THE IMPACT OF SATISFACTION ON FUTURE CHOICES

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ABSTRACT

In recent years there has been disenchantment with the performance and relevance of customer satisfaction models in applied business contexts. An expected utility framework overcomes many of the weaknesses inherent in conventional customer satisfaction modelling and is introduced in the paper. The framework uses a three-stage designed choice experiment to assess the impact of disconfirmations and satisfaction on after experience choices. The impact of expectations, performance and satisfaction on future choices is estimated using summary statistics and binary logit models. Overall, satisfaction appears to have a significant impact on future choices although this impact does not appear to be linear. Updated expectations for the experienced brand also appear to be relevant in explaining post experience expected utility. The results provide insights for managers as to how product experiences and measured satisfaction can be used to provide essential input for decisions and to improve prediction of future key performance indicators.

INTRODUCTION

Customer Satisfaction/Dissatisfaction (CSD) studies in the marketing literature have evolved approximately in parallel with the development from the early 1960's of customer centric philosophies in marketing. These studies cover a broad range of topics in CSD (for a detailed overview see (Yi 1990)) with key papers using either single or multiple equation models to cover competing theories of satisfaction, relevant measurement concepts, issues regarding attribute expectations (both mean and variance), macro-level CSD and related post purchase behaviors (Anderson 1973; Anderson, Fornell and Lehmann 1994; Bearden and Teel 1983; Cardozo 1965; Churchill and Suprenant 1982; Hellier, Guersen, Carr and Rickard 2003; Inman, Dyer and Jia 1997; Olshavsky and Miller 1972; Oliver 1980, 1981, 1983; Oliver and Swan 1989; Rust, Inman, Jia and Zahorik 1999; Swan and Trawick 1981; Tse and Wilton 1988) Despite the large volume of academic papers exploring these satisfaction issues, application of the numerous CSD models in the literature to the business environment has been less than successful. There is an increasing body of research indicating management disgruntlement with the predictive ability of CSD metrics. Wilson (2002) cites evidence from various industries of high satisfaction scores accompanied by declining sales and low re-purchase rates. Further, predictions (derived from CSD models) of managerial key performance indicators (KPI's) such as future market shares and profits have not been, in general, accurate. (Reicheld 1995; Brandt 1997; Westbrook, 1987, 2000; Williams and Visser 2002). These inaccuracies have diminished the value of CSD models for management and arguably inhibited the application of CSD models in business.

Linking CSD to Profits and other KPI's

A number of researchers have attempted to link CSD metrics with profits and other relevant performance metrics. Typically, CSD metrics and stated future purchase probabilities or stated future purchase intentions are measured *concurrently* and correlated within the CSD model. (Bolton and Drew 1991; Hellier et al. 2003; Oliver and Swan 1989; Teas 1993;)

Other researchers employ a longitudinal approach and measure profits after a specified time interval (from measurement of the CSD metrics) and infer linkage by correlation or regression (Athanassopoulos, Gounaris and Stathakopoulos 2001; Babakus, Bienstock and van Scotter 2004; Cooil, Keiningham, Aksoy, and Hsu 2007; Sureshchandar, Rajendran and Ananatharaman 2002; van Der Wiele, Boselie and Hesselink 2002;) In a similar vein, another body of research examines the impact of CSD metrics on broader company performance metrics such as shareholder value or stock prices (Aksoy, Cooil, Groening, Keiningham and Yalçın 2008; Anderson and Mansi 2009; Fornell, Mithas, Morgenson and Krishnan 2006) However, conclusions about linkages between measured satisfaction and profits using this longitudinal approach may be questionable due to lack of experimental controls particularly with reference to independent variables. Changes in future period sales activity measured in these studies may be due to unmeasured and omitted variables such as competitor activity, market and/or environmental changes. This is likely to be a key reason explaining the poor predictive performance of models based on this approach.

In contrast to the aggregate satisfaction models discussed above, consumer level satisfaction models seek to explain how product experiences impact on key variables such as consumer expectations, attitudes, emotions and future purchase intentions. Typically, these impacts are modelled using a structural equations modelling (SEM) approach and are estimated with recursive regressions, LISREL, AMOS or similar software (Bell, Auh and Smalley 2005; Bitner and Hubert 1994; Cadotte, Woodruff and Jenkins 1987; Jones and Suh 2000; McQuitty, Fin and Wiley 2000; Oliver and Swan 1989; Wirtz and Bateson 1999; Yang and Peterson 2004). Estimation of these models enables prediction of future intentions and hence KPI's (such as sales and market share) to be derived from given product experiences and measured satisfaction. An alternative to micro level satisfaction modelling assumes rational decision making and is based on expected utility. (Abendroth 2001; Inman, Dyer and Jia 1997; Palan and Teas 2005; Rust et al. 1999) Generally, in expected utility models satisfaction is linked to sales, shares and profits through examination of post experience choices.

