Aesthetics in the Adoption of Information and Communication Technology

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ABSTRACT

Borrowing from Davis' (1989) Technology Acceptance Model (TAM), Venkatesh and Morris (2000) TAM2 and Kant's (1790) Theory of Aesthetics; we aim to expand on the contributions and frameworks provided by the literature by testing the nomological relationships between aesthetic judgment, user's personality and the adoption of innovation in Information and Communication Technology (ICT). This study contributes an exploratory scale for the measurement of aesthetics in ICT. Survey data is utilized to explain perceived aesthetics, moderated by aesthetic centrality of a user, in addition to perceived usefulness, as dimensions of an ICT product that influence adoption intent. Preliminary results also show a weakening influence of social norms, non-significant ease of use indicators. We propose a shift in the paradigm of adoption of ICT innovation in which design, brand affinity and usefulness define the competitiveness of an ICT device in today's market.

Keywords (Required)

Aesthetics, Novelty, Adoption of Innovation, Perceived Usefulness, Perceived Ease of Use, Social Norms, TAM, TPB, Empirical, Scale Development

INTRODUCTION

Steve Jobs, Fortune's CEO of the Decade and a visionary of the technology industry whose innovations were mostly based on simplicity, beauty and charming experiences, passed to immortality this year. During an interview, when asked about his passion to design aesthetics as his signatory trademark of the companies he managed, he passionately explained that design is "the fundamental soul of a man-made creation that ends up expressing itself in successive outer layers of the product or service… is not just the color or translucence or the shape of the shell. The essence…is to be the finest possible consumer computer in which each element plays together" (Apple's One-Dollar-a-Year Man, 2000). Indeed, a decade of exponential growth in the market share dominance of Information and Communication Technology (ICT) by Apple, Inc. under his direction suggests his deep understanding of the role of product aesthetics in adoption.

Aesthetics is a philosophical branch of science that explores the nature of art, beauty and taste; a study of sensory values and judgments of sentiment and taste associated with human creations (Riede, 1988). The use of the word "aesthetics" is attributed to Baumgarten as a philosophical terminology derived from the Greek word "aisthanesthai" which means to perceive, rather than the word 'apolaustic', which was offered by other scholars as a term that means to enjoy (Saw and Osborne, 1960). The early debate—and prevailing term—on what to call the science of the beautiful, is congruent with the intrinsic nature of an interdependent relationship between the characteristics of an object and the subjective judgment of the observer's sensation based on reflective contemplation. As explained by Bardzell (2011), "The hybrid existence of aesthetic works—at once inhering in material objects and human subjective responses to them—implies a hybridity of aesthetic cognition" (p. 609). As such, aesthetics is not simply determined by craftsmanship and a set of characteristics; rather, it requires an enjoyment rise from the act of observing the device, making judgment of beauty a sensory, emotional and intellectual determination (Haynes & Paradice, 2007). Such nature of aesthetics was more clearly explained by Berlyne's (1974) psychobiological theory on aesthetics, where he proposed that aesthetic appraisal should be determined by the arousal potential of an object in a curvilinear relationship in which very low and very high arousal potential were perceived as unpleasant. More importantly, Berlyne, established the suggestion that aesthetics is dependent on both an objective property and an idiosyncratic reaction (Moshagen & Thielsch, 2010).

The literature is abundant with models that aim to explain the constructs that influence adoption of innovations. While most of the literature has focused on the reliability (strength) and usability (utility) of systems, aesthetics has been neglected, possibly to the detriment of a scholarly understanding of adoption of innovation. This study contributes to the literature by

testing the relationships between aesthetic judgment, the user's personality and adoption of ICT innovation using previously established Venkatesh and Morris' (2000) TAM 2 model as the basis for our model.

LITERATURE REVIEW

Diffusion of ICT

Adapted from the Theory of Reasoned Action (Ajzen and Fishbein, 1980), Davis' (1986) Technology Acceptance Model (TAM) is considered as one of the most influential theories used in the field of diffusion of innovations. TAM proposes that an individual's acceptance of information systems is determined by two major variables: the degree to which a person believes that using a particular system will enhance their job performance or perceived usefulness (PU), and the degree to which a person believes using a particular system would be free of effort, or perceived ease of use (PEOU). TAM, however, in its initial conceptualization, makes no attempt to incorporate the effect of the social environment on a user's degree of intent to use a particular system, or behavioral intention (Srite & Karahanna, 2006). Such social environmental influence is properly addressed by the Theory of Planned Behavior (TPB), which was proposed by Ajzen (1985) as an extension of the theory of reasoned action linking attitudes and behavior and it is considered one of the most predictive persuasion theories. One of its main constructs, subjective norms, describes a person's perception of other's beliefs and judgment on a particular behavior in question, which result in the influence of adoption of innovation. Other scholars have empirically grounded this dimension as it relates to information systems by incorporating it into TAM2 (Malhotra & Galletta, 1999; Venkatesh & Morris, 2000). Scholars, however, have pointed out the instability of perceived ease of use as a predictor of behavioral intention, and further compile the afforded reasons for the often found non-significance of this construct (Lee, Kozar, & Larsen, 2003). Some suggest that the reason for the instability of such construct is that the systems used in studies are by their inherent nature easy to use (Subramanian, 1994); others argue that certain organizations focus on usefulness of innovation rather than focusing on its ease of use (Igbaria, Guimaraes, & Davis, 1995).

