Why People Aren't Using Wireless Internet: A Behavioral Economics Approach to Technology Preferences

Punit Ahluwalia

College of Business Administration
1201 West University Drive
Edinburg, TX 78539, USA
Email: punit@utpa.edu

Gregory Gimpel

PhD Fellow
Center for Applied ICT
Copenhagen Business School
Howitzvej 60, 2 floor
2000 Frederiksberg
Email: gg.caict@cbs.dk

Upkar Varshney

Robinson College of Business
Georgia State University
Atlanta, GA 30303, USA
Email: uvarshne@cis.gsu.edu

Biographical Notes:

Punit Ahluwalia is Assistant Professor at the University of Texas – Pan American. His research interests include quality of service in computer networks, wireless and mobile technologies and their impact on individuals, organizations, and society. He has authored several papers in major journals and conferences.

Gregory Gimpel is a PhD Fellow at Copenhagen Business School. His research interests include developing models for technology adoption and utilization in the presence of competing technologies. His research is supported by CAICT, the DREAMS project, and the Danish Agency of Science and Technology (grant number 2106-04-0007)

Upkar Varshney is Associate Professor of CIS at Georgia State University, Atlanta. His current interests include mobile and wireless technologies, healthcare technologies, pervasive computing, and m-commerce and have authored over hundred papers. He chaired International Pervasive Health Conference in 2006 and program chaired AMCIS in 2009.

Abstract:

This paper proposes a new model for understanding the adoption of internet services when competing technological standards can fulfill similar needs. Using prospect theory as its theoretical foundation, the model posits that reference prices, flat rate preference, and status quo bias constitute the perceived sacrifice when users consider adoption of new services such as wireless internet. Perceived sacrifice and perceived quality influence the perceived relative value, which in turn influences the intention to adopt wireless internet. The proposed model and related hypotheses are empirically confirmed through a field study. The paper discusses several implications for telecommunications policy and industry.

Keywords: Wireless internet; reference price; status quo bias; flat rate preference; perceived quality; perceived value; service organizations; services and standards

Reference to this paper should be made as follows: Ahluwalia, P., Gimpel G. and Varshney Upkar (2010) 'Why People Aren't Using Wireless Internet: A Behavioral Economics Approach to Technology Preferences', Int. J. Services and Standards, Vol. , No. , pp

1 Introduction

Internet penetration is high in the USA, Europe, and parts of Asia, with extensive consumer use of broadband technology. Many service providers offer internet access via a variety of different competing technologies. Wireless data technologies for laptop computers, such as 3G, 4G and WiMAX, offer a new type of service that is fundamentally different from the more widely adopted fixed line internet standards. There is a need to study the adoption of these broadband internet access technologies. Several researchers have employed traditional theories of technological adoption that have proved useful when studying individual technologies. The current broadband market offers existing standards that compete with new technologies. In such an environment of technological alternatives, new models become necessary to understand the process of decision making in situations of choice.

This paper explores the adoption of technology in a situation in which different technologies fill a similar consumer need by researching the factors that determine the adoption of fixed line or wireless internet service. In a market offering a plethora of technological choice, why does such a large portion of the population use such a small number of technologies? What goes on in people's minds when deciding which type of access technology to buy? This paper is motivated by gaps pointed out by calls for alternative perspectives on technology adoption (Benbasat and Barki, 2007; McMaster and Wastell, 2005; Venkatesh et al., 2007).

A key shift in perspective is to view internet service providers as service organizations that have made investments in specific technological standards. Such a view is suitable due to the nature of internet service delivery. Mills (1980) proposes a typology of service organizations and their important attributes. Two distinct characteristics of service oriented companies are that 1) their offerings are consumed as they are produced, and 2) they do not circulate in the marketplace as products after initial provision. Within the framework proposed by Miles (1980), Internet service providers belong to the Maintenance-Interactive type of service organization. This type of service organization is characterized by high specificity of contracts, high client expectations vs. service capabilities, high levels of receptivity and response to customer evaluations, and low levels of power and attachment. Therefore, perceived quality and value should be important for customer satisfaction and retention. Furthermore, the intangible nature of service-oriented products causes performance ambiguity in service exchanges. The cost of retaining customers is greater when performance ambiguity is high (Bowen 1986). Internet service organizations need to examine what are the set of behaviors, routines, and ways of working that may improve internet delivery outcomes, administrative efficiency, cost effectiveness, and user experience (Greenhalgh 2004). The impact of customer retention is "astronomical" because of repeated purchase of the service (Internet) as long as the customer stays loyal (Heskett 1984). Loyalty is derived from customer

satisfaction, which is influenced by value of services offered (Heskett 1984). The concept of customer loyalty contributes to the status quo bias that reduces the likelihood of customers choosing alternatives to the service they currently use.

This study contributes to research into services, standards, and information systems by proposing a new model for understanding the adoption of technology-based service when more than one technology and more than one provider can fulfill a similar need. The model posits that status quo bias, flat rate preference, and the comparison between the perceived price of wireless internet and the reference price of internet service constitute the construct of perceived sacrifice, which influences perceptions of value in wireless internet. Perceived sacrifice is expected to negatively influence the perceived value. Existing consumer choice literature provides significant evidence for support of the product quality – value – purchase intention chain that explains consumer behavior when confronted with choices. This study explores the role of this causal chain to explain the adoption of wireless internet service when consumers face alternative choices. The hypothesized relationships are confirmed by conducting a field study.

This paper proceeds as follows. The next section provides an overview of major broadband access technologies. Section 3 reviews the adoption literature, establishes the gap filled by this paper, and draws upon theory to develop a new decision model and related hypotheses. Section 4 details the method, the measures, and summary information about the participants. Section 5 presents the results. Section 6 provides a discussion that compares the research outcomes to the theoretical arguments and proposes areas for further research. Section 7 concludes the paper by summarizing its contributions, describing its limitations, and identifying future research opportunities.

2 Broadband Overview

Many service providers offer high-speed Internet access, but they use various technologies that deliver the service in distinctly different ways and offer different performance traits. Fixed line technology requires a user to access the Internet from a specific location. Portable broadband frees users to move their computers within a limited geographic area. Mobile Internet enables free movement between access points without interruption. Table 1 provides a summary of common access technologies and their important characteristics (Dekleva et al., 2007; Cousins and Varshney, 2009).

Table 1 Here

This research makes the explicit distinction between using a Wi-Fi router to relay a fixed line connection for a few meters and using wireless internet technologies such as 3G/4G or WiMax. Wi-Fi is considered as an extension of a fixed line technology because DSL or cable are the primary access technologies connected to a Wi-Fi router. On the other hand, wireless internet access technologies such as 3G/4G and WiMax enable wider mobility. See Fig. 1 for an illustration of the distinction made for Wi-Fi in this study.

Figure 1 Here

3 Literature Review

This section begins with a review of the calls for different theoretical approaches to the study of technology adoption within Information Systems research. It provides an overview to the theoretical basis for development of a new decision model and the related hypotheses.

3.1 Technology Adoption

Much of the recent IS adoption literature uses theories such as the Theory of Planned Behavior (TPB) (Ajzen, 1991), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), Technology Acceptance Model (TAM) (Davis, 1989; Davis et al., 1989), and other theories that focus on individual-level adoption. TAM, the most often employed and influential IS theory (Benbasat and Barki, 2007; Lee et al., 2003), has made a strong contribution to information systems research. It offers a combination of power and parsimony (Venkatesh and Davis, 2000) and it has focused a formerly scattered field of study (Lee et al., 2003). Despite its contributions, some argue that TAM's contributions to IS research largely have been realized and that future research should explore other theoretical approaches (Benbasat and Barki, 2007).

This paper breaks from the study of technology in an isolated environment to address the gaps pointed out by Benbasat and Barki (2007), McMaster and Wastell (2005), and Venkatesh et al. (2007) in their calls for alternative theoretical perspectives that expand the study of technology diffusion to include contingent models that take into account the real-world usage context. Consumer choice literature provides theories and models that explain factors which influence a buyer's intention to purchase or use a product when confronted with multiple choices. Prospect theory provides a behavioral explanation for people's decisions when they are faced with choices and alternatives. The next section discusses how the concepts of flat rate preference, reference price, and status quo bias, which are all based on prospect theory, are relevant to the adoption of wireless internet.