Of the two micro level approaches above, the SEM approach dominates (numerically) the CSD literature. A major criticism of expected utility based approaches has been the implied rationality of consumer judgments and decisions. Although measures for emotions, attitudes, trust etc. may be included, the basis for key decisions and judgments within these models is inherently systematic. This would appear to be incompatible with the body of research into biases and heuristics (Kahnemann and Tversky 2000; Koehler and Harvey 2004). This research suggests a number of biases when humans are presented with experimental decision problems broadly concluding that the assumption of rationality for human judgments and decisions is tenuous. These findings have led to decreased interest in expected utility based models for satisfaction and inclusion of more emotion based variables in structural equations models.

However, recently there has been research questioning the conclusions of the above decision bias and heuristics studies (Fiedler and Wänke 2009; Haselton et al 2009; Hertwig and Herzog 2009; Kenrick et al 2009: Kruger 2009; Kruglanski and Orehek 2009). This recent research provides evidence to support alternative explanations for the supposed biases in decisions and judgments. In some cases, repeating the initial experiments but changing some of the experimental characteristics eliminated the apparent decision biases. Changing experiments to reflect greater compatibility with real decision making environments reduced or eliminated the biases. In other cases, apparent biases were shown to be explained by ecological factors influencing information input into decisions. Heuristics were also shown, in certain cases, to be compatible with rational decisions by considering search costs and context. Although this research does not suggest all decisions or judgments are rational, it broadly suggests that in certain contexts, after accounting for ecological and experimental factors, outcomes are consistent with rational decisions or judgments. This suggests satisfaction models based on micro level rational decision making (in particular expected utility models) cannot be dismissed and may warrant further investigation.

In light of the above, this paper re-introduces an expected utility approach to modelling CSD within a three stage choice framework based on the work of Korkofingas (2004a, 2004b). This framework analyses expected utility both before and after a *hypothetical* product experience. Within the framework, prior attribute expectations (predictive) are set initially and experimental manipulation of expectation disconfirmations are used to generate satisfaction scores. These satisfaction scores are used, together with observations on after experience choices, to estimate post experience expected utility. Analysis of the estimated expected utility function allows brand probabilities to be determined and hence potential market shares and volumes to be *directly* determined.

There are a number of advantages of the expected utility choice framework relative to SEM models of CSD. Firstly, choices provide a *direct* link between dis-confirmations, satisfaction and the managerially relevant KPI's such as market share and profits. This direct link is strengthened theoretically by reliance on an accepted decision rule to explain choice (utility maximization). Choices represent the final outcome of the relevant behavioral process involving satisfaction. Although an understanding of latent measures such as attitudes, expectations, etc. is worthwhile to an extent, the key outcome for managers is the impact of satisfaction on consumer expected utility, choice and hence market share. A single equation model for expected utility, estimated by logistic regression, represents a simpler, more parsimonious and direct model for measuring the impact of satisfaction than complex SEM's.

Secondly, the expected utility approach is likely to reduce measurement errors typically associated with SEM models. Given some of the key constructs in a CSD model are latent, there exists potential for large errors in measurement. This is exacerbated by the typical use of assumed ratings (really ordinal) based measures for many of the model constructs. Typical measurement biases include negatively skewed satisfaction response distributions (ceiling constraints, self selection bias), biases due to question form, context or timing and halo effects in measuring key constructs. (Drolet and Morrison 2001; Fisk, Brown, Cannizzaro and Naftal 1990; Oliver 1981; Peterson and Wilson 1992; Westbrook 1980; Wirtz and Bateson 1995; Wirtz 2001). These measurement errors, for both dependent and independent variables within the structural equations model, are likely to lead to biased and inefficient estimates and erroneous conclusions. The expected utility approach reduces measurement error because the focal measurement is choice (observable and minimal measurement error) rather than an array of latent constructs.

Thirdly, there are a number of issues that are likely to reduce the relative validity and/or reliability of SEM estimation. Ordinal based measures for constructs in CSD models are likely to violate typical error distribution assumptions especially when used as dependent variables within the structural equations. Given the ordinal nature of constructs within the SEM, the variance-covariance matrix is likely to be an invalid representation of the true association between constructs. The use of ordinal constructs throughout the structural equations model is likely to lead to invalid estimation (typically confirmatory factor analysis, regression) with low power. This may lead to increased likelihood of erroneous conclusions about construct associations, significance of constructs and significance of pathways. In contrast, the expected utility approach needs fewer latent constructs thus decreasing the likelihood of error assumption violations and invalid estimates. Further, SEM significance tests of overall model fit and other key statistics are typically sample based (Cheung and Rensvold, 2001) reducing applicability of statistical inference procedures. Macdonald and Ho (2002), in presenting general recommendations for SEM models, highlight problems of identifiability, sampling, measurement, data, estimation and modelling that may make conclusions from SEM models erroneous.

Fourthly, the experimental stated choice framework allows for greater control of extraneous and internal variables (market and competitive environment, attributes, expectations, variability of expectations, disconfirmations, and switching costs) than in typical SEM models estimated from revealed preference data. This would suggest greater reliability for estimated response functions.