The extensive efforts over the last 15 years to expand the literature with new and external variables postulating diversified relationships to the TAM and TPB frameworks has yielded a complex series of models that include individual and organizational characteristics (Lee et al., 2003). Rogers' (1983) Diffusion of Innovation Theory was used in combination with TAM resulting in mixed results for trialability, visibility and demonstrability (Moore & Benbasat, 1991; Karahanna, Straub, & Chervany, 1999; Xia and Lee, 2000). On the other hand, compatibility and complexity were found to be strong antecedents of perceived usefulness (Premkumar & Potter, 1995; Igbaria, Parasuraman, & Baroudi; 1996). A variety of personality traits and attitudes have also been found to influence the established adoption models. Venkatesh and Morris (2000) TAM2 has been found to be clearly adequate for systems in which individual preference exerts a major influence on the decision of millions of individuals based on their diverse social norms. Venkatesh, Morris, Davis and Davis proposed the Unified Theory of Acceptance and Use of Technology (UTAUT) based on the grounding of the most salient constructs of the diverse TAM, TAM2, TPB, Social Cognitive Theory (Bandura, 1986), Innovation Diffusion Theory (Rogers, 1983), and the Model of PC Utilization (Thompson, Higgins, & Howell, 1991). UTAUT's model highlights and empirically grounds the strength of TAM2 constructs and it incorporates facilitating conditions as a parallel variable of user intent. These facilitating conditions represent non-volitional factors for which behavioral intention is unable to account in determining use behavior. Demographic variables are also presented as moderators of the predicting variables of both behavior intention and use behavior (Venkatesh et al., 2003). Despite the intuitiveness of facilitating conditions, empirical evidence suggests it is an unstable construct due to its inability to account for unavailable information that may realistically exert control over a behavior (Ajzen & Madden, 1986; Karahanna et al., 1999; Sheeran, 2002; Sheeran, Trafimow, & Armitage, 2003; Taylor & Todd, 1995; Venkatesh, Brown, Maruping, & Bala, 2008).

Additional findings in the literature include openness to technology and playfulness as predicting variables of user intent (Agarwal & Karahanna, 2000). A more unique dimension suggested in the literature that leads to our discussion in this study is the perceived aggregate enjoyment, in addition to performance outcomes by a system, which was postulated to increase adoption intent of a user (Chin & Gopal, 1995; Teo, Lim, & Lai, 1999).

Aesthetics in ICT Product Design

Given that perceived usefulness has been strongly established as the main predictor of user intent to adopt technology, most practitioners' product development strategies partake in the fundamental essence that a technology device must be useful (Igbaria et al., 1995), suggesting that no other variable of adoption would ever compensate for lack of usefulness of a product. However, given the ruthless global competitiveness of our interconnected markets, companies must invest heavily in product design in order to sustain their competitive edge in the marketplace. This is particularly the case in the information and communication technology companies, whose client base normally consists of millions of users with diverse socio-economic demographics who can quickly ascertain their preferences in functionalities and device characteristics. It is

in this particular industry where design plays an important mediating role between technology usability and user characteristics (Gemser, Jacobs, & Cate, 2006).

The recent study of aesthetics is a profound indication of a new awareness of the wide-ranging dimensions of interaction between humans and computers (Udsen & Jorgensen, 2005). While moderately increasing in attention, the literature has been parsimonious in addressing the influence of aesthetics in user adoption of certain technology products. For example, aesthetics was found to positively influence individuals' preference for industrial products and web sites across diverse demographics. (Lavie & Tractinsky, 2004; van der Heijden, 2003 (sic); Yamamoto & Lambert, 1994). Aesthetics has also been posited to increase intention to adopt and actual use of systems (Wang, Hong, & Lou, 2010), influence the intent to acquire mobile devices (Cyr, Head, & Ivanov, 2006; Ha, Yoon, & Choi, 2007), and, overcome perceived ease of use and negatively influence psychic cost perceptions (Liao, To, Liu, Kuo, & Chuang, 2010). Baljko and Tenhaaf (2008) presented a theoretical framework for aesthetics in the form of joint interactions between news media, artificial life and human-computer interaction. Dalsgaard and Hansen (2008) argued that the performing perception shapes a user's experience partially based on aesthetics. Finally, Yang and Hsu (2011) advance the research model that included the construct of perceived usefulness, ease of use, playfulness, and aesthetics as the ergonomic factors impacting user intention to adopt and use a fashion technology. Nonetheless, the collective conclusions in the literature are so broad that they dilute the notion of aesthetics in the context of interaction design (Bardzell, 2011); this is particularly the case when scholars have intertwined usefulness characteristics with aesthetics.

