THE DYNAMICS OF BRAND CHOICE BEHAVIOUR IN SELECTED PERSONAL CARE PRODUCTS IN URBAN PHILIPPINES

BEN PAUL BALTAZAR GUTIERREZ
Bachelor of Science in Chemical Engineering (B.Sc., Chem Engg)
Master of Business Administration (M.B.A.)

This dissertation is submitted in partial fulfilment of
the requirements for the degree of
Doctor of Business Administration (D.B.A.)

Department of Legal and Executive Studies
Faculty of Business

Victoria University of Technology
Melbourne, Australia

February 1998

DECLARATION

This thesis contains the original academic work of the author except where stated in the thesis. It contains no material which has been submitted for examination or award of any degree in any university. I also certify that this thesis is less than 100,000 words in length, exclusive of tables, figures, exhibits, appendices, and references.

BEN PAUL B. GUTIERREZ

23 February 1998

ACKNOWLEDGMENTS

I wish to acknowledge the following people and organisations for playing a special part in my arduous and often lonely intellectual journey. Their assistance, in some way, were invaluable to the completion of this dissertation.

First, I am grateful for the role of my two supervisors, Dr. Kandiah Jegasothy of the Department of Applied Economics at Victoria University of Technology, and Dr. Felix T. Mavondo of Syme Department of Marketing at Monash University. As mentors, their probing questions helped synthesise my ideas and improve my research design. As friends, their time, encouraging words, and confidence in my capabilities are unparalleled. I also thank Dr. Segu Zuhair of the Department of Applied Economics, Victoria University and Dr. Leon Loftus, a management consultant, for their comments on an earlier draft of the thesis. I also wish to thank the staff members of the Department of Applied Economics, and Department of Hospitality, Tourism and Marketing of Victoria University for their questions and comments during my research presentations.

I would like to appreciate the assistance of my fifteen interviewers during the data collection in Manila and the librarians in Melbourne, Monash, and Victoria Universities and the National Statistics Office in Manila, Philippines.

I would like to express my sincere appreciation to Prof. Keith Lansley, Prof. Geoffrey George, Dr. Nick Billington, and Dr. Jean Dawson of Victoria University, for their kind assistance with research facilities and administrative matters. I specially thank the University for defraying the costs of mailing and interviewing.

I wish to thank AusAID of the Australian Department of Foreign Affairs and Trade for providing the round trip airfare during my fieldwork in Manila. More importantly, the AusAID scholarship gave me a tremendous opportunity to pursue this higher level of study.

My heartfelt thanks also go to Mr. Carlos Ocampo and his family in Melbourne for their generous support and hospitality during the last few months, leading to the submission of this dissertation.

Finally, I would like dedicate this work to my parents, Benjamin and Basilia, my sisters, Lina, Marley and Glenda, and my brother, Jim Mark, in recognition of their generous support, encouragement and prayers, while I was away studying in Melbourne, Australia.

Ben Paul B. Gutierrez

February 1998

TABLE OF CONTENTS

PART IV. DISCUSSION

LIST OF EXHIBITS

LIST OF FIGURES

LIST OF TABLES

List of Tables, Continued.

List of Tables, Continued.

LIST OF ABBREVIATIONS

ACA	Adaptive Conjoint Analysis
AIC	Akaike Information Criterion
ANOVA	Analysis of Variance
BCM	Binary Choice Model
DF	Degrees of Freedom
DM	Dirichlet Model
EBA	Elimination-By-Aspects
EBC	Elimination-By-Cutoffs
EBD	Elimination-By-Dimensions
HS	Head & Shoulders
IAL	Independent Availability Logit
IIA	Independence of Irrelevant Alternatives
IRI	Information Resources Inc.
IRLS	Iteratively Reweighted Least Squares
GANNT	Generic Adaptive Neural Network Training
GEV	Generalised Extreme Value
GLM	Generalised Logit Model
LOO	Leave-One-Out
MDS	Multidimensional Scaling
MLE	Maximum Likelihood Estimation
MNL	Multinomial Logit
MNP	Multinomial Probit
MSA	Kaiser's Measure of Sampling Adequacy
NDE	Nonparametric Density Estimation
NMNL	Nested Multinomial Logit
NSO	National Statistics Office, Philippines

List of Abbreviations, Continued.

OLS	Ordinary Least Squares
PMS	Pattern Matching Stochastic
PRETREE	Preference Trees
PSM	Preference Structure Measurement
SAS	Statistical Analysis Software
SC	Schwartz Criterion
SPSS	Statistical Package for the Social Sciences
-2 Log L	-2 Log Likelihood
UPC	Universal Product Code
URM	Utility Residual Method

ABSTRACT

This thesis investigates the dynamics of brand choice behaviour in shampoo and toothpaste products in urban Philippines. A review of theories highlights that American researchers dominate in brand choice literature and very few studies consider the context of less developed countries.

To identify and measure the determinants of brand choice, a factor analysis on pilot data produced salient product attributes. These attributes were used on a sample of 500 respondents in Metro Manila, Philippines.

To formulate and estimate the relationship between brand choice and its determinants, discriminant and logit models were developed. The best discriminant model was chosen after examination of classification and crossvalidation rates while multinomial and binary logit models were evaluated using within-sample and holdout-sample prediction rates, and information theoretic measures. Two brand preference measures were validated - the frequently purchased brand and last brand bought. The thesis also evaluated whether the last brand bought may serve as a surrogate to the frequently purchased brand.

Buying shampoo was found to be a personal decision driven by conspicuous consumption. Thus, cosmetic benefits such as giving body to hair, fragrance, and hair manageability seem to be the main determinants of brand choice. Cleaning ability, dandruff control, and gentleness to hair were also significant shampoo functional benefits. On the other hand, toothpaste purchase was a household decision that is influenced by private feeling of self-worth and concern for family. Thus, toothpaste brand choice appeared to be explained by therapeutic benefits like cleaning ability, cavity protection, tartar prevention, and dental approval.

Finally, the thesis identified several implications to marketing management and academic research. Product managers can evaluate the strengths, weaknesses, and positioning of their brands in terms of the identified salient

attributes. Models explaining and predicting brand choice support management in developing marketing strategies. Moreover, an understanding of usage patterns, consideration set formation, and brand satisfaction ratings may be useful to management.

This study benefits future researchers because it synthesises the framework and methodology for brand choice from the context of less developed countries. Five constructs were validated: four designed by other researchers - brand switching, brand innovativeness, purchase involvement and social consumption motivation; and a product knowledgeability scale created during the study. Other methodological lessons include the use of triangular methods in validating brand choice measures, and the evaluation of rank ordering and value allocation as importance rating systems.

CHAPTER 1
INTRODUCTION

1.1 Overview

Decision making is an important aspect of life in a free market economy. Consumers' choices of products or services influence the degree of satisfaction or dissatisfaction of their needs and wants. Similarly, management decisions on strategies or policies determine the success or failure of organisations. As consumers and organisations choose among countless potential products and alternatives, they process a number of competing information.

Decision making is a process by which an individual, group or organisation makes a choice or judgment after an evaluation of information about two or more alternatives (Schiffman, et al. 1997). Thus, a good decision process utilises all available relevant data, and applies a logical criterion in examining the alternatives.

Decision theory encompasses a broad range of disciplines and contexts: from psychology, political science, sociology, and economics to engineering. Carrol and Johnson (1990) observed that the most rapid growth of decision research is found in professional schools of management, medicine, education, and public policy.

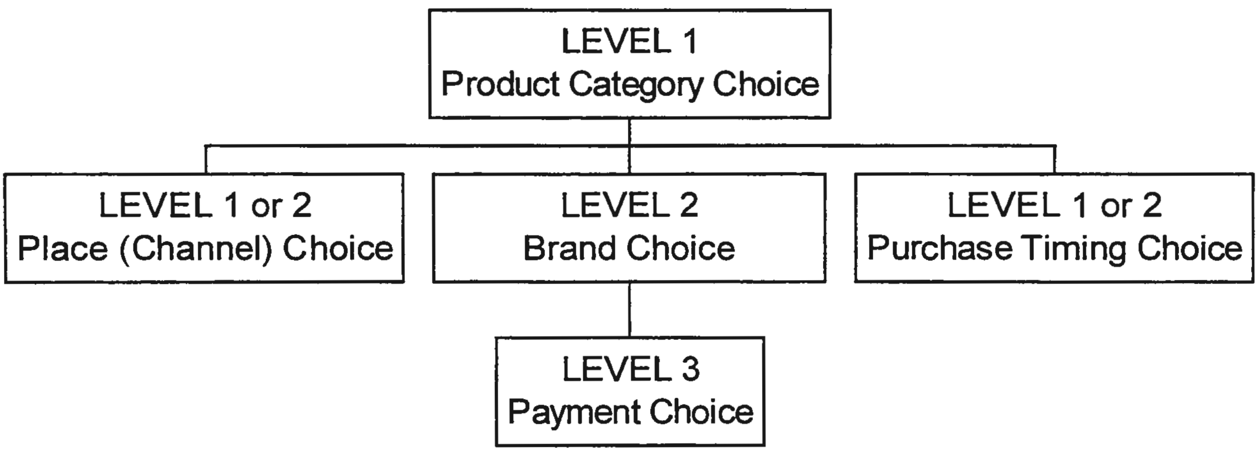
Consumer decision making is a direct concern to manufacturers and marketers, as they face an increasingly competitive marketing environment. This is not surprising because the consumers' decision to purchase a product or not may suggest, to a great extent, how well the marketing strategies for that product were planned and implemented. Most successful marketers surpass their competitors in understanding and meeting their customers' needs with high quality products and services. Hence, the study of consumer decision making is a primary interest of marketing research.

Decision making occurs in three consumer behaviour activities: obtaining, consuming, and disposing of products (Engel, Blackwell, and Miniard 1995).

purchase a required item, a decision making process commences. This purchase process consists of complex and sequential choice decisions. However, the logic of such a process can be understood by identifying the different choice decisions at three levels (Figure 1.1).

Figure 1.1

THE PURCHASE DECISION PROCESS



Source: Adapted from Schiffman, et al. (1997), Table 19-1, p.527.

The above stratified framework suggests, at the first level, a consumer decides whether to purchase a product category or not depending on her or his prevailing needs and situation. At the second level, the consumer chooses the brand that would give maximum utility or satisfaction. Then, at the third level, the consumer chooses the method of payment (Schiffman, et al. 1997). Other considerations like the place and time of purchase may enter at either first or second level. Although the purchase decision process can be thought of as a multi-level process, choice made at different level is unique. Therefore, to provide a complete analysis, it is necessary to formulate a framework for each decision level. Such a framework becomes a basis for modelling consumer choice behaviour.

1.3 The Consumer Market in a Less Developed Country

Consumer markets in less developed countries differ from North American, European, or Australian markets in several aspects: average household disposable income is low, income disparity between the rich and poor is high, youths represent more than two thirds of the population, literacy level is low, and access to a wide variety of communication media is poor. According to the 1994 Family Income and Expenditure Survey in the Philippines, rural families have an annual average income of Ps 53,483 and an average expenditure of Ps 44,427. By contrast, urban families have twice the average income and expenditure of rural families. Urban families have an annual average income of Ps 113,121 and an average expenditure of Ps 91,115. In Metropolitan Manila, the most urbanised area, the difference between urban and rural income is more than three times. Families in Metro Manila have an annual average income of Ps 173,599 and an average expenditure of Ps 138,427. While it is true that the average income is growing, in real terms, this growth is insignificant. In 1994, the average income of Filipino families grew by 27.6 percent to Ps 83,161 compared to the 1991 level of Ps 65,186. However, net of inflation, the average income actually dropped by 0.2 percent between 1991 and 1994.

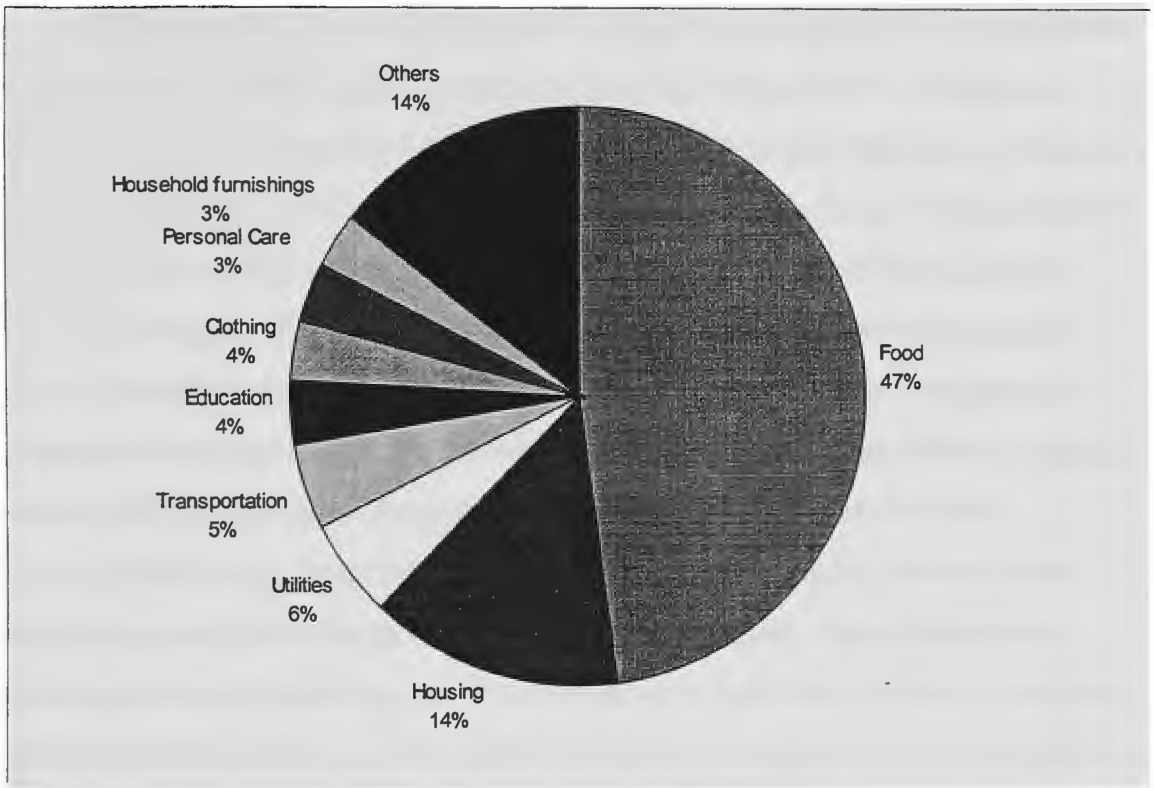
The last four Family Income and Expenditure Surveys in the Philippines indicated a general trend towards lower spending on food. However, the share of food expenditures is still almost half of the family income at 47.8 percent, dropping to 44.2 percent in Metro Manila (Figure 1.3). When families have extra income there is a tendency to buy durables rather than consumables, especially in the rural areas as shown by the steady increase in the share of household furnishings and equipment. Spending on personal care and effects[2] is only 3.3 percent in Metro Manila but it has been relatively stable over the last nine years. Whilst the share of personal care products is low, Metro Manila's population of 9,454,040 grows at 3.3 percent per annum, as compared to national population growth rate of 2.3 percent (National Statistics Office, 1995 Census of Population). Such population dynamics suggests that the growth in the personal

[2] Personal care and effects category is composed of the following: beauty aids and toilet articles (deodorant, oil, make-up, toothpaste, shampoo, soap, etc.), personal effects

care product market would be significant. Therefore, the personal care product market remains attractive to manufacturers and marketers.

Figure 1.3

1994 FILIPINO HOUSEHOLDS' EXPENDITURE PATTERNS



Source: 1994 Family Income and Expenditure Survey, Series No. 80, National Statistics Office, Manila, Philippines, Table E, xxxvi.

The growth rate of shampoo and toothpaste consumption in the Philippines follows the population growth rate. Shampoo consumption was about 11,300 metric tons in 1995 and growing at 24 percent annually.[3] Removing the consumption of children below five years old, the annual per capita consumption is 212.7 millilitres (ml), less than 1 ml per day. The toothpaste market volume of 14,000 metric tons grew by 16.7 percent over the

(jewellery, bag, watch, etc.), beauty parlour or barbershop services (haircut, perm wave, manicure, etc.), and other services (sauna, aerobics classes, etc.).

[3] The shampoo and toothpaste consumption numbers are approximate figures supplied by product managers of a major manufacturer in Manila. Per capita consumption was calculated from the market volumes and population based on the 1995 Census of Population of National Statistics Office, Manila, Philippines.

1993 volume because of the entry of lower priced brands. This volume translates to a per capita consumption of 237.2 grams per year, less than 1 gram per day. Shampoo and toothpaste consumption is expected to rise as household incomes increase.

1.4 The Objectives of the Study

The purpose of the research is to investigate the dynamics of brand choice behaviour for toothpaste and shampoo products in Metro Manila, Philippines. The study utilises the multi-attribute model of brand choice behaviour. Shampoo and toothpaste are considered as important personal care products because their usage is independent of age, sex, or disposable income. Since these products have high usage and familiarity, it will be easier to obtain survey respondents, and this could minimise data collection costs. Moreover, the investigator has considerable knowledge of the personal care products and their markets, having worked with the Philippine marketers for nine years from 1985 to 1993.

While brand choice behaviour is the focus of the study, there are other complementary issues important to marketing strategists. Usage behaviour, consideration set formation, and brand satisfaction may also influence the brand choice decision. Hence, to capture the fluid, rather than the static, nature of the interrelationships of these decisions, the term "dynamics" is used to describe the process.

The scope of the study, however, is delimited to Metro Manila, Philippines. Compared to the rural areas, urban communities have higher market potential. Metropolitan Manila is the most urbanised region of the Philippines and all the marketers of the target products have strong marketing presence. Smaller companies have distribution problems penetrating the rural areas because of the archipelagic nature of the country. Moreover, the Metropolitan Manila region is very important because it accounts for at least forty percent of the sales of most companies. The findings of the study will apply to the rapidly urbanising areas of the country to a lesser degree.

The comprehensive study of the aggregate market of these two personal care products attempts to address five specific objectives below.

1. To identify and measure the dominant attributes and situational factors that determine the brand choice of shampoo and toothpaste.
2. To formulate and estimate the relationship between brand choice and its determinants by using mathematical choice models.
3. To validate two brand preference measures - frequently purchased brand and the last brand bought and to test whether or not the last brand bought can become a surrogate of the frequently purchased brand.
4. To test the predictive adequacy of the estimated models in terms of prediction rates and statistical information measures and compare the results with models using similar methodology.
5. To provide some suggestions to the formulation of marketing strategies for shampoo and toothpaste marketers in the Philippines.

An understanding of brand choice and its determinants would improve decision making in market segmentation, new product development and product positioning. Thus, this knowledge would benefit manufacturers in the Philippines by improving their performance in marketing shampoo and toothpaste products.

1.5 Significance of the Study

The investigation would make contributions to shampoo and toothpaste marketers and extends the understanding of future researchers in the area of brand choice as it generalises the model to less developed countries.

Wilson, Gilligan, and Pearson (1992) pointed out that eighty percent of new products launched into the market fail. They explicated that the high percentage of product failures is mainly caused by lack of understanding of consumers' expectations and decision making processes. As a result, manufacturers plan poorly and encounter unexpected difficulties during their implementation of strategies and tactics. Thus, it is of paramount importance that any marketing strategist thoroughly understands the dynamics of the buying process; since the costs and competitive implications of failing to do so are likely to be significant. For instance, early in the 1990s, launching a new shampoo in the US market required a marketing budget of at least US$ 20 million (Coeyman 1993).

The significance of this empirical study is to identify appropriate inputs in the formulation of marketing strategies that are useful to manufacturers and marketers. A knowledge of the dominant attributes affecting brand choice of shampoo and toothpaste can influence product development, positioning, and market promotion strategies. On the other hand, the brand choice models would enable marketers to reasonably comprehend the buying patterns and predict more readily the buyer's behaviour under comparable conditions. Moreover, the models attempt to give measures of buyer intentions not just directionally, but also quantify them in economic terms.

Most consumer studies, commissioned in the past by the multinational companies in the Philippines, were conducted with very specific objectives. Consequently, these studies analysed only limited attributes in product development and advertising effectiveness. Studies that consider the aggregate product market are rare and less frequent (Personal Communication 1, 1995). Starting with a broader number of attributes and extracting the more significant ones is the basic premise of the model adopted in this study. Consumers then evaluate the toothpaste and shampoo brands based on the reduced attributes. Consequently, the brand choice models are developed from consumer evaluations.