Fifthly, typical structural equation CSD models only collect measures about the focal brand or product and ignore measures relating to competitive brands. There is little or no consideration of the range of alternatives available to the consumer or even the alternatives within the consumer's consideration set. This would appear to be a fundamental flaw when trying to assess the impact of satisfaction on future indicators such as sales, market shares and profits. Measures of whether the consumer is more likely or less likely to consume the focal brand after a product experience (as measured typically) are likely to be erroneous if the alternatives available to the consumer change after measurement. The expected utility framework can assess after experience purchase intention for a number of different competitive scenarios. This allows for a potentially more general response function to be estimated using varied hypothetical disconfirmations, attribute levels and market environments.

Using stated choices (based on a designed experiment) overcomes many of the issues with SEM models explained above. The expected utility approach can incorporate expectation variability, information updating and switching costs, allows for control of extraneous variables and circumvents many SEM model data and estimation problems (collinearity, variable measurement issues, and inference issues). It also allows for observation of many diverse points (purposely selected) on the satisfaction/utility space compared to a limited number with traditional CSD models.

The next section describes the research objectives and the proposed theoretical model. A following section describes the specific experiment undertaken while in the section after that analysis and results are discussed. In the final section, conclusions, limitations and avenues for further research are presented.

RESEARCH OBJECTIVES AND THE PROPOSED MODEL

Given the evidence not rejecting rational decision making and the disadvantages of SEM models cited above, this research seeks to investigate the impacts of satisfaction on consumers' choices via an expected utility framework. In particular, the objective of the research is to determine if variations in consumers' expected utility evaluation for a product (measured by after experience choice decisions) is related to systematic variations in satisfaction. A related research question refers to the nature (linear, non-linear) of the relationship (if any exists). As a basic requirement of addressing the research objective, a model of expected utility is proposed below:

Expected Utility

Utility theory suggests rational decision makers will select an alternative which has the largest utility (U) over all alternatives given constraints. Alternative j will be chosen by individual i if $U_{ij} > U_{im}$ for all $j \neq m$. $U_{ij,t}$ of alternative j (for individual i at time t) is deemed a weighted sum of the levels of the k attributes of alternative j.

$$\mathbf{U_{ij,\,t} \mid I_{t-1} = w_{ij} + \Sigma_k (w_k{*}X_{ijk}) + v_{ij}} \qquad (1)$$

where w_k is the weight attributed to attribute k and v_{ij} is a disturbance term.

X_{ijk} is the perceived level of attribute k for alternative j. Inclusion of the disturbance term v_{ij} allows for probabilistic choice behavior. I_{t-1} refers to the information set known by the consumer at time t-1.

In typical situations, some X_{ijk} are not known with certainty. Under these circumstances, the consumer may use *expected* utility of an alternative in pre-purchase evaluations. The consumer may use the mean expectation (μ_{ijk}) of attribute X_{ijk} to determine expected utility for a given alternative as in (2)

$$\mathbf{EU_{ij,t} \mid I_{t-1} = w_{ij} + \Sigma_k (w_k{*}\mu_{ijk}) + v_{ij,t}} \qquad (2)$$

where μ_{ijk} is the mean of $X_{ijk.}$

The consumer considers the expected utility of all alternatives and chooses the alternative with the highest expected utility (say alternative "c"). Product experience with alternative "c" will allow for comparison of utility expected and utility received with an ensuing satisfaction judgment. The product experience and subsequent evaluations add to the information available to the consumer and *may* lead to adjustment of expected utility components in period t+1 (attribute expectations may be adjusted). Assume the change to expected utility between periods t and t+1 can be written as $\Delta EU_{ij,\,(t,\,t+1)}$. Expected utility at time t+1 (post experience) can be written as in (3)

$$\mathbf{EU_{ij,t+1} \mid I_t = EU_{ij,t} \mid I_{t-1} + \Delta EU_{ij,(t,t+1)} + v_{ij,t+1}} \qquad (3)$$

We now hypothesize $\Delta EU_{ij,\,(t,\,t+1)}$ WILL be directly related to Satisfaction (S_{ij}) and to changes in attribute expectations ($\Delta\mu_{ijk}$) engendered by the product experience. Thus we can hypothesize (4) as below:

$$\mathbf{\Delta EU_{ij,(t,t+1)} = \Sigma_p (\delta_p{*}\, S_{pij}) + \Sigma_k (b_k{*}\, (\Delta\mu_{ijk})} \qquad (4)$$

where "p" is an index for P scale points of measured satisfaction (p = 1, 2,....P), S_p is a dummy variable representing the p^{th} satisfaction scale category, δ_p represents the coefficient on the relevant S_p dummy, b_k is the weight assigned to the change in expectation of attribute k.

Transforming measured satisfaction into suitable dummies (each dummy representing a category on the scale) allows for testing of general response functions.

Attribute weights are possibly invariant between the two choice periods (consistent with an established well known product category with relatively constant taste weights) but this proposition may be statistically tested by testing $w_k = b_k$ for all k.