Framework of Product Experience

Desmet and Hekkert's (2007) Framework of Product Experience, further expanded by Hekkert and Leder (2008)'s *Product Aesthetics*, is perhaps the most relevant contribution to taxonomy of aesthetics. In their contribution, the authors suggest individuals differ extensively in their aesthetic reactions to objects; and that these reactions as well as the differences are not arbitrary, but follow certain lawful dimensions that help understand the general response to device aesthetics. While such rules are not exact science, they provide an insightful framework to approach the science of beauty. This framework is particularly helpful in discerning prior contributions in the information systems literature that have focused only certain dimensions of aesthetics. The authors propose organizational properties, which are aesthetic principles that can be measured or formalized, along with subjective measures, which refers to perception of an item's properties. Such duality is in alignment with Berlyne's (1974) theory of aesthetics and it offers the following organizational factors: color, order, texture, weight, harmony, symmetry and proportion; and subjective factors: originality, novelty and innovativeness. Some of the highest critics offered by Hekker and Ledder (2008) are their rejection of the notion made by some scholars (e.g. Dunne 1999, Overbeeke et al., 2003) that the sensory nature of aesthetics may expand its definition to include interaction design effects or "proprioceptive aesthetics". The authors deemed such interaction to be tautological and overlapping with other available constructs.

RESEARCH MODEL

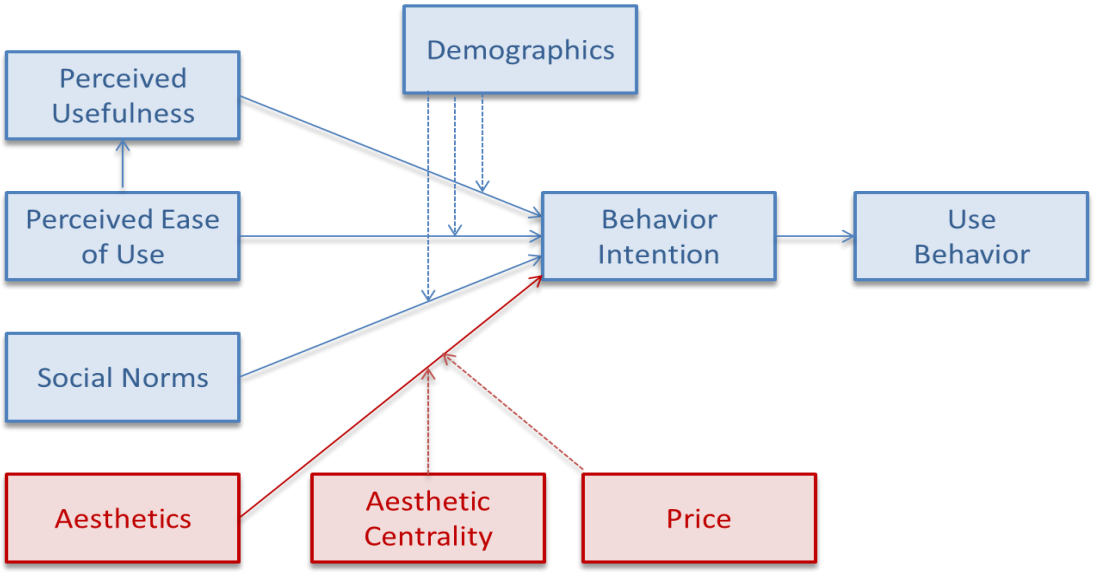

Figure 1. ICT Adoption Research Model

The literature in adoption has empirically tested constructs that establish the adoption of innovation. We borrow from TAM2 (Venkatesh & Morris, 2000) which expanded the original TAM model to include social norms. We thus theorize that perceived usefulness, perceived ease of use and social norms will play a significant role as direct determinants of behavior intention to adopt ICT innovation. In addition, we propose aesthetics as a direct construct that will determine the adoption of ICT innovation. We support previously vetted demographics of the user as moderators of behavior intention and propose that a user's Aesthetic Centrality and the device's price will moderate the influence on aesthetics on behavior intention. Figure 1 illustrates our proposed research model.