3.2 Perceived Sacrifice

Value, a key element of customer retention by service providers (Heskett, 1984), has been

defined as the trade-off between what is sacrificed and what is gained (Zeithaml, 1988). When a decision maker has multiple options to choose from, the perceived gains and losses tied to the decision are not assessed as an isolated transaction but within the context of competing alternatives. Rather than taking a theoretical-rational approach to defining perceived sacrifice, we draw upon behavioral economics to define key constructs of what is *lost* and what is *gained* when an individual decision maker seeks to maximize the value of his or her IT decision.

Because people cannot gather or analyze every bit of information, they simplify the decision process and seek satisfactory, but not necessarily optimal solutions. Building on this concept of Bounded Rationality (Simon, 1955), Kahneman and Tversky (1979) proposed prospect theory, a behavioral economics approach to decision making in the presence of choices and risks. They argue that decisions are not made in isolation, but that decision outcomes are contingent upon comparisons to a referent. People judge value by gains or losses relative to a reference point, not in terms of absolute monetary value (Kahneman and Tversky, 1979). For example, people perceive a $5 price change on a $25 item as greater than a $5 change on a $100 item, even though the differences have the same absolute financial value (Thaler, 1980). The way in which people process information cannot be separated from its context (Kahneman and Tversky, 2000). A choice becomes acceptable when the value of its advantages is greater than the value of the disadvantages (Kahneman and Tversky, 2000). The differences, however, are not only relative; they are unequally weighted because people weigh losses more heavily than gains. This unequal weighting of outcomes creates loss aversion among decision makers (Kahneman et al., 1986; Kahneman and Tversky, 1979, 2000; Tversky and Kahneman, 1991).

Decision making usually involves constructive preferences, or determining preferences when presented with a choice rather than drawing upon a priori predilections. Because preferences are determined when confronted with a choice, the context and the framing of the choice affect the

decision (Bettman et al., 1998; Tversky and Simonson, 1993). The point of reference is usually based on the decision-maker's current position (Tversky and Kahneman, 1991). Decisions are often made without exhaustive thought (Kahneman and Tversky, 2000), and part of the decision making process is to maximize the ease of justifying a decision (Bettman et al., 1998). When comparing choices against a reference point, people disregard shared traits and focus on the salient differences (Kahneman et al., 1991).

Thaler (1999) builds upon the analogical reasoning of prospect theory to include transaction value, which is the price of an option relative to a referent. If a price is lower than the chosen point of reference, it is a good value; if the price is higher than the referent, then it is a poor value. Therefore, reference pricing, or the comparison of the cost of a choice to an established price, plays a material role in decision making (Thaler, 1999). Out-of-pocket expenses are viewed as losses and opportunity costs are viewed as foregone gains, making people prone to consider a price higher than the referent (loss) more heavily than the additional benefit received (gain) when making decisions (Thaler, 1980; Kahneman et al., 1991). Accordingly, willingness to pay is based on whether a price is lower or higher than the reference price (Tversky and Simonson, 1993). Blechar et al. (2006) introduce reference pricing to the use of advanced mobile services by arguing that mobile phone users compare phone-based data services to computer-based Internet services. The reference situation of the Internet, perceived as nearly free of charge for similar services, made nearly any price for mobile services too expensive in the consumer mind. Therefore, the redundancies between mobile services and PC- based Internet could constrain mobile services adoption if users perceive the personal computer as higher in quality relative to mobile devices (Blechar et al., 2006). Cost was found to be the most important decision factor for users of advanced mobile features (Constantiou et al., 2007), and price and speed were found to be the primary considerations of internet service choices (Gimpel, 2009). The difference between

the perceived price of wireless internet and the reference price contributes to perceived sacrifice of users when faced with a decision to adopt wireless internet for the laptop.

The theoretical underpinnings of flat rate preference and status quo bias are reviewed next. Consumers use "mental accounting" to frame purchasing decisions by assigning them to an expense category. They use these mental distinctions as a frame of reference to measure changes to reference prices. Decisions about which category, and whether to combine categories, impacts the perceived value of the choice. Loss aversion strongly influences how people organize financial transactions in their mind. People favor mental accounting practices that minimize cognitive effort (Thaler, 1999). Ambiguity adds more potential choices to the choice process, which complicates decision making (Fox and Tversky, 1995). People do not want to continually make cost-benefit calculations, which leads to a preference for payment options that eliminate the need for subsequent decision making (Thaler, 1980). Accordingly, "consumers don't like the experience of having the meter running. This contributes to what has been called the 'flat rate bias' in telecommunications. Most telephone customers elect a flat rate service even though paying by the call would cost them less" (Thaler, 1999). The convenience of flat rate plans enables consumers to avoid the "taxi meter effect," which requires constant attention to variable expenses. Additionally, flat rate plans take the risk out of service usage. Although the customers could potentially save money by paying for actual uses, the potential gain is valued less than the perceived loss that may occur by going over-budget (Lambrecht and Skiera, 2006). The influence of mental accounting in purchase and usage decisions leads to the assertion that flat rate preference contributes to perceptions of sacrifice in selecting wireless internet for the laptop. Flat rate preference is expected to affect behavioral decisions only when some choices offer fixed rate plans and some do not, because people compare only the differences among choice options (Kahneman and Tversky, 1979).

Status quo bias refers to the tendency of people to stay with the current state unless there are strong forces which oppose staying with the present (Kahneman and Tversky, 1979; Kahneman et al., 1991; Samuelson and Zeckhauser, 1988; Thaler, 1980). Because preference construction is contingent on the framing of the problem, the method of elicitation, and the context of the choice; contrast effects play a strong role in decision making by influencing the reference point that is used to gauge value. Since losses loom larger than corresponding gains, loss aversion suggests that disadvantages are more salient than advantages (Tversky and Simonson, 1993). In an identical situation, a different decision can be reached, depending on whether the choice is framed to indicate a gain or a loss (Kahneman and Tversky, 2000). Perception is reference-dependent and people notice and evaluate changes as percentages rather than the whole value. This creates a phenomenon in which people assign a higher value to something that they view as theirs to be lost; while they assign a lower value to something they see as a gain. Take for example the person who is unwilling to pay more than $35 for a bottle of wine yet is unwilling to sell a bottle he already owns for $50. The loss aversion associated with this "endowment effect" contributes to status quo bias (Kahneman et al., 1991). Samuelson and Zeckhauser (1988) found that status-quo bias not only plays a material part in decision making, but that the bias increases with the number of alternatives within the choice set. The more choices must be evaluated, the more mental effort must be used to make the decision. Deciding to remain in the current position reduces the need to evaluate other options, and thus reduces the transaction costs involved with decision making. Uncertainty about a new alternative, combined with potential losses being more salient than potential gains, also contributes to the likelihood of avoiding change (ibid.). As such, people often avoid making a choice. Often they do not want to know that alternatives are available because the mere knowledge of alternatives creates decision making costs (Thaler, 1980). This results in less search than would lead to optimal decisions (Samuelson and Zeckhauser, 1988). Previous research indicates that status quo bias, combined with the time and

effort necessary to switch Internet service, adds a perceived switching cost to the transaction (Gimpel, 2009). Loss aversion during the discernment process leads to the assertion that status quo bias contributes to the perceptions of sacrifice when people are faced with the choice of adopting wireless internet for the laptop.

Fig. 2 summarizes the discussion in this subsection and shows that reference price, flat rate preference, and status quo bias constitute the construct of perceived sacrifice.

Figure 2 Here

3.3 Perceived Quality – Perceived Value – Adoption Intention

In the purchase decision process, acquisition utility refers to the value of a good or service and transaction utility refers to the difference between the reference price and the price paid (Thaler, 1999). People determine value through an accuracy-effort approach in which they base their decisions on a compromise between accuracy and minimizing the mental effort needed to make the decision (Bettman et al., 1998). People evaluate different choices by the expectations of subjective value (with losses weighted more heavily than gains and a status-quo bias) of the outcome. As such, options become acceptable if the perceived advantages outweigh the perceived disadvantages relative to the referent (Kahneman and Tversky, 1979, 2000). Contrast effects play a vital role in determining relative value. Contrast effects cause something to appear attractive when compared to a less attractive product or to appear unattractive against a background of a more attractive alternative (Tversky and Simonson, 1993). The assessment of whether something is better or worse is carried out quickly (Kahneman and Tversky, 2000). People disregard common attributes of choices and consider the more salient differences. They edit the choice set

by creating simplified representations of the competing choices then make an evaluation based on the simplified prospects. Decision makers then choose the option with the highest value relative to the other choices (Kahneman and Tversky, 1979).