The findings of the study would benefit, not only the local and foreign organisations presently operating in the Philippines, but also those planning to enter the market in the future. The findings for shampoo can be extended to a lesser degree to other products like hair conditioners or styling gels. Similarly, the findings for toothpaste can be extended to mouthwashes or toothbrushes. The psychographic and demographic profile of the consumers can be useful to marketers of other personal care products or even cosmetic products.

The study is important to researchers because it synthesises the theoretical framework and elaborates on the methodology for brand choice behaviour and its determinants from a less developed country context. Studies on brand choice for less developed countries are limited because of the bias of researchers towards using scanner panel data. The sampling and the design of instruments considers the limitations in the developing countries. Modifications made in this study would be beneficial to researchers who intend to undertake brand choice research of manufactured products in less developed countries.

The present study makes a number of contributions to the methodology of brand choice research. First, the data collection methods consider the context of less developed countries. Second, the study utilises triangular methods in the validation of brand choice measures. The brand choice models are estimated with and without the last brand bought as predictor. Later, the last brand bought is tested as a surrogate of the frequently purchased brand. Third, the study evaluates two importance rating measures - rank ordering and value allocation. Models using attributes weighted by ranks or values are compared to models using unweighted attributes. Finally, the study attempts to link perceptual measures with objective data (e.g. market shares and consideration numbers).

Therefore, this study makes a contribution to marketers of personal products and to future researchers undertaking research studies in less developed countries.

1.6 Plan of the Dissertation

The eleven chapters of the dissertation are organised intō four parts consisting of the literature review, research methodology and design, results, and discussion.

The first part contains two literature review chapters. Chapter 2 provides a theoretical framework of the research problem. To describe the state of play in modelling brand choice behaviour, multidimensional scaling, conjoint analysis and multi-attribute choice models, are described and analysed for their suitability to the research problem. Chapter 3 then synthesises the review by systematically analysing the empirical brand choice studies in terms of data, methodology and findings. This chapter also identifies the gap in brand choice literature that the research seeks to address.

The second part of the dissertation has two chapters that describe the methodology and research design. Chapter 4 begins with a general description of the methodology and then outlines the design of sampling and instruments in the pilot study and main survey. Two brand preference measures are identified - the frequently purchased brand and the last brand bought. Determinants of brand choice are reviewed and summarised using the framework developed by Sheth, Newman and Gross (1991). Moreover, the five attitudinal scales to be utilised in the study are described in terms of their operational definitions and measurement questions. In Chapter 5, the factor analysis results of the pilot study are presented. After the pilot sample is described, the results are discussed by interpreting the factor loadings. To simplify the models, some items within an identified factor are integrated following the benefit-chaining principle (Young and Feigin 1975). The attribute scale measures generated for the main questionnaire are also tested for reliability.

The third part presents the results and its four chapters comprise at least forty percent of the dissertation. Chapter 6 provides the background information from the main survey results that lends a suitable context to the models. In this chapter, the consumer attitudinal profiles, demographic description of the sample, and issues like usage behaviour, consideration set formation and brand satisfaction are discussed. The attitudinal scales, designed by other researchers, that were used in the study are also validated.

Consequently, Chapters 7 and 8 present the modelling results for shampoo using discriminant analysis and logistic regression, while Chapter 9 provides the results for toothpaste. In Chapters 7 and 9, the linear discriminant model is developed using SPSS Discriminant Procedure, while the quadratic and nonparametric models are built using the SAS Discriminant Procedure. The best discriminant model is chosen after examination of classification and crossvalidation rates. On the other hand, multinomial and binary logit models, using all four selection methods of the SAS Logistic Procedure, are developed in Chapters 8 and 9. All the logit models are evaluated for predictive adequacy in terms of prediction rates (both within sample and holdout sample) and information theoretic measures. During the logit modelling of brand choice, the two brand preference measures, highlighted in Chapter 4, are validated.

Finally, the major findings of the study are presented in the last part of the dissertation. Chapter 10 is a discussion of the main findings and compares the results for shampoo and toothpaste. Hypotheses about the nature of purchasing decision and product consumption in shampoo and toothpaste are formulated and tested using the significant explanatory variables from the brand choice models.

In this chapter, the results of the study are also compared to the empirical findings of other researchers. The discussion of results ends with an identification of the limitations of the study and directions for future research. Chapter 11 summarises the main conclusions of the study and their implications to management practice and academic research. More specifically, the implications of the study are given to assist management during the formulation of marketing strategies for shampoo and toothpaste in the Philippines. In addition, the last chapter discusses the methodological contributions of the study to academic research. This would benefit future researchers undertaking brand choice behaviour studies that consider the context of less developed countries.

PART II

LITERATURE REVIEW

CHAPTER 2
A REVIEW OF MATHEMATICAL BRAND CHOICE MODELS

2.1 Introduction

Brand choice models represent how an individual consumer integrates information to select a brand from a set of competing brands. Since brand choice models facilitate an understanding of how a consumer evaluates available information to make a choice among several brands, they can serve as valuable inputs to the formulation of new marketing strategies. The dynamic nature of consumers' needs and wants and its implications for brand choice requires that these brand choice studies should be conducted continuously or periodically. Consequently, these changes provide challenges that motivate researchers to better capture the brand choice behaviour in their models.

This chapter reviews recent developments in mathematical modelling of brand choice behaviour. Brand choice models are developed with a variety of logic structures, assumptions and purposes. Hence, the data requirements of the models vary in terms of the quality and quantity of the responses from the consumers. Three broad categories of mathematical models are: (i) multi-dimensional scaling models, (ii) conjoint analyses, and (iii) multi-attribute choice models. The next three sections of the chapter discuss the underlying structure and properties, estimation procedures, and some applications of these models. The final section summarises the major points and identifies directions for future research.

2.2 Multidimensional Scaling Models

Multidimensional scaling (MDS), also called perceptual mapping, generates a spatial representation of consumers and products/brands by transforming consumer judgments of similarity or preference into distances represented in multidimensional space. MDS can be a powerful tool for visually representing interrelationships among products from consumers' perceptions of product features. MDS uses a method of paired comparisons that involves presenting a consumer with two brands at a time. This procedure, however, is appropriate only when it is not feasible to make continuous measurements of the utilities of a set of products. Theorists develop the probabilistic preference choice mapping models to accommodate the inconsistency in consumers' judgments.

In their review, Carrol and Green (1997) traced the development of MDS in the early 1960s to the more recent applications in marketing. On the other hand, Green and Krieger (1989) focused their survey on advances made in modelling optimal product positioning and buyer segmentation. A third review identifies two general classes of the MDS models used to represent preference or choice: vector and unfolding models (DeSarbo, De Soete, and Jedidi 1989).

Various model specifications and reparameterization options can provide further flexibility in investigating determinants of both individual consumer differences (e.g. demographic information) and product differences. An internal analysis can be performed, where the researcher estimates both brand points and vectors/ideal points. On the other hand, in an external analysis, the researcher can fix one or more sets of coordinates throughout the analysis. This external type of preference MDS analysis is generally referred to as conjoint analysis.

Despite the availability of the MDS procedure for at least four decades, Carrol and Green (1997) observed that most computer programs[4] have been around since the mid-1970s, and that there are no commercially available computer packages that can handle three-way unfolding, stochastic MDS, nonsymmetric mapping, or hybrid (MDS/discrete) models. They noted the potential of MDS as a predictive method in marketing research. Thus, they envisioned an ambitious research program to devise a user-friendly computer program to advance MDS, not only as an exploratory tool, but also as a viable approach for product/service design and consumer response prediction.

When paired comparison data are collected, the MDS models are useful in measuring latent, unobservable constructs such as utility, similarity, risk, intention/attitude, etc. However, their applications are still limited because of the

---

[4] Computer programs include KYST, MDPREF, PREFMAP, INDSCAL or SINDSCAL, ALSCAL and MULTISCALE. SPSS and SAS provide versions of ALSCAL (Carroll and Green, 1997, p. 198).

practical problem that the number of paired comparisons increases geometrically, rather than linearly as the number of brands increases. In addition, the interpretation of perceptual dimensions requires a great degree of researcher subjectivity, making this process an art rather than a science. Thus, the MDS models are not appropriate to study brand choice behaviour when there are a large number of brands.

2.3 Conjoint Analyses

The second category of brand choice models uses an approach developed in the early 1970s, known as conjoint analysis. It is based on a simple premise that consumers evaluate the value or utility of a product by combining the separate amounts of utility (part-worth) provided by each attribute or factor. Thus, given a set of alternatives that are prespecified in terms of levels of attributes, the structure of consumer preferences can be estimated (Green and Srinivasan 1978, 1990). The general form of the conjoint model is

$$\text{(2.3.1)} \quad \text{Total Worth for Product}_{ij\ldots n} = \text{Part-worth of level}_i \text{ for factor}_1 + \text{Part-worth of level}_j \text{ for factor}_2 + \ldots + \text{Part-worth of level}_n \text{ for factor}_m$$

where the product has m attribute factors, each having two or more levels. Hence, the product has level_i of factor_1, level_j of factor_2, ... up to level_n of factor_m.

Conjoint analysis is widely used in the marketing research industry. In the United States, Wittink and Cattin (1989) estimated that about 400 commercial applications per year were carried out during 1981-1985. They showed that most conjoint applications investigate consumer goods (59%), industrial goods (18%), financial services (9%), and other services (9%). Conjoint analysis was originally intended for evaluation of new products and concepts by predicting consumer reactions to them. The application of conjoint analysis has now expanded into other studies such as competitive analysis, pricing, market segmentation and repositioning.

Conjoint analysis applications increased with the development of standardised microcomputer packages and modified approaches to handle many attributes (Wittink and Cattin 1989). Whilst this would be welcomed by researchers, conjoint analysis can always be misused, when one is unaware of its limitations. First, the standard full-profile and trade-off[5] conjoint methods only work well when there are six or fewer attributes (Green and Srinivasan 1990). Beyond this number, respondents resort to simplifying tactics because of severe information overload. Since the part-worth estimates may not reflect the true respondent preference structures, reliability of the results may be affected (Wright 1975). Second, the conjoint experiment results are only exploratory, since many are directly attributable to basic assumptions made during the design and execution of the study. In view of these limitations, the conjoint experimental design is not used in the research program.

2.4 Multi-Attribute Choice Models

Multi-attribute choice models belong to the third category of mathematical brand choice behaviour models. These choice models use survey or scanner panel data which are most readily available in marketing. Moreover, they possibly give the lowest information overload on respondents in situations where there are many alternatives to be evaluated on numerous attributes. Consequently, the multi-attribute choice models are now more widely used in marketing applications. They are used in the determination of market structure, demand forecasting, positioning and buyer segmentation, and prediction of consumer choice (Manrai 1995). The multi-attribute choice model is applied in this study because it is the most appropriate mathematical model which can explain the brand choice of toothpaste and shampoo. These products, chosen in this study, are sold in many brands and these brands are well differentiated across several product attributes.

Brand choice models that are available in the marketing literature, usually assume that consumers consider a set of brands in a deterministic framework.[6]

---

[5] The full profile approach requires each respondent to describe each option or stimulus on all attributes while the trade-off method uses two-attributes-at-a-time in trade-off tables (Green and Srinivasan 1990).

[6] Other choice modelling experts consider the consumer behaviour in frequently bought, relatively inexpensive products to be stochastic. They argue that even if the decision process is

This implies that consumers have all the required information about relevant attributes to select a brand. However, this assumption may be invalid when consumers face innovative brands in markets such as in durables like cars, computers, and electrical equipment. When there is uncertainty about the values of characteristics of new brands, it is more appropriate to treat the set of brands in a probabilistic framework.

Schiffman et al. (1997, p. 206) suggested that a consumer uses an abstraction process to reduce a large number of attributes into concepts. For example, the attributes of an automobile such as price, shape, colour, air bags, performance, advertising, etc. may be chunked into few perceptual attribute dimensions like economy, style, reliability, and safety. Then, the consumer uses this reduced set of perceptual attributes to evaluate the competing brands and eventually, forms the preference for a brand. Scaled preference or choice data are used to derive attribute weights at individual or aggregate level. Finally, attribute weights and attribute values are combined to generate the utility values for the various competing brands.

There are two ways of classifying the multi-attribute models according to the nature of the decision process and the principles underlying that decision (Manrai 1995). First, there are models based on the economic principle of utility maximisation building on the von Neumann and Morgenstern model (1947) and its extensions by Hauser (1978). The decision process assumes that all attributes are considered in a simultaneous compensatory[7] structure, where a total utility value of each alternative is assigned. In this process the brand with the highest total utility is selected. The second class of models are based on the psychological principle of feature- or attribute-based sequential elimination. Here a consumer compares the brands on an attribute-by-attribute basis and generally assumes a random or hierarchical sequence in which the attributes are

---

deterministic, the model must include a stochastic element to measure all exogenous variables such as marketing mix variables, consumer experience with product, word-of-mouth communication, etc. For a review of stochastic models, see Wagner and Taudes (1987); more discussion is provided by Massy, Montgomery and Morrison (1970), and Ehrenberg (1972).

[7] A consumer utilises a compensatory decision rule when she or he evaluates each brand in terms of each relevant attribute and selects the brand with the highest weighted score. The rule allows a positive evaluation of a brand on one attribute to balance out a negative evaluation on some other attribute, hence the term compensatory (Schiffman and Kanuk 1994, p. 573).

considered. The first class of multi-attribute brand choice models is discussed next.

2.4.1 Brand-based Processing Models

The objectives of this sub-section are threefold. The underlying structure is first described and then the major assumptions are stated. Finally, the applications of the model are presented.

The formulation of independent random utility maximisation models is as follows (Manrai 1995). Let $S = \{1,2,.....N\}$ be a set of competing brands, with brand i having coordinates $X_i = (x_{i1}, x_{i2}, ... x_{ik})$ in a K-dimensional perceptual attributes space. In a linear compensatory preference model, the utility V_i is given by the weighted additive function of attribute levels.

(2.4.1.1) $$V_i = \beta_1 x_{i1}, + \beta_2 x_{i2} + ...+ \beta_k x_{ik}$$

In matrix form, equation (2.4.1.1) reduces to $V_i = \beta' X_i$, where $\beta' = (\beta_1, \beta_2, ..., \beta_k)$ represents the vector of attribute importance weights, while the V's denote preference scale values or strict utilities, summarising the attractiveness of competing brands. Under a random utility framework, the independent multinomial logit (MNL) model of McFadden (1976) uses the same compensatory model as (2.4.1.1), with additively separable linear form. The model assumes that

(2.4.1.2) $$U_i = \beta_1 V_i + \varepsilon_i \quad \text{and} \quad V_i = \beta' X_i$$

where U_i is the utility used in choice evaluation of preference scale value V_i, plus random error ε_i. In this model structure, the consumer is assumed to select a brand with the highest utility and the errors ε_i are independently distributed with type I extreme value distributions (Weibull distribution). The probability of choosing a brand i from the set S is given by

(2.4.1.3) $$P(\, i/S\,) = \text{Prob}(U_i \geq U_j,\ j \in S \text{ and } j \neq I)$$

for $P(\varepsilon_i \leq \varepsilon) = \exp(-\exp)(-\varepsilon))$. It can be shown that

$$(2.4.1.4) \qquad P(\, i/S\,) = \frac{eVi}{\sum_j eVj} = \frac{e^{\beta X_i}}{\sum_j e^{\beta X_j}}, \quad j \in S.$$

This model given in (2.4.1.4) is estimated by the maximum likelihood estimation (MLE) procedure (McFadden 1973, Maddala 1983).

A major assumption of linear logit models is Luce's (1959) independence of irrelevant alternatives (IIA) property. The IIA assumption states that the relative odds of two alternatives are independent of the attributes, or even a third alternative (Malhotra 1984). This implies that no allowance is made for different degrees of substitution or complementarity among the choice of alternatives. Thus, the IIA models are context independent, i.e. they ignore the effect of similarities among competing brands on the probability of choice.

The independence of irrelevant alternatives assumption has its advantages and disadvantages. The IIA axiom facilitates data processing and computation because it allows analysis of samples of brands from a large set of competing brands. On the other hand, the IIA property implies a uniform pattern of response to changes in attributes of one brand. Green and Srinivasan (1990) claimed that this may not be a realistic assumption in many consumer behaviour contexts. In addition, the IIA property is being challenged on empirical grounds by some psychologists (Tversky 1972).

The IIA restriction on linear logit models should not be regarded as limitations of logit modelling in general (Malhotra 1984). There are procedures developed to test for the IIA assumption. A reasonable indication can be made by evaluating the goodness of model fit of the proposed multinomial logit model. Violations of the IIA property will create systematic errors in predicted choice probabilities as shown by the difference between the observed choice frequencies and the predicted choice frequencies (the residuals). More rigorous tests for IIA have been proposed by Hausman and McFadden (1981), and Horowitz (1981). However, experts disagree on which these tests for IIA assumption is the best.

Malhotra (1984) recommended that the goodness of fit of the estimated model should first be examined. Then, the researcher should compute the test statistic proposed by Hausman and McFadden (1981).

Where the IIA assumption is not valid and may affect the results critically, other logit forms free of this assumption could be employed. One of them is the generalised extreme value (GEV) model, (McFadden 1981), which captures brand interdependence by assuming more substitution among some pairs of brands than others. McFadden (1981) extended the GEV model to the nested multinomial logit (NMNL) model, which can be seen as a nested sequence of multinomial logit models in a preference tree structure. Maddala (1983) and Manrai (1995) discussed the model structure and estimation of the various logit model extensions such as the DOGIT model (Gaundry and Dagenais 1979), generalised extreme value (GEV) model (MacFadden 1981), nested multinomial logit (NMNL) model (MacFadden 1981), and generalised logit (GLM) model (Dalal and Klein 1988).

There are also models free of the IIA assumption which are not based on the logit formulation. These are the multinomial probit (MNP) model of Hausman and Wise (1978), elimination by aspects model of Tversky (1972), and preference tree model of Tversky and Sattath (1979). However, all of these models present complex numerical analysis problems and high computation time, especially for problems of modest size frequently encountered in marketing. The differing views among the experts in the testing for IIA, extends to the specifications of models which are free of this assumption. Therefore, both issues are fertile areas for future research (Malhotra 1984).

Many researchers have studied several logit model applications besides brand choice such as prediction of brand quantity and purchase timing decisions (Chiang 1991, Chintagunta 1993), modelling heterogeneity (Gonul and Srinivasan 1993, Chintagunta 1994), benchmarks for comparing choice models (Kalwani, Meyer, and Ghose 1994), and the role of scale parameter in estimation and comparison of MNL models (Swait and Louviere 1993). The search for more applications and model modifications is another area of much research activity.

Recent logit modelling studies utilise choice-based sampling processes.

Here, series of alternatives are drawn and the characteristics of the decision makers selecting the alternatives are observed. In contrast to a random sample in which the probability of being included is the same for all individuals (an exogenous sampling process), the probability of being included in a choice-based sample depends on which choice the individual made. Malhotra (1984) recommended the use of choice-based sampling when the choice data can be obtained from purchase or point-of-sale surveys including the popular scanner panel data. Furthermore, choice-based sampling is recommended if infrequently chosen alternatives are involved. This overcomes the need for a much larger random sample to provide useful information on the infrequently chosen alternatives. This will also provide substantial potential economy in finding and observing subjects.

2.4.2 Attribute-based Processing Models

The attribute-based processing choice models assume that brands are a collection of measurable aspects/attributes. Moreover, a consumer uses information selectively and sequentially to eliminate brands from the choice set, until only the preferred brand remains. The conceptual basis is the binary choice model (BCM) of Restle (1961). In this model, the probability of choice of brand 1 in a binary set {1, 2} is given by:

(2.4.2.1) $$P(\,1/\{1,2\}) = \frac{M(A_1 \cap \overline{A_2})}{M(A_1 \cap \overline{A_2})+M(\overline{A_1} \cap A_2)},$$

where M is a measure function that transforms features into a scaler, $A1$ and $A2$ are feature sets of brands 1 and 2, and $(A_1 \cap \overline{A_2})$ and $(\overline{A_1} \cap A_2)$ are distinct features of brands 1 and 2 respectively.