HYPOTHESIS DEVELOPMENT

Perceived Usefulness, Perceived Ease of Use, Social Norms and Demographics

Perceived usefulness has been evidenced by at least 88% of the literature to significantly influence behavior intention (Lee et al., 2003). Scholars in the literature acknowledge that perceived usefulness is similar to synonymous constructs in other models; e.g. usefulness and extrinsic motivation (Davis, 1989), usefulness and job-fit (Thompson et al., 1991), usefulness and relative advantage (Davis 1989; Moore & Benbasat, 1991), usefulness and effort expectancy (Venkatesh et al., 2003). Such construct has been found to be the strongest predictor of all the available models (Adams, Nelson & Todd, 1992; Benbasat & Barki, 2007; Hendrickson & Latta, 1996; Hendrickson, Massey & Cronan, 1993; Lee et al., 2003; Szajna, 1994). The few studies that have not found this construct to be significant are normally complex models that include other constructs (Lee et al., 2003). Given the prior findings discussed in our literature review in reference to TAM 2, we must validate the relevance of perceived usefulness; thus, we hypothesize:

H1: Perceived usefulness will be positively related to the intention to use ICT innovation.

Perceived ease of use has been evidenced to be unstable predictor of behavior intention in at least 30% of the literature studies (Lee et al., 2003). However, it has been evidenced to be a significant antecedent of perceived usefulness rather than a parallel, positive determinant of behavior intention. As such it is posited to be an indirect factor to behavior intention having perceived usefulness as a mediator (Davis et al., 1992; Benbasat & Barki, 2007; Straub & Burton-Jones, 2007). The available models in the literature provide similar constructs to perceived ease of use; e.g. TAM and TAM2 (Davis, 1989; Venkatesh & Morris, 2000) use the same construct, Thompson et al. (1991) use complexity, and Venkatesh et al. (2003) use effort expectancy. Given the prior findings discussed in our literature review in reference to TAM2, we must validate the relevance of perceived usefulness; thus, we hypothesize:

H2: Perceived ease of use will be positively related to the intention to use ICT innovation.

Subjective norms, or an individual's perception that the people who are most important to them think he or she should conduct a particular behavior, was excluded by Davis (1989) but introduced into TAM 2 by Venkatesh and Morris (2000). Thompson et al. (1991) used the term social norms in defining their construct based on TRA's subjective norms. Venkatesh et al. (2003) use social influence to describe the same construct pertaining to the degree a behavior is influenced by the way in which individuals believe others will view them as a result of having used the technology. The strength of this construct has also been evidenced in the literature (Agarwal & Prasad, 1998; Karahanna et al., 1999; Thompson et al., 1994; Venkatesh & Morris, 2000; Venkatesh et al., 2003); and the individuality of ICT devices makes social norms particularly influential in the choice of personal devices often described as fashion technology (Yang & Hsu, 2011). Given the prior literature findings discussed in our literature review in reference to TAM2, we must validate the relevance of social norms; thus, we hypothesize:

H3: An individual's Social Norms will be positively related to the intention to use ICT innovation

Gender has been empirically demonstrated to have a moderating effect on the TAM2 predicting constructs of behavior intent: perceived usefulness was more salient for men while perceived ease of use and social norms were more salient for women (Bozionelos 1996; Venkatesh & Morris, 2000; Venkatesh et al., 2003). The effect of age has also been shown to moderate a system's perceived ease of use but seldom reported (Venkatesh & Morris, 2000; Venkatesh et al., 2003). Experience, however, is posited to diminish adverse effects of ease of use and temper social influence (Venkatraman & Price, 1990; Venkatesh et al., 2003). Given the prior literature findings discussed in our literature review in reference to TAM 2, we must validate the relevance of demographics as a moderating variable of user intent; thus, we hypothesize:

H4: Demographics of age, gender, experience will moderate the relationships of perceived usefulness, perceived ease of use and social norms with intention to use an innovation

Definition and Role of Aesthetics

Following Gemser et al. (2006)'s use of the ISO standard 9241-11 definition of usability as "the extent to which a product can be used by specific users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" we differentiate aesthetics beyond the usability in that it brings the hedonic, emotional, and subjective property to an environment (Wang et al., 2010). In order to maintain discriminant validity of this construct, it is imperative not to blend the enjoyment resulting from good performance of a system or device with the pleasant feeling derived from the experience of sensing such a device. Thus, expanding on the contributions made by previous scholars (Gemser et al., 2006; Hekker & Ledder, 2008; Lavie & Tractinsky, 2004; Wang et al., 2010; Yang & Hsu, 2011) we define *aesthetics* in the context of technology as the degree to which a person perceives a technology device to be attractive and sensorially enjoyable beyond any performance consequences resulting from its usability. Given the previous discussion regarding the effect of aesthetic criterion as an integral part of user's intention to adopt technology products found in the literature, in addition to the previous research studies that investigate the effect of perceived attractiveness and perceived aesthetics (van der Heijden, 2003 (sic); Yang & Hsu, 2011), we propose the following hypothesis:

H5: Aesthetics will be positively related to the intention to use ICT innovation

Aesthetic Centrality (Personality)

Desmet and Hekkert's (2007) offers culture and individual personality as variables held responsible for many of the differences in aesthetic preferences. The authors suggest attention must be placed to the predicting ability of preferences. In this context, Bloch, Brunel and Arnold (2003)'s aim to explain such individual personality differences by suggesting that certain individuals are more subject to purchase aesthetically pleasant products than others. They propose a personality trait called Centrality of Visual Product Aesthetics (CVPA) that represents a continuous individual difference variable where visual aesthetics dominate a consumer's acquisition and usage of goods. The authors provided evidence that CVPA holds a strong moderating affect in the purchase intentions, aesthetic evaluations, product attitudes, preferences for brands, and the effect of product price (Bloch et al., 2003). As such we propose the following hypothesis:

H6: The relationship between Aesthetics and Behavior Intention to adopt an innovation will be moderated by an individual's Centrality of Aesthetics disposition, such that the stronger measurement of centrality of aesthetics in a person, the greater the effect of aesthetics on behavior intent for that individual.

