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THE APPLICATION OF MULTI-ATTRIBUTE MODELLING TECHNIQUES TO THE MINERAL WATER MARKET

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ABSTRACT

This research tests the efficacy of the Extended Fishbein Model in predicting consumer behaviour. Structural changes in the mineral water market are described and justification for this model presented. The model casts doubt on the notion that market growth is based upon the "designer water" concept. Our research suggests that consumers place utilitarian values above status driven benefits.

European Consumption of Mineral Water

Since the second world war, mineral water markets have been successfully created in Western Europe and the U.S.A. France leads the world in consumption of mineral waters, at 72 litres per capita (table 1) and remains the leading producer.

<u>Country</u>	<u>Litres</u>
France	72
Belgium	54
Italy	54
Germany	53
Spain	20
U.S.A.	20
Holland	9
UK	2

Table 1. : Per Capita consumption of mineral water (litres) Source B.S.D.A. (1986)

Some 70% of French people regularly drink the product and in terms of beverages consumed, it comes in fourth position behind tap water, wine and coffee. Since the early 1980's, sales of both sparkling and still mineral waters in France have remained static. However, exports of both products from France have grown dramatically, spearheaded by the efforts of the market leader, the Source Perrier Company, which has a product portfolio of some 15 brands including Perrier, Volvic and Buxton which it acquired in 1987. In the USA, Perrier accounts for about 86% of all imported water and is market leader with a 30% (volume) share (Financial Times 1988). Source Perrier has also been instrumental in developing the UK market. Since 1972, when Perrier (UK) was formed, the UK market has been dominated by Source Perrier brands.

Mineral Waters in the UK

During the 1970's, Perrier (UK) built the market almost single handed, aided by the "Eau so successful" advertising campaign devised by Leo Burnett (UK). By the early 80's, there were five major competitors each contributing to advertising spend and stimulating market growth (table 2). In 1983, there was a major marketing windfall - a national water strike - which caused the market to leap by almost 50% in one year. At the same time, the market began to segment on a price basis, as the premium brands gained national distribution through grocery outlets and own labels were introduced.

1980	25
1982	34
1984	65
1986	105
1987	150
1990(E)	210

Table 2: The UK Mineral Water Market (Million litres)

Source: Perrier UK estimates.

Today, the ownership of the mineral water brands can be divided between those companies which have a diversified product range eg Nestle, Cadbury Schweppes, and those who purely mineral water producers (eg Source Perrier, Highland Spring)

Whilst product life-cycle theory suggests that volume growth will inevitably slow down, the CEO of Perrier (UK) estimates that the average Briton will be drinking ten litres of bottled water a year within two decades (Financial Times 1986). A British Market Research Bureau (1986) survey showed that 34% of UK adults claimed to drink bottled mineral water, 25% once a month or more.

The UK Consumer and derived brand benefits

Forty one per cent of UK mineral water is consumed by Londoners, perhaps due to the fact that the original 'eau' campaign was targeted, in the words of the CEO of Leo Burnett, upon "image-conscious trendies" who saw mineral water as a status symbol. Perrier was associated with life-style, fashion and success. The press and poster campaign was London and southern based to complement the distribution channels which were primarily through the on-trade - hotels, bistros, restaurants and pubs. Thus, the intention was to establish mineral water as an expressive product; one which lends itself to demonstrations of status.

As the distribution base broadens (56% of national sale are now distributed through major multiples - Mintel Market Intelligence, 1988) and the market structure changes, it seems likely that with increasing consumer demand, a mass market will develop from the niche position previously occupied.

There is considerable evidence to suggest that other environmental and social factors are also encouraging these structural changes. Thompson (1986) writes "... there has been an increased awareness of the fact that tap drinking water has been subjected to multiple recycling; concern about chemical additives (to tap water) such as fluoride; worries about the effects of industrial and farming pollution, especially nitrates, and changes in drinking habits with younger people looking for alternatives to spirits". Two years ago, Richard Foulsham (Managing Director of the BSN Groupe) suggested that the drink-drive factor had made an important contribution to the increased sales of mineral water. He concluded that this was due to a psychological shift in consumers' perceptions of soft drinks as acceptable alternatives to alcohol.