Tversky (1972) in his Elimination-By-Aspects (EBA) model generalised the BCM to choice situations with more than two competing brands. At each stage of the EBA choice process, an aspect or feature is chosen with a probability proportional to its weight, with importance given to distinctive aspects possessed by a brand. The EBA model is given by this structure. Let $S = \{1,2,...N\}$ be the set of competing brands and S_1, S_2, S_3 denote nonempty subsets of S. Let $P(1/S_{1,\alpha})$ be the probability of selecting brand 1 from the subset S_1 which share aspect α. Then, let S_1' be a set of *aspects* (unlike S_1 which is a set of *brands*). Let, $1'$ be a set of aspects of brand 1, such that, $1' = \{\alpha,\beta,...\}$ and $u(\alpha)$ be the scale value defining utility or weight of aspect α. EBA is defined by the recursive formula:

$$P(1/S) = \frac{\sum_{\alpha \in 1'} u(\alpha) \cdot P(1/S_1)}{\sum_{\beta \in S_1'} u(\beta)}, \tag{2.4.2.2}$$

where $u(\beta)$ is the utility or weight of feature β which may or may not be possessed by brand 1. Whereas logit-like models require choice probability to be expressed in terms of externally predetermined perceived attribute values of brands, in the EBA model, it is not necessary for the researcher to measure the aspects which are used to eliminate the brands. Unfortunately, the EBA model has not been widely used by marketers in understanding consumer choice because it requires a large number of parameters, up to $(2^N\text{-}3)$ parameters for a choice set containing N brands. In addition, there is no readily available special-purpose parameter software to provide easier computation.

Later, Tversky and Sattah (1979) proposed two procedures, more generally known as preference trees or PRETREE, to address the large numbers of parameters in EBA. The number of parameters to be estimated in the model is reduced to (2N-2) for a set of competing N brands. Here a consumer selects a branch from a tree and eliminates all brands that are excluded from that branch. The same process is applied to each selected branch until only one brand remains.

A limitation of the EBA model is its failure to incorporate continuous variables like price in the analysis. To overcome this problem, Manrai and Sinha (1989) developed the elimination-by-cutoffs (EBC) model. Their model uses ratings on multiple attributes derived from the location of the competing brands in a perceptual map, while still using the EBA framework to generate choice probabilities. Similarly, Gensch and Ghose (1992) proposed another procedure called elimination-by-dimensions (EBD), where factors obtained from factor analysis of attribute ratings, are then matched to a preference tree. The preference tree is based on a brand similarity matrix of the average factor scores.

Among the above attribute-based brand choice models, the PRETREE model has been utilised by several researchers. It has been demonstrated to give virtually the same fits to data as the NMNL model (MacFadden 1981). However, for larger number of explanatory variables, the NMNL model is preferred.

Whilst the attribute-based processing models have been present for more than two decades, their application is not as widespread as the models that use logit formulation. However, these models appear to have intuitive appeal and seem to better capture the consumer decision processes. More efforts are being directed to have an eclectic model of brand choice behaviour, one that puts together the aspects of brand-based and attribute-based processing models.

2.4.3 Two-Stage Brand Choice Models

Recently, more researchers are modelling brand choice behaviour in a two-stage approach, one which combines the models using attribute-based sequential elimination (usually in stage 1) and the models operating under the principle of utility maximisation (typically stage 2). The first stage reduces the number of brands in the full feasible set to the final choice set, also called the consideration set. In the second stage, the consumer selects a single brand from the final choice set.

Gensch (1987) modelled brand choice behaviour using a maximum-likelihood-hierarch model in the first stage and the logit approach in the second stage. He demonstrated that the predictive accuracy of the two-stage model compared favourably to single-stage models. On the other hand, Roberts and Urban (1988) incorporated the effect of uncertainty on preference models using decision analysis framework. Their model captures diffusion effects, because they postulate that a consumer's beliefs about attribute levels and uncertainty, changes with more information about the brand.

Andrews and Srinivasan (1995) used a two-stage model to investigate a dynamic consideration set formation model and a brand-based processing approach. Their model complements the static cost-benefit model of Roberts and Lattin (1991) and does not require direct consumer reports of consideration. The consideration stage of the model uses the independent availability logit (IAL) model. Their two-stage model exhibits improved predictive accuracy over the MNL model as applied to scanner data on catsup and yogurt consumption analysis.

2.5 Summary

The chapter has surveyed the underlying theory, assumptions, and purposes of the various mathematical choice models. It has shown that multidimensional scaling and conjoint analysis have some limitations when there are larger number of alternatives to be evaluated on several attributes. In these situations, multi-attribute choice models provide the lowest information overload on respondents.

Recent research studies focus on the two-stage choice models. Such models assume a different decision processing is carried out at each stage of the choice process. The first stage, that reduces the size of the full feasible set of brands to a smaller consideration set, is often guided by the attribute-based sequential elimination. The second stage of brand-based processing is driven by the principle of utility maximisation. Thus, the two-stage choice models are based on the theoretical aspects from economics, marketing, and psychology. Most of the empirical studies have shown that the predictive accuracy of the two-stage models prove superior to the single-stage models in most situations.

The literature on mathematical brand choice behaviour has seen many developments during the last two decades. However, improvements are required to quantify and mathematically formalise: (i) various situation based simplifying heuristics and (ii) biases such as anchoring, availability and attractiveness (Manrai 1995; Lilien, Kotler, and Moorthy 1992). An example of simplifying heuristic is the work of Keller and Staelin (1989), studying consumer choice under varying conditions of information availability. Furthermore, comparative testing of the various single-stage models and the two-stage models requires specification of boundary conditions to identify a better performing model

(Currim 1982; Swait and Louviere 1993; Kalwani, Meyer, and Morrison 1994). There is also a need to match choice models to market segments because much of the consumer behaviour work assume customer heterogeneity. Gensch (1987) showed that such segmentation can be particularly powerful when it can be done a priori on a population of industrial buyers.

In view of the number of variables and brands to be included in the present study, a multi-attribute choice model is necessary. The next chapter surveys previous brand choice empirical work to provide context to the purpose of the study and to rationalise the chosen methodology.

CHAPTER 3
A SURVEY OF BRAND CHOICE LITERATURE

3.1 Introduction

The aim of this chapter is to survey the empirical literature on brand choice. This survey is undertaken to place the study in context and to compare the purpose of the study with previous work. It also identifies a gap in brand choice literature that the research seeks to answer. To limit the scope of the survey, only a representative sample of brand choice studies utilising conjoint analysis and multidimensional scaling is included. Since multi-attribute choice model is employed in this study, details of multinomial logit studies are greater.

An overview of the data, methodology and major findings of previous work is provided in Section 3.2, followed by tables presenting the details of studies. The important features that emerge from the survey are discussed in Section 3.3. This section also includes a critical evaluation of the data, methodology and findings of these studies. A final section summarises the major points of the review.

3.2 Survey of Brand Choice Empirical Literature

Over the last twenty years, there has been over a hundred published studies on brand choice and commercial applications may number several times more. However, there has been no published surveys of empirical brand choice literature. Whilst Manrai's (1995) review focused on the theoretical aspects of brand choice, this survey attempts to summarise the previous empirical studies employing brand choice models. The survey is not meant to be exhaustive but an effort to describe the state of play in the brand choice literature.

The following survey describes the data and methodology employed in previous work on this area to rationalise the methodological approach chosen in this empirical study. For ease of reference, these studies are summarised in tabular form, with separate columns to identify the study, describe the data and methodology, and summarise the research focus and key findings. The taxonomy of brand choice studies is presented in three groups. The first group of studies in Table 3.2.1 presents evidence on information processing - how consumers acquire and process information prior to brand choice. Studies in Table 3.2.2 utilise conjoint analysis and multidimensional scaling techniques while the remaining studies in Table 3.2.3 concentrate on explaining and predicting brand choice outcomes. The studies are listed in chronological order based on year of publication and within each year the names of the researchers are recorded in alphabetical order.

3.3 Essential Features of Previous Studies

The survey covers 84 empirical studies on brand choice. Of these studies, 23 examine information processing, 8 relate to multidimensional scaling and conjoint analysis, while 53 attempt to explain brand choice. Although the focus of this research is explaining and predicting brand choice, studies on information processing before brand selection are not ignored for a number of reasons. These studies identify promising variables that can be used in building the model. Moreover, hypotheses that become the basis for future brand choice studies can be generated. Finally, almost a third of the brand choice literature focuses on information processing aspects in decision making. Some studies using conjoint analysis and multidimensional scaling are included to complete the picture of previous brand choice work.

There are a number of issues that emerge from the survey of brand choice literature that need to be highlighted. These issues relate to the: (i) country-coverage, (ii) data and methodology, and (iii) findings. These are discussed in the following sub-sections starting with the nature of country coverage.

TABLE 3.2.1

INFORMATION PROCESSING STUDIES

Study	Methodology and Data	Research Focus and Findings
Chaterji (1980)	Pilot study uses unstructured interviews with a convenience sample on unknown brands of 8 different products. Questionnaire measures risk perceptions in 20 different products, using a random sample of married women in Dayton, Ohio.	Investigates the role of reference groups among consumers who are choosing between unknown brands of a product under conditions of inherent perceived risk. Results indicate that consumers perceive risk differently along all elements in a product. In the presence of inherent risk, consumers consider it important to clarify their doubts whenever they perceive risk. Reference groups perform three different functions - informational, utilitarian and value-expressive.
Wahlers (1981)	Experiments on choice of life insurance using six alternative evaluation process strategies. Evaluation task was complicated by varying the numbers of product class choices alternatives and/or product characteristics.	Investigates the effect of the number of product characteristics involved in the evaluation task on consumer's choice of an evaluation process strategy. In making relatively simple comparisons, respondents appear to prefer compensatory additive utility evaluation strategy. As the evaluation task was complicated, subjects displayed an increasing tendency to employ noncompensatory lexicographic evaluation strategy.
Cobb (1983)	Unobtrusive observation of 521 grocery shoppers buying coffee and tissue. Followed by brief in-store interview and completion of mail-in questionnaire. Discriminant Analysis Personality and lifestyle variables: cognitive style, status concern, personal competence, information seeking, venturesomeness, price consciousness and shopping proneness.	Examines consumer decision processes for low involvement products and tests the hypothesis that consumers utilise simplifying decision rules, or choice tactics (situational and enduring) to reduce cognitive strain and minimise time and effort. Results of the study raise serious questions concerning the adequacy of traditional theories of consumer behaviour. Supports findings of previous low involvement research in implying that consumers are not as active, information seeking, evaluative, and goal oriented as they are believed to be for many decision environments.

TABLE 3.2.1 - Continued

Study	Methodology and Data	Research Focus and Findings
Nantel (1985)	Protocol analysis	Investigates some determinants of preference formation strategies Subjects who hold strong and distinctive attitude toward one of the alternatives have simple choice process and very short protocol - an empirical support for affect referral process. When subjects do not hold such attitude, they use more complex preference formation strategies and generate longer protocols. The type of strategy used is found to be significantly mediated by the personality of the subject (low or high self-monitor) and the degree to which his/her product usage is conspicuous.
Biehal and Chakravarti (1986)	Experiments where subjects make brand choice under varying conditions of information accessibility. Protocol analysis.	When subjects made choices based on memory, they used more and varied information processing operations. Memory accessibility tends to influence brand choice.
Assar (1987)	Experiment on choice of single lens reflex (SLR) camera. Manipulates high and low product knowledge in terms of inter-attribute correlation, time pressure and task involvement.	Examines impact of consumer product class knowledge on information search and evaluation. Subjects lacking attribute range knowledge avoided extreme evaluations, search by attribute and had lower confidence in evaluations. Proposes a taxonomy of consumer product class knowledge to contain 1) terminology 2) brand-attribute values, 3) attribute range knowledge 4) inter-attribute correlations 5) summary brand evaluation 6) summary attribute importance 7) usage situation
Rosen and Olshavsky (1987)	Experiment on 67 student-subjects choosing a high- and low-risk product.	Examines dual influence of reference groups as information sources during purchase decisions. 42.2% of subjects emphasise brand recommendation, rather than attribute-value information. The degree of reliance on recommendation information increased with time cost and with choice of higher risk product.

TABLE 3.2.1 - Continued

Study	Methodology and Data	Research Focus and Findings
Swanson (1987)	Experiment on children, familiar and unfamiliar products	Examines how familiarity influences children's product choices. Younger children appear to rely on direct experience as salient attribute in product choice than older children. A greater number of trials offered prior to ultimate choice tends to increase the probability of the child choosing a previously unfamiliar product. Older children have greater familiarity levels with the product classes and brands.
Costley (1988)	experiments using ads that convey information	Investigates influence of memory and selective information use in brand choice. Hypothesised factors are stimulus modality, cue modality and cue content. Modality cue did not significantly influence recall. Content of an ad cue influenced the content of recall from an earlier ad by inhibiting access to uncued information. Respondents did not use all recalled information for brand evaluations. Information selection takes place in two stages: some information may be lost at recall, some ignored at choice. The first stage is influenced by memory processes while the second stage may be influenced by the decision task.
Johnson, Meyer and Ghose (1989)	Three stages: 1) Use 4 choice heuristics: elimination by aspects (EBA), lexicographic, conjunctive (satisficing), phased EBA/compensatory rule; applied to 100 choice sets created by Pascal simulation 2) Process tracing experiment, 12 subjects making 24 choices, four per cell in a factorial design 3) Experiment on 77 students about hypothetical apartment alternatives in groups of 10 to 15 (revealed preference analysis)	Findings: (i) Negative correlation between attributes diminishes the performance of compensatory model. Including interactions in compensatory model has beneficial effects under negatively correlated setting (ii) A slight increase in concentration of search as N increases. Strategy changes may occur in response to changes in intercorrelational structure, but the magnitude of the changes maybe small in relation to that associated with the changes in number of alternatives and (iii) Supports the simulation study - degrading effects of a change in correlational structure was substantial.

TABLE 3.2.1 - Continued

Study	Methodology and Data	Research Focus and Findings
Rhi-Perez (1989)	Questionnaire in personal interviews about laundry detergent, margarine and soap. Mexican and US subjects: 101 Mexicans. 140 Mexican-Americans, 92 Anglos	A cross cultural study that examines the relationship between ethnicity and attitudes towards advertising, brand loyalty and brand choice strategies. Attitudes toward advertising, parental influence, buying prestigious brands are not significantly related to ethnicity. Price consciousness and brand loyalty are the only two consumer traits related to ethnicity. Mexican-Americans are adopting those consumer patterns associated with the Anglo consumers.
Hoyer and Brown (1990)	Choice experiments on 173 freshman college students with little experience in purchasing peanut butter. Independent variables: Awareness, Quality Dependent Variables: Choice tactics, Number of brands sampled. Choice of quality brand	Brand awareness influences choice and brand sampling especially among consumers facing new decision task. Subjects with no brand awareness tend to try more brands and select the high-quality brand on the final choice more often than those with brand awareness. Suggests that advertising is a viable strategy to increase brand choice probabilities.
Nedungadi (1990)	Two experiments on undergraduate business students manipulate determinants of brand accessibility and measure consequent effects on retrieval, consideration, choice, and evaluation.	Examines whether changes in brand accessibility affects consideration of a brand using memory-based situations. External cues influences brand consideration and evaluation and brand choice probabilities depend on the brand's link to any cues in accessing brands. Results support influence of memory during brand choice process.
John and Lakshmi-Ratan (1992)	Experiment on 210 children, ages 4-12 years. Children allocate coins to their choices. Mixed factor design, four age groups by three choice sets.	Supports existence of age differentials in children's choice behaviour when children are faced with introduction of new alternatives. Younger children are more vulnerable to introduction of new alternatives.

TABLE 3.2.1 - Continued

Study	Methodology and Data	Research Focus and Findings
Mathur (1992)	3 Approaches: experiment, survey instrument, and scanner panel data analysis	Results reveal that consumers primarily use a combination of compensatory and non-compensatory choice strategies, and pure compensatory models may not adequately represent consumers' choice processes. The choice set size and type of product decision influence the choice strategy.
Choi (1993)	MNL using computer-aided simulated shopping experiment	Investigates external search effort in brand/store choice behaviour of consumers with incomplete information about a durable product market.
Tidwell (1993)	250 psychology students respond to survey questionnaire.	Results indicate that consumers believe they use non-compensatory choice strategies more often than compensatory choice strategies for both high and low involvement products. This supports Engel's model but contradicts Howard's.
Grewal and Baker (1994)	297 undergraduate students view videotapes and then answer questionnaire. 2 x 2 x 2 between subjects factorial design. Using high and low levels of ambient, social and design.	Examines whether specific factors in store environment influence consumers' price acceptability and purchase intentions. Findings: (i) High ambient factor led to higher subjects' price acceptability, but not significant on low design-condition (ii) High-social store environment produced higher price acceptability. (iii) Effect of high design factor on price acceptability is significant, but not for low design factor.
Boyle (1994)	Experimental design	Examines constructive choice processes of two groups (more and less knowledgeable) on choice of all-terrain bicycles and video camcorders. More knowledgeable decision makers engaged in planned and opportunistic behaviour to improve quality of decisions. Less knowledgeable decision makers relied on opportunism to reduce effort.

TABLE 3.2.1 - Continued

Study	Methodology and Data	Research Focus and Findings
Hite and Hite (1995)	Experiments on young children using advertised name brands and lesser-known brands.	Examines preference formation and choice processes of children, including the influence of parents and advertising. Results indicate that even young children rely on non-functional perceptual brand attributes when choosing brands, even when prompted to consider functional attributes. Children as young as 2 years old exhibit brand reliance which was influenced by parental brand loyalty and reinforced by television advertising.
Eaton (1996)	Experiments with female subjects viewing newscasts interspersed with commercials Five psychological variables - product knowledge, cognitive response, attribute evaluation and importance, object-related evaluations and emotions, and commercial execution.	Examines effects of five psychological variables on brand choice. Increasing frequency increases product knowledge, but decreases brand choice. As product knowledge deteriorated, positive affect emerged. Awareness of competing brands negatively contributed to brand choice
Keillor, Parker and Schaefer (1996)	360 adolescents (178 Mexican and 182 American) Questionnaire survey administered in a classroom style setting; Use of parallel- and back translation of questionnaire in Spanish.	A cross cultural study that examines information sources used in forming brand preferences of adolescents. Mexicans are receptive to outside information sources in forming brand preferences at various involvement levels. Mexican youths rely more on parents, place more importance to promotional elements, and have positive attitude towards salespeople than Americans do. Influence of siblings in forming brand preference is relatively high in both cultures.

TABLE 3.2.1 - Continued

Study	Methodology and Data	Research Focus and Findings
Shiv (1996)	Six experiments. Manipulation: varying the extent of processing and by providing an external tactics-related cue.	Examines the framing effects of advertisement claims on brand attitude and choice; also evaluates the effectiveness of different advertising responses to negatively framed 'attack' advertisement. Findings: Negative framing is more effective than positive framing when processing is less extensive and when no external tactics-related cues are present. A positive advertising response to a negatively framed "attack" ad is more effective than a negative "counterattack" response, particularly when the response highlights the tactics used by the attacker.

TABLE 3.2.2

CONJOINT ANALYSIS AND MULTIDIMENSIONAL SCALING STUDIES

Study	Methodology and Data	Research Focus and Findings
Kaas (1977)	100 German consumers provide paired comparisons data for 7 shampoo brands and 3 prices.	Study compares the factorial model, probabilistic ideal point model, and vector models to evaluate perceived similarities between choice objects.
Mahajan, Green, and Goldberg (1982)	420 respondents classified by the last brand purchased (4 brands) are interviewed about 16 pricing conditions of a consumer nondurable good.	Approach uses conjoint analysis to measure self- and cross-price demand relationships. Suggested model can examine the change in market share of a particular brand as a result of a marginal change in own price or prices of other brands.
Cattin, Gelfand and Danes (1983)	43 students evaluate 16 sets of typewriters on 6 attributes at 2 levels each. Attributes: automatic carriage return, warranty period, tabulator, platen release key, character size, and price.	Proposed Bayesian procedure combines self-explicated data with conjoint data for estimating conjoint model. Pilot empirical results show improvement over the estimation and prediction of Ordinary Least Squares (OLS).
Shugan (1987)	DEFENDER model applied to 22 weeks of scanner panel data at 26 stores of a major Chicago supermarket in 1983; for three product categories (toothpaste, mouthwash, and dishwashing liquid)	Estimation procedures uses least squares regression analysis to generate perceptual maps from observed choice behaviour. The brand's position is inferred from changes in the brand market shares and price changes.
Zufryden (1988)	Conjoint experimental data from 300 paper-napkin consumers using 18 test concepts and physical stimuli.	Proposed model links conjoint analysis and stochastic models of purchase response behaviour and useful in evaluating new product concepts in terms of trial and repeat purchase.

TABLE 3.2.2 - Continued.