Individuals use the internet for a variety of motives, including utilitarian, hedonic, and social reasons. As such, a variety of theories can be used to explore how internet use provides value to consumers. Monroe (1990) (page 1972) defines value as the difference between perceived benefits and perceived sacrifice. Zeithaml (1988) suggests that the value of a product perceived by customers is an overall assessment of "what is given" and "what it costs." Prior research on the adoption of mobile internet has employed a definition of value based on benefits and sacrifices (Kim et al., 2007). With a variety of theories to choose from, it becomes essential for researchers to select the most appropriate theoretical lens to investigate each particular subject. While this paper explores the adoption of wireless internet for the laptop, it investigates the value consumers derive from the delivery technology, not from the more generic focus of general internet use. As such, this paper employs the definition of perceived value as the subjective relative assessment of benefits versus sacrifice. The foregoing discussion leads to the first hypothesis of this study:

Hypothesis 1: Perceived sacrifice negatively affects perceived relative value of wireless internet service for the laptop.

According to Zeithaml (1988), value is a trade-off between the *give* and *get* components in respect to the product under consideration. Both *give* and *get* components are peculiar for customers depending on their individual disposition. For some customers, the cost of the product may principally form the *give* component while for some, time and effort expended may also

form part of their assessment (Zeithaml, 1988). In the same way, the evaluations of the *get* component may vary. For some, what is received may be the equivalent of "high quality," while for others, it may have more to do with quantity/volume (e.g. A 5 bedroom house in an average neighborhood may be more valuable than a 3 bedroom house in an exclusive neighborhood or vice-versa); and for some others it might be convenience. Consumers make their choices based on their value judgments and their attitudes (Hansen, 1969). Individuals can process a limited number of value factors; and which value perception will be more pronounced depends on the decision situation itself. Consumer choice, therefore, will in part depend on the value importance (Hansen, 1969). It follows that when people face adoption decision among multiple choices, they place relative value on the choices with respect to their referent technology.

Perceived quality is defined as the individual's subjective judgment about a product's overall excellence or superiority (Zeithaml, 1988). According to Zeithaml (1988), "instrumentality is the extent to which an object or action will achieve an end." Hence quality could be viewed as instrumentality. Earlier studies have distinguished between different perspectives of the term quality. For example, objective quality refers to the measurable attributes of a product which describes its verifiable superiority, whereas perceived quality is the subjective evaluation of attributes (Dodds and Monroe, 1985; Zeithaml, 1988).

The perception of quality differences between a new option and the referent affect the likelihood of switching (Constantiou et al., 2006). While attributes of quality can be measured, the concept of quality is inherently subjective by nature. Therefore, the measurement of perceived quality can give strong insight into the decision making process. The evaluation of quality is usually relative and made via comparison (Qin et al., 2009). The judgment about whether something is high or low quality depends upon its superiority or inferiority to a referent (Zeithaml, 1988). Previous studies have argued for direct influence of quality on the behavioral intentions (Boulding et al.,

1993; Parasuraman et al., 1988). Consequently, we set forth hypotheses 2 and 3:

Hypothesis 2: Higher perceived quality of wireless internet will positively influence the perceptions of value in choosing wireless internet service for the laptop.

Hypothesis 3: Higher perceived quality of wireless internet service will positively influence the behavioral intention to adopt wireless internet for the laptop.

Fishbein and Azjen's intention model has been widely used in IS and other fields to predict individual behavior (Azjen and Fishbein, 1980; Fishbein and Ajzen, 1975). This model suggests behavioral intention is the best precursor to intended action in the future. Behavioral intention is measured by asking the individuals whether or not they intended to perform a behavior on a subjective probability scale (Warshaw and Davis, 1985). The intention model is based on theory of propositional control which states that a person's intention to perform is based on his or her attitude toward performing the behavior in the given situation and on the subjective norms directing the behavior (Fishbein, 1967; Wilson et al., 1975). Reference to the literature reveals that perceived value directly influences the behavioral intentions of consumers. According to Sweeney and Soutar (2001), people form value perceptions before they use a product or service. Toften and Olsen (2004) find that perceived value is the main impetus for use and Kim et al. (2007) find that perceived value is a significant antecedent to adoption intention. Cronin et al. (2000) found strong support for the positive effect of value on purchase intentions. The overall perceived value of information and communication technology is an important predictor of the intention to use it (Turel et al., 2007). In accordance with the existing value literature, users are likely to subscribe to wireless internet service if they perceive value in these services. Choices are made through comparisons and gain/loss evaluations (Kahneman and Tversky, 1979) and a choice is made based on evaluating one choice relative to another (Kahneman and Tversky,

2000). This leads us to present the fourth hypothesis of this paper.

Hypothesis 4: The positive relative perceived value of wireless internet compared to the referent will positively influence the behavioral intention to adopt wireless internet service for the laptop.

The four hypotheses set forth in this section lead to the research model shown in Fig. 3.

Figure 3 Here

4 Methodology

This section details the methodology used to design the survey instrument and to collect and analyze the data.

4.1 Measures

Multi-item Likert scales with 7-point and 4-point anchors were used to measure all key constructs in the study. The latent construct of sacrifice was formed by three indicator variables: status quo bias, flat rate preference, and reference price. The items for these indicator variables were taken from the extant literature and adapted for this study. The item for flat rate preference was a 4-point Likert scale that tapped into participant's preference for fixed rate internet service pricing and was adapted from Prelec and Loewenstein (1998). The scale measured the preference ranging from "great extent" to "not at all". The indicator of status-quo bias tapped into the tendency of participants to maintain their current service (Samuelson and Zeckhauser, 1988). Product quality has been defined as the set of attributes which offer functional utility (Garvin, 1984). Four indicator variables of perceived quality were adapted for wireless internet to tap into participants' perceptions regarding the bandwidth/speed, reliability, security, and overall quality of wireless internet. Perceived value has been defined as the trade-off between *get* and *give* components

(Zeithaml, 1988). The perceived value of the internet service currently being used by the participants, as compared to the perceived value of wireless internet, was assessed using five measures that demonstrated the degree to which the respondents saw benefits that outweighed the costs of subscribing to the Internet service. The measurement items for perceived value were adapted from Sweeney and Soutar (2001), Kim et al. (2007), and Sirdeshmukh et al. (2002). Perceived value in current and wireless internet was measured by 6 similar indicators (see Table 2). These items were 7-point Likert scales ranging from strongly disagree to strongly agree. The indicators for perceived value were obtained by taking a difference of similar items for wireless internet and for the as compared with current internet service ($VAL_i = WVAL_i - CVAL_i$). The intention to choose wireless internet was assessed using two indicators which measured the extent to which respondents were prepared to subscribe to the wireless Internet and to recommend it to others. The behavioral intention items were 7-point Likert scales on agree–disagree dimensions (Kim et al., 2007; Agarwal and Karahanna, 2000). The initial item pools were refined based on feedback from an expert panel consisting of 17 graduate students and 3 academic experts. The purpose of this step was to ensure that the wording of the items was unambiguous and to ensure the face validity of the survey items.

Table 2 Here

4.2 Data collection

To test the hypotheses, a field survey was conducted at two university campuses in Copenhagen, Denmark. Permission was received from faculty members for the researchers to solicit respondents to voluntarily participate in the survey. Class time was allocated for the participants to complete the questionnaire. Both undergraduate and graduate students participated in the survey on a voluntary basis. Individual level data were collected from 229 respondents about

their perceptions about the wireless technologies and other access technologies. One of the surveys was dropped as the respondent did not answer most of the key questions resulting in a total of 228 usable responses.