If one accepts the premise that the mineral water market is now evolving from a niche to a mass market, one also needs to recognize that consumers' attitudes towards the brands and their perceived benefits are likely to have shifted as the products became more widely available. Under these market penetration conditions, the products are likely to be perceived with less status value and more instrumentally (ie benefits derived from personal satisfactions). Clearly,

this classification system is unlikely to be mutually exclusive since many products reflect both expressive and instrumental dimensions. On balance, it is contended that a shift in consumer behaviour, attitude and intention has occurred in the UK mineral water market, placing the product firmly towards the utilitarian end of this continuum. The purpose of our research was to carry out an exploratory market study in order to test this hypothesis by constructing and testing a multi-attribute model of the mineral water market in one region of the UK. If the disaggregated data did prove to be sufficiently discriminatory, the model could also be used as a basis for segmentation.

The Role of Attitudes in Influencing Consumer Behaviour

Traditional marketing research appears to be based on the assumption that an understanding of consumers' attitudes will provide some guidance as to likely behaviour, albeit a knowledge of attitudes will not guarantee a reliable forecast of a specific type of behaviour. Whilst there has been a considerable amount of research on the relationship between attitude and behaviour (eg Day and Deutscher, 1982), the concept "attitude" has been defined in over 100 different ways with at least as many different approaches to measurement (Fishbein and Ajzen, 1975), confounding any attempt to understand the attitude- behaviour relationship. The most widely accepted definition of attitude, though is that from Allport, ie "learned predispositions to respond to an object or class of objects in a consistently favourable or unfavourable way".

The framework generally held for understanding attitudes is based upon three components, ie cognitive (beliefs about the particular object), affective (feelings or evaluation regarding the attitude object) and conative (behavioural tendencies towards the object). The relationship between differing patterns of these three components is thought to characterise the nature of attitude (Krech et al, 1962). Consideration of market research procedures (Sampson and Harris, 1970), shows that attitude measurement techniques tend to be unidimensional scaling of either beliefs about brands or evaluations of brands. Also, these measures often focus upon consumers' attitudes towards brands, rather than their attitudes towards buying the brand (cf Levitt's (1970) classic observation that industrial purchasers buy quarter inch holes, not quarter inch drills).

In developing the theory of reasoned action a new era of attitude research was introduced by Fishbein and Ajzen (Fishbein and Ajzen 1975,1980) who stressed the difference between attitude and belief (ie the probability of the object having a specific relationship with some other object or value). They viewed attitude as a unidimensional concept based upon the amount of affect for an object and define attitude as "a learned implicit response that mediates evaluative behaviour". They also argued that researchers need to study 4 variables to better understand consumer behaviour:- actual behaviour, behavioural intentions, attitudes and beliefs. In the model (the Extended Fishbein Model) they postulate that overall behaviour can be inferred from behavioural intention which is a function of:

1. the individuals attitude toward performing the behaviour in a given situation
2. the norms governing that behaviour in that situation and the persons motivation to comply with these norms

So the model takes the form:

$$B \approx BI = W1 [Attitude to act] + W2 [influencing norms] + E \quad (1)$$

$$Attitude to act (A_{act}) = \sum_i b_i e_i \quad (2)$$

$$Influencing norm (SN) = \sum_j (nb_j) (mc_j) \quad (3)$$

Where

B	=	actual behaviour
BI	=	behavioural intention
b_i	=	salient belief about an outcome of the behaviour
e_i	=	evaluative aspect of the possible outcome (ie relative desirability of each outcome)
nb_j	=	normative belief, ie respondents belief about what salient referents would advise
mc_j	=	motivation to comply with the wishes of the referent
$W1, W2$	=	weighting factors (Beta weights)
E	=	residual term

From a marketing perspective, this model is very apposite since it evaluates a consumers attitudes toward consuming or purchasing a product rather than the attitude toward the product itself. Whilst someone may have a very positive attitude towards a Porsche, there may be a negative attitude to purchasing because of the price. By also including the influencing effect from social groups, this model more logically takes into account other influences on behaviour.