Study	Methodology and Data	Research Focus and Findings
Eliashberg and Manrai (1992)	103 undergraduate business students respond to questionnaire about the importance of 20 cigarette attributes. Second study utilises 108 students accepting or rejecting 19 positioning alternatives of a hypothetical new "smokeless" cigarette.	Research focuses on identifying specific locations for a new product concept in perceptual product-attribute space. Analytical precision becomes difficult when three or more segments are involved.
Elrod, Louviere, and Davey (1992)	115 students-evaluations of rental apartments. Variables: Bedrooms, distance, safety, rent	Ratings-based and choice-based conjoint models are comparable in terms of predicting shares in a holdout choice task. Choice between two approaches depends more in intended use. Choice-based models use aggregate data and produce share predictions for new brands while ratings-based models are appropriate to segmentation studies.
Huber, et al. (1993)	400 respondents from 11 cities in a computer-aided experiment in choosing a refrigerator on 5 or 9 attributes at various levels.	In tests several preference elicitation methods (full-profile, adaptive conjoint analysis (ACA), ACA's self-explicated prior), hybrid models combining information from different elicitation tasks outperform models based on one task. Each elicitation technique taps a different aspect of the choice process during a validation task.

TABLE 3.2.3

BRAND CHOICE MODELLING EMPIRICAL STUDIES

Study	Methodology and Data	Research Focus and Findings
Duffus (1979)	284 female heads of households in Kingston. Jamaica; for 8 product categories, 4 imported products plus one domestic product. Factor analysis, discriminant analysis and regression analyses and contingency table analyses.	Determines effectiveness of "country of origin" of a product as a basis for consumer preference. Groups of individual exist within community which exhibit varying level of national intensity. Identified four dimensions of nationalism - societal image; citizenship and belonging; a people image; and sense of duty and commitment to nation. Prediction rate of attitude model varies from 32.7 to 36.7 % compared to 20% expected due to chance. Suggests the plausibility for using nationalism as basis for international market segmentation.
Gencsh and Svestka (1979)	Transportation data for Santa Monica. California. Questionnaire survey, n=1000, selected 650; estimation sample = 400; holdout sample = 250	Propose a hierarchical noncompensatory model (HIARC) from individual choice data. Comparable prediction rate results: Logit 88/250; HIARC 79/250. Different diagnostic information, so models are complementary and should be used jointly. Individuals appear less discriminating when considering their lower ranked attributes. Thus, eliminating lower ranked attributes in the model increases its predictive ability.
Moller (1979)	411 consumers' evaluation of 4 colour TV brands and 4 toothpaste brands. Multitrait-multimethod matrix, regression analysis, rank correlation and canonical correlation methods. Variables: consumers' brand familiarity, product evaluation ability, choice uncertainty, risk taking style, cognitive style, venturesomeness, general self-confidence, and information processing confidence.	Develops and tests a multi-attribute choice model that accounts for the uncertainty that consumers perceive in a choice situation. Mean interindividual correlation sets for TV and toothpaste were 0.64 and 0.65. At individual level testing, the mean Spearman rank order correlations for TV and toothpaste were 0.76 and 0.76. Models explained equally well consumer preferences towards different products.

TABLE 3.2.3 - Continued.

Study	Methodology and Data	Research Focus and Findings
Chapman and Staelin (1982)	320 Monte Carlo experiments on artificially generated data. Model then applied to college choice behaviour survey data on freshman applicants of Carnegie-Mellon. 11 Variables: 6 college characteristics; 3 price, cost, financial aid; 2 miscellaneous groups	Estimates stochastic utility logit model using preference rank orderings of choice set alternatives. Suggests an explosion process to cope with "noisy" and possibly unreliable rank order information. Monte Carlo results show that explosion depth larger than 3 are normally not required in survey research application since beyond this number leads to noisy choice sets. Suggest that in survey research, rank order only three and ask for other alternatives considered to reduce burden on respondents.
Currim (1982)	Interviewer administered questionnaire over 608 households on choice of transport mode. Logit modelling	Compares predictive accuracy of consumer choice models not subject to IIA property. Using aggregate data, models without IIA property outpredict those with IIA. Diagnostics achieved and corresponding managerial priorities the models are different.
Bawa (1984)	Soft drinks purchase data obtained from split-cable television panel of consumers	Proposes a probabilistic model of choice that incorporates inertia effects, and variety-seeking tendencies on brand choice behaviour. Also examines relationship between consumers' demographic descriptors and their inertia- and variety-seeking tendencies. Increased advertising for some brands had a significant impact on variety-seeking tendencies.
Bayer (1985)	Metered household cabled panel data provide information linking advertising exposures to longitudinal purchase data. Experiment by manipulation of media exposures in households. Choice variables: past behaviour, level of effective advertising, the impact of different ads, ad/brand misattribution, and relative price changes.	A new model is developed and tested to improve advertising effectiveness. Past purchasing behaviour has the greatest effect on future behaviour. Advertising effects were small but positive. Both the amount of advertising and the ad impact of the commercial contributed to advertising effectiveness. In some ad campaigns, there tends to be levels of ad/brand misattribution which can weaken a brand's overall advertising effectiveness.

TABLE 3.2.3 - Continued.

Study	Methodology and Data	Research Focus and Findings
Jain (1986)	Empirical analysis on instant coffee market followed by a simulation study.	Examines the implications of aggregating the purchasing behaviour of individuals in a household. Determines brand competition within a well defined product class and infers market structure from brand switching data. The household brand choice process approaches a zero-order process as the number of individuals in the household increases.
Landwehr (1986)	Pooling technique and the conditional logit model using panel data.	Develops and tests a 2-stage brand choice model. First stage represents the choice process between variety seeking and habitual choice behaviour while second stage represents the brand choice. In the first stage, a change in store, past promotional purchase, and past choices, household characteristics influence current choice. In the second stage, store promotion, manufacturer's promotion, price, and household characteristics influence choice.
Winer (1986)	Universal Product Code (UPC) scanner data (coffee) for 222 households over a 429-day period.	Tests a model that includes reference price formation among consumers. Brand choice results are affected strongly by discrepancies between expected and observed prices. Implies that marketers may suffer from holding frequent short-term price deals as consumers make forecasting errors about prices.
Gencsh (1987)	Electrical equipment survey, pretest (n=98) main questionnaire (n=182)	Develops a two-stage disaggregate attribute choice model with stage 1 using hierarchical - attribute processing and stage 2 using MNL. The 2-stage model predicts better than standard MNL.

TABLE 3.2.3 - Continued.

Study	Methodology and Data	Research Focus and Findings
Anwar (1988)	835 self-administered questionnaires. to be returned by mail in San Diego.	Investigate consumer preference of national and generic brand grocery products. National brands are preferred in terms of product quality, quality consistency. and quality variation. Significant correlations found between education and purchaser's willingness to try new national brands; and between information sources and information available on the package. Consumers preferred brand availability over low prices. Consumers who considered low prices most important reported higher percentage of generic product purchases, used more discount coupons in each shopping trip. and most often compared prices of national brands.
Krisnamuthi and Raj (1988)	ADTEL diary panel. 375 families. 7000 purchases, 3 brands Using Multinomial logit analysis	Investigates price sensitivity in brand choice and purchase quantity decisions jointly. Competitive prices affect only choice of brand and not the purchase quantity. The decisions are interdependent but decision making process is different for each consumer.
Gupta (1988)	Information Resources Inc. (IRI) scanner panel data for regular ground coffee. Uses a recursive system of an Erlang-2 interpurchase time model, MNL brand choice model, and a cumulative model of purchase quantity.	Proposes an integrated model of interpurchase time, brand choice and purchase quantity. Investigates how marketing mix variables like price and promotion affect brand sales volume using a disaggregate approach. More than 84% of the sales increase due to promotion comes from brand switching. Purchase acceleration in time accounts for 14% of sales increase, whereas stockpiling due to promotion is a negligible phenomenon accounting for less than 3%. Model allows prediction of brand sales volume in a given time period.

TABLE 3.2.3 - Continued.

Study	Methodology and Data	Research Focus and Findings
Higgins (1989)	Scanner panel data on toilet tissue, 450 households; MNL models	Evaluates aggregation effects in conditional logit estimation of brand choice. Aggregated individual models fit the data better than homogeneous-in-parameters model. In explaining lack of model fit, the common approach of focusing on model specification errors without regard to aggregation errors may lead to erroneous conclusions as to the source of error.
Kanetkar (1989)	Panel data for frequently purchased products, dry dog and aluminium foil.	Examines effect of number of TV ad exposures on household price sensitivity. Develops a new measure of brand loyalty that is sensitive to temporal pattern of household's previous brand purchases. Increased TV advertising is associated with higher price sensitivity. Confirms the robust nature of Guadagni and Little (1983) model that both advertising and promotional variables have significant impact on brand choice.
Lattin and Bucklin (1989)	IRI scanner panel data (ground coffee) over 75 weeks. 1000 cases from 6 stores in Pittsfield Massachusetts.	Investigates reference effects of price and promotion on brand choice behaviour. Results support notion that consumers form expectations from exposure to promotional activity and these expectations influence brand choice.
Winter and Rossiter (1989)	Panel data from Consumer Panel of Australia	Propose a Pattern Matching Stochastic (PMS) model that assumes consumers use a mental pattern in deciding when to repeat purchase and when to switch to another brand. Consumers are shown to oscillate between repeating and selecting in a simple zero-order stochastic manner.

TABLE 3.2.3 - Continued.

Study	Methodology and Data	Research Focus and Findings
Delener (1990)	349 affluent Catholic and Jewish households who purchased new automobile or microwave oven; questionnaire survey.	Examines the effect of religion in explaining consumer behaviour. Results show that Catholics are more sensitive to potential negative consequences of their purchase decisions like poor functioning. Suggest the need to reduce ambiguity in the brand choice decision by providing courteous assistance during product selection of durables.
Koslow (1990)	Consumer panel data.	Applies measurement generalisability theory to identify sources of error in panel data. Measurement dependency, is one large, non-linear, and biasing source of error, which is removed by conditional bootstrapping transformation. Size of this error is several times larger than well known effects like consumer heterogeneity. Removing this error leads to improved measures of unobserved latent constructs like variety-seeking and brand loyalty.
Bucklin and Srinivasan (1991)	Survey-computer-aided telephone interview (1987) Ground coffee, 275 households for Williamsport, PA.	Develops preference-structure measurement (PSM) approach to determine brand cross-price elasticities and switching matrices. Overall preference linearly related to price but neglects price promotions and variety-seeking effects. Households' behaviour models have high prediction rates.
Krisnamuthi and Raj (1991)	ADTEL diary panel data from Burke Marketing Research and IRI scanner data (caffeinated ground coffee) Using Multinomial logit analysis	Investigates the relationship between brand loyalty and price elasticity in brand choice and purchase quantity decisions. Results show that loyals are less price sensitive than nonloyals in the choice decision but more price sensitive in the quantity decision.

TABLE 3.2.3 - Continued.

Study	Methodology and Data	Research Focus and Findings
Lane (1991)	Survey of consumers across 40 product categories	Identifies causal variables of brand loyalty to derive a choice model that explains the differences in the degrees of brand loyalty across product categories. Degree of brand loyalty is a function of household risk aversion, relative quality differences between brands and absolute price differences between brands. Brand loyalty is a significant explanatory variable in entry barrier-performance relationship. This finding supports the first mover advantage hypothesis as a consequence of brand loyalty, being primarily a function of risk aversion.
Roberts and Lattin (1991)	Stages 1 consideration - MNL Stage 2 - MNL survey of 121 households in Sydney, ready-to-eat cereal market	Develops a model of consideration set composition. The 2-stage model improves forecasting of aggregate choice behaviour. Study has implications to (i) explaining consideration set membership (ii) predicting consideration of new product concepts and (iii) predicting market-level purchase behaviour.
Chintagunta (1992)	AC Nielsen scanner panel data (catsup) in Springfield, Mo. Estimation sample, 1,987; Validation sample, 1,093 Probit and Logit modelling. Variables: Feature, display. price	Investigates effects marketing variables on household brand choice in a model free of IIA restriction using method of simulated moments probit model. Logit and probit models are not comparable. Own elasticities of probit are smaller than heterogeneous logit. Asymmetric nature of price competition among the 6 brands. Holdout validation, Probit 79%, Logit 71% of choices. Similarity matrix from probit models can be used for other data analysis techniques like MDS.

TABLE 3.2.3 Continued.

Study	Methodology and Data	Research Focus and Findings
Hariharan (1992)	Disaggregate single source household scanner data	Proposes a purer measure of brand loyalty in a better fitting model with superior forecasting abilities. No short term advertising effects and confirms strong positive short term effects of promotions. Little support for any long term advertising or promotions. Brand switchers are likely to be more price and deal sensitive.
Putler (1992)	Weekly per capita demand for eggs in Southern California, 1981-1983	Incorporates reference price formation effects into traditional economic theory of choice. Reference price formation influences demand for eggs. Consumer response for egg price increases is 2.5 times higher than egg price decreases (own price elasticity). Empirical support for loss aversion - asymmetric behaviour.
Ramaswami (1992)	Random telephone survey for six product categories; and scanner panel data on 3 products	Proposes price inertia, the consumers' tendency to restrict purchases to brands in the same price range, as a unifying construct on reference prices and market structure defined by price tiers. A majority of consumers had upper bounds on the acceptability of prices for frequently purchased categories. Price inertia is a significant influence on brand choice of three products. Price, promotion and consideration set membership are the strongest and most consistent predictors of brand choice.
Agarwal (1993)	Student sample (sneakers) Mall intercepts (insurance) in 6 different US cities. Proposed model compared with regression and nested logit	Tests a conceptual framework to explain the differential role of affect and its interaction with belief-based dimensional attitude in influencing brand choice. Results support hypothesis that in any consumer choice context both dimensional (intrinsic attributes) and holistic processing (affect, mood, or emotions/feelings) co-occur in varying intensities.

TABLE 3.2.3 - Continued.

Study	Methodology and Data	Research Focus and Findings
Chintagunta (1993)	AC Nielsen scanner panel data (yogurt) . 3 years. in Springfield. Mo. Estimation sample, 5,976 Validation sample. 6,780 Var: feature ads. price, inventory, brand loyalty	Develops utility maximising framework to study impact of marketing variables on category purchase, brand choice and purchase quantity decisions of households for frequently purchased goods. Results support variation of reservation prices and intrinsic brand preference across households. Larger unconditional brand choice elasticities than conditional ones. Estimated parameters maybe biased if unobserved heterogeneity across households is not included. Proposed model outperforms the nested logit model.
Divakar (1993)	Simulated study on panel data using new methodology Simulation maximum likelihood method	Measures brand loyalty with structural state dependence models. Failure to account for issues of heterogeneity and initial conditions results in overstatement of the brand loyalty coefficient. Demonstrates the superiority of Dirichlet-multinomial measure of brand loyalty.
Fader and Lattin (1993)	Scanner panel data	Tests a new measure of brand loyalty based on Dirichlet multinomial choice model that handles heterogeneity and nonstationarity distinctly. Proposed model provides better fit than other existing models.
Gonul and Srinivasan (1993)	AC Nielsen scanner data (disposable diapers). 52-week period. 152 households, 2,675 purchases. Augmented logit model with brand loyalty specification.	Provides framework to calculate sources of heterogeneity in MNL brand choice models. Strong support for heterogeneity that includes brand loyalty in households. Thus, need to control for heterogeneity in logit models so that influences of marketing variables are not under-estimated.
Horowitz and Louviere (1993)	1000 Monte Carlo experiments	Proposes new test for comparing predicted and observed choices in MNL in two populations. New test avoids loss of power due to aggregation but does not indicate whether model is useful.

TABLE 3.2.3 - Continued.

Study	Methodology and Data	Research Focus and Findings
Swait and Louviere (1993)	MNL scale factor estimation applied to bicycle trail user's perception and trail choice behaviour in Chicago. Tasks: (i) trail consideration -4 blocks (ii) trail choice - between 2 trails	Proposes a scaling test to make MNL parameter comparisons between different datasets. Good approach for comparing small number of data sets but need more efficient and practical procedure for comparison like general purpose FIML estimation procedure.
Chintagunta (1994)	AC Nielsen household level scanner data (liquid detergents) in Sioux Falls, South Dakota. 519 households, 1,689 choice observations.	Discusses heterogeneous logit model in the generation of product maps (product positioning). Proposes an easier estimation to account for heterogeneity. Results reveal that proposed model has better fit to the data than unrestricted mixture-of-logit model or the Choice Map methodology.
Kalwani (1994)	Scanner panel data (regular ground coffee). 216 households, 65 weeks, 5,229 purchases. Simulation	Proposes fairer benchmarks (parametric and non-parametric) to compare discrete choice models. Dirichlet model (DM) provides fair benchmarks, and also recognises heterogeneity.
Kumar (1994)	AC Nielsen scanner panel data on laundry detergents. Variables: consumers' price expectations, brand loyalty, brand switching and stock piling.	Proposes a theoretical model of brand and purchase quantity choice behaviour in an intertemporal setting. Identifies normative explanations of unexplained empirical results, such as why brand loyal customers tend to stockpile more.
Jain, Vilcassim, and Chintagunta (1994)	Scanner panel data, uses a random-coefficients logit model	Tests a model that allows for unobserved heterogeneity in brand preferences. Results reveal that there is a significant unobserved heterogeneity across households and ignoring its effects results in downward bias in parameter estimates of marketing variables and differences in marketing implications.

TABLE 3.2.3 - Continued.

Study	Methodology and Data	Research Focus and Findings
Rajendran and Tellis (1994)	IRI scanner panel data (saltines). 2-year period, in 3 cities. Multinomial logit analysis.	Test the hypothesis that consumers use reference prices based on context (other prices in the store) and past prices. Results show that within context, the lowest prices seems to be an important cue for reference price, whereas within time, the brand's own past price seems to be an important cue.
Abe (1995)	Application of nonparametric density estimation (NDE) method on store and panel data on 3 fruit drink brands from 143 panelists for 111 weeks. NDE was compared to MNL.	Paper demonstrates feasibility of non-parametric density estimation (NDE) by establishing operating characteristics of NDE with reference to MNL. NDE shows promise because it does not require the applying various specifications tests required by parametric assumptions. Proposes semiparametric utility residual method (URM) found to be useful in identifying influential points, outliers and heterogenous segments. Model combines category purchase incidence and Poisson advertising with NDE.
Andrews and Srinivasan (1995)	IRI scanner panel data for ketchup purchases and AC Nielsen data set for yogurt purchases. Variables: store feature advertising, TV ad, aisle display, and price	Estimates an individual-level 2-stage probabilistic choice model (an extension of Robert and Lattin 1991). First to model consideration, probabilistically without direct consumer results. Developed model not subject to IIA assumption and has better fit than standard MNL model on the data sets.
Bucklin, Gupta and Han (1995)	Ground coffee scanner panel data, 376 households, 84-week period for Pittsfield, MA. MNL and probabilistic mixture models integrated with cluster analysis. Variables: Brand loyalty, last brand purchased, price, promotion	Develops a brand choice model, determines brand-level segments by cluster analysis and evaluates price response in choice behaviour. Procedure can assist brand managers in identifying opportunities and assessing whether competitors share them.

TABLE 3.2.3 - Continued.

Study	Methodology and Data	Research Focus and Findings
Elrod and Keane (1995)	Panel data (detergent) New method for estimating probit models	Analyses market structure of panel choice data using probit models. Result outperforms Choice Map, SCULPTURE, and Chintagunta's latent class model in terms of goodness-of-fit, predictive validity, and face validity.
Fish (1995)	Replicated Guadagni and Little (1983) model using scanner panel coffee data and MNL Uses three neural network algorithms: backpropagation, logicon projection, and generic adaptive neural network training (GANNT).	Compares artificial neural networks (artificial intelligence computing) and multinomial logit for the estimation of discrete choice. Neural networked trained with backpropagation was slightly more accurate than MNL in forecasting brand share. Neural networks do not suffer as severe an extrapolation penalty as logistic regression.
Park (1995)	AC Nielsen panel scanner data (spaghetti): Household brand-size conditional logit choice models (six brand-size and not-purchase) and nested MNL (buy- not buy; which brand, which size)	Household loyalty and inventory level are important factors in deciding which size. Household income and size fail to explain brand size behaviour. Marginal effects of price cuts are same as price but in opposite direction - implies that household treat promotions as a kind of price reduction. Own price elasticities are elastic.
Rust and Donthu (1995)	Simulation - estimate logit model then infer the geographically localised misspecification error using two hypothetical store chains. Then, empirically tested on 4 national grocery chains - 123 households	Test the hypothesis that misspecification of retail choice models can be geographically localised. Propose an approach that combines nonparametric density estimation with logit choice models. Incorporating geographic component greatly improves model and its predictive accuracy.
Carrol (1996)	Pharmacy prescription records	Investigates factors influencing the consumer choice for brand and generic prescription drugs. Five significant factors influence choice: per prescription pharmacy profit, evidence of past generic prescription use by the final consumer, prescriptions written with proprietary drug name, pharmacy generated prescriptions and payor mandates.

TABLE 3.2.3 - Continued.