Denmark was selected as the source of data for this study because it is the world leader in broadband penetration (Economist Intelligence Unit 2007) and it serves as a market exemplar for Western nations. Our sampling frame consisted of internet users and subscribers. According to Calder et al. (1981), goal of theory falsification requires maximally homogeneous respondents. Purposive sampling was employed because virtually all students of the business school are internet subscribers and play an active role in selecting their Internet service. The study focuses on young adult participants for several reasons. The study aimed to reduce extraneous variables, and prior studies show that age affects individual technology adoption (McFarland, 2001; Morris and Venkatesh, 2000; Yang and Jolly, 2008). This population is also likely to be more informed about the emerging technologies, such as next generation wireless Internet; and therefore, is a suitable population group for this study. Members of the selected group have lived their entire lives since the introduction of mainstream personal computing and related technologies (Prensky, 2001). They make heavy use of ICT, particularly the Internet; and they have therefore incorporated it into their daily lives. They consider technology to be part of the landscape (Oblinger, 2003) and they consider computers as commonplace, not as technology (Frand, 2000; McMahon and Pospisil, 2005). Networked for most of their lives (Prensky, 2001), they are generally unaware of the pre-Internet era (Rickard and Oblinger, 2003). Equally important, they are consumers whose entrance as decision makers into the marketplace closely coincides with the wide-scale launch of wireless Internet services. The survey instrument included many control questions which permit assessment of differences among the participants with respect to age, role in selecting the internet service, awareness about the internet technologies, etc. The aggregate

statistics of the participants are provided in section 4.3.

4.3 Participants

Questions about respondents' characteristics were included in the survey to assess fitness of the sample for answering questions about choices among internet access technologies. Over 70% of the respondents reported that they were either very well aware or somewhat aware of various internet technologies. In contrast only 4% of the respondents said that they were not aware at all about these technologies. The sample frame comprised of relatively young individuals: 96% of the total sample were less than 35 years of age and 86% were 27 years or younger. Nearly 70% of the respondents reported that they either decided or had an influence in deciding which internet service to use. 100% of the respondents said that they used internet at least once every day. The sample, therefore, is appropriate to serve as a data source for this study. The summarized demographic information is presented in Table 3.

Table 3 Here

About 40% of the respondents had used their current Internet service for more than 12 months at the time of the study. The participants paid a wide range of prices for their service. Respondents were asked what was their internal reference access technology against which they tend to compare different options. 50.22% of the respondents said that DSL was their reference technology and 21.97% said that cable Internet was their reference technology. Interestingly, 8.07% of the respondents thought of fiber optic as their reference technology. The frame of reference seemed to correlate with the type of technology being used by the respondents at the time of answering the survey questions. 50.45% of the respondents were using DSL connections

to access the Internet, 24.55% were using cable and the rest were distributed among satellite, wireless and fiber technologies.

5 Results

Table 4 presents the descriptive statistics of the main constructs of the study. This was obtained by averaging the indicator variables measures of each latent variable.

Table 4 Here

The model hypothesized in section 3 was analyzed by confirmatory latent-variable structural modeling using the SEM package in R statistical program (Fox, 2006). This analysis provides a simultaneous estimation of the hypothesized regressions using the covariance matrix of the relations among all variables. The analysis uses the gap between the observed and the estimated covariance matrix, produced according to the specified model, to compute goodness-of-fit indices that help determine the extent to which the hypothesized model provides an acceptable fit – that is, acceptable representation of the data. The analysis produces the widely used goodness-of-fit indices known as the normed fit index (NFI), the non-normed fit index (NNFI), and the comparative fit index (CFI) to indicate the extent of fit. “Normed fit index” (NFI) is the percentage of total variation found in the null model that is explained by the target model (Bentler and Bonett, 1980). NFI values close to 1.0 are considered desirable and values in the range of 0.90–1.0 are considered acceptable (Bentler and Bonett, 1980). In addition, we also used the root-mean-square error of approximation (RMSEA) misfit index and its recommended value of .06 or lower (Hu and Bentler, 1999) to indicate acceptable fit. NNFI and CFI values of 0.95 or greater indicate acceptable fit (Hu and Bentler, 1999). As discussed in section 4.2, the estimated model was constructed with two or more indicators for each theoretical construct. The path model

is shown in Fig. 4. The labels along the edges are the standardized regression coefficients associated with the paths. All 4 hypothesis set forth in section 3 were found to be statistically significant at $p > 0.01$.

Figure 4 Here

The SEM analysis estimated the measurement model that included all the indicators and constructs. The goodness of fit indices are tabulated in Table-5. The results indicated a very good fit to the data, χ^2 (df = 216, N = 227) = 119.75, $p < 0.05$; and with NFI = 0.92, NNFI = 0.96, CFI = 0.97, and RMSEA = 0.047.

Table 5 Here

6 Discussion and conclusions

This study introduces a new model for understanding the behavioral intention to use technology-based services in situations in which multiple options can accomplish the same goal. By focusing on decision making in the presence of alternatives, this paper contributes to the body of literature that studies the adoption of technology and services by individual consumers. This paper contributes to the literature by furthering the argument that consumer adoption of new technology can be understood and explained with broadly applicable decision models rather than technology-specific models. Focusing exclusively on technology diffusion models when conducting research may ignore real and present influences that affect the acceptance and uptake of innovation and

the acceptance of new services. The analytic results presented in section 5 provide strong evidence that the specific constructs presented in this paper play significant roles in technology adoption decisions. As a result, this paper answers the calls for alternative perspectives that expand the study of technology diffusion (Benbasat and Barki, 2007; McMaster and Wastell, 2005; Venkatesh et al., 2007).

This study finds support for the assertion that perceived quality and perceived sacrifice are related to perceived value (Dodds et al., 1991; Teas and Agarwal, 2000; Zeithaml, 1988). This study acknowledges that most users will give up their existing internet service in order to adopt a new one. Status-quo bias adds to the perceived sacrifice. While other studies have explored status-quo bias (Kahneman et al., 1991; Kim and Kankanhalli, 2009; Samuelson and Zeckhauser, 1988), it is largely absent from technology adoption literature. In this study, it accounts for the greatest weight among the indicators of perceived sacrifice. While status-quo considerations will be applicable in all switching scenarios, flat rate preference will be applicable only if there is a change in pricing structure between the current and alternative choices. This study differs from the prior research because it uses behavioral economics concepts to propose that flat rate preference and status-quo bias contribute to perceived sacrifice, a concept traditionally limited to perceived monetary sacrifice (Monroe, 1990).

This study considers the adoption decision when the participants already use a competing technology. Under this scenario, the difference between the perceived price and the reference price, flat rate preference and status quo bias constitute the sacrifice perceptions of the users. Accordingly, sacrifice is a higher level latent construct represented by the three indicator variables. All the participants in the survey reported that they subscribed to internet service, albeit using various technologies. A high proportion of participants used DSL and cable based internet access. In general 3G/4G and WiMax plans cost more than DSL and cable internet access at the

time the participants took the survey. Finally, wireless internet plans were not offered as flat rate plans at the time of data collection. At the time, all prominently advertised 3G laptop internet connections had a maximum usage limit, above which additional use incurred incremental costs. The results of this study are in line with the existing literature that has found support for flat rate preferences in telecommunications pricing (Hartman and Naqvi, 1994; Lambrecht and Skiera, 2006; Thaler, 1980, 1999) and wireless internet subscriptions (Gimpel, 2009).

The data supported all 4 hypotheses of this paper. Table 6 provides a summary of the these hypotheses and the associated analytic results.

Table 6 Here

The model proposed in this paper provides a new way to look at the process by which individual users choose one internet access service (and related technology standard) over another. The model was empirically tested using structural equation modeling. The goodness of fitness indices indicate a good fit of the model. According to the hypothesized model, when people are using a certain technology and they are faced with a decision to adopt alternate technologies, the "perceived value" in the alternate technologies is influenced by "perceived sacrifice" that would be brought forth because of the associated change. Hypothesis 1 posits that the sacrifice negatively affects the relative value perceptions in wireless internet. The analytic results support this hypothesis at $p < 0.001$. The negative sign of the coefficient in sacrifice – perceived value relationship (see Fig. 4 and Table 6) supports the direction of the hypothesized relationship. The data support the behavioral economics literature (Kahneman et al., 1991; Lambrecht and Skiera, 2006; Samuelson and Zeckhauser, 1988) and the reference price literature (Thaler, 1980, 1999),

which argue that reference prices, flat rate preference and status-quo bias play an essential part in determining whether something is perceived to be a good value. It also builds upon Blechar et al.'s (2006) research on reference pricing in ICT by extending it beyond mobile data services into the category of wireless internet.