The virtue of this model is that it tries to simplify the complex process of consumer behaviour. However, it is not without its weaknesses. The first is the assumed relationship between behavioural intention and actual behaviour. As the time between measurement of intentions and actual behaviour increases, factors can intervene to change the original intention. Other factors that can weaken the assumed relationship are unforeseen situational and environmental events as well as new information. Secondly, if consumers feel a low degree of involvement with the product category, they are likely to have only a few weakly-held views in memory upon which to base attitudes and intentions. There is then the danger of consumers' intentions being unstable. Thirdly, there is the problem that both the attitudinal consequences and the normative beliefs may relate to the same influencing source, confusing any attempt to identify whether the attitude to the act or the influencing norm is responsible for the behaviour. As a consequence of these problems, several studies have been critical of the value of the Extended Fishbein Model (see Wilkie (1986) for details). Others though have shown the model to have predictive validity in both the laboratory (eg Bonfield, 1974, Wilson et al, 1972,1975) and the market place (eg Cowling [1973] Ryan and Bonfield [1980] Tait [1983] and Tuck [1973])

Recognising the limitations of the Extended Fishbein Model, we decided to use it help provide guidance on understanding consumers behaviour.

The Research Hypotheses

The purpose of the research was to provide a measure of consumers behaviour, attitudes and social influences relevant to the mineral water market. The Extended Fishbein Model (EFM) was

selected as being the most appropriate device for this purpose. However, it was first necessary to establish the predictive validity of the model before component analysis can be applied with any degree of confidence. Thus, our research hypotheses can be summarised:

H1 That the EFM is a valid predictor of consumption behaviour in the mineral water market, accounting for more than 60% of the variance in behavioural intentions.

H2 That the benefits from consumption are derived from personal satisfactions rather than from the effects of social conspicuousness.

METHODOLOGY

Individual Depth Interviews

In order to elicit behavioural and normative beliefs regarding the drinking of bottled water, 25 in-depth interviews were carried out amongst respondents using a free response format. Eighty per cent of the sample were female and 25 years old or more; sixty per cent were in the C1 C2 socio-economic category. Twenty per cent of interviewees were drawn from non-users aware of the product category. Modal attitudinal and normative beliefs were identified as outlined by Fishbein and Ajzen (1980); in total, there were 12 salient attitudinal beliefs and 7 salient referents derived by data reduction of the twenty five taped interviews which are listed below in figure 1

Attitudinal beliefs

Drinking bottled water.....

1. Provides a source of water free from impurities
2. Provides a drink free from additives
3. Provides a drink which is alcohol-free
4. Provides a refreshing drink
5. Gives me a drink with no calories
6. Provides a drink which is healthy
7. Provides a non-alcoholic drink when driving

8. Will help me control my weight
9. Offers an alternative taste to soft drinks
10. Tastes the same as drinking tap water
11. Provides a mixer with other drinks
12. Is a waste of money

Normative beliefs

Referent influences include:

13. The Family
14. The Doctor
15. Close friends
16. Articles in the press
17. Advertisements on T.V.
18. Media personalities
19. Fellow members of sporting and social groups.

Figure 1: Attitudinal beliefs and salient referents

Main Survey Sample

One hundred subjects for the main study were drawn from the Anglian T.V. region at three sampling points (Bedford, Flitwick and Cambridge). The region was selected for two principal reasons:-

- 1) According to the "Which" report on tap water, the region does not meet E.E.C standards for principal drinking water pollutants.
- 2) The region now has a higher overall level of bottled water consumption per capita than London or Southern TV areas (Mintel Market Intelligence 1986)

In this area of the country, the sample population would therefore be most likely to hold beliefs about the consumption of bottled water which reflected both utilitarian and socially-derived benefits.

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A stratified quota sampling technique was used to ensure that four user groups (heavy, medium, light and non-users) were included. In the event, the researchers were able to recruit 25 respondents into each of these four cells. The sample was weighted towards women AB's in the 25-44 age group, identified by Mintel Market Intelligence (1988) and TGI (1987) as being the highest consuming categories. No attempt was made to differentiate between individual brands or water types (still or carbonated).

Measuring Behaviour and Behavioural Intentions (BI)

The Dependent Variable

Behavioural intention was measured amongst users and non-users by asking how often respondents intended to drink bottled water in the next month. Each respondent was then placed into one of ten consumption categories based upon the Mintel (1988) classification. These ten behavioural categories were then used as a basis for constructing a behavioural intention index, corresponding to the BI component in equation (1). As a cross reference, respondents were also asked how often they drank bottled water at present (B in equation 1) and there was very little difference between stated current behaviour and intentions over the next month. (It would have been more rigorous methodologically to measure behaviour by collecting labels or empty bottles after a one month period but, time did not permit in this exploratory study).