Substitution of (4) into (3) yields an equation for post experience expected utility as in (5)

$$\mathbf{EU_{ij,t+1} \mid I_t = EU_{ij,t} \mid I_{t-1} + \Sigma_p (\delta_p{*}\, S_{pij}) + \Sigma_k (b_k{*}\,(\Delta\mu_{ijk})) + v_{ij,t+1}} \qquad (5)$$

Substituting $EU_{ij,t} \mid I_{t-1}$ as in (2) yields (6)

$$EU_{ij,t+1} \mid I_t = w_{ij} + \Sigma_k (w_k^* \mu_{ijk}) + \Sigma_p (\delta_p^* S_{pij}) + \Sigma_k (b_k^* (\Delta\mu_{ijk})) + v^*_{ij,t+1} \quad (6)$$

Estimation of equation (6) can be used to assess the significance of satisfaction in explaining estimated after experience expected utility. In particular, a joint significance test on δ_p (coefficients on the dummy variables representing satisfaction scale categories) can be used to assess whether satisfaction is a significant component in explaining after product experience expected utility. Thus we hypothesize **H1**;

$\mathbf{H1_0}$: $\delta_p = 0$ for all p

$\mathbf{H1_1}$: At least one $\delta_p \neq 0$

Non-rejection of the null would imply that satisfaction measurements do not help to explain and/or predict post experience expected utility whereas rejection of the null would suggest that satisfaction scores can be a useful tool in explaining post experience expected utility. Rejection of the null would imply that variations in after experience expected utility are being, in part, explained by systematic variations in satisfaction scores. Since variations in expected utility are linked to variations in choices, this would imply satisfaction explains, in part, variations in after experience choices and hence market shares. This would provide evidence for the link between satisfaction and relevant KPI's.

Conditional on $H1_0$ being rejected we may conjecture on the type of pattern of the δ_p parameters. The type of pattern of the δ_p parameters dictates the nature of the systematic relationship between variations in satisfaction scores and variations in expected utility. Various response functions have been proposed which include the basic linear response function, linear but asymmetric (i.e. positive satisfaction does not have the same magnitude impact on choices and expected utility as the equivalent negative satisfaction), non-linear or any of the above with discontinuities at key scale points.

Hypotheses about the structure of δ_p parameters can be formulated to test linearity, non-linearity, asymmetry or discontinuities. For example to test for linearity of the satisfaction parameters we hypothesize **H2** as below:

$\mathbf{H2_0}$: $\delta_p = \alpha_0 + \alpha_1 * p$

$\mathbf{H2_1}$: Not $H2_0$

The assumption of linearity would imply that identical *incremental* changes (on the scale used) to satisfaction scores used would have a constant impact on expected utility. This would apply similarly for both the positive (satisfied) and the negative (dissatisfied) sections of the scale. Further it would imply that positive differences from a neutral satisfaction position would have the same absolute impact (but opposite in direction) on expected utility as negative differences.

Higher order polynomial structures for the δ_p parameters may also be tested sequentially using a similar approach to the linearity case of H_2 above. The use of limited points on the satisfaction scale (five) in this experiment limits the testing of higher order polynomial structures. We thus test if the impact of satisfaction is linear ($H2_0$) against the general alternative of a non-linear response function ($H2_1$)

To enable estimation of expected utility functions both before and after product experience, a three stage stated choice experiment framework is applied. These choices can then be used to analyse the impact of the hypothetical product experience and satisfaction on post experience expected utility. The details of the specific experiment which involves broadband network choices and associated disconfirmations is described in the next section.

THE EXPERIMENT

The experiment was designed to provide evidence for hypotheses H1 and H2, through assessment of the impact of attribute disconfirmations and satisfaction on expected utility.

Method

The experiment was a three stage choice experiment where respondents were asked to make a number of choices between two branded (but not real) broadband services: *Leap* and *Dimension*. The first stage of the experiment elicited respondent choices over numerous designed choice sets. The second stage involved a hypothetical product experience with one of the brands. The final stage, following on from the hypothetical product experience, presented the same choice sets (and in the same order) as in the first stage. All stages were conducted sequentially using a survey booklet. More specific details about the design of each stage are presented below:

Design – Stage 1

The initial scenario information asked the respondent to assume he/she did not have broadband connection at their home and wanted to connect. Further, there were only two companies (Leap, Dimension) that were able to provide broadband service for their home area. It was also indicated that various scenarios, representing different broadband service packages/offers, were going to be presented over several choice sets with respondents required to choose a preferred broadband service in each choice set. Each of the eight choice sets involved a binary choice between Leap and Dimension with attribute expectation (predictive) information presented in table format. The eight choice sets were constructed from an orthogonal design enabling attribute level main effects to be determined for each alternative. The attributes used for both brands were download speed, download limit and price. Each of the attributes had two levels for each alternative. Contract length and installation costs were included as attributes in the attribute table but were kept constant (3 months, $0 respectively) for each alternative in each choice set. The attributes and their levels are summarized in **Table 1** below:

Table 1: Attributes and Attribute Levels used in the Experiment

	Leap	**Dimension**
Ave. Exp. Download Speed (Mb/sec) *(Speed)*	**8 or 6**	**5 or 3**
Download Limit (Gb) *(Dlim)*	**20 or 7**	**15 or 5**
Price per month ($) *(Price)*	**50 or 40**	**30 or 20**