Previous studies have found support for direct link between perceived quality and perceived value (Dodds et al., 1991; Cronin et al., 2000). However, in situations where people are already using a similar technology when they consider adopting a new technology, relative value is more meaningful than the perceived value of an individual technology evaluated in isolation. Blechar et al. (2006) argue that people form perceptions of not only reference price but also of referent technology. A very high proportion of participants in the survey (about 85%) considered fixed line access technologies as their referent. According to Hypothesis 2, perceived quality of wireless internet positively influences the perceived relative value of wireless internet. The results found support for hypothesis 2 at $p < 0.0001$. In her exploratory research, Zeithaml (1988) argued that people may assign different meanings to perceived value. For example, while some interpret value as a good price for the given quality, others may define it strictly based on quality. Previous studies have also examined perceived quality as an unmediated antecedent of behavioral intentions (Dodds et al., 1991). In this study, Hypothesis 3 tests whether perceived quality has a direct relationship with intention to adopt wireless internet for the laptop. This hypothesis is also supported at $p < 0.01$. Comparing the estimates of the direct perceived quality – BI link and the mediated perceived quality – perceived value – BI link, the results point to stronger relationships when the perceived quality – behavioral intention link is mediated by perceived relative value.

Finally, hypothesis 4 postulates that the perceived relative value in wireless technologies positively affects the behavioral intention of users to adopt wireless internet. There is strong evidence of support in the literature for perceived value as the most significant direct antecedent

of behavioral intentions (Dodds et al., 1991; Teas and Agarwal, 2000; Zeithaml, 1988; Kim et al., 2007). The analytic results support this hypothesis 4 at $p < 0.0001$. As such, the data support the expectation that behavioral intention is based on the attractiveness of one option against another (Kahneman and Tversky, 1979; Tversky and Simonson, 1993).

An important contribution of this paper is demonstrating that consumer adoption of new technology and services can be explained with alternative decision models. It provides significant evidence that these models play a primary role in adoption decisions and it suggests avenues for further theoretical development. In doing so, the paper helps illustrate that research which relies exclusively on technology diffusion and acceptance models may ignore real and present influences that affect the acceptance and uptake of innovation.

While this study provides support for and insight into applying cognitive decision models to the adoption of technology services and standards, the study has limitations that warrant further research. The study investigates one type of service; therefore, the findings may not be generalizable to other technological services. The participants of this study are young, educated, and well-informed about technology. They are located in a region that ranks first in broadband penetration rates. Future research could overcome this limitation of uniformity by sampling other theoretically-motivated groups or targeting a sample representative of the population at large. If differences between younger and older demographics prove significant, for example, the findings might support a call for different approaches to the study of technology adoption based on generational considerations.

This study has significant implications for the practitioner community. First, a technology adoption model is proposed that takes into account the construct of perceived sacrifice that influences existing users of technology as they consider new choices. In cases of new evolving

technologies such as 3G/4G wireless internet, "perceived sacrifice" will adversely affect the value perceptions of these technologies. While the status quo bias may be circumstantial, perceived sacrifice can be influenced by manipulating the flat rate preference and the difference between the perceived price and the reference price. The analytic results of this study have found support for the negative relationship between perceived sacrifice and perceived relative value. Therefore practitioners should consider potential users' points of reference when designing new offerings. This study operationalized relative value compared to a reference point, providing a potential tool for practitioners. Furthermore, this study found stronger support for the direct link between perceived quality and perceived relative value, which in turn influences behavioral intentions compared with a direct link between perceived quality and behavioral intentions. This suggests that technical offerings must be developed relative to existing options in the market. The quality literature points to stronger influence of perceived quality as compared to the objective quality in determining the purchase behavior of people (Zeithaml, 1988). Studies have also shown that perceived quality can be influenced by several variables such as cues, price, advertising, service quality, actual experience with the product etc. (Rust and Oliver, 2000; Oliver, 1997, 1980; Slotegraaf and Inman, 2004; Cronin et al., 2000). Therefore, companies that develop and offer new technologies can draw insights from the results of this study in their development strategies and marketing efforts.

7. Implications for the administration and management of services and standards

In addition to applicability for researchers in studying the adoption of current and emerging technologies, this work has relevance to the administration and management of services and standards. It presents several implications for industry and policy makers. Over the past few years, with the diffusion of 3G and improvements such as "Turbo 3G," the performance of wireless internet technology has been converging with that of fixed line services. While wireless

speeds have increased, they generally are slower than the fixed line options offered to the same customer base. The study data indicate that the performance gap and the current difference in pricing plans inhibit consumer adoption of wireless internet service for the laptop.

The diffusion of 4G and WiMAX offers to close the performance gap between wireless broadband and the dominant fixed line technologies: DSL and cable. However, the rapid expansion of ultra-fast fiber-to-home technology coincides with the spread of next generation of wireless. Despite the improvements 4G and WiMAX offer over exiting 3G technology, the performance of wireless to fixed line will begin a notable divergence from that of fixed line alternatives. The performance differential between the next generation of fixed line and wireless will increase. The divergence between the two will grow at an exponential rate, as generations of fixed line technology are introduced much more quickly than generations of wireless broadband.

In order for a new generation of wireless broadband to enter the market, government regulators must decide which technologies to license. Then they must allocate spectrum space to accommodate the new technology. As the airways become more congested, this increasingly involves the process of reallocating space from other technologies. The complexity of spectrum allocation results in a slow process. After the spectrum is available, the licenses to use the airwaves are auctioned or allocated to service providers. Only after the licensing process can telecommunications companies begin building new networks, a process that takes years.

Conversely, the implementation of new generations of wired broadband technology is much more tightly controlled by the companies providing the service. Regulation and licensing provide much smaller barriers to introducing fixed line technology. Additionally, different providers can pick standards that fit their needs rather than being limited to a few select technologies, as are wireless providers. As a result of the regulatory and technical regime, fixed line providers can introduce

new, faster, better technology much more quickly than wireless providers.

This study indicates that higher perceived prices discourage wireless broadband adoption. Higher prices are not just a marketing decision, but are directly affected by government licensing policy. High auction prices for licenses necessitate high usage fees. If the government and regulatory agencies wish to encourage the diffusion of wireless internet for laptop computers, then they will need to carefully consider the impact that high license costs ultimately will have on pricing.

If adoption is going to increase, then corporations and policy setters need to reevaluate the position of wireless broadband in the internet access space. Will wireless internet be an alternative to fixed line internet service, or will it be an infrequently-used substitute utilized only when people are on the move? The findings of this study indicate that perceived quality, reference prices, flat rate bias, and status quo bias, among other drivers of relative value determine the intention to adopt or ignore wireless broadband. Given the likelihood of an increasing performance gap, policy setters should set the licensing fees so that wireless broadband can cost less than fixed line access. Additionally, the referent against which wireless broadband is judged may need to be changed. Currently, it is a potential replacement for fixed line access. If the referent is changed from potential replacement to supplement – a technology used only when fixed line is unavailable – then the performance and quality issues may become less influential.

An important policy decision is whether to encourage adoption in the short term. With the prospect of an increasing performance gap, it is advisable to encourage adoption now, when the gap is small. Once users adopt wireless internet and become accustomed to using it, the endowment effect and status quo bias will make them unlikely to abandon it. Near-term adoption will likely result in long-term use, even if the relative performance drops. With this in mind,

policy makers, including the marketing departments that create subscription plans, should focus on driving adoption now by dropping prices and positioning it as an inexpensive mobile addition to the fixed line broadband. Implementing such a strategy would be advisable before fiber-to-home technology becomes standard and the difference in perceived value becomes insurmountable, relegating wireless broadband to the domain of smart phones and tablets.

References

Agarwal, R. and Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. MIS quarterly, 24(4):665–694.

Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2):179–211.

Al-Gahtani, S. S., Hubona, G. S., and Wang, J. (2007). Information technology (IT) in Saudi Arabia: Culture and the acceptance and use of IT. Information & Management, 44(8):681–691.

Azjen, I. and Fishbein, M. (1980). Understanding Attitudes and Predicting Social Behavior. Prentice Hall, Englewood Cliffs, New Jersey.

Benbasat, I. and Barki, H. (2007). Quo vadis, TAM. Journal of the Association for Information Systems, 8(4):211–218.

Bentler, P. and Bonett, D. (1980). Significance tests and goodness of fit in the analysis of covariance structures. Psychological bulletin, 88(3):588–606.

Bettman, J., Luce, M., and Payne, J. (1998). Constructive consumer choice processes. Journal of consumer research, 25(3):187–217.

Blechar, J., Constantiou, I. D., and Damsgaard, J. (2006). Exploring the influence of reference situations and reference pricing on mobile service user behaviour. European Journal of Information Systems, 15(3):285–291.