Study	Methodology and Data	Research Focus and Findings
Chintagunta and Honore (1996)	Scanner panel data (saltine crackers) Probit model using method of simulated moments	Investigates effects of marketing variables and household heterogeneity. Their method allows similarities across alternatives, recovers differential patterns of brand competition, and determines extent of household-price-sensitivity variation.
Degeratu (1996)	Use simulated data then scanner panel data (catsup) 1st order Markov model and first to use smoothed simulated maximum likelihood estimation procedure	Estimates a choice model with structural state dependence (learning and forgetting) and continuous unobserved heterogeneity across the population. However, model is too complex to estimate with current technology. Retained model indicates that market leaders can benefit from a "high-low" pricing strategy or from introducing and appropriately promoting "fighting brands" (i.e., no frills, low-price brands)
Papatla and Krishnamurthi (1996)	Scanner panel data (liquid detergent) Random effects, heteroskedastic covariance probit time-varying parameter model.	Determines whether frequent promotions can hurt brand choice. Results indicate that increased purchases using coupons erode brand loyalty and increase price sensitivity.
Park (1996)	IRI scanner panel data (saltine crackers); Using multinomial logit and multiperiod probit models	Examines the role of unobservable characteristics (individual differences, relationship among brands, and dynamic relationship among choices) of consumers in brand choice. Models include differences in coefficients of marketing mix variables and effect of unobservable consumer characteristics. Results of MNP model although using only a subset of data are similar to those of MNL using the full data.

3.3.1 Country-Coverage

Most of the published work on brand choice were conducted in United States, with a few from other developed countries such as United Kingdom, Canada, and Germany. In Australia, few choice modelling studies have been conducted in Sydney universities (Winter and Rossiter 1989; Roberts and Lattin 1991; Lane 1991; Horowitz and Louviere 1995).

Not many researchers have considered the situations in developing countries. Duffus (1979) investigated nationalism among Jamaicans in their choice between products manufactured locally and those imported from three other countries. Rhi-Perez (1989) examined the relationship between ethnicity and brand choice among Mexicans, Mexican-Americans and Anglos. This study is an attempt to contribute to the scanty empirical literature from less developed countries. In addition, the applicability or robustness of the brand choice theories and models to less developed countries is clarified.

3.3.2 Methodology and Data

In Chapter 2, it was shown that choice models may vary in terms of logic, assumptions and purposes. In most brand choice research, the data requirements and methodology depend on the purpose of the study. Thus, the survey has paid particular attention to the nature of data and methodology used in brand choice studies for two reasons. The reliability of results is affected by the quality of data and methodology used. Moreover, the data collection method dictates the choice models and analysis that can be performed.

Information processing studies mainly utilise experimental data (Assar 1987, Nedungadi 1990; Boyle 1994). These studies employ limited variables which are manipulated to study how consumers process information before choosing brands. In conjoint analysis, however, the researcher has a choice between trade-off, full profile, and pairwise comparison methods to present the stimuli to the consumers, who indicate their preference by rank-ordering or rating (i.e., a 1-to-10 scale). Earlier conjoint experimental tasks are often conducted in personal interviews with cue cards to present the stimuli but recent studies utilise questionnaires, computer-based surveys, and telephone interviews.

Multidimensional scaling (MDS) requires collection of similarity or preference data from comparison of paired objects. Whilst similarity-based perceptual maps represent attribute similarities and perceptual dimensions of comparison, they do not reflect any insight on determinants of choice than do preference-based maps. Thus, the decision to use similarities or preference data depends on the research question. Scaling methods can either be decompositional (attribute-free) or compositional (attribute-based). The former is normally associated with MDS and is available in several computer programs while the latter uses specifically designed perceptual mapping methods like correspondence analysis or more traditional multivariate techniques (i.e., factor analysis and discriminant analysis).

To explain and predict brand choice outcomes, researchers employ panel or survey data. The availability of consumer panel data at reduced cost made this a popular choice of recent studies in more developed countries (Chintagunta 1994; Andrews and Srinivasan 1995; Papatla and Krisnamurthi 1996). The main advantage of panel data is the flexibility of conducting cross sectional or time series analysis. Researchers take advantage of the historical nature of panel data to generate models that have high predictive power (Winer 1986; Gupta 1988; Lattin and Bucklin 1989; Chintagunta 1993). To analyse panel and survey data, multinomial logit (MNL) regression is used.

Earlier studies in developed countries used survey data collected through questionnaires (Currim 1982; Chapman and Staelin 1982; Gencsh 1987). The questionnaires are usually administered during personal interviews, but some are done by mail, telephone interview and interactive computer. Very likely these are cross sectional studies that are good in explaining brand choice (Gensch 1987; Roberts and Lattin 1991). Whilst the models built on survey data can also be used in prediction, they seem to be not as good as the historical panel data models. Very few researchers use survey data due to the inherent difficulty and the cost of collection. However, when panel data is not available, as in the case of this study, conducting a survey is the only alternative method of gathering data (Keillor, Parker and Schaefer 1996; Duffus 1979).

3.3.3 Findings of Previous Studies

3.3.3.1 Information Processing

Studies on information processing can be classified into two groups. The first group examines the influence of information availability on choice processing while the second group focus on the choice tactics or choice strategies that consumers employ. Other studies consider the children's choice processes and the influence of reference groups as sources of information.

Most researchers experiment on varying conditions of information availability. Biehal and Chakravarti (1986) found that under different conditions of information accessibility, subjects used more and varied information processing operations. They concluded that memory accessibility tends to influence brand choice. Moreover, Assar (1987) showed that subjects lacking in attribute-range knowledge tend to avoid extreme evaluations, search by attribute and had lower confidence in evaluations. Later, Nedungadi (1990) manipulated the levels of brand accessibility to determine if the chance of a brand being considered and chosen is affected. His results indicate the influence of memory during the choice process. Information availability is also controlled in Choi's (1993) computer-aided shopping experiment that investigates the consumers' search effort in a durable product market.

Boyle (1994) manipulated information availability by first classifying subjects with high and low product knowledge. In choosing bicycles and video camcorders, more knowledgeable decision makers engaged in planned and opportunistic behaviour whereas less knowledgeable decision makers relied only on opportunism. In addition, Hoyer and Brown (1990) examined the role of brand awareness during the choice process. They found that subjects with no brand awareness tend to sample more brands and select the high-quality brand on the final choice.

The choice tactics or strategies employed by consumers before selection of a brand is another area of information processing studies. There is a continuing debate whether consumers employ compensatory rules, a basic assumption of logit models, or noncompensatory rules, of the attribute-processing models. In his survey of 521 grocery shoppers, Cobb (1983) indicated that consumers utilise simplifying decision rules to reduce cognitive strain and minimise time and effort. When there is negative correlation between attributes, the performance of compensatory model is diminished (Johnson, Meyer and Ghose 1989).

Reference groups act as sources of information during purchase decisions. Rosen and Olshavsky (1987) claimed that almost half of the subjects emphasise brand recommendation over attribute-value information. They also found that the degree of reliance on brand information increases with time constraint and with higher risk product. Similarly, a cross cultural study shows that Mexican adolescents are receptive to outside information sources such as parents, promotional elements and salespeople than Americans do (Keillor, Parker and Schaefer 1996). It was also found that the influence of siblings in forming brand preference is relatively high in both cultures.

Age differences in children influence choice behaviour especially when children are faced with new alternatives (John and Lakshmi-Ratan 1992). Results of a study on children's preference formation and choice processes indicate that even young children rely on non-functional attributes, even when prompted to consider functional attributes (Hite and Hite 1995).

3.3.3.2 Conjoint Analysis and Multidimensional Scaling

Conjoint analysis may be used in segmentation studies or prediction market shares of new product concepts using conjoint simulators (Mahajan, Green, and Davey 1982; Cattin, Gelfand, and Danes 1983). In his study of 18 test concepts for paper napkins, Zufryden (1988) proposed a model linking conjoint analysis and stochastic models of purchase behaviour. On the other hand, ratings-based and choice-based conjoint models were found to be comparable in terms of predicting shares in a holdout choice task (Elrod, Louviere, and Davey 1992). Finally, in their national study, Huber, et al. (1993) indicated that hybrid models combining information from different elicitation tasks outperform models based on one task.

In spite of its popularity, conjoint analysis should be viewed as exploratory because it places more emphasis on the ability of the researcher to theorise about the behaviour of choice. While it is true that statistical assumptions are lesser, conceptual assumptions are far greater than with other methods. Analysts specify the general form of the model before designing the conjoint experiment. They also choose which attributes to include, how many levels of each attribute, and how to present the stimuli during data collection. Thus, before using conjoint analysis, familiarity with the procedure and the choice situation are important.

Multidimensional scaling can illustrate market segments based on preference judgments, determine similar products, and deduce the criteria used by consumers to evaluate products. Decompositional techniques are common in earlier applications. Kaas (1977) evaluated perceived similarities between choice objects of 7 shampoo brands and 3 prices. In comparing the performance of the factorial model, probabilistic ideal point model, and vector models in terms of Akaike information criterion (AIC), the wandering ideal point model gives the best fit. Later marketing applications employ multivariate techniques to generate perceptual maps. Shugan (1987) used least squares regression analysis to map brands' positions from market shares and price changes captured in scanner panel data of toothpaste, mouthwash and dishwashing liquid products. On the other hand, Eliashberg and Manrai (1992) employed factor and cluster analyses to evaluate nineteen new product concepts using only two segments. They found that obtaining precise analytical expressions becomes difficult when three or more segments are involved. The highly inferential nature of MDS makes validation efforts problematic because the only output is the relative positions of objects. This is compounded by the lack of systematic methods of comparison developed into the available computer programs.

3.3.3.3 Brand Choice

Brand choice literature is dominated by American researchers. Applications of empirical studies range from low involvement frequently purchased products (coffee, detergent, catsup, yogurt, etc.), durables (bicycles, cameras, cars, etc.), health care services, prescription drugs through to national, private and generic brands. The most popular variable is price and promotion effects which are readily available from panel data. However, panel data do not capture psychographic variables so investigators assume households or individuals are homogeneous. Recent studies have attempted to capture heterogeneity by modelling brand loyalty and variety-seeking tendencies (Gonul and Srinivasan 1993; Fader and Lattin 1993; Chintagunta and Honore 1996). Other studies have attempted to model interpurchase time, brand choice, and purchase quantity decisions simultaneously (Krisnamurthi and Raj 1988; Gupta 1988; Chintagunta 1993).

Consumers develop reference prices by forming expectations from past prices and comparing prices among the brands at point-of-purchase. Winer (1986) provided evidence for the effects of reference price formation on brand choice. He suggested that holding frequent short-term price deals may affect manufacturers as consumers make forecasting errors about prices. Similarly, Lattin and Bucklin (1989) also indicated that consumers form expectations not only from past prices but also from promotional activities, and these expectations influence brand choice. Eventually, Rajendran and Tellis (1994) concluded that at point-of-purchase, the lowest prices seem to be an important cue for reference price, whereas within time, the brand's own past price seems to be important. Finally, Papatla and Krisnamurthi (1996) provided evidence that increased coupon purchases during promotions erode brand loyalty and increase price sensitivity.

Modelling sources of heterogeneity is another area of concern to brand choice researchers. There is strong support for existence of heterogeneity which may result in under-estimation of parameters when heterogeneity is ignored (Gonul and Srinivasan 1993; Jain, Vilcassim and Chintagunta 1994). In their proposed new measure of brand loyalty, Fader and Lattin (1993) utilised a Dirichlet multinomial choice model that accounts for heterogeneity and nonstationarity.[8] They claimed that their proposed model provides better fit than other existing models.

In modelling the interdependence of purchase timing, brand choice and purchase quantity, Krisnamurthi and Raj (1988) found that competitive prices

[8] In econometrics, stationarity in a time series implies no trend, constant variability, and stable correlations over time. In the historical scanner panel data, stationarity in the market is associated with repeat purchasing, where a consumer panelist purchases the same total amount in any two periods. Thus, the incorporation of nonstationarity in brand choice models attempts to capture variances in the purchase amounts at any two periods which may be due to promotions like temporary price reductions (East 1990, p. 29, see also, Wagner and Taudes 1987, pp. 7, 12-13).

affect only brand choice but not purchase quantity. Gupta (1988) supported this finding by indicating that 84 percent of the sales increase due to brand promotion comes from brand switching. Loyal customers accelerating their regular purchases account for 14 percent while stockpiling is a negligible phenomenon at less than 3 percent. In another study, Krisnamurthi and Raj (1991) concluded that loyal customers are less price sensitive than non loyal customers in the choice decision but more price sensitive in the quantity decision.

Other researchers claim that brand choice is stochastic and consumers follow a certain pattern by chance rather than evaluating brand attributes. Winter and Rossiter (1989) developed and tested a pattern matching stochastic model that shows customers seem to oscillate between repeat purchasing and brand switching in a simple zero-order stochastic manner.

In terms of the models used, the probit model is most common alternative to the standard logit model. Currim (1982) demonstrated that models without the independence of irrelevant alternatives (IIA)[9] property outpredict those with IIA. On the other hand, Chintagunta (1992) obtained slightly higher prediction rate over the logit model after applying the probit model using method of simulated moments on catsup panel data. In a new method for estimating probit models, Elrod and Keane (1995) demonstrated that their model outperforms Choice Map, Sculpture and Chintagunta's latent class model in terms of goodness-of-fit, predictive validity and face validity.

On another vein, Abe (1995) compared non-parametric density estimation to multinomial logit (MNL). Although shown to have promise in identifying influential points and outliers, the non-parametric approach requires large amounts of data. On the other hand, Fish (1995) compared artificial neural networks with MNL for estimation of brand choice. The backpropagation algorithm is shown to be slightly more accurate than MNL.

In summary, brand choice models have been applied to a number of products using scanner panel data where price effects appear to motivate most researchers. Several studies have attempted to capture heterogeneity among

---

[9] Section 2.4.1 contains an extensive discussion of this assumption associated with linear logit models.

panel households and integrate the interdependence of timing, brand choice, and purchase quantity decisions in the models. Other researchers concentrate on estimation aspects such as the use of probit models, nonparametric approach, and artificial intelligence concepts.

3.4 Summary

In this survey, this chapter reviewed three groups of brand choice studies: information processing before brand selection, conjoint analysis and multidimensional scaling, and explaining and predicting brand choice using mathematical models. Information processing studies determine the influence of information availability on choice processing and what choice strategies are employed under different conditions. By contrast, conjoint analytic studies are useful in segmentation and prediction of shares of new concepts while multidimensional scaling techniques generate perceptual maps useful in product positioning. On the other hand, brand choice models identify causal variables that can explain and predict brand choice.

Brand choice models are applied to a wide range of products: from low involvement frequently purchased products, to durables, and services. They rely on consumer panel data or questionnaire survey data. Modelling price effects is the main objective of a number of choice models while other models seek to capture consumer heterogeneity by incorporating brand loyalty and variety seeking tendencies. Some models using historical panel data have attempted to integrate the interdependence of purchase timing, brand choice, and purchase quantity decisions.

This chapter has shown the dominance of American researchers in brand choice literature following a trend that mainly uses scanner panel data. This development may not be unhealthy but it is seen to be inconsistent with the increasing integration of economies of the world. At least two thirds of these economies are those of less developed countries. Therefore, it is important to test the brand choice modelling theory under different contexts.

Brand choice consumer behaviour may vary according to the factors faced by the consumer in a given buying situation. The brand choice models formulated in more developed countries may not be fully applicable in a less developed country. Consumers in less affluent countries may be driven more strongly by other factors like culture, economic circumstances, and family reference groups. To date, very few published brand choice studies consider the situation in developing countries. Therefore, this study attempts to develop brand choice models and apply them to shampoo and toothpaste products in the Philippines.

The next part of the dissertation consists of two chapters that present the methodology and research design of the study. Chapter 4 discusses the variable measures and the survey instruments, while the Chapter 5 presents the results of the pilot study.

PART III

METHODOLOGY AND RESEARCH DESIGN

CHAPTER 4
SAMPLING AND DEVELOPMENT OF MEASUREMENT INSTRUMENTS

4.1 Introduction

This chapter has four objectives. First, to summarise the measures of variables from the literature survey and present the comprehensive methodology in addressing the research problem. Second, to state the operational definitions of concepts or constructs used. Third, to highlight the appropriate measurement scales incorporated in the questionnaire. The last objective is to describe the sample, the data collection phase, and data analysis of the study.

This chapter is organised as follows. After outlining the general procedure in Section 2, Section 3 describes the sampling process. Section 4 characterises the variables and their operationalisation while Section 5 describes the pilot study and measures undertaken to reduce the expected non-participation rate. Section 6 then outlines the data collection and the treatment of the data. Finally, Section 7 summarises the chapter.

4.2 Research Methodology

In modelling brand choice, an alternative-focused method is adopted. The model inputs are the consumers' ratings of the various brands that are evaluated on known attributes. From these ratings, the estimated choice model infers the contributions of the component attributes. An advantage of the technique is the convenience in collecting consumer responses. The requirements to the alternative-focused technique are: (i) knowledge of the brands and attributes available to the decision maker; (ii) observations of the decision maker's preferences in the set of alternatives; and (iii) statistical model-building techniques (Carrol and Johnson 1990). Therefore, to build a choice model for toothpaste and shampoo, it is necessary to first, identify the choice attributes and second, collect consumer preferences on the alternative brands based on the pre-identified choice attributes.

The investigation was conducted in five stages (see Figure 4.1). Each stage is described below.

Stage 1: Identifying the choice determinants. Product attributes affecting choice of shampoo/toothpaste brands were generated from focus group discussions and literature search. The Sheth-Newman-Gross (1991) model was used as the conceptual framework to name these product attributes. Some of the attributes were obtained from focus group discussions conducted by a major shampoo and toothpaste marketer in the Philippines (Personal Communication 1, 1995).

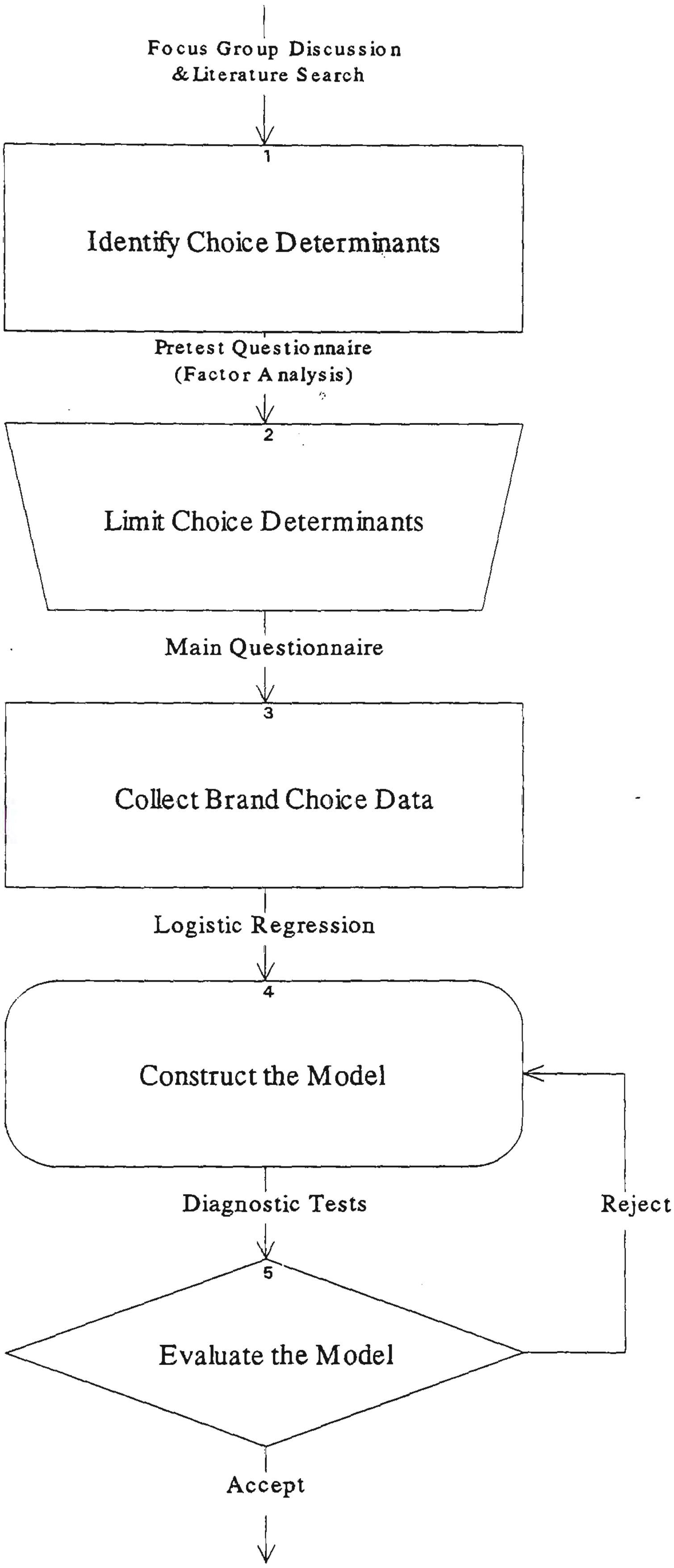
Stage 2: Limiting the choice determinants. The product attributes generated from this exploratory work were incorporated in a pretest questionnaire. The pilot study collected responses of 105 users of shampoo and toothpaste in Metro Manila, Philippines. Using factor analysis and the varimax rotation technique, a reduced set of relatively independent attributes explaining the most variation in the original set was extracted from the pretest data.