Price

The rate of adoption of innovations has been suggested to be influenced by the price of a product (Kalish, 1985). Prins and Verhoef (2007) suggested that prices would have a considerable impact on customer's adoption timing of a product. Thus, price may play a significant role in the overall success of a product based on an individual's assessment of the utility and aesthetics of a product vis-à-vis device's price (Kapur, Singh, Chanda, & Basirzadeh, 2010). While such capacity may be suggested by the individual's capacity to purchase a product, we propose that higher purchasing power of an individual will not increase the price they are willing to pay for a product in the same proportion; rather, it will stay within normal range. Thus, we propose the following hypothesis:

H7: The relationship between aesthetics and behavior intention to adopt ICT innovations will be moderated by the price of the product, is such that the greater the price, the less the effect of aesthetics on behavior intent.

METHODOLOGY

Phase I: Developing Preliminary Aesthetics Measures

Data was collected in different phases at a U.S. university library and computer laboratory with the participation of students and staff from diverse discipline backgrounds to ensure heterogeneity across technologies, industries and personalities. Phase I was aimed at developing measures for constructs proposed by the literature but not previously tested in instruments. Seventeen different terms based on price and Hekkert and Leder (2008)'s Products Aesthetics were selected for an online questionnaire. Participants were asked to drag-and-drop each term to one of four boxes labeled with *price* and three main

dimensions we propose as aesthetics dimensions: *looks, feel and novelty*. Our intent for this preliminary phase was to obtain at least three instrument items to operationalize nomologically valid measures of aesthetics not previously validated in the literature (Lee, Kozar, Larsen, 2003). Respondents were asked to provide any comments on the questionnaire content and structure (Hsu & Chiu, 2004). Two iterations of pilot tests were conducted with five Ph.D. students to ensure the exercise was clear and concise. Once the wording was satisfactory and released, a total of 124 respondents participated in this phase, yielding 97 to 103 valid responses. Since users were able to leave items without classification, some categories received slightly more assignments than others, explaining a 6-response variance in the category response frequency. Figure 2 displays the results of the terms best associated with the aesthetics dimensions used in the questionnaire. The top three to four terms that were best aligned with a particular dimension were kept, removing those that were not as clearly aligned with one category or redundant e.g. size, proportion and craftsmanship. Table 1 shows a summary of the terms that remained for the