Boulding, W., Kalra, A., Staelin, R., and Zeithaml, V. A. (1993). A dynamic process model of service quality: From expectations to behavioral intentions. Journal of Marketing Research, 17(4):7–27.

Bouwman, H., Carlsson, C., Molina-Castillo, F. J., and Walden, P. (2007). Barriers and drivers in adopting actual and future mobile services in Finland. Telematics and Informatics, 24(2):145–160.

Bowen, D. and Jones, G. (1986). Transaction cost analysis of service organization-customer exchange. Academy of Management Review, 11(2):428–441.

Calder, B. J., Phillips, L. W., and Tybout, A. M. (1981). Designing research for application. Journal of ConsumerResearch, 8:197–207.

Constantiou, I. D., Damsgaard, J., and Knutsen, L. (2006). Exploring perceptions and use of mobile services: user differences in an advancing market. International Journal of Mobile Communications, 4(3):231–247.

Constantiou, I. D., Damsgaard, J., and Knutsen, L. (2007). The four incremental steps toward advanced mobile service adoption. Communications of the ACM, 50(6):55.

Cousins, K. and Varshney, U. (2009). Designing ubiquitous computing environments to support

work life balance. Communications of the ACM, 52(5):117–123.
Cronin, J. J., Brady, M. K., and Hult, T. M. (2000). Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments. Journal of Retailing, 76(2):193.
Davis, F. (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., and Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. Management Science, 35(8):982–1003.
Dekleva, S., Shim, J., Varshney, U., and Knoerzer, G. (2007). Evolution and emerging issues in mobile wireless networks. Communications of the ACM, 50(6):43.
Dinev, T. and Hu, Q. (2007). The centrality of awareness in the formation of user behavioral intention toward protective information technologies. Journal of the Association for Information Systems, 8(7):386–408.
Dodds, W. and Monroe, K. (1985). The effect of brand and price information on subjective product evaluations. Advances in consumer research, 12(1):85–90.
Dodds, W., Monroe, K., and Grewal, D. (1991). Effects of price, brand, and store information on buyers' product evaluations. Journal of Marketing research, 28(3):307–319.
Fishbein, M. (1967). Attitude and the Prediction of Behaviour, chapter 51, page 482. Readings in Attitude Theory and Measurement. John Wiley and Sons.
Fishbein, M. and Ajzen, I. (1975). Belief, attitude, intention and behavior: An introduction to theory and research. Addison-Wesley Reading, MA.
Fox, C. R. and Tversky, A. (1995). Ambiguity aversion and comparative ignorance. Quarterly Journal of Economics, 110(3):585.
Fox, J. (2006). Structural equation modeling with the sem package in r. Structural Equation Modeling, 13(3):465–486.
Frand, J. L. (2000). The information-age mindset changes in students and implications for higher education. Educause Review, 35:14–25.
Garvin, D. (1984). What does product quality really mean. Sloan Management Review, 26(1):25–43.
Gimpel, G. (2009). Decision models and the use of wireless internet. In 17th European Conference on InformationSystems, Verona, Italy, 2009, page 14.
Green Jr., K. W., Rudolph, L., and Stark, C. (2008). Antecedents to service quality in a service centre environment. International journal of Services and Standards, 4(2).
Greenhalgh, T., Robert, G., MacFarlane, F., Bate, P., and Kyriakidou, O. (2004). Diffusion of innovations in service organizations: systematic review and recommendations. Milbank Quarterly, 82(4):581–629.
Hansen, F. (1969). Consumer choice behavior: An experimental approach. Journal of Marketing Research (JMR), 6(4):436 – 443.
Hartman, R. and Naqvi, Z. (1994). Estimation of household preferences for long distance telecommunications carrier. Journal of Regulatory Economics, 6(2):197–220.
Heskett, J., Schlesinger, L., et al. (1994). Putting the service-profit chain to work. Harvard business review, 72(2):164–174.
Holbrook, M. (2006). Consumption experience, customer value, and subjective personal introspection: An illustrative photographic essay. Journal of Business Research, 59(6):714–725.
Hsieh, J. J. P.-A., Rai, A., and Keil, M. (2008). Understanding digital inequality: Comparing continued use behaviroal models of the socio-economically advantaged and disadvantaged. MIS Quarterly, 32(1):97–126.

Hu, L. and Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal, 6(1):1–55.

Jackson, J., Yi, M., and Park, J. (2010). Effects of individual innovativeness on physician acceptance of information technology. International Journal of Services and Standards, 6(1):21–42.

Jensen, T. and Aanestad, M. (2007). Hospitality and hostility in hospitals: a case study of an EPR adoption among surgeons. European Journal of Information Systems, 16(6):672–680.

Kahneman, D., Knetsch, J., and Thaler, R. (1986). Fairness as a constraint on profit seeking: Entitlements in the market. The American economic review, 76(4):728–741.

Kahneman, D., Knetsch, J. L., and Thaler, R. H. (1991). The endowment effect, loss aversion, and status quo bias. Journal of Economic Perspectives, 5(1):193–206.

Kahneman, D. and Tversky, A. (1979). Prospect theory: An analysis of decision under risk. Econometrica: Journalofthe Econometric Society, 47(2):263–291.

Kahneman, D. and Tversky, A. (2000). Choices, values, and frames. Cambridge University Press.

Kim, H., Chan, H., and Gupta, S. (2007). Value-based adoption of mobile internet: an empirical investigation. Decision Support Systems, 43(1):111–126.

Kim, H. W. and Kankanhalli, A. (2009). Investigating user resistance to information systems implementation: A status quo bias perspective. MIS Quarterly, 33(3):567–582.

Lambrecht, A. and Skiera, B. (2006). Paying too much and being happy about it: Existence, causes, and consequences of tariff-choice biases. Journal of Marketing Research, 43:212–223.

Lee, Y., Kozar, K., and Larsen, K. (2003). The technology acceptance model: Past, present, and future. Communications of the AIS, 12:752–780.

Lopez-Nicolas, C., Molina-Castillo, F. J., and Bouwman, H. (2008). An assessment of advanced mobile services acceptance: Contributions from TAM and diffusion theory models. Information and Management, 45(6):359–364.

Mathwick, C., Malhotra, N., and Rigdon, E. (2001). Experiential value: conceptualization, measurement and application in the catalog and Internet shopping environment. Journal of Retailing, 77(1):39–56.

McFarland, D. J. (2001). The role of age and efficacy on technology acceptance: Implications for e-learning. In World Conference on the WWW and Internet Proceedings. Orlando, Florida, 2001.

McMahon, M. and Pospisil, R. (2005). Laptops for a digital lifestyle: Millennial students and wireless mobile technologies. In Ascilite, pages 421–431.

McMaster, T. and Wastell, D. G. (2005). The agency of hybrids: Overcoming the symmetrophobic block. Scandinavian Journal of Information Systems, 17(1):175–182.

Mills, P. and Margulies, N. (1980). Toward a core typology of service organizations. Academy of Management Review, 5(2):255–265.

Monroe, K. (1990). Pricing: Making profitable decisions. McGraw-Hill College.

Morris, M. G. and Venkatesh, V. (2000). Age differences in technology adoption decisions: Implications for a changing work force. Personnel Psychology, 53(2):375–403.

Oblinger, D. (2003). Boomers, Gen-Xers, and millennials: Understanding the new students. Educause review.

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. JournalofMarketing Research, 17(4):460.

Oliver, R. L. (1997). Satisfaction, A Behavioral Perspective on the Consumer. McGraw-Hill.

Oliva, R. and Kallenberg, R. (2003). Managing the transition from products to services. International Journal of Service Industry Management, 14(2):160–172.