Stage 3: Collecting the brand choice data. The reduced set of attributes and their corresponding levels for perceptual measurement were then included in the questionnaire. Respondents ranked and rated various brands of toothpaste (e.g., Close-Up, Colgate, Hapee) and shampoo (e.g., Palmolive, Pantene, Rejoice). Respondents were also asked to identify the last brand bought and the brand they would most likely purchase next.

Stage 4: Constructing the model. Discriminant and logit models were developed. Discriminant models utilised the entire sample in the analysis. The product brands served as groups or classes, while the reduced set of attributes, extracted from the pilot study, acted as independent variables. However, in building the logit models, the product data was randomly divided into two samples: estimation sample and validation (or holdout) sample. The dependent variable of the logit models is the probability of choosing a particular brand of shampoo or toothpaste while the independent variables include the reduced set of product attributes, psychographic attitudinal profiles and demographic variables.

Figure 4.1

THE RESEARCH STAGES



Stage 5: Evaluating the model. The predictive adequacy of the discriminant models was examined in terms of classification rates (within sample), and crossvalidation rates (leave-one-out method, and use of a holdout sample). The holdout sample in validating the discriminant model employed the same split-sample procedure into estimation and holdout samples described for the logit model. To evaluate the predictive adequacy of the logit model, the generated model from the estimation sample was tested on the other half, the validation sample. This was accomplished by comparing the brand choice estimated by the logit model to the actual choice of the respondents. Furthermore, the model was compared with the findings of other researchers using the same model. The diagnostic information from the estimated models became useful in identifying the implications to marketing strategies of shampoo and toothpaste products.

4.3 The Sample

The household population of Metropolitan Manila is 1,987,659 which is composed of 9,454,040 individuals based on the 1995 Population Census of the National Statistics Office of the Republic of the Philippines. Metro Manila area is composed of nine cities and seven municipalities.[10] In selecting the sample, it was ensured that a cross section of socio-economic classes were represented.

It must be emphasised here that the individual consumers are taken as the basic units of analysis instead of the households, which are small, closely-knit collections of individuals. This assumption was required by theory of the Sheth-Newman-Gross (1991) model. The brand choice of an individual and a household cannot be taken to be identical. In economics, for those working with macroeconomic models, the basic decision-making entity with respect to consumption is the household while those working in the microeconomic theory and welfare economics consider the individual as the basic unit (Lancaster 1991). Although one-person households do exist, their existence is not widespread in developing countries.

In consumer marketing, however, the basic decision-making entity depends on the type of product to be investigated. Some products like perfumes

[10] Appendix 1 presents basic demographic and economic facts about the Philippines in general, and Metro Manila in particular.

and alcoholic beverages require that the brand choice be made by the individual. In personal care products, the brand choice can be made either by the individual or the household. However, to avoid factors associated with group decisions and to simplify the models, individuals were taken as units of analysis.

Nevertheless, it is acknowledged that the product decision may be jointly made by members of a household. To illustrate this, consider a household that desires to acquire a tube of toothpaste. There can be several individuals with different roles involved in the acquisition and consumption process. These roles can be any of the following: proposer, influencer, decision-maker, buyer and user. A child proposes a certain brand, whilst another child recommends an alternative brand. Then a parent who is usually the decision-maker, chooses which brand to buy. The actual buying of the toothpaste can be made by another member (the customer) of the household. All the household members can be potential users of the brand (the consumers). Naturally, it is also possible that these roles can overlap such that the same person selects, buys, and uses the brand.

4.3.1 Obtaining the Pretest Questionnaire Sample

To limit the choice determinants to a manageable number, a pretest questionnaire was administered. A convenience sample of 105 toothpaste and shampoo consumers who represent the households was selected in Quezon City. Potential respondents were screened. Accepted respondents must satisfy three requirements. First, the respondent must be a user of shampoo (or toothpaste) and must have purchased the product within the past six months. Second, only respondents who make the buying decision, or who influence the buying decision of their respective households were chosen. Finally, the respondent must not have a family member or a close relative working for a shampoo or toothpaste marketer, an advertising agency, or a marketing research agency.

Sheth, Newman and Gross (1991) recommended a choice-based sample where equal numbers of users from each brand are to be used. This is appropriate because their objective is to obtain the independent variables to be used in a discriminant analysis later. In discriminant analysis, the objective is to start with known groups and to determine the factors that describe these groups.

In using the Sheth, Newman and Gross (1991) framework the recommended choice-based sample was modified. The objective of the pilot study is to identify the salient attributes in the brand choice and these salient attributes are eventually used in discriminant and logistic regression analyses. In this case, a simple random sample was considered more representative of the market because the brands do not have equal market shares. Some brands tend to dominate the market and hence by intuition, the major brands' attributes arguably stand out more than the smaller brands.

4.3.2 Specifying the Main Questionnaire Sample

In order to collect the brand choice data, the main questionnaire was administered. Except for the sampling method, the characteristics of the respondents in the survey sample are the same as the pilot study (i.e. satisfy the three requirements described in the previous section). A total of 600 individuals were selected using a multistage sampling to reduce the normal sampling variation associated with simple random sampling and systematic sampling.[11] No two individuals must belong to the same household. The 600 individuals were identified using a Metro Manila telephone directory. However, the 12.39 telephone density per 100 population in Metro Manila, brings a sampling bias against individuals without telephone (National Statistics Office, 1995). An additional 100 respondents, based on area quotas, were planned to be interviewed to overcome sampling bias.

Respondents were picked from the telephone directory by systematically picking out the 10th name on each page until required representatives from each city/municipality were filled. Only one name was selected from each page of the directory. The pages were chosen by starting from a number generated from Table of Random Numbers[12] and progressing by a multiple of five pages. When the last page was reached, a number was again generated from the table. For underrepresented areas, the first name that appears in the right city or

[11] See Appendix 2 for details of the sampling plan and the actual sample obtained from each city/municipality. The actual sample is described in Chapter 6.

[12] The Table of Random Numbers was generated by a computer program which ensures that every digit or number in it had an equal chance of occurring. Rand Corporation's (1955) Table of Random Numbers was employed.

municipality was selected. The main questionnaires were mailed to the potential respondents in Metro Manila, Philippines from Melbourne, Australia. However, the low response rate to the mail survey prompted the change to interviewers personally administering the main questionnaire. Filled questionnaires from the mail survey were set aside and were not included during the data analysis.

Using a similar sampling plan to the mail survey based on area quotas, the sample to be interviewed was reduced to 500 individuals. Respondents were selected by the interviewers from various suburbs in each city or municipality. Interviewers were directed to get only one respondent from a household and the quota allocated for a certain suburb. Hence, interviewers were selected based on their familiarity to certain suburbs in the sampling area.

4.4 Instrumentation

The research design uses the survey method to collect evidence to address the research problem. The survey is conducted in two stages. First, the pretest questionnaire seeks the opinion of shampoo and toothpaste consumers on brand purchase and usage issues. The questionnaire contains various product attributes and choice situations that may affect brand choice. Second, the survey questionnaire gathers opinions of respondents on a set of alternative brands according to a reduced number of attributes. These are the dominant attributes previously identified after performing a factor analysis of the pilot study data. Both the pretest and main questionnaires were reviewed by Victoria University's Human Research Ethics Committee prior to their use during the field research. Before the particulars of the questionnaires are given, it is necessary to discuss the issues associated in measuring the variables.

4.4.1 Measures of Dependent and Independent Variables

When a study uses the scientific method, it requires a systematic gathering of facts and observations which are later classified and analysed. This is followed by formulating a generalisation from the evidence to address the research problem. Beforehand, it is important to identify which variables are to be measured and what kind of relationships among the variables are to be developed.

4.4.1.1 Brand Choice - The Dependent Variable

The dependent variable in the logistic regression model is brand choice. It is measured by the probability of choosing a certain brand i, among several brands in the consideration set, N. There are two ways of classifying brand choice modelling studies depending on the nature of the data that is used. It can either be attitude-based or behaviour-based (Lune, Blabbers, and Seaman 1986).

Attitude-based brand choice models emphasise images, beliefs and importance weights of individuals to predict and explain consumer behaviour. Consequently, attitude-orientated models need a theoretical base on which to make projections of likely behaviour. Most of the theory underlying the models has been drawn from behavioural sciences. Such theories can explicate how people develop needs for different product characteristics, how information about the products is processed, and how the attitudes towards the brands are developed or changed. Thus, attitude-based models are usually used in explanation rather than prediction of brand choice.

In contrast, behaviour-based models use actual or intended behavioural readings from consumers. Since behaviour-based models employ more robust data, they are often used for prediction rather than explanation of brand choice. However, behaviour-based models are also useful in explaining brand choice. This study uses behavioural-orientated measures of brand choice.

Researchers disagree on the brand preference measure to be used as the dependent variable. The preferred brand can either be the brand most frequently purchased and used or the last brand bought. Suppose a consumer prefers two brands A and B over time. If the consumer purchase pattern over a time span is ABABAAAB, brand A which has been chosen five times is thought to be the preferred brand. Other experts, however, will view brand B as the preferred brand because it is the last brand purchased. In this study, both measures were separately utilised as dependent variables in the regression models. The results are compared later in Chapters 8 and 10.

The third indication of the preferred brand is the intended behaviour which is the next brand to be purchased. This measure was utilised in this study to examine the ability of the estimated models to predict future brand choice behaviour of consumers. The model will have high validity when there is a high goodness-of-fit between the results predicted by the models and those observed in the third variable. Management will only accept models with high validity, because they are the only ones that comprehensibly represent the market and are relevant to decision making.

4.4.1.2 The Independent Variables

The independent variables are the determinants of brand choice. In marketing, Lune, Blabbers, and Seaman (1986) classified them to be product-related, market-related or environment-related attributes. In the economics literature, these attributes are generally known as characteristics (Lancaster 1991). Product attributes may include the product formulation, packaging, price and the consumer benefits derived from the product. Market-related attributes are advertising, promotional elements, media mix and sampling. Environment-related attributes can involve the situational factors the buyer is faced with during the buying process. This can take the form of the store location and its ambience, shelf display, competitive brand positioning, and even the context of why the product is being purchased and used.

Sheth, Newman and Gross (1991) presented a more comprehensive classification of attributes and referred to them as values. The five values which influence choice behaviour are functional, social, emotional, epistemic, and conditional. Since this was the framework used during the pilot study, the five values are described below.

Functional value. Brand choice is influenced by the functional or utilitarian value possessed by the alternatives. According to the Marshallian utility theory in economics, the consumers are assumed to be rational. This implies that this choice behaviour of consumers is driven by the need to maximise utility. Functional value may be a physical attribute of the brand or a benefit derived from the use of the brand. More specifically, a shampoo's functional value can be manifested in its fragrance, a physical attribute; or in its ability to provide shiny and beautiful hair, a product benefit. In categories where products are regarded to be equivalent, such as petrol, price is the most salient value which determines the buying decision.

Social Value. Brand choice can also be determined by social value. Sociologists treat these social groups as reference groups. Depending on the demographic, socioeconomic and cultural-ethnic backgrounds of these reference groups, they can convey either positive or negative stereotypes to other groups of people. However, perceptions play a major role in determining whether products will have positive or negative social values. Consumers often purchase and use products to show a social image that corresponds to friends, or other groups they would like to be associated with. Products associated with positively perceived social groups have high social value. For instance, a housewife may buy a toothpaste that was endorsed by a qualified dentist who is well recognised in the country. Similarly, a university student may purchase a shampoo brand that was endorsed by a popular celebrity whom he or she idolises.

Emotional Value. Some products are primarily chosen because of their potential to arouse emotional feelings. These emotions can either be positive and enjoyable or negative. A great deal of emotional value is often associated with aesthetic products such as type of music, or in the packaging colour of most products. Colours and shapes can convey a variety of feelings such as sexuality, romance or virility. In the cosmetic segment of the toothpaste market in the Philippines, the users of a major brand claim that brushing with their brand gives them a feeling of confidence whenever they go out to meet their friends (Personal Communication 2, 1996).

Epistemic Value. Choice behaviour can be driven by curiosity, novelty-seeking and knowledge-seeking motivations. Most often, curiosity is the primary reason for the purchase of a new product and to switch brands. To take a simple example, a consumer who is satisfied with the current brand of shampoo can be attracted by an interesting advertisement of a new brand. Some toothpaste users can become bored with their current brand or be tired of its flavour (flavour fatigue). Such users may switch to another brand to seek a novel experience, rather than out of curiosity.

Conditional Value. Lastly, brand choices depend on the situation or set of circumstances faced by the consumer. For example, a household with a limited disposable income will only buy a cheaper toothpaste. On the other hand, a young woman can have a shampoo brand for everyday use, but would have another shampoo brand for special occasions like going out on a date. By contrast, a young man suffering from dandruff and scalp problems would buy a special shampoo brand to remedy his hair problems, and stop using the brand when the hair problems are gone.

Sheth, Newman, and Gross (1991) claimed that their framework can be useful across a broad market choice behaviour. The choice levels are to buy or not to buy, the choice of a product type, and choice of a brand. In the brand choice of toothpaste and shampoo, all the five values discussed above can contribute to the brand choice decision, without knowing which values are salient or pertinent. Whilst the variables delineating each value can be easily identified, the relevant ones are not known a priori. Thus, it is necessary to evolve a procedure to determine the relative importance of the values and reduce the variables into the more salient ones. This is the basic objective of the pretest questionnaire.

4.4.2 The Pretest Questionnaire

The pretest questionnaire seeks the opinion of shampoo and toothpaste consumers on brand purchase and usage issues.[13] It contains a large number of product attributes and choice situations that may affect brand choice as obtained from the exploratory focus group studies based on the Sheth-Newman-Gross (1991) model and from a major shampoo and toothpaste manufacturer (Personal Communication 1, 1995). Three focus group discussions (FGDs) for toothpaste and five FGDs for shampoo were conducted. Eight to ten users of every shampoo or toothpaste brand were grouped together. The participants from each group is represented by a broad mix of social classes: from B/upper C (middle class) to C, D, and E classes. The moderator of each group attempted to facilitate a free flow of discussion, starting with the questions outlined by the Sheth-Newman-Gross (1991, pp. 94-96) model.

To make the attribute listing as extensive as possible, it was supplemented by attributes from other shampoo and toothpaste empirical studies (Slama and Tashchian 1987; Feinberg, Kahn and McAlister 1987; Horowitz and Louviere 1995; Park and Srinivasan 1994). In addition, the attribute list was reviewed by the marketing research manager of a major Philippine shampoo and toothpaste manufacturer (Personal Communication 1, 1995).

The respondents were required to complete three parts of the pilot questionnaire. First, the respondents stated their preferred shampoo or toothpaste brands. Respondents' commitment to their brands was determined by the items on brand switching behaviour and frequency of using the product. Second, the respondents were presented with statements on product attributes and choice situations. These statements were grouped according to the functional, social, conditional, emotional, and epistemic attributes as suggested by the Sheth-Newman-Gross (1991) model. The number of items belonging to each value in the pilot questionnaire is listed in Table 4.4.2.1. Respondents indicated their agreement or disagreement with the scaled statements as it applied to their preferred brand. Finally, the pretest questionnaire obtained the basic demographic profile of the respondents. These items include age, sex, marital

[13] Appendix 3 includes the pretest questionnaire for shampoo and a portion of the toothpaste questionnaire.

Exhibit 4.4.3.1

BRAND SWITCHING: CONSTRUCT AND MEASUREMENT

Operational Definition:

The degree to which a person reports himself/herself liking to try new and/or different brands rather than buying and using the same brand all the time. This is the opposite of brand loyalty.

Measurement Questions: (7-point Likert-type scale).

1. I enjoy sampling different brands of shampoo for the sake of comparison.
2. I would rather stick with a brand I usually buy than to try something I am not sure of. (R)
3. Even though shampoo is available in different fragrances, I always tend to buy the same fragrance. (R)
4. I get bored with buying the same shampoo brands even if they are good.
5. If I like the brand, I rarely switch from it just to try something different. (R)

Scale Rule:

Items 2, 3, and 5, marked (R), are to be reversed. A person who scores 25 points or more is classified as a brand switcher.

Reliability:

A Spearman-Brown coefficient of 0.784 and 0.832 were reported for 336 homemakers and 105 students, respectively.

Scale Origin: Raju (1980)

Exhibit 4.4.3.2

PURCHASE DECISION INVOLVEMENT:

CONSTRUCT AND MEASUREMENT

Operational Definition:

The degree of importance a person places on purchase decision for some product and the amount of attention devoted to it.

Measurement Questions:

Please rate the process of choosing your toothpaste brand on each of the following scales (7-point Likert-type scale).

very unimportant decision --------------------	very important decision
decision requires little thought --------------------	decision requires a lot of thought
little to lose if you choose the wrong brand --------------------	a lot to lose if you choose the wrong brand

Scale Rule:

A person who scores 15 points or more is highly involved in the purchase decision process.

Reliability and Validity:

Reported alpha values on adult samples of 0.81 (n= 30), 0.74 (n = 249 over 75 products), 0.75 (n = 50), and 0.77 (n = 1,792 over 254 products). Discriminant and Criterion validity (n = 1,792 data).

Scale Origin: Ratchford (1987)

Exhibit 4.4.3.3

BRAND INNOVATIVENESS: CONSTRUCT AND MEASUREMENT

Operational Definition:

The degree of a person's perceived tendency to try new brands driven by curiosity and/or novelty-seeking tendency.

Measurement Questions: (7-point Likert-type scale).

1. When I see a new shampoo brand at the store, I often buy it just to see what it's like.
2. I often try new shampoo brands before my friends and neighbours do.
3. I like to wait until a brand has been proven before I try it. (R)
4. I like to try new and different things.

Scale Rule:

Item 3, marked (R), is to be reversed. A person who scores 20 points or more has a high tendency to try new brands.

Reliability:

A split-half reliability of 0.52 was reported by Darden and Perreault (1976) for 278 housewives, and an alpha of 0.28 was reported by Dickerson and Gentry (1983). Although not a promising scale, this study is an opportunity for confirming the scale's reliability.

Scale Origin: Wells and Tigert (1971)

Exhibit 4.4.3.4

SOCIAL CONSUMPTION MOTIVATION:

CONSTRUCT AND MEASUREMENT

Operational Definition:

The degree to which a person places importance on what others think or are doing before buying products.

Measurement Questions: (7-point Likert-type scale).

Before purchasing a toothpaste brand, it is important to know:

1. What friends think of different brands.
2. What kinds of people buy certain brands.
3. What others think of people who use certain brands.
4. What toothpaste brands to buy to make good impressions on others.

Scale Rule:

A person who scores 20 points or more has high social consumption motivation.

Reliability:

Alpha values of 0.85 for 806 high school students and 0.74 for 451 mothers were reported by Moschis (1981) and Carlson and Grossbart (1988), respectively.

Scale Origin: Moschis (1981)

Exhibit 4.4.3.5

PRODUCT KNOWLEDGEABILITY:

CONSTRUCT AND MEASUREMENT

Operational Definition:

The degree to which a person rates himself/herself on product benefits, brand familiarity, and conscious awareness to media advertising.

Measurement Questions: (7-point Likert-type scale).

1. I know a lot about hair and scalp problems.
2. I am familiar with most shampoo brands in the market.
3. I know which shampoo brands are good to prevent hair and scalp problems.
4. I often watch shampoo television advertisements.
5. I usually like to listen to shampoo radio advertisements.

Scale Rule:

A person who scores 25 points or more is highly knowledgeable about the product.

Reliability:

Alpha values of 0.765 for 460 shampoo consumers, and 0.741 for 452 toothpaste consumers were determined during this study.

Scale Origin: This scale was created for this investigation.

The second part of the main questionnaire requires the respondents to form their consideration sets. Concepts of unaided recall and aided recall were applied, given the consumers' awareness of the product brands. In unaided recall, the respondents named as many brands as possible that they would consider buying. In contrast, the aided recall allowed the respondents to check the brands they like in an alphabetically arranged list.