The questionnaire was administered over a two week period during the summer of 1988, so that any seasonal influences on consumption would not vary significantly.

Analysis

The raw data was analysed in two phases. Firstly, aggregate analysis was carried out and the average multiple R (regression correlations) and their corrected values (R^2) was determined by

regression analysis using Minitab. Summed scores for Aact (equation 2) and SN (equation 3) were also calculated using this software.

Secondly, disaggregate analysis was carried out on the attitudinal data using SPSS so that the characteristics of user groups could be identified.

Results and Discussion

A major objective of the study was to determine the extent to which the EFM could predict behavioural intention. Table 3 shows the beta weights and multiple regression coefficients obtained for the model specified in equation 1 and also for two additional models incorporating the attitudinal and normative components separately. In the full model, attitudinal and normative components together accounted for 75% of the variation in behavioural intention. In the other two models tested, attitude alone accounted for 72% of the variation in behavioural intention, and subjective norm alone accounted for 47% of the variation in behavioural intention.

REGRESSION MODELS	AVERAGE REGRESSION BETA. Wt. W_1	AVERAGE REGRESSION BETA Wt, W_2	AVERAGE MUTIPLE R	CORRECTED AVERAGE MULTIPLE R^2
$BI = W_1 A_{act} + W_2 SN + E$	0.72**	0.17	0.87**	0.75
$BI = W_1 A_{act} + E$	0.85**	-	0.85**	0.72
$BI = W_2 SN + E$	-	0.69**	0.69**	0.47

TABLE 3: Regression Analysis Results: ** $p < 0.05$

With regard to the intention to consume mineral water, the EFM was thus shown to have good predictive power (accepting the validity of the assumptions underlying the use of multiple regression models)

H1 is shown to be valid

The relative magnitudes of the beta weights W_1 (0.72) and W_2 (0.17) in the first regression model in Table 3, suggest that attitudes influence behavioural intentions about drinking bottled water

more strongly than normative influences. This is borne out by the correlation of the two independent variables (Aact and SN) with BI (see second and third models in Table 3) R^2 values of .72 and .47 were obtained for these component contributions when assessed individually. In consumer behaviour research, it seems reasonable to assume that differences in predictive usefulness (as measured by beta weights) for normative vs attitude beliefs will reflect the degree of social conspicuousness vs the need for personal satisfaction with product performance (Bourne 1964, Cohen and Barber 1970). In this instance, the attitudinal component significantly outranked the normative component from which one could infer that these products are regarded as 'instrumental' rather than 'expressive' purchases. Whilst the researchers have no empirical evidence to suggest that the reverse was true during the early 1980's, the historical development of the advertising and distribution strategy suggests that this was the underlying assumption of the manufacturers.

H2 is shown to be valid

Differentiating between user groups

To assess whether the different groups of respondents (ie non-users, light, medium and heavy users) considered the same basic dimensions to formulate their behavioural intentions, a principal component analysis of the beliefs and social norms relevant to mineral water was undertaken. This technique is a powerful data reduction device and has also been used in several research projects to determine the key attributes of different consumer groups (see Churchill (1983) for details). For each of the 4 respondent groups separately, attention was focused on the matrices of the 25 cases x 19 variables (ie the 12 elements of the beliefs about drinking mineral water and the 7 social norms). Correlations between the 19 variables were calculated and, using the SPSS suite of programs, these 4 correlation matrices were subjected to principal components analysis.

Examination of the non-rotated component loadings did not provide a particularly illuminating picture and extracting those components with eigenvalues greater than 1, (between 6 and 9 components depending on the respondent group), a Varimax rotation was applied. For each of

the 4 respondent groups it was found that the first 5 components explained approximately 60% of the variance and attention was focused on these 5 components. To interpret the meaning of these components, those variables that had the highest loadings on each of the rotated components were considered. Table 4 summarises the high loading variables on each of the five components for the different user groups.

A visual inspection of the variables describing the 5 components shows that there are similarities across the 4 user groups (eg within the first 3 components each of the 4 groups is influenced by media personalities). What is interesting though is that when comparing the non-user with the heavy user of mineral water, the non-user is characterised more by the influence of social norms, while the heavy user has a wide repertoire of beliefs and shows less reliance upon influential social norms. By looking at the first 4 components, non-users can be identified through the influence of the press, close friends, the media, TV adverts and doctors, but only by their beliefs about mineral water as a low calorie, mixer drink. By contrast on these 4 components the heavy user is only influenced by social groups, the press and media personalities, but has beliefs about wasting money, impurities in water, being an alcohol free product, being a healthy drink and about the taste of tap water.