Parasuraman, A., Berry, L. L., and Zeithaml, V. A. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. Journal of Retailing, 64(1):12.
Prelec, D. and Loewenstein, G. (1998). The red and the black: Mental accounting of savings and debt. MarketingScience, pages 4–28.
Prensky, M. (2001). Digital natives, digital immigrants. On the horizon, 9(5):1–6.
Qin, H., Prybutok, V. R., and Peak, D. A. (2009). Service quality in the usa and mainland China's fast-food restraunts. International journal of Services and Standards, 5(4):291–315.
Rickard, W. and Oblinger, D. (2003). The next-generation student. In Higher education leaders symposium, Redmond,WA.
Rust, R. and Oliver, R. (2000). Should we delight the customer? Journal of the Academy of Marketing Science, 28(1):86–94.
Samuelson, W. and Zeckhauser, R. (1988). Status quo bias in decision making. Journal of risk and uncertainty, 1(1):7–59.
Sheth, J., Newman, B., and Gross, B. (1991a). Consumption values and market choices: Theory and applications. South-Western Pub., Cincinnati.
Sheth, J., Newman, B., and Gross, B. (1991b). Why We Buy: A Theory of Consumption Values. Journal of BusinessResearch, 22:159–70.
Simon, H. A. (1955). A behavioral model of rational choice. The quarterly journal of economics, 69(1):99–118.
Sirdeshmukh, D., Singh, J., and Sabol, B. (2002). Consumer trust, value, and loyalty in relational exchanges. The Journal of Marketing, 66(1):15–37.
Slotegraaf, R. J. and Inman, J. J. (2004). Longitudinal shifts in the drivers of satisfaction with product quality: The role of attribute resolvability. Journal of Marketing Research, XLI:269–280.
Sweeney, J. and Soutar, G. (2001). Consumer perceived value: the development of a multiple item scale. JournalofRetailing, 77(2):203–220.
Teas, R. and Agarwal, S. (2000). The effects of extrinsic product cues on consumers perceptions of quality, sacrifice, and value. Journal of the Academy of Marketing Science, 28(2):278–290.
Thaler, R. (1980). Toward a positive theory of consumer choice. Journal of Economic Behavior & Organization, 1(1):39–60.
Thaler, R. H. (1999). Mental accounting matters. Journal of Behavioral Decision Making, 12(3):183–206.
Toften, K. and Olsen, S. (2004). The relationships among quality, cost, value, and use of export market information: an empirical study. Journal of International Marketing, 12(2):104–131.
Turel, O., Serenko, A., and Bontis, N. (2007). User acceptance of wireless short messaging services: Deconstructing perceived value. Information and Management, 44(1):63–73.
Tversky, A. and Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent model. TheQuarterly Journal of Economics, 106(4):1039–1061.
Tversky, A. and Simonson, A. I. (1993). Context-dependent preferences. Management Science, 39(10):1179–1189.
Uzoka, F. M. (2008). Organisational influences on e-commerce adoption in a developing country context using UTAUT. International Journal of Business Information Systems, 3(3):300–316.
Venkatesh, V., Davis, F., and Morris, M. (2007). Dead or Alive? The Evolution, Trajectory, and Future of Technology Adoption Research. Journal of the Association for Information Systems, 8(4):267–286.
Venkatesh, V. and Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46(2):186–204.

Venkatesh, V., Morris, M. G., Davis, G. B., and Fred, D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3):425–478.

Warshaw, P. and Davis, F. (1985). Disentangling behavioral intention and behavioral expectation. Journal ofExperimental Social Psychology, 21(3):213–228.

Wilson, D., Mathews, H., and Harvey, J. (1975). An empirical test of the Fishbein behavioral intention model. Journal of Consumer Research, pages 39–48.

Yang, K. and Jolly, L. D. (2008). Age cohort analysis in adoption of mobile data services: gen xers versus baby boomers. Journal of Consumer Marketing, 25(5):272–280.

Yoon, C. and Kim, S. (2007). Convenience and TAM in a ubiquitous computing environment: The case of wireless LAN. Electronic Commerce Research and Applications, 6(1):102–112.

Zeithaml, V. (1988). Consumer Prceptions of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence. The Journal of Marketing, pages 2–22.

Zhang, J. and Mao, E. (2008). Understanding the acceptance of mobile SMS advertising among young chinese consumers. Psychology and Marketing, 25(8):787–805.

Table 1: Summary of common technologies and their distinguishing features

Technology	Capacity	Transmission	Portability	Maximum Range
xDSL	1.5 Mbps (12 Mbps)	copper telephone lines	fixed location	5.4 km (0.3 km)
Cable	40 Mbps	coaxial cable TV lines	fixed location	1-3 km
Fiber	1 Gbps	fiber optic cable	fixed location	20 km
Powerline	200 Mbps	existing A/C power lines	fixed location	1-3 km
Satellite	155 Mbps	extraterrestrial satellite	fixed location / wireless	1000-36,000 km
Wi-Fi	11.3 Mbps	unlicensed radio band	portable / wireless	100 m
WiMax	2.8 Mbps (practical speed)	3.5 GHz radio frequency	portable/wireless	50 km
3G	2.0 Mbps	mobile telephone tower	mobile / wireless	Large: based on cellular network

Table 2: Relative Value of wireless internet compared to current Internet,

Now consider your current internet service to answer the following questions:	**Now consider 3G/4G/WiMax wireless internet services to answer the following questions:**
For the price I pay, the use of internet is beneficial to me (CVAL1)	For the price I would have to pay, the use of the wireless service will be beneficial to me (WVAL1)
Compared to the time I spend on it, the use of internet is worthwhile to me (CVAL2)	Compared to the time that I will have to put in, the use of wireless internet will be worthwhile to me (WVAL2)
For the effort that I put in, the use of internet is beneficial to me (CVAL3)	For the effort I will have to put in, the use of wireless internet will be beneficial to me (WVAL3)
Compared to the price I pay, the speed of my internet connection is good (CVAL4)	Compared to the price I would pay, the speed of my internet connection will be good (WVAL4)
For the price I pay, I can access the internet anytime, anywhere I have a use for it (CVAL5)	For the price I would pay, I will be able access the internet anytime, anywhere I have a use for it (WVAL5)
In general, the use of internet delivers me good value (CVAL6)	Overall, the use of wireless intern et will deliver me good value (WVAL6)

Table 3: Frequency Distribution of Participants Data

Age in years	≤ 21	22-27	28-35	36-45	46-55	> 55
N	87	110	22	2	5	1
Percentage N	38.33	48.46	9.69	0.88	2.20	0.44
Cumulative Percentage	38.33	86.78	96.48	97.36	99.56	100.00
Monthly cost of Internet (DKK)	Nothing	1-100	101-150	151-200	201-250	> 250
N	50	37	29	53	24	33
Percentage N	22.12	16.37	12.83	23.45	10.62	14.60
Cumulative Percentage	22.12	38.50	51.33	74.78	85.40	100.00
Internal frame of reference	DSL	Cable	Satellite	WiMax	3G/4G	Fiber
N	112	49	1	6	37	18
Percentage N	50.22	21.97	0.45	2.69	16.59	8.07
Cumulative Percentage	50.22	72.20	72.65	75.34	91.93	100.00
Current Internet access	DSL	Cable	Satellite	WiMax	3G/4G	Fiber
N	111	54	0	5	29	21
Percentage N	50.45	24.55	0	2.27	13.18	9.55
Cumulative Percentage	50.45	75.00	75.00	77.27	90.45	100.00
Role in choosing internet	Decision maker	Influence decision	Informed but not involved	Don’t care		
N	120	38	34	36		
Percentage N	52.63	16.67	14.91	15.79		
Cumulative Percentage	52.63	69.30	84.21	100.00		
Awareness	Very well aware	Somewhat aware	A Little aware	Not at all aware		
N	75	85	57	10		
Percentage N	33.04	37.44	25.11	4.41		
Cumulative Percentage	33.04	70.48	95.59	100.00		
Internet usage	>3 hrs daily	1–3 hrs daily	< 1 hr daily	Not daily		
N	150	74	2	0		

Percentage N	66.37	32.74	0.88	0.00		
Cumulative Percentage	66.37	99.12	100.00	100.00		

Table 4: Goodness of fit indices

Model χ^2 = 119.75 Df = 79 Pr (> χ^2) = 0.00212
χ^2 (null model) = 1463.8 Df = 105
Goodness-of-fit index = 0.9372
Adjusted goodness-of-fit index = 0.90462
RMSEA index = 0.047669 90% CI: (0.029108, 0.064353)
Bentler-Bonnett NFI = 0.9182
Tucker-Lewis NNFI = 0.96014
Bentler CFI = 0.97001
SRMR = 0.07105
BIC = -309.17