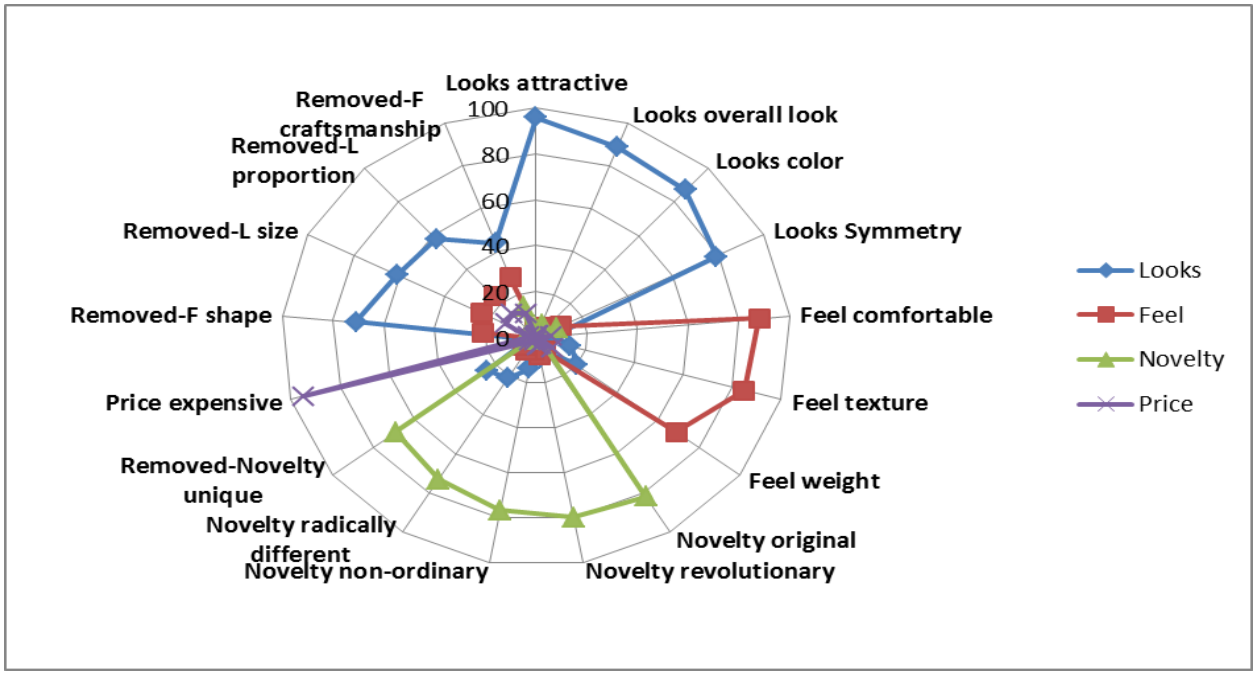

Figure 2. Aesthetic Dimensions Proposed

Construct	Answer	Looks	Feel	Novelty	Price
Feel	comfortable	7	**88**	0	6
Feel	texture	14	**85**	1	0
Feel	weight	20	**69**	2	8
Looks	attractive	**96**	3	4	0
Looks	overall look	**89**	4	6	1
Looks	color	**87**	6	5	1
Looks	symmetry	**79**	11	9	0
Novelty	original	8	7	**82**	4
Novelty	revolutionary	9	8	**80**	4
Novelty	non-ordinary	14	6	**77**	2
Novelty	radically different	21	7	**73**	0
Price	expensive	3	2	1	**95**
Removed	shape	71	**21**	4	3
Removed	craftsmanship	44	**28**	14	11
Removed	size	**61**	24	1	13
Removed	proportion	58	**24**	4	14
Removed	unique	24	6	**69**	3

Table 1. Summary of Aesthetic Measures

operationalization of our next phase.

Phase II: Pilot Study Participation

Phase II was aimed at pilot testing the survey's wording and the validity of the constructs. As suggested by Hinkin (1998) development of scale measurement is a never ending exercise; thus, such phase was conducted to gain feedback on the questionnaire instrument and test the discriminant and convergent validity of the constructs utilized. University students and staff were asked to test a Toshiba Thrive operated by Google's Android 3.1 Honeycomb operating system and an Apple iPad 2 with iOS 5 (e.g. browse the internet, play games, check email). By providing two comparative items, we aimed to prime the participants of the study with a point of reference of two similarly-priced items. However, according to CNET Editor's Review, the Android Toshiba Thrive is a "bulky but aggressively priced Honeycomb tablet that earns its girth with full port support and a removable battery…but, is a bulky tablet inherently a bad thing or can a tablet justify its extra mass?"[1] As such, individuals were expected to relate their experience in relation to an immediate point of reference. Participants were asked to voluntarily participate in completing an online survey shortly after their experience. We aimed to control for personal brand preferences by randomly assigning questions in connection with only one of the two products. Our efforts yielded a total of 118 completed surveys during this phase. Table 2 summarizes the descriptive statistics of the pilot participants with a breakdown of experience, gender, age and household income levels from all the participants. Most individuals were in between twenty and thirty years of age and but equally divided on gender. The majority had less than 2 years experience with these devices and made less than US$40,000 per year.

Categories	Frequency	Percentage
Experience		
Less than 12 Months	30	25%
12-24 Months	49	42%
24-36 Months	20	17%
36-48 Months	12	10%
More than 48 Months	7	6%
Gender		
Male	58	49%
Female	60	51%
Age		
Less than 20	21	18%
20- 30 Years	78	66%
20- 30 Years	15	13%
More than 40 Years	4	3%
Household Income Level		
Less than 20,000	45	38%
20,000 - 40,000	35	30%
40,000 - 60,000	24	20%
60,000 - 80,000	6	5%
More than 80,000	8	7%
Total	118	100%

Table 2. Descriptive Statistics

[1] http://reviews.cnet.com/tablets/toshiba-thrive-16gb/4505-3126_7-34468401.html?tag=mncol;lst;1#reviewPage1

Measurements

Over the past years, researchers have developed and validated the measures for TAM2 in different information systems. We specifically borrowed Srite and Karahanna's (2006) TAM2 measures for perceived usefulness, perceived ease of use, social norms, and behavior intention. Demographic measures and use behavior were borrowed from Venkatesh et al.'s (2008) measurement scales.