Design – Stage 2

The second stage of the experiment randomly presented each respondent with *one* of two choice sets similar to the choice sets of stage one. The two choice sets were selected (based on pilot studies) to represent varying initial conditions in terms of probability of brand choice. Two initial choice sets were selected to investigate if the impact of disconfirmations and satisfaction on choices depended on initial choice context. The attribute levels for these two initial choice sets are given in the appendix. Respondents were asked to indicate a choice of brand for the choice set scenario presented. No matter the choice of brand, respondents were directed, eventually, to an outline of a hypothetical product experience with the Leap brand. For those that had chosen Dimension, information was presented suggesting Dimension would not be able to service their street for three months (contract duration of both services). This meant they would need to connect with Leap for at least the initial contract period of three months. Each respondent then received one of eight randomly selected hypothetical product experiences which manipulated average download speed received and service availability over the three month contract period.

Average download speed was designed as a confirmation /disconfirmation of (+2, 0, -2, -4) of download speed expectation (predictive) for Leap (in Megabytes) in the initially presented choice set. The service availability variable was designed as either "*Service always available*" or " *Service unavailable 1 time for 3 days, 4 other days unable to connect for 2-3 hours*" over the three month period of the contract. The hypothetical product experience information was presented in tabular format. In addition, the attribute table from the initially presented choice set was displayed for purpose of reference. Given the information on product experience and initial attribute predictive expectations shown, respondents were asked to indicate their Satisfaction with the Leap "experience" on a five point scale (Very Satisfied, Satisfied, Neither, Unsatisfied, Very Unsatisfied). Additionally, respondents were asked to indicate updated predictive expectations of average download speed for both brands (separately).

Finally, respondents were asked to indicate a choice of brand (under the assumption of identical advertised offerings as in the initial choice set presented in stage two) for a *future* three month contract.

Design – Stage 3

Stage three of the experiment consisted of presentation of the same eight choice sets (presented in the identical order) as in the first stage. Respondents were asked to reflect on their experience with Leap and to consider the choice sets presented as brand offers for the *next* three month contract. Following on from the eight choice sets, demographic questions relating to age, gender, income and broadband usage were asked. A schematic summarising the design of all three stages of the experiment appears in **Figure 1**: An example of the choice scenario information presented to respondents and the measures elicited appears in the Appendix at the end of this article.

Figure 1

Design Schematic for Three Stage Experiment

Stage	Purpose	Design
1	Experiment Introduction Determine Pre-Experience Expected Utility function	Experiment Pre-amble Eight binary choice scenarios (Leap, Dimension)- Predictive attribute expectations presented in tabular format
2	1. Set Choice Context	One initial binary choice scenario presented to individual respondents (2 possible)
	2. Actual Product Experience (Leap)	Hypothetical product experience with Leap – disconfirmation of download speed and service availability (8 possible disconfirmations, one for each respondent)
	3. Elicitation of Experience Measures	Disconfirmation information and initial choice information from Stage 2 (1) presented a. Measurement of Satisfaction (5 point scale) b. Measurement of future download speed expectation (predictive) for Leap and Dimension
	4. Immediate Choice Impact of Product Experience	Repeat binary choice from Stage 2 (1) above
3	Determine Post-Experience Expected Utility function	Eight binary choice scenarios (Leap, Dimension) identical to and in same order as in Stage 1.

Procedure

The experiment was undertaken by a convenience sample of university students using self contained booklets. There were sixteen experimental manipulations (eight hypothetical product experiences times two initial context sets) with 12 different students from a final year business course allocated randomly (prior to distribution the booklets were shuffled sufficiently to approximate random order) to each manipulation (192 respondents). The group had an approximately even split of males/females with a modal age of approximately 21- 22 years. Almost all of the group were regular broadband users but detailed prior experience or current satisfaction with broadband was not measured.

The use of a university student group, although a convenience sample, may be justified by research showing (for the USA) the 18-29 year age group (similar demographic to the student group) has by far the highest broadband adoption rate of all age groups (Pew, 2009). Students were given a non-monetary reward (small snack of choice) for successful completion of the booklet. Each booklet contained all three stages of the experiment with each stage sealed separately. The instructions indicated that each stage was to be opened only after the preceding stage had been completed. Average survey completion time was approximately eight minutes.

ANALYSIS and RESULTS

Preliminary investigation to explore relationships between key variables was undertaken using summary statistics and contingency tables. The results of these preliminary investigations indicated that the experimental manipulations (disconfirmations) impacted on measures such as satisfaction and post experience choices. More rigorous analysis of the key relationships was then undertaken using logistic regression on choices. All analysis was undertaken using SPSS 16.0. Results are presented stage by stage as described and discussed below.

1st stage Results

The first stage results examined pre experience choices over the eight scenarios presented to all 192 respondents (1536 choices overall). Over the eight scenarios, the percentage of respondents who selected Leap (in individual scenarios) varied from approximately 10% to 90% with an average of 58% over all 1536 choices. The higher average percentage for Leap is explained due to the attribute levels chosen for the experiment (see Table 1). These levels were not identical for both brands and were chosen to minimise some design issues inherent in developing choice scenarios.

