Favorite Things": A Cross-Cultural Inquiry into Object Attachment, Possessiveness, and Social Linkage. *Journal of Consumer Research*, 14(4), 531-547.
- Wang, Y. S., Lin, H. H., & Liao, Y. W. (2010). Investigating the individual difference antecedents of perceived enjoyment in the acceptance of blogging. *World Academy of Science, Engineering and Technology*, 67, 1014-1023.
- Wang, Y. S., Lin, H. H., & Luarn, P. (2006). Predicting consumer intention to use mobile service. *Information Systems Journal*, 16(2), 157-179.
- Wehmeyer, K. (2007). *Assessing users' attachment to their mobile devices*. Paper presented at the Management of Mobile Business, 2007. ICMB 2007, July 9-11, Toronto, Ontario.

- Weightman, D., & McDonagh, D. (2003, June 23-26). *People are doing it for themselves*. Paper presented at the international conference on designing pleasurable products and interfaces (DPPI '03), Pittsburgh, PA.
- Wells, M. M. (2000). Office clutter or meaningful personal displays: The role of office personalization in employee and organizational well-being. *Journal of Environmental Psychology*, 20(3), 239-255.
- White, F. A., Hayes, B. K., & Livesey, D. J. (2005). *Developmental psychology: From infancy to adulthood*: Prentice Hall, Frenchs Forest.
- White, R. W. (1959). Motivation reconsidered: the concept of competence. *Psychological review*, 66(5), 297-333.
- Wise, K., & Reeves, B. (2009). *The effect of user control on the cognitive and emotional processing of pictures*. Paper presented at the annual meeting of the International Communication Association, New York.
- Wixom, B. H., & Todd, P. A. (2005). A theoretical integration of user satisfaction and technology acceptance. *Information Systems Research*, 16(1), 85-102.
- Workman, J. E., & Kidd, L. K. (2000). Use of the need for uniqueness scale to characterize fashion consumer groups. *Clothing and Textiles Research Journal*, 18(4), 227-236.
- Wright, M., & Charlett, D. (1995). New product diffusion models in marketing: an assessment of two approaches. *Marketing Bulletin*, 6(1962), 32-41.
- Yousafzai, S. Y., Foxall, G. R., & Pallister, J. G. (2010). Explaining Internet Banking Behavior: Theory of Reasoned Action, Theory of Planned Behavior, or Technology Acceptance Model? *Journal of Applied Social Psychology*, 40(5), 1172-1202.
- Yu, J., Ha, I., Choi, M., & Rho, J. (2005). Extending the TAM for a t-commerce. *Information & Management*, 42(7), 965-976.
- Yun, Y. (2010). Motivations for mobile phone personalization in appearance and User Interface (UI) and corresponding with Real Life experience, Unpublished Paper.
- Zhang, S., Zhao, J., & Tan, W. (2008). Extending TAM for online learning systems: an intrinsic motivation perspective. *Tsinghua Science & Technology*, 13(3), 312-317.
- Zickuhr, K. (2013). Tablet Ownership 2013. Retrieved June 10, 2013, from [http://pewinternet.org/~media/Files/Reports/2013/PIP\\_Tablet%20ownership%202013.pdf](http://pewinternet.org/~media/Files/Reports/2013/PIP_Tablet%20ownership%202013.pdf)
- Zimmerman, J. (2009). Designing for the self: making products that help people become the person they desire to be. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, (pp. 395-404). ACM., 395-404.