Table 5: Regression Coefficients

Hypothesis	Path	Estimates	SE	z value	p-value
H1: Higher perceptions of sacrifice will cause negative influence on value perception towards wireless Internet for the laptop	SAC → VAL	-0.41	0.258	-3.540	0.0004
H2: Higher perceived quality of wireless internet will positively influence the perceptions of value in choosing wireless internet for the laptop	PQ → VAL	0.34	0.089	4.500	< 0.0001
H3: Higher perceived quality of wireless internet will positively influence the behavioral intention to adopt wireless internet for the laptop	PQ → BI	0.19	0.088	2.706	0.0068
H4: The positive relative perceived value of wireless internet compared to the referent will positively influence the behavioral intention adopt wireless internet for the laptop.	VAL → BI	0.56	0.088	6.611	< 0.0001

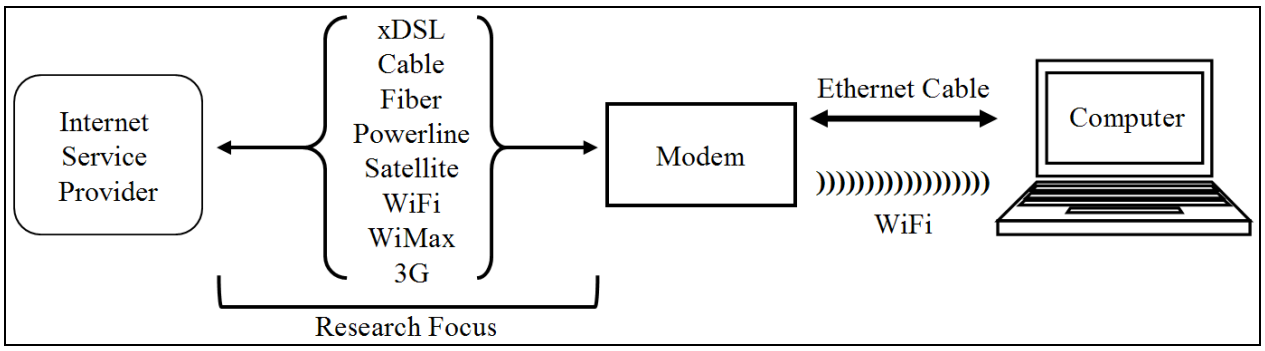

Fig. 1: Distinction regarding focus of broadband technology choice

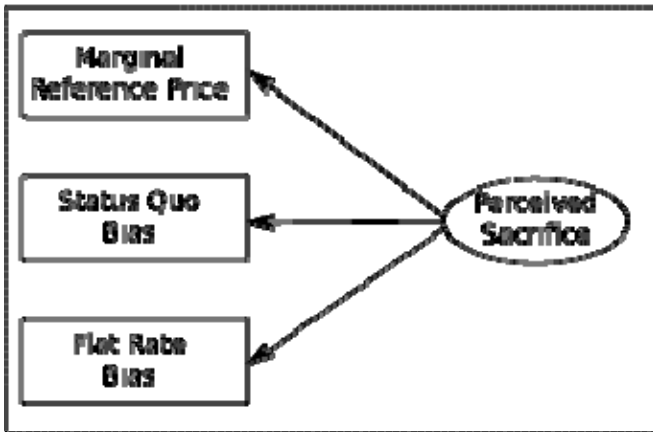

Fig. 2: Indicators of Perceived Sacrifice

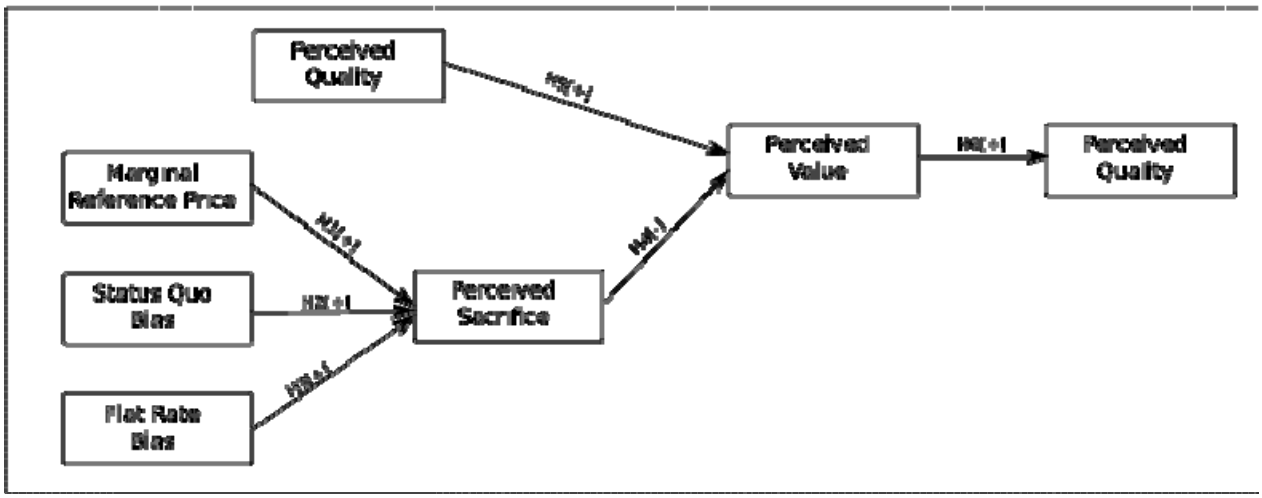

Fig. 3: Hypothesized Model

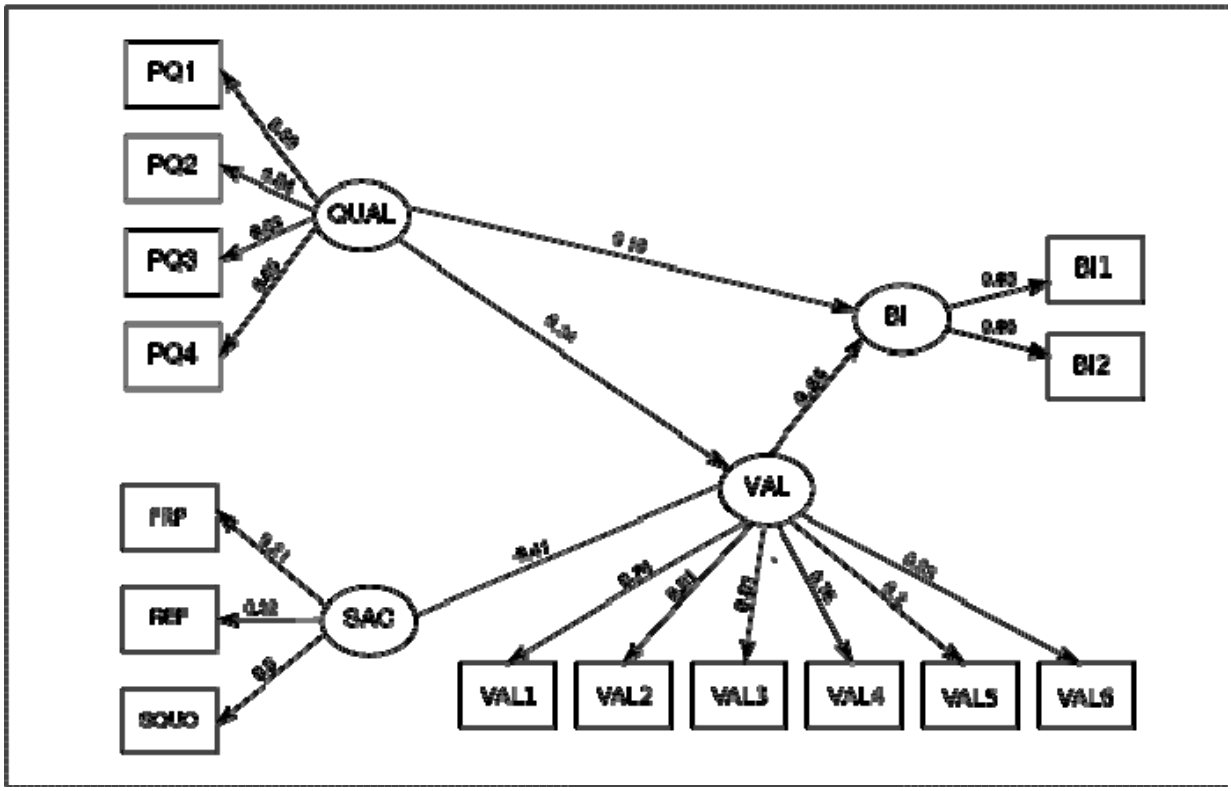

Fig. 4: Results of Structural Equation Modeling- Standardized coefficients