A binary logistic regression was undertaken on the stage one choices to estimate the pre-experience utility function. Additionally, the logistic regression serves as a manipulation check on whether the attributes chosen and the levels of those attributes are significant in determining choices between the various scenarios. The estimated logistic regression results (focal choice = Leap) appear in **Table 2** below:

Table 2

Pre-Experience Logistic Regression (Leap = 1)

Variables	B	S.E.	Wald	Sig.	Exp(B)
Speed_L (Leap)	0.1428	0.0821	3.0262	0.0819	1.1535
Dlim_L	0.1743	0.0118	217.9814	0.0000	1.1904
Price_L	-0.0817	0.0164	24.8414	0.0000	0.9216
Speed_D (Dimension)	-0.5666	0.0846	44.8900	0.0000	0.5674
Dlim_D	-0.2198	0.0159	189.9313	0.0000	0.8027
Price_D	0.1595	0.0150	113.5702	0.0000	1.1729
Constant	1.0496	0.8426	1.5516	0.2129	2.8565

The binary logistic regression indicates all attributes are significant in explaining pre-experience choices and all coefficients have correct signs. The expected download speed of Leap (Speed_L) is marginally significant (p-value between 5 and 10%) which may be due to the closeness of the alternative attribute levels for the download speeds of Leap and Dimension. The Nagelkerke R^2 is 0.475 with an average correct category prediction rate of approximately 80%. The attributes, and in particular the attribute levels, are significant in explaining variations in choices between scenarios (p-value relevant $\chi 2 \approx 0$). Overall, the model seems reasonable in explaining pre-experience expected utility.

2^{nd} stage Results

In stage two, each respondent (out of the 192 overall) received one of two possible initial choice scenarios (96 received initial choice scenario "A" and 96 received initial choice scenario "B"). The two choice scenarios were selected to represent different starting contexts from which the impact of the eight disconfirmations could be separately compared. Preliminary analysis however, revealed that the key measures (satisfaction scores, post experience choices etc) were not significantly different for each of the two starting context scenarios. It was thus decided to combine the two groups and the results presented below are for all 192 respondents.

Of the 192 respondents, 165 (86%) chose Leap for the initial choice scenarios presented After respondents were exposed to (within their booklet) the hypothetical experience (disconfirmation/confirmation of speed, service availability) with Leap they were asked to indicate (in the booklet) a choice for a future 3 month broadband contract (assuming identical brand offers to the initial choice scenarios presented to them in this stage). For this immediate post experience choice, only 113 respondents (59%) chose Leap. Of those that chose Leap initially, 36% switched to Dimension while 29% of those that initially chose Dimension, switched to Leap. The switching percentages are a preliminary indication of the impact of the hypothetical product experience on future choices.

Satisfaction with the hypothetical product experience was also measured using a five-point scale (Very Satisfied (1) – Very Unsatisfied (5)). The results are presented in **Table 3** below. Overall satisfaction scores are reasonably evenly spread with a proportionately larger amount of unsatisfied (Un_Sat, V_ Un_Sat) responses. This is to be expected given there were twice the number of negative disconfirmations relative to positive disconfirmations (spread across all respondents) in the experimental design. Overall, there were 47% of respondents who were, at the very least, unsatisfied with their product experience with Leap.

Table 3

Satisfaction

	Count	%
1 (V_Sat)	21	10.94
2 (Sat)	51	26.56
3 (Neither)	29	15.10
4 Un_Sat	53	27.60
5 (V_Un_Sat)	38	19.79
	192	

The impact of Satisfaction on immediate post experience choice (*aftch*) is illustrated in **Table 4** below. Although there appears a clear inverse relationship between satisfaction level and post experience choice, it is noteworthy that even a satisfied ("Sat", category 2) respondent may switch to the alternative brand. Further, unsatisfied (Un_Sat) or very unsatisfied (V_Un_Sat) customers (i.e. categories 4 and 5) may not necessarily defect. In particular, almost 40% of respondents who were unsatisfied (Un_Sat) chose Leap again for the immediate post experience choice.

Table 4

Satisfaction and Post-Exp Choices (aftch)

				Count	Column N %
Satisfaction	1 (V_Sat)	aftch	Leap	20	95.24
			Dimension	1	4.76
	2 (Sat)	aftch	Leap	46	90.20
			Dimension	5	9.80
	3 (Neither)	aftch	Leap	20	68.97
			Dimension	9	31.03
	4 (Un_Sat)	aftch	Leap	21	39.62
			Dimension	32	60.38
	5 (V_Un_Sat)	aftch	Leap	6	15.79
			Dimension	32	84.21

When only those who initially chose Leap are considered (table not shown here), the % of respondents in categories 4 (Un_Sat) and 5 (V_Un_Sat) is 40.1%. However 31% of these unsatisfied or very unsatisfied respondents decided to remain with Leap for the future broadband choice. For unsatisfied respondents (Un_Sat) a little over half (53.5%) decided to switch to Dimension. This suggests dissatisfaction with Leap may not *necessarily* translate into loss of market share and may indicate satisfaction is not a totally reliable indicator of future revenues or profits.