Latent Variables	Questionnaire Items	
Perceived Usefulness	PU1	Using this type of device would enhance my productivity in college/work
	PU2	I would find this device useful in my college/work activities
	PU3	Using this device would enhance my effectiveness in college/work
	PU4	Using this device would improve my performance in college/work
Perceived Ease of Use	PEOU1	It would be easy for me to become skillful in using this device
	PEOU2	I find this device easy to use
	PEOU3	I find it easy to get this device to do what I want it to do
	PEOU4	Learning to operate this device would be easy for me
Social Norms	SN1	My relatives think that I should use this device
	SN2	My friends believe I should use this device
	SN3	My mentors think I should use this device
	SN4	I believe that my classmates at college will think I should use this device
Aesthetics	A1.1	This device is attractive
	A1.2	This device's overall look is appealing
	A1.3	This device's color is appealing
	A1.4	This device's symmetry is appealing
	A2.1	This device is comfortable
	A2.2	This device's texture is appealing
	A2.3	This device's weight is appealing
	A3.1	This device is original
	A3.2	This device is revolutionary
	A3.3	This device is out of the ordinary
	A3.4	This device is radically different
Price	P1	This device is expensive ($400-$500)
Aesthetics Centrality	AC1	Owning products that have superior designs makes me feel good about myself
	AC2	I enjoy seeing displays of products that have superior designs
	AC3	A product's design is a source of pleasure for me
	AC4	Beautiful product designs make our world a better place to live
	AC5	I have a skill to see subtle differences in product designs
	AC6	I see things in a product's design that other people tend to pass over
	AC7	I have the ability to imagine how a product will fit in with designs of other things I own
	AC8	I have a pretty good idea of what makes one product look better than its competitors.
	AC9	Sometimes the way a product looks seems to reach out and grab me
	AC10	If a product's design really "speaks" to me, I feel that I must buy it.
	AC11	When I see a product that has a really great design, I feel a strong urge to buy it.
Behavior Intention	I1a	I would purchase this device
Behavior Intention Frequency	IF1a	I would intend to use this device
	IP2a	I predict I would use this device
	IP3a	I would plan to use this device
	IP4a	I would expect to use this device
Behavior Intention	I1b	I would purchase this device again based on the satisfaction
Behavior Intention Frequency	IF2b	I normally intend to use this device
	IP2b	I normally plan to use this device
	IP3b	I normally expect to use this device
Use Behavior	IP4b	I use this device

Table 3. Questionnaire Items and Latent Variables

Phase I measures were incorporated into our instrument to assess the product's measurement of aesthetics. Finally, we borrowed from Bloch, Brunel, Arnold (2003)'s centrality of visual product aesthetics to explain individual's aesthetic centrality. All measures were assessed by seven-point Likert-type scales, with higher values indicating more positive intensity of the measured factor. Table 3 displays the measurement variables we used to determine the latent variables.

Analysis

The first step in scale validation was to examine the goodness-of-fit of the overall model (Hinkin, 1998). The responses were downloaded from Qualtrics into a SPSS/CSV file that was imported into SmartPLS (Ringle, Wende & Will, 2005) to conduct the statistical analyses. A reliability analysis was conducted for each latent variable through SPSS to assess the convergent validity of the factors measuring the particular construct. As reflective indicators, we expect them to be highly correlated with each other as measured by their Cronbach's Alpha. Thus, it would be reasonable to drop certain indicators for brevity purposes, particularly those that by removing them would improve the overall validity effect. Mirroring Bhattacherjee (2001)'s methodology to validate measurement scales, convergent validity was evaluated using three criteria originally suggested by Fornell and Larcker (1981): all indicator factor loadings should be significant and exceed 0.7; construct reliabilities should exceed 0.80; and, average variance extracted (AVE) by each construct should exceed the variance due to measurement error for that construct (Bhattacherjee, 2001). The confirmatory factor analysis contained in Table 4 displays that most items are proper measurements of their respective constructs. Only one measure (I1a) was removed based on the potential Cronbach's Alpha improvement of the construct after its removal. It would be possible to remove those indicators without an asterisk to develop proper parsimonious measures.

Factor	Factor Loading	Standard Error	T-Statistic	Cronbach's Alpha/ Removed
Aesthetics				**0.946**
A1.1 *	0.789	0.0705	11.184	0.934
A1.2 *	0.763	0.0823	9.276	0.934
A1.3	0.737	0.0907	8.122	0.935
A1.4 *	0.765	0.0797	9.606	0.934
A2.1 *	0.720	0.0819	8.790	0.937
A2.2 *	0.818	0.0616	13.281	0.932
A2.3 *	0.781	0.0541	14.433	0.935
A3.1 *	0.848	0.0344	24.628	0.932
A3.2	0.823	0.0450	18.297	0.935
A3.3*	0.869	0.0373	23.299	0.932
A3.4 *	0.848	0.0334	25.405	0.934
Behavior Intent				**0.905**
I1a ++	0.696	0.0876	7.945	0.961
IF1a *	0.876	0.0725	12.078	0.855
IP2a *	0.877	0.0818	10.710	0.847
IP3a *	0.886	0.0800	11.076	0.842
IP4a	0.849	0.0873	9.717	0.862
Perceived Ease of Use				**0.881**
PEOU1	0.730	0.4205	1.737	0.873
PEOU2 *	0.867	0.4810	1.803	0.826
PEOU3 *	0.950	0.5628	1.688	0.856
PEOU4 *	0.770	0.4235	1.819	0.833
Perceived Usefulness				**0.942**
PU1*	0.906	0.0908	9.980	0.927
PU2	0.903	0.0846	10.678	0.934
PU3*	0.939	0.0861	10.904	0.913
PU4*	0.941	0.0857	10.987	0.910
Social Norms				**0.086**
SN1	0.795	0.1041	7.638	0.833
SN2 *	0.827	0.1109	7.452	0.790
SN3*	0.902	0.0860	10.488	0.804
SN4*	0.804	0.1106	7.271	0.838