The third part determines the rank and value system of the respondents according to a limited number of factors or attributes. These attributes were considered salient after factor analysing the pretest questionnaire data. There were thirteen factors obtained for shampoo and twelve factors derived for toothpaste. First, the respondent chose the ranks of the factors from the most important to the least important. There is an opportunity for the respondent to apply the conjunctive decision rule. If there were any factors that were considered unimportant, the factors were not included during the ranking.

Second, the respondent assigned the values. The most important factor ranked as number 1 was assigned a value of 100 points. This factor served as an anchor or a reference point of comparison. The value of each remaining factor was then given by determining the importance of the factor relative to the factor rank as 1. For example, if a factor is only half as important as the factor ranked as number 1, it is assigned a value of 50 points. The third part is the most difficult part of the questionnaire. The English and Filipino language translation of the instructions occupied almost one page of the questionnaire. Before doing the fieldwork, all the interviewers were sufficiently oriented to handle this section of the questionnaire.

In the fourth part, the respondent rates the brands according to the factors. The ratings were indicated in a 0 to 10 satisfaction scale. Respondents were free to mark any appropriate portion along the 0 to 10 line. An illustration was given to further clarify the bilingual instruction. Since there may be instances when the respondent has not actually used a brand, the rating was based on any information that was available to them. Most likely sources of information are what they have known from friends (word-of-mouth), what they have seen and heard (television and radio advertisements), and what they have read (print advertisements and packaging labels). This is the most tedious part of the questionnaire. Before accepting each questionnaire from the interviewers, it was ensured that all brands have been rated. There were 8 shampoo brands evaluated over 13 factors, and 5 toothpaste brands evaluated over 12 factors.

Part five of the questionnaire includes measures of the dependent variable brand choice. In the given set of brands, the respondent ranked the brands in their order of importance. This was done in the cases of the brand most frequently purchased and the brand to be purchased next. Instead of eliciting only one response, additional information can be gathered in this manner. Naturally, the last brand bought needed only a single response. This was augmented by a 7-point Likert- type satisfaction rating scale for this brand.

Finally, basic economic and demographic information that were considered relevant to the consumer responses were obtained. These included the age, highest level of education, sex, marital status, family size, age of eldest child, number of children under 5 years of age, occupation, and average monthly income.

4.4.4 Validity of Measures

The attributes included in the pretest questionnaire are externally valid. They were taken from exploratory focus group studies conducted by a major shampoo and toothpaste manufacturer in the Philippines (Personal Communication 1, 1995). Most of the scales were used by researchers and have valid measure properties (see Exhibits 4.4.3.1 to 4.4.3.5). In this study, three of the five scales were found to have high internal consistency while the data from brand switching and brand innovativeness scales have to be discarded because of low scale reliability (see Chapter 6).

4.4.5 Summary

The designed instruments provided measures of brand choice and its determinants. These became the primary inputs in building the brand choice models. A modified Sheth, Newman, and Gross (1991) framework was used in identifying the attributes. To satisfy requirements of the factor analysis, more scale categories were used, instead of the suggested binary scale. Consequently, the two questionnaire instruments utilised a 7-point Likert type scale to measure variables underlying the concepts. Finally, the ranks and value systems of the respondents were also determined in the main questionnaire.

4.5 The Pilot Study

The pretest questionnaire served as an ideal preliminary study to identify potential problems with the main questionnaire during the fieldwork. Both the pretest and main questionnaires widely utilised the 7-point Likert type scales and used some common demographic questions. However, the main questionnaire requires longer response time. Nevertheless, the administration of pretest questionnaire provided learnings that were useful during the design of the main questionnaire. The pretest questionnaire was administered on a convenience sample in Metro Manila, Philippines in January 1996 with a response rate of 95 percent.

Even with the high response rate to the pretest questionnaire, it was anticipated that non-participation can be a problem in the main questionnaire survey as the latter requires at least 40 minutes to 1 hour response time. To reduce the expected non-participation rate, there were four measures undertaken. First, the language of the questionnaire was designed to the level of understanding of the potential respondents. The words were chosen to match the understanding of a respondent who has completed six years of primary school. To allay the respondent fear of being tested about his or her knowledge of the subject, the initial instructions emphasised that there were no right or wrong answers. More importantly, the questionnaire items were translated into Filipino, and the instructions were given in both English and Filipino. Filipino is the main language spoken in Metro Manila, Philippines.

The back-translation procedure recommended by Brislin (1986) was implemented. The questionnaire items were first prepared in English and then translated into Filipino by a bilingual individual. Subsequently, five bilingual Filipinos with various educational backgrounds were asked to translate the Filipino version back into English. The English back translations were then compared to the original English questionnaire. Finally, the minor inconsistencies were reconciled by making changes until the substance of the Filipino and English versions are equivalent.

The second measure to reduce non-response rate is printing the questionnaire on both sides of the paper to further reduce the impression of length. The questions were neatly organised and conveniently spaced to minimise eyestrain. Consequently, responding to the questionnaire would require minimum time and effort. The third measure involves coding of questionnaires. Only the researcher had access to a separate private document that connect the codes to the respondents' names and addresses. Lastly, a letter was included which states the purpose of the research and promises confidentiality of the responses. Apart from the letter, a consent form was attached to each questionnaire. Respondents were required to sign the form to signify their consent to participate in the investigation.

4.6 Data Collection

There were several sources used to collect the data required in the study. First, the data came from primary sources such as the 1995 Census of Population and 1994 Family Income and Expenditure Survey: Integrated Survey of Households Bulletin, Series No. 80 of the National Statistics Office (NSO), Philippines.

Second, the consumer responses from previous focus group discussions conducted by a major Philippine toothpaste and shampoo manufacturer provided information on toothpaste and shampoo usage, brand selection, and brand attitude (Personal Communication 1, 1995). The attributes used in the pretest questionnaire were direct consumer responses from these focus group discussions. To supplement the attributes needed, various shampoo and toothpaste empirical studies were consulted (Slama and Tashchian 1987; Feinberg, Kahn and McAlister 1987; Horowitz and Louviere 1995; Park and Srinivasan 1994). These proved useful during the design of instruments used in the investigation.

Third, the main source of data came from the responses to the pretest and main questionnaires of shampoo and toothpaste consumers. Finally, interviews with marketing practitioners of a major Philippine shampoo and toothpaste marketer were also conducted to validate some of the findings from the study (Personal Communication 2 and 3, 1996). These sources provide adequate evidence to support the findings presented in Chapters 6 to 9.

Like some field research studies, there were problems encountered during the data collection which prompted a modification in the original research design. Non-response or refusals was a problem in the mailed questionnaire survey. Although, the expected response rate was about 40 percent, the actual rate was less than 10 percent. This happened in spite of the precautionary measures made (as described earlier in Section 5) to reduce these refusals.

The research design was modified to collect the required data. The planned second mailing to the respondents was abandoned. Instead, the planned personal interviewing was expanded from 100 to 500 respondents. The questionnaires were personally administered by 15 trained student-interviewers. Interviewers were selected on the basis of their familiarity with the targeted cities and municipalities in the sampling area.

To reduce interviewer bias, the interviewers were given a four-hour orientation on the questionnaire items including the method of sampling, and respondent profile. Each interviewer was required to answer the questionnaire to anticipate questions from respondents and improve familiarity with the questionnaire. The researcher was also available to answer questions from interviewers throughout the day through a telephone. The researcher was also available in an office three times a week to collect the returned questionnaires during the data collection period of July to August 1996.

Returned questionnaires were carefully checked to ensure that all the questions were completed. An interviewer allowance was given for each accepted questionnaire. A random check with 50 respondents was made to verify if they actually completed the questionnaires. The respondents' responses to some demographic questions were also compared to their responses in the questionnaires. In some cases, the researcher joined the student-interviewers in the field. This was a good opportunity to secure first-hand feedback about the questionnaires. This time, the response rate was highly satisfactory with 92 percent for shampoo and 90 percent for toothpaste.

4.7 Treatment of Data

To analyse the data, several univariate and multivariate techniques including nonparametric methods were employed. Descriptive statistics characterised the sample by computing frequencies, means and standard deviations. In Chapter 5, the pretest questionnaire is analysed using factor analysis. Reliability analysis is performed on the resulting factors through Cronbach alphas.

In Chapters 7 and 9, discriminant analysis is utilised to differentiate the brands on selected attributes. To check for any violations in the assumptions of linear discriminant function, one-way analysis of variance with resulting F-test, Box's M test of equality of covariance matrices, and Levene test for homogeneity of variance are conducted. To test for normality, the Shapiro-Wilks' and Lilliefors tests are used. In conjunction with these tests, normal Q-Q and detrended normal Q-Q plots are used to examine any actual departure from normality. Moreover, graphical displays in form box and whisker plots are utilised to examine group distributions. The quadratic rule and nonparametric discriminant methods are also used to improve classification rates.

In Chapters 8 and 9, logistic regression is used to generate pairwise relationships between brands. When quasi or complete separation occurs, univariate analyses are employed to identify confounding variables. Four selection methods are utilised to choose the best model namely: the basic logit regression where all predictors are jointly entered, stepwise selection, backward elimination, and stepwise selection. The correlation matrix of every model is inspected for any multicollinearity between the continuous variables. In addition, the significant continuous variables are checked for any nonlinearities. The models are validated using measures like prediction rates, -2 Log Likelihood (-2 Log L), Akaike Information Criterion (AIC), and Schwartz Criterion (SC).

In the chapters where the results are presented, the basic issues, assumptions and limitations of the analytical techniques are summarised.

4.8 Summary

This chapter provided a description of the methodology to build multi-attribute preference models for shampoo and toothpaste products. The variables of brand choice and its determinants, and prevailing issues regarding measurement were briefly discussed. The chapter also outlined and described the survey method used in the data collection. Two questionnaires were designed and personally administered to the respondents to measure the variables. Furthermore, the chapter has described the sample, pilot study, data collection techniques, and analyses required. Hence, this would enable other researchers to replicate the study in the future.

The next chapter presents the results of the pretest questionnaire. The pilot study is undertaken to reduce the number of attributes to a manageable level for the main questionnaire.

CHAPTER 5

A FACTOR ANALYSIS MODEL OPERATIONALISING THE BRAND CHOICE DETERMINANTS

5.1 Introduction

In the exploratory studies, a considerable number of attributes and situational factors that may influence brand choice were identified. There are several primary reasons for reducing the variables to a manageable size and making them suitable for modelling. For parsimonious reasons, it is more prudent to utilise only the important or salient attributes. It is impractical to require consumers to evaluate several brands, on say eighty attributes, and expect them to enjoy it. When the questionnaire response time is too long the accuracy of the study is affected as respondents suffer from information overload. A reduced set of explanatory variables would also decrease the degrees of freedom in the models. Factor analysis was utilised to identify the salient attributes.[15]

In this sense, the objectives of this chapter are two-fold. The first objective is to present and interpret the findings from the factor analysis models of toothpaste and shampoo choice determinants. The second objective is to specify measures for the various factors that become predictor variables during the modelling stage.

This chapter is organised as follows. Section 2 describes the pretest sample, while Section 3 provides the results of the analysis for shampoo and toothpaste pretest data. Consequently, Section 4 presents the factors, their Cronbach alphas, and Section 5 provides the chapter summary.

---

[15] Appendix 6 provides a brief review of factor analysis. The review covers theory and procedure; assumptions and limitations; and factor extraction and rotation.

5.2 The Pretest Sample

To evaluate and delimit the attributes generated from the exploratory studies a pretest survey was conducted in December 1995. The response rate was 87 percent for a convenience sample of 120 consumers. Table 5.2 shows that the respondents are mostly unmarried females, and aged under the 26 years. A majority of the respondents possess at least 10 years of education, and earn an average monthly income below A$ 250.

An examination of the sample and the urban population reveals that the samples taken are representative. The only limitations of the samples are: too orientated towards females and lower income classes that have an average monthly family income of A$ 250. By contrast, the population of Metro Manila has about equal ratio of males to females and an average monthly family income of A$ 470.

Table 5.2

PRETEST SAMPLE DEMOGRAPHIC SUMMARY

Demographic Variable	Shampoo	Toothpaste
Number of people surveyed	120	120
Number responding (percentage)	104 (87 %)	105 (88 %)
Males	20 (19 %)	27 (26 %)
Females	84 (81 %)	78 (74 %)
Respondents under 26 years of age	86 (83 %)	85 (81 %)
Number of unmarried respondents	89 (86 %)	85 (81 %)
Respondents with 10 years of education	59 (57 %)	55 (52 %)
Respondents with 14 years of education	39 (38 %)	45 (33 %)
Average monthly income below A$ 250	84 (81 %)	82 (78 %)

N.B. Except for the second row, items enclosed by parentheses are percentage of people responding.

5.3 Results of Factor Analysis

5.3.1 Shampoo

There were five separate factor analyses conducted for each of the five values as required by the Sheth-Newman-Gross (1991) framework. This section presents only the results of the functional value analysis of forty shampoo attributes that provide benefits to the consumer. Such consumer benefits appear to explain most of the brand choice of the respondents.

The proportion criterion extracts 15 factors but the scree plot in Figure 5.3.1 shows that only 7 factors may be retained. However, when applying the maximum likelihood factor analysis procedure, up to 10 factors are acceptable. Table 5.3.1 contains an extract of the shampoo functional value factor analysis. Although 104 respondents as a sample size may be small, the Kaiser's measure of sampling adequacy of 0.93 is considerably high. It exceeds the 0.80 standard described as good by the SAS manual. Factor 1 (eigenvalue = 20.77) explains 66.76 percent of the variance. Such factor loads high on items that reflect the ability of the shampoo brand to give a clean smell (0.73), clean the hair (0.71), give soft and smooth hair (0.70), and promote a healthy hair/scalp (0.59). Other items that load high on factor 1 appear to have no clear meaning. Thus, factor 1 is interpreted as a "cleaning ability" variable. Similarly, an examination of the respective factor loadings facilitates the labelling of other factors. Factor 2 is interpreted as a "mildness" variable, factor 3 as a "hair manageability" variable, and factor 4 as an "endorsements" variable.

To keep the models simple, a parsimonious principle was applied to identify the explanatory variables that best capture the brand choice of shampoo. To achieve this, some items within the identified factor were integrated following the benefit-chaining principle copyrighted by Hal Lee in 1970 and popularly used in consumer behaviour qualitative research (Young and Feigin 1975).

To cite an example, cleaning hair is a primary shampoo benefit. However, consumers may associate other benefits with clean hair such as soft and smooth hair, no build-up on scalp, no dandruff, easier styling, or even a clean smell. These functional benefits in turn may be related to intangible emotional benefits such as improved self-esteem, confidence and rich feelings.

Figure 5.3.1

SCREE PLOT OF EIGENVALUES

FOR SHAMPOO FUNCTIONAL VALUE

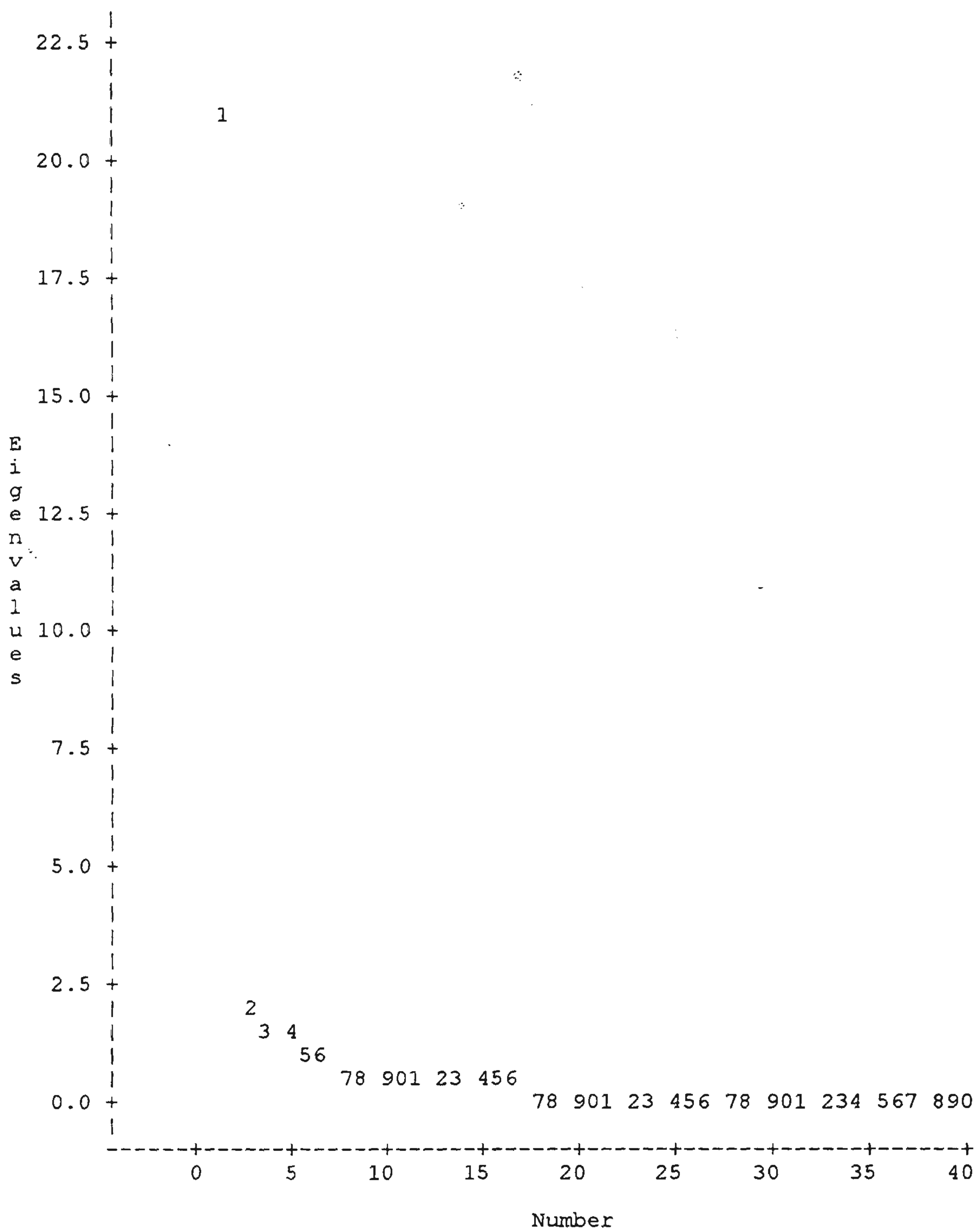


Table 5.3.1

PARTIAL ROTATED FACTOR STRUCTURE
FOR SHAMPOO FUNCTIONAL VALUE
PRINCIPAL FACTOR ANALYSIS WITH VARIMAX ROTATION*

FACTOR1 cleaning ability	FACTOR2 mildness	FACTOR3 hair manage-ability	FACTOR4 endorse-ments	VARIABLE NAME
0.73026	0.0	0.0	0.0	CLEAN SMELL
0.70621	0.0	0.0	0.0	CLEANS HAIR
0.69683	0.0	0.0	0.0	SOFT/SMOOTH HAIR
0.58717	0.0	0.0	0.0	HEALTHY HAIR/SCALP
0.58086	0.46236	0.0	0.0	CONTAINS VITAMINS
0.57131	0.41636	0.0	0.0	AFFORDABLE
0.56016	0.0	0.0	0.0	SHINY/BEAUTIFUL HAIR
0.55329	0.0	0.0	0.0	PROTEIN-ENRICHED
0.55119	0.0	0.0	0.54400	NATURAL INGREDIENTS
0.52235	0.0	0.0	0.0	MOISTURISES HAIR
0.0	0.72218	0.0	0.0	MILD TO HAIR
0.0	0.70485	0.0	0.0	MILD FRAGRANCE
0.0	0.63888	0.0	0.0	ATTRACTIVE PACKAGING
0.43425	0.46878	0.0	0.0	GENTLE TO USE EVERYDAY
0.0	0.42333	0.41921	0.0	ECONOMICAL TO USE
0.0	0.0	0.65539	0.0	EASY TO STYLE
0.0	0.0	0.63926	0.0	EASY TO COMB
0.0	0.40745	0.51701	0.0	FALLING HAIR
0.0	0.0	0.49781	0.0	BODY TO HAIR
0.0	0.0	0.48484	0.0	NO IRRITATING FRAGRANCE
0.0	0.0	0.45981	0.44225	COLOUR
0.0	0.0	0.42963	0.0	RINSES EASILY
0.0	0.0	0.40881	0.0	GOOD CONDITIONERS
0.0	0.0	0.0	0.79998	HAIRDRESSER
0.0	0.0	0.0	0.76944	CELEBRITY
0.0	0.0	0.0	0.48428	LASTING FRAGRANCE
0.42308	0.0	0.0	0.0	COMPATIBLE TO HAIR
0.0	0.0	0.40714	0.0	BOUNCY HAIR
0.0	0.0	0.0	0.47442	HAIR EXPERT
0.0	0.0	0.0	0.40064	pH-BALANCED FORMULA
0.0	0.41350	0.0	0.0	PLEASANT FRAGRANCE
0.42441	0.0	0.0	0.0	EASY TO USE PACKAGING
20.76802	1.86061	1.47046	1.39889	Eigenvalue
0.6676	0.0598	0.0473	0.0450	Variance Explained

*Zeroes replaced all items that failed to hurdle the 0.40 minimum criterion.