To better analyse the relationship between satisfaction and post experience choice a suitable binary logistic regression was estimated. **Table 5** below presents estimation results for a binary logistic regression (Leap = focal brand) based on *stage two immediate* post experience choices and measured satisfaction (assuming identical offerings for both brands to those presented in the initial context scenarios in stage two).

Table 5

Logistic Regression Post Experience Choices (2nd stage)

	B	S.E.	Wald	Sig.	Exp(B)
SAT			50.57	0.00	
V_Sat	4.67	1.12	17.47	0.00	106.67
Sat	3.89	0.65	36.12	0.00	49.07
Neither	2.47	0.60	17.03	0.00	11.85
Un_Sat	1.25	0.53	5.67	0.02	3.50
Constant	-1.67	0.44	14.16	0.00	0.19

The Nagelkerke R^2 is 0.455 with an average correct category prediction rate of approximately 78%. Overall, it appears that Satisfaction (all categories combined) is significant in explaining immediate post experience choice (Wald = 50.57 for Satisfaction category overall, p-value ≈ 0). Relative to the omitted category "Very_Un Sat" (very unsatisfied), increasing satisfaction leads to an increasing likelihood of Leap being chosen. However, examining the coefficients on the individual satisfaction categories suggests the response function is not linear. The difference between estimated coefficients for successive satisfaction categories is not constant. In particular, the coefficient change from "Sat" (satisfied) to "V_Sat" (very satisfied) is dissimilar to the difference between other successive satisfaction category coefficients (the scale for the three lower satisfaction categories does appear to follow approximate linearity). However, the issue of linearity may require further examination and testing with alternative scales of satisfaction before any valid conclusions can be made. Additionally, the results may be influenced by the specific initial choice scenarios chosen for stage two of the experiment.

3rd stage Results

The results of the logistic regression discussed above (stage two results) apply to immediate post experience choice. This immediate post experience choice assumes initial brand offers remain the same as the initial choice scenarios presented at the beginning of stage two. What is likely to be more useful is to examine what impact satisfaction has on the general expected utility function. This is best examined over more and varied choice scenarios. Stage three of the experiment examined post experience choices over the same eight scenarios (and in the same order) as those presented in stage one (all 192 respondents - 1536 choices overall). Over the eight scenarios the percentage of respondents who selected Leap varied from approximately 10% to 83% (in individual scenarios) with an average of just under 50% over all 1536 choices. This result contrasts with the results of stage one where approximately 58% of overall choices were for Leap. There appears to be some preliminary evidence of switching away from Leap to Dimension. It would appear the hypothetical product experiences in the experiment (averaged over all respondents) have had an impact on the post-experience choices. To explore this more deeply, a binary logistic regression on stage three choices (based on equation (6)) was undertaken to estimate the post experience utility function (the focal brand is Leap). Results are presented in Table 6 below:

Table 6

Logistic Regression Post Experience Choices (3rd stage)

	B	S.E.	Wald	Sig.	Exp(B)
Speed_L (Leap)	0.178	0.068	6.896	0.009	1.195
Dlim_L	0.146	0.011	189.818	0	1.157
Price_L	-0.057	0.013	18.126	0	0.944
Speed_D (Dimension)	-0.373	0.068	29.692	0	0.689
Dlim_D	-0.165	0.014	145.906	0	0.848
Price_D	0.106	0.013	64.758	0	1.112
Sat (Overall)			85.373	0	
V_Sat	1.612	0.25	41.421	0	5.014
Sat	1.641	0.2	67.567	0	5.158
Neither	1.106	0.21	27.83	0	3.023
Un_Sat	0.543	0.18	9.158	0.002	1.722
Change_Speed_L	0.077	0.042	3.371	0.066	1.08
Change_Speed_D	-0.082	0.074	1.234	0.267	0.921
Constant	-1.178	0.779	2.288	0.13	0.308

The Nagelkerke R^2 is 0.396 with an average correct category prediction rate of approximately 75%. Overall, the results indicate the pre experience attribute expectations (predictive) are significant (with correctly signed coefficients) in explaining post experience choices (coefficient p-values ≈ 0). The updated predictive expectation of speed for Leap (***Change_Speed_L***) is marginally significant while the updated predictive expectation for Dimension is not significant. This is to be expected since all respondents received a disconfirmation or confirmation of speed with Leap and not Dimension. Although, some respondents updated their expectations of speed of Dimension based on their experience with Leap (possible updating of product category expectations) this was not significant in explaining post experience choices.