Table 4. Factor Loadings and Validity Tests

Results

Anderson and Gerbing (1988) suggest that at least 150 observations must be collected to provide sufficient statistical validity to a sample. This is a preliminary report intended to report the progress made thus far on this project. Nonetheless, the preliminary analysis results in Table 5 show promising exploratory results.

The path coefficient for perceived usefulness as an indicator of behavior intent demonstrates a path coefficient of 0.3837, a t-statistic of 3.9906 and a Standard error of 0.0961, with a p-value of .001, supporting Hypothesis 1. On the other hand, the path coefficient for perceived ease of use once again shows a non-significant relationship with a negative path coefficient of -0.1782, a t-statistic of 0.9935 not supporting Hypothesis 2. The predicting ability of social norms on behavior intent was also found to be non-significant with a path coefficient of -0.1131 a t-statistic of 1.1492 not supporting Hypothesis 3. Aesthetics was

found to be significant at the alpha of 0.1, with a path coefficient of .1227, a standard error of 0.082 and a t-statistic of 1.4822; it would be adequate to suggest further analysis might further confirm this relationship.

The relationships posited by hypotheses 4, 6 and 7 are not included in this report, but will be developed as soon as a satisfactory sampling size is reached. While there some indications that these relationships were not significant, not having sufficient statistical validity on the moderating relationships may lead to erroneous results.

	Path Coefficient	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics	Result
Perceived Usefulness -> Behavior Intention	0.3837	0.3723	0.0961	0.0961	3.9906	Supported
Aesthetics -> Behavior Intention	0.1227	0.1293	0.0828	0.0828	1.4822	Supported
Social Norms -> Behavior Intention	0.1131	0.1233	0.0985	0.0985	1.1492	Not Supported
Perceived Ease of Use -> Behavior Intention	-0.1782	-0.1223	0.1793	0.1793	0.9935	Not Supported

Table 5. Preliminary Results

LIMITATIONS

Given the preliminary nature of this study, it is difficult to reach a statistically valid result without further exploration and further data collection. This limits our ability to provide further insight on the results as of the deadline for this paper. Nonetheless, the study will be continued for the next days until a statistically valid sample is reached and the entire set is completed.

DISCUSSION

Even at the stage of this study, we can affirm that the preliminary results of the efforts made have resulted in the scale development of aesthetics in the studies of adoption of ICT innovations. While scale development is a continuous process, preliminary results confirm the discriminant and convergent validity of these measures that are borrowed from the discipline of design and marketing to better understand consumer behavior. The distinction from prior literature by clearly separating aesthetics from normally perceived usefulness provides clarity and purpose for this and future research. Thus, we advance the literature by further defining aesthetics beyond the usability and utility effects of other system and device characteristics. In addition, we provide exploratory suggestions at the time of this report that aesthetic plays a slightly stronger role than social norms, and a much bigger role than perceived ease of use. It seems that as more individuals are exposed to ICT technology, the variant between one generation of products and the next does not change significantly to hinder user's perception of a device's ease of use. Most individuals will continue to assume personal devices to be easy to use and relatively familiar to operate. Perceived ease of use is expected to diminish as a function of time for personal ICT innovations. The preliminary results on social norms suggest that the influence from supervisors and peers is not as strong as perceived usefulness and product aesthetics. It is possible that users might have a propensity for brand affinity that overcomes social influences. This premise supports the strength of the original TAM model and proposes a new shift in the paradigm of diffusion of innovation in which ease of use is taken for granted, decisions become more individualized and aesthetics becomes the new frontier for competitive market dominance in the ICT industry.

CONCLUSION

This study proposes a new shift in the paradigm of diffusion of innovation by introducing and highlighting the role of aesthetics as the new important factor in diffusion of ICT innovations. This study contributes an exploratory scale for the measurement of aesthetics in ICT. Our study provides exploratory evidence that aesthetics, in addition to perceived usefulness, is one dimensions of an ICT product that influence adoption intent. Results also suggest that most ICT products are so similar that ease of use continues to diminish in importance. Contrary to the scholarly contributions of the last decade, social norms were suggested to also be a weak determinant of user intent, although more data needs to be gathered to offer such conclusion as evidentiary.

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