Recognising the limitations of small sample research, the results tentatively indicate that the non-user and heavy user of mineral water may be differentiated by being more concerned about their perceptions of influencing social norms rather than their constellation of beliefs. These results would benefit from further testing amongst a larger sample and, if replicated, they could help develop marketing strategies. For example, by using qualitative research amongst non-users, the influence of social norms could be explored and the marketing offering suitably altered (eg positioning). Likewise research could be undertaken amongst heavy users to assess whether their beliefs about brands of mineral waters reflected the chemical characteristics of the brands and promotional strategies devised to either reinforce correctly held beliefs or communicate a message to counter incorrect beliefs.

MINERAL WATER USER STATUS

COMPONENT	NON-USERS	LIGHT	MEDIUM	HEAVY
1	Influenced by press	Beliefs about refreshment and alcohol free. Influenced by press	Beliefs about additives and being alcohol free	Influenced by social groups. Beliefs about wasting money and being free from Impurities
2	Influenced by friends and media personalities	Influenced by TV advert and doctor	Beliefs about healthy drink and alternative to soft drinks. Influential social group	Belief about alcohol free. Influenced by press
3	Beliefs about drinking and helping control weight	Influential media personalities. Additive free belief	Influential family. Beliefs about refreshment and helping control weight	Influenced by personalities. Belief about healthy drink
4	Influenced by TV adverts	Beliefs about tap water taste being additive free	Belief about alcohol free. Influenced by adverts	Belief about tap water taste
5	Beliefs about money and alternative to soft drinks	Beliefs about alternative to soft drinks and helping control weight	Influenced by media personalities and close friends	Beliefs about alternative to soft drink and alcohol free

Table 4: Dimensions discriminating between user groups

Median tests were carried out for each of the 19 variables so that average scores, amongst each of the four user groups, could be determined and the significance of differences between cells (Carr 1986, p122) investigated. What was particularly striking about these cell responses was their consistency. For example, across eight of the ten significant belief statements (two of the twelve did not prove significant), a heavy to non-user order was maintained which re-inforced the view that attitude/behaviour correspondence is an appropriate measure in the modelling technique.

Conclusions

The present research was undertaken to test the efficacy of multi-attribute modelling in predicting consumer behaviour in the UK mineral water market. It was argued that the Extended Fishbein Model would be appropriate for this exploratory research based upon the marketing literature. The research has shown that the model has good predictive power under the conditions in which behavioural intentions and behaviour were judged by the respondents. With the model measuring both attitudes towards a given behaviour and the social influences, it has been possible to discount the notion that the current market growth is based upon the "designer water" concept since the evidence suggests that instrumental or utilitarian values are now more important than status-derived benefits.

Principal component analysis found that non-users were more concerned about influential norms, while heavy users had a constellation of beliefs about mineral waters. For the heavier user, consumption appears based upon a risk reduction process (drinking mineral water due to concern about tap water pollution). Non-users do not seem to value the benefits of mineral water, and while apparently aware of media activity, are insufficiently predisposed to modify their behaviour.

The disaggregated data also provided convincing evidence to suggest that attitudinal - behavioural consistency varied according to frequency of usage which lends further weight to the behaviouristic approach; that is, for minimum involvement products of this type, behavioural

change is necessary before the formation of attitudes (see Krugman [1965,1967] and Foxall [1983]).

Whilst the researchers recognised that it was never the intention to measure individual brand benefits (or derived benefits to be more precise), the salient beliefs do appear to be highly generic to the market. The growth in own label products and their use of supplier brand names bears witness to this generic market idea. However, the forecasts seem to be suggesting that market growth will continue in the short term and that household penetration should also increase as uncertainty about tap water purity continues to be reported in the media. Source Perrier, as the market maker and leader, continues to provide an awareness function through its media advertising. Spadel, on the other hand, has recognised the importance of associating its Spa brand with body purity and health; this year the company has run a black and white campaign in the quality press with this product positioning. It remains to be seen how effective Goliath remains in arresting the advances of David and the Israelites now the niche market is evolving into a mass market and "designer water" is a thing of the past.

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