From the results, Satisfaction (treated as a categorical set of variables) is significant (Wald of 85.373 (p-value ≈ 0)), in explaining after experience choices. Each of the coefficients of the satisfaction scale categories (V_Sat, Sat etc) is significantly different (p-values < 0.05)) (from the omitted satisfaction category (Very_Unsat). This suggests variation in satisfaction scores (relative to Very_Unsat) significantly impact on expected utility and future choice probabilities. This, in conjunction with a similar finding in stage two results, provides sufficient evidence to reject $H1_0$ in favor of $H1_1$. Additionally, the results suggest there is not a significant difference (in terms of impact on estimated choice probability) between very satisfied (V_Sat) and satisfied (Sat) respondents. There could be some argument to combine these two categories as a general "Satisfied" category. However, more testing based on different satisfaction scales needs to be undertaken before such conclusions can be generalised. This would also suggest that a test of linearity for the satisfaction category parameters is likely to be rejected in favor of non-linearity. A test of linearity was undertaken (results not shown here) and imposing the relevant linear restrictions on the δ_p parameters resulted in an insignificant change to the log-likelihood. This finding is similar to the results of the logistic regression in stage two and provides evidence to reject $H2_0$ in favor of $H2_1$.

LIMITATIONS AND CONCLUSIONS

The research is a preliminary initial step and has a number of limitations. Product expectations (predictive) for some attributes are assumed to be equivalent to actual product performance. Variability of expectations was not considered and results may change significantly if variability is introduced. Further, product experiences may impact on the random error component in the post experience expected utility function. This may reflect greater or less uncertainty in attribute expectations and will impact on choices and estimation of the estimated expected utility function. The expected utility function and the responses to disconfirmations and satisfaction may also vary across respondents. In this work, a common expected utility function and common satisfaction response function was assumed. All of the above issues provide the basis for ongoing research using this experimental framework. The study was also conducted using a limited number of attributes although pre-testing suggested the attributes used were the main attributes considered by consumers for broadband services. The experiment itself may lack realism given the limited number of alternatives and forced choices. Measurement of satisfaction in this experiment was based on one common five-point satisfaction scale. Further testing of the model using other satisfaction scales would be welcome. Further hypotheses relating to the nature of the satisfaction response function could also be investigated by using more category points on the satisfaction scales used. Overall, more circumstances across a wider range of products and services are needed before the results can be generalised.

Given the limitations noted above, the research has provided a useful first step in introducing the experimental framework to assess the impact of satisfaction on post experience expected utility. The designed experiment is potentially a way of overcoming many of the issues/problems with traditional CSD models. For broadband services, all of the attributes used in this experiment appear to have had an impact on brand choices. Product experiences appear to influence measures of satisfaction although there does not appear to be a perfect correlation between satisfaction scores and switching to alternative brands. This may be due to inertia, switching costs or may be reflective of the brand chosen having superior expected utility even when respondents are dissatisfied with that brand. In this specific product category, it appears that satisfaction is significant in explaining post experience choices although the impact is not linear.

From a managerial perspective, the results suggest that disconfirmations influence satisfaction scores which in turn impact on post experience expected utility and choices. Using the estimated post experience utility function (as in Table 6) and Satisfaction scores, managers may be able to better predict brand probabilities and hence market shares. Further, they may assess the impact of different degrees of disconfirmation or confirmation and compare disconfirmations or confirmations of different attributes. For example, in this study a manager could compare the impact on brand purchase probabilities of a disconfirmation of service with various speed disconfirmations or confirmations. Additionally, a manager could assess the impact of a disconfirmation of an initially proposed high speed relative to a lower speed. Is it better, for example, to suggest a speed of 8Mb/s (possibly maximum speed) or the more typical average speed of

6Mb/s? Promotion of the higher speed while likely to attract more customers initially but may lead to higher incidence of expectancy disconfirmation. Will the probable initial gain in market share be negated by the possible loss of market share due to dissatisfaction when consumers have their expectations disconfirmed? The estimated expected utility function can be used to predict the outcome in terms of brand probability for both strategies and this provides valuable managerial decision support.

These results provide valuable insights for managers on the relationship between CSD, choices and ultimately profits. The model provides managers with a powerful tool to link attribute level predictive expectations, product experiences (including disconfirmation and satisfaction) with choice probabilities and hence market shares and profits). Managerial decisions regarding attribute levels can be evaluated by assessing the direct impact on profits in the context of a controlled experiment. Although this work is preliminary, analysis using the framework introduced here can be extremely useful as decision input for strategic marketing decisions and predictions of future consumer behavior and KPI's.

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Appendix

A: An example of a scenario from stage 1, 3 of the experiment

Scenario 1

(information about what Leap and Dimension are offering is indicated below)

	Leap	Dimension
Download Speed	8 Mb/sec	5 Mb/sec
Download Limit/month	20 GB	15 GB
Price	$ 50	$ 30

If you were to choose between these broadband providers, which would you be likely to choose (tick one)?

Leap ☐ **Dimension** ☐

B: An example of a product experience scenario from stage two of the experiment

Your Experience with Leap

Over the 3 months of the contract, your experience with Leap is as follows;

Average Download Speed: 6 MB/sec

Service Availability: Connection always available

Given your experience indicated above how would you rate your satisfaction with Leap broadband (tick one only)?

Very Satisfied ☐

Satisfied ☐

Neither ☐

Unsatisfied ☐

Very Unsatisfied ☐

Now suppose after the three month contract, Dimension and Leap are offering the same initial package as advertised 3 months ago *(the initial offers are on the opposite page)*. Which of the services would you choose?

Leap ☐ **Dimension** ☐