Kaiser's Measure of Sampling Adequacy:
Over-all MSA = 0.92835711

Eigenvalues of the Reduced Correlation Matrix:
Total = 31.1076279   Average = 0.7776907

Two benefit chains for clean hair would look like these below:

Benefit 1		Benefit 2		Benefit 3
1. clean hair	→	is smooth and soft	→	get compliments on beautiful hair
2. clean hair	→	has no dandruff	→	receive no unpleasant comments about my hair

It important to know, however, that every consumer uses the benefit-chaining principle differently.

This benefit chaining principle has parallels to the benefit composition rule in advertising. Rossiter and Percy (1987, p. 179) argued that a consumer "combines benefits in mentally arriving at an attitude towards a brand." The formation of positive or negative attitude towards a brand influences the brand choice decision and later on the brand purchase. The primary reason for combining benefits is to simplify the information processing within a consumers mind. This was the reason for combining the questionnaire items into the factors. Later, a reliability analysis would show that there is high correlation between the combined items into the factor.

The second set of factor analysis examines the social groups who are associated to their chosen shampoo brands. The three variables that explain the social groups variance are males (74 percent of variance), females (19 percent) and rich people (9 percent). From the conditional value, advertising and promotion (96 percent), and price (7 percent) are interpreted as factors. From the emotional value items, an aspirer mind-set variable (eigenvalue = 5.38) is identified. It explains 76 percent of the emotional variance and loads high on items such as professional (0.88), high-fashion (0.85), rich (0.82), young (0.81), and attractive (0.65). The novelty value identifies a brand switching attitude as an explanatory variable.

Besides the five-value classification of the Sheth-Newman-Gross (1991), there is a simpler method of classifying the choice determinants in a multinomial logistic regression model. The attributes and situational factors are known as the "characteristics of choice." On the other hand, the psychographic attitudinal profiles and demographic variables are grouped into "characteristics of the chooser" or the decision maker.

The characteristics of choice were reduced to thirteen variables generated from the factors in functional, emotional, and conditional values. In contrast, the variables identified from social groups and novelty values best describe the consumer (the chooser), rather than the shampoo brand (the choice). Meanwhile, the characteristics of the decision maker is described in the next chapter.

5.3.2 Toothpaste

Similarly, five separate factor analyses were performed on the toothpaste pretest data. The scree plot in Figure 5.3.2 shows that up to 8 factors can be extracted from the analysis of the 33 variable items. Table 5.3.2 is the first part of the functional value rotated factor structure. The Kaiser's measure of sampling adequacy is still high at 0.90 for the 105 respondents.

The first factor (eigenvalue = 15.70) accounts for 62 percent of the functional value variance. The five items with the highest loadings are: makes mouth feel just like coming from a dentist after brushing (0.72), cleans teeth thoroughly (0.71), encourages children to brush their teeth (0.64), gives shiny teeth (0.61), and long-lasting fresh breath (0.60). With the exception of the third item, all items can be associated with the clean teeth and its benefits. Therefore, factor 1 is interpreted as the cleaning ability of a toothpaste. Using the same procedure, factors 2 to 4 are interpreted as cavity protection, approval of dentists, and whitening power respectively.

In terms of social groups that are associated with a toothpaste brand, two factors are extracted by using the scree plot criterion. The first factor (91 percent of variance) is labelled as mainstreamers while the second factor (9.6 percent) is identified to be low-income earners. The conditional value analysis obtains promotion (88 percent of variance) as the first factor. Such factor loads high on items such as sales promotion (0.82), new toothpaste (0.79), prestigious department store (0.75), television advertisement (0.63) and friends stop using

Figure 5.3.2

SCREE PLOT OF EIGENVALUES

FOR TOOTHPASTE FUNCTIONAL VALUE

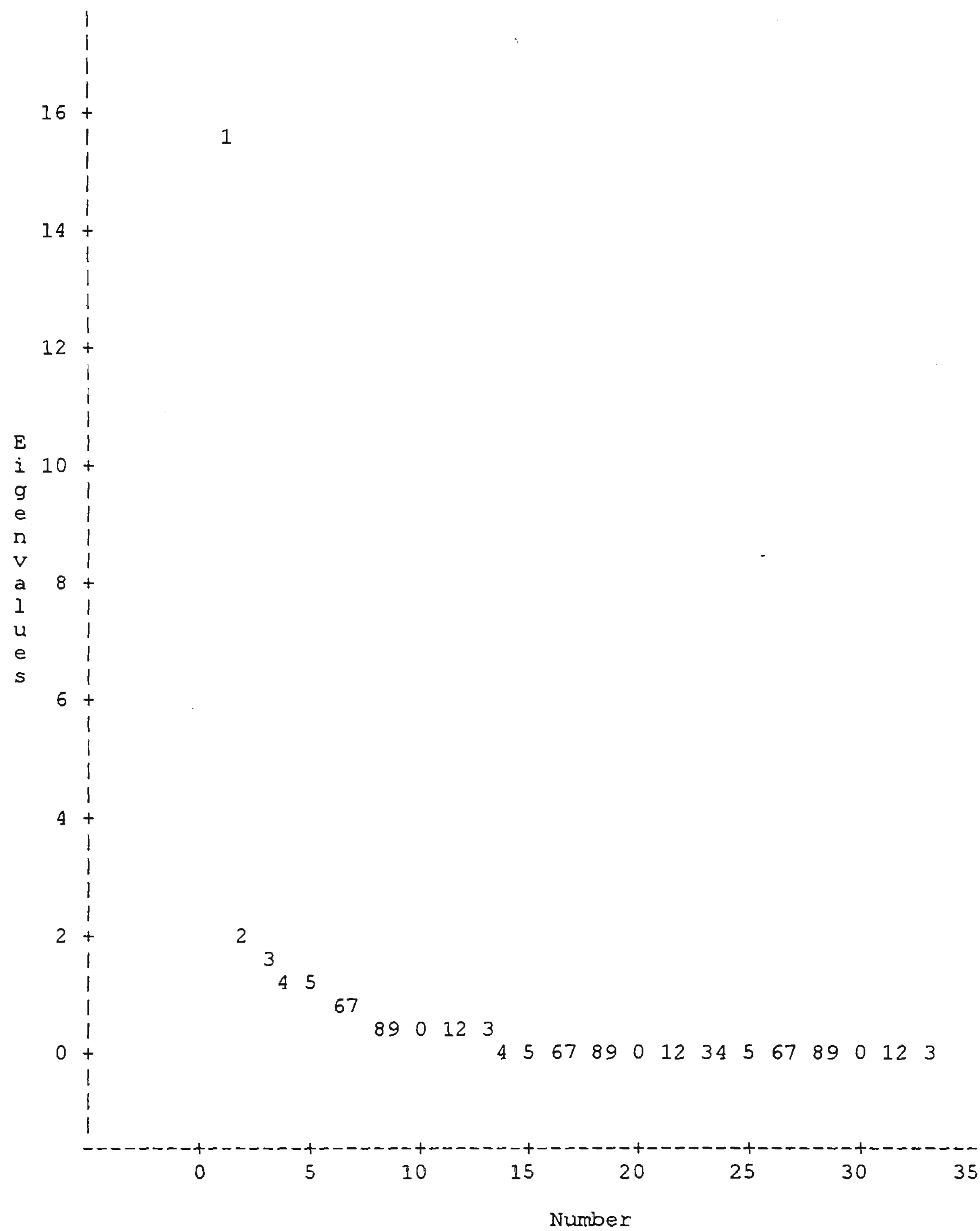


Table 5.3.2

PARTIAL ROTATED FACTOR STRUCTURE

FOR TOOTHPASTE FUNCTIONAL VALUE

PRINCIPAL FACTOR ANALYSIS WITH VARIMAX ROTATION*

FACTOR1 cleaning ability	FACTOR2 cavity protectn	FACTOR3 dentists approval	FACTOR4 white teeth	VARIABLE NAME
0.71527	0.0	0.0	0.0	PROPHYLAXIS FEEL
0.71400	0.0	0.0	0.0	CLEANS TEETH THOROUGHLY
0.63969	0.0	0.0	0.0	ENCOURAGE CHILDREN
0.61217	0.0	0.0	0.0	SHINY TEETH
0.60651	0.0	0.51579	0.0	LONG-LASTING FRESH BREATH
0.57487	0.0	0.0	0.0	STRONG TEETH
0.57241	0.0	0.0	0.40779	TARTAR REDUCTION
0.53315	0.0	0.0	0.0	ALL DENTAL PROBLEMS
0.47856	0.0	0.0	0.41981	HEALTHY TEETH
0.42678	0.0	0.0	0.0	WORKS AFTER BRUSHING
0.0	0.84359	0.0	0.0	FRESH BREATH
0.0	0.81921	0.0	0.0	CAVITY PROTECTION
0.0	0.79712	0.0	0.0	GUM PROTECTION
0.0	0.71668	0.0	0.0	CONFIDENCE
0.0	0.0	0.65376	0.0	DENTAL SEAL
0.0	0.0	0.65081	0.0	DENTISTS RECOMMENDED
0.0	0.0	0.62922	0.0	LEADING MFR
0.0	0.0	0.57106	0.47797	SENSITIVE TEETH
0.0	0.0	0.0	0.64849	PLAQUE REDUCTION
0.0	0.0	0.0	0.64671	MOUTH FEELS CLEAN
0.44349	0.0	0.0	0.57665	WHITE TEETH
0.40117	0.0	0.0	0.54981	TEETH FEEL SMOOTH
0.0	0.0	0.0	0.43725	EVERYDAY USE
0.0	0.0	0.40332	0.45461	HAS FLUORIDE
15.7057	2.1461	1.6989	1.3358	Eigenvalue
0.6201	0.0847	0.0671	0.0527	Variance Explained

*Zeroes replaced all items that failed to hurdle the 0.40 minimum criterion.

Kaiser's Measure of Sampling Adequacy:
Over-all MSA = 0.90204418

Eigenvalues of the Reduced Correlation Matrix:
Total = 25.3283194   Average = 0.76752483

brand (0.53). The second conditional factor is dissatisfaction with current brand (10 percent of variance) because of price increase, deterioration in quality performance and flavour fatigue.

Furthermore, the emotional value analysis highlights two factors. The first one is labelled confident (88 percent of variance) describing the contented feeling of having clean and healthy teeth. The other factor, however, is similar to the aspirer mind-set factor in shampoo. It loads high on items such as rich (0.76), attractive (0.62), and young (0.61). Finally, the novelty items are summarised into two factors: "curiosity," brought about by new brands, packaging redesigns, sales promotions or even trying their friends' different brand, and for a "change of pace" mainly to get a better tasting toothpaste.

5.4 Reliability Measures

The factors and their underlying item variables were subjected to reliability analysis. The reliability coefficient of the scale and its items would enable other researchers to duplicate the study later. A scale is internally consistent when its items are highly intercorrelated (DeVellis 1991, Nunnally 1978). Thus, a major assumption is that the items on the scale are positively correlated with each other because they are measuring a common entity. To test internal consistency the most commonly used is Cronbach's (1951) coefficient alpha, α. It is based on the average correlation of items within a test, if items are standardised.

Theoretically, alpha can take values from 0.0 to 1.0. The minimum acceptable alpha varies from 0.50 to 0.70 among researchers. DeVellis (1991) formulates these comfort ranges of research scales which may serve as starting point: below 0.60 , unacceptable; between 0.60 and 0.65, undesirable; between 0.65 and 0.70, minimally acceptable; between 0.70 and 0.80, respectable; between 0.80 and 0.90, very good; much above 0.90, one should consider shortening the scale.

Alphas were calculated for each labelled factor. The alpha values range from 0.71 to 0.92 in shampoo, and 0.79 to 0.91 in toothpaste. Tables 5.4.1 and 5.4.2 list the scales, their item measures, factor loadings, and Cronbach alphas for both shampoo and toothpaste products.

Table 5.4.1

QUESTIONNAIRE ITEMS USED FOR SHAMPOO SCALES

Scale Name	Questionnaire Items[a]	Factor Loading	Alpha
	My shampoo brand...		
Body to Hair	1. is compatible with my hair.	0.56	0.84
	2. makes my hair shiny and beautiful	0.51	
	3. gives body to my hair.	0.49	
	4. leaves hair bouncy.	0.44	
Cleaning ability	1. gives hair a clean smell after use.	0.73	0.92
	2. cleans hair thoroughly.	0.71	
	3. leaves hair soft and smooth.	0.69	
	4. makes my hair and scalp healthy.	0.58	
	5. moisturises hair.	0.52	
	6. cleans scalp thoroughly.	0.40	
Hair manage-ability	1. leaves hair easy to style/manage.	0.66	0.81
	2. leaves hair easy to comb when wet.	0.64	
	3. rinses easily.	0.43	
	4. has good conditioners.	0.41	
Dandruff control	1. prevents dry brittle hair.	0.71	0.84
	2. leaves hair tangle-free.	0.66	
	3. gets rid of dandruff.	0.46	
Mild fragrance	1. has mild fragrance.	0.70	0.80
	2. does not have irritating fragrance.	0.40	
Gentleness to hair	1. is mild/not harsh to hair.	0.72	0.86
	2. has pH-balanced formula.	0.60	
	3. is gentle to use everyday.	0.47	
	4. does not cause falling hair.	0.41	
Fragrance	1. has a pleasant fragrance I like.	0.55	0.85
	2. has lasting fragrance.	0.46	
Variants	1. has different fragrances to choose from.	0.62	0.71
	2. is good for my family	0.45	

[a]A seven-point Likert scale (7 = Strongly Agree and 1 = Strongly Disagree) was used to assess the scale items.

Table 5.4.1 - Continued.

Scale Name	Questionnaire Items[a]	Factor Loading	Alpha
	My shampoo brand...		
Endorse-ments	1. is endorsed by hairdresser.	0.80	0.84
	2. is endorsed by celebrity.	0.77	
	3. is endorsed by hair scientist/expert.	0.47	
Price	1. is affordable.	0.57	0.77
	2. is economical	0.40	
Packaging	1. has attractive and prestigious packaging.	0.64	0.74
	2. offers convenient opening/closing.	0.43	
	Feelings associated with your decision to use your shampoo brand. I feel...		
Rich feeling	1. professional when I use my brand.	0.88	0.92
	2. I'm using a high fashion brand.	0.85	
	3. rich when I use my brand.	0.82	
	4. young when I use my brand.	0.81	
	5. attractive when I use my brand.	0.65	
	Conditions that might cause you to switch to another brand.		
Promotion	1. After viewing a convincing television advertisement.	0.68	0.91
	2. When friends stop using your brand.	0.68	
	3. When a prestigious department store sells another brand.	0.57	
	4. When there is a new shampoo.	0.51	
	5. When you are given free sample.	0.49	
	6. When other brands have sales promotion.	0.48	

[a]A seven-point Likert scale (7 = Strongly Agree and 1 = Strongly Disagree) was used to assess the scale items.

Table 5.4.2

QUESTIONNAIRE ITEMS USED FOR TOOTHPASTE SCALES

Scale Name	Questionnaire Items[a]	Factor Loading	Alpha
	My toothpaste brand...		
Cleaning ability	1. makes my mouth feel just like coming from my dentist after brushing with it.	0.72	0.84
	2. cleans my teeth thoroughly.	0.71	
	3. helps to make my teeth shiny.	0.61	
Whitening power	1. reduces plaque.	0.65	0.88
	2. helps to keep my teeth white.	0.58	
	3. leaves teeth feeling smooth.	0.55	
Cavity protection	1. protects my teeth from cavities.	0.82	0.84
	2. protects my gums.	0.80	
	3. makes my teeth strong and healthy.	0.45	
	4. helps strengthens teeth.	0.40	
Tartar reduction	1. cares for all dental problems.	0.43	0.86
	2. reduces tartar build-up.	0.42	
Fresh breath	1. good for sensitive teeth.	0.57	0.80
	2. leaves long-lasting fresh breath.	0.52	
	3. freshens my breath.	0.40	
Cap	1. is good value for money.	0.69	0.80
	2. has attractive paste/gel colour.	0.67	
	3. offers convenient opening/closing.	0.64	
	4. contains new ingredients.	0.46	
	5. helps encourage children to brush their teeth regularly.	0.44	
Taste	1. has pleasant minty taste I like.	0.51	0.84
	2. leaves mouth feeling clean and healthy.	0.42	
	3. is good for everyday use.	0.40	
Flavour variants	1. has different flavours to choose from.	0.66	0.81
	2. is good for the whole family.	0.62	
	3. contains fluoride to fight tooth decay.	0.49	

[a]A seven-point Likert scale (7 = Strongly Agree and 1 = Strongly Disagree) was used to assess the scale items.

Table 5.4.2 - Continued.

Scale Name	Questionnaire Items[a]	Factor Loading	Alpha
	My toothpaste brand...		
Dentists' approval	1. is approved by dentists.	0.65	0.86
	2. is recommended by dentists.	0.65	
	3. is made by a leading manufacturer.	0.63	
Price	1. has a low price.	0.81	0.79
	2. is affordable.	0.73	
	Feelings associated with you decision to use your toothpaste brand. I feel ...		
Confident feeling	1. confident when I use my brand.	0.82	0.89
	2. healthy when I use my brand.	0.72	
	3. contented when I use my brand.	0.65	
	4. happy when I use my brand.	0.65	
	Conditions which might cause you to switch to other brands.		
Promotion	1. When other brands have sales promotion.	0.82	0.91
	2. When there is a new toothpaste.	0.79	
	3. When a prestigious department store sells another brand.	0.75	
	4. After viewing a convincing television advertisement.	0.63	

[a]A seven-point Likert scale (7 = Strongly Agree and 1 = Strongly Disagree) was used to assess the scale items.

5.5 Summary

Factor analysis was utilised as a data reduction procedure to obtain a manageable number of predictors for the logit models. Thirteen continuous variables were derived for shampoo, while twelve variables were obtained for toothpaste. The reliability coefficients of the explanatory variables ranged from good to excellent.

The last two chapters covered in detail most of the methodological issues. More importantly, they operationalised the concept of brand choice and provided measures for the dependent and independent variables. Chapter 4 outlined the general procedure, sampling and instrument design, and variable measures. Subsequently, Chapter 5 obtained the attributes that distinguish the alternative brands from each other.

The next part of the dissertation presents the results. Chapter 6 discusses the characteristics of the decision maker. These explanatory variables consist of the consumer attitudinal profiles and the demographic variables. This leads to three chapters that present the model results.

PART III

RESULTS

CHAPTER 6
ATTITUDINAL PROFILES, USAGE PATTERNS, AND CONSIDERATION SETS

6.1 Introduction

After summarising the characteristics of the choice brands the next step is to operationalise the characteristics of the chooser in terms of demographic variables and consumer attitudinal profiles. This chapter has three key objectives: first, to provide a demographic summary of the sample, second, to discuss the results of consumer attitudinal profiles, and third, to summarise some aggregate market information that provides a suitable context to the brand choice models. Such background information may identify issues that would be helpful to management in formulating marketing strategies and tactics.

The first two sections of the chapter describe the sample and results of the consumer attitudinal profiling. Consequently, two sections discuss the usage patterns and consideration sets. Finally, the last section describes the attribute value and ranking systems of consumers including the brands chosen by most customers and current brand satisfaction ratings. Thus, this provides background on shampoo and toothpaste market prior to the model results.

6.2 The Sample

The main survey was conducted last July to August 1996 with the assistance of fifteen interviewers. The composition of the sample is similar to the pretest sample in many aspects. Unmarried females, and those under the 26 years of age comprise most of the respondents to the survey. A majority of the respondents possess at least 10 years of education, and earn an average monthly income between A$ 250-750. Table 6.2.1 describes the sample.

Table 6.2.1

SAMPLE DEMOGRAPHIC SUMMARY

Demographic Variable			Shampoo	Toothpaste
Number of people surveyed			500	500
Number responding (percentage)			460 (92 %)	451 (90 %)
Males			185 (40 %)	208 (46 %)
Females			275 (60 %)	243 (54 %)
Respondents under 26 years of age			303 (64 %)	286 (63 %)
Number of unmarried respondents			273 (59 %)	252 (56 %)
Education:	at least 10 years		441 (96 %)	449 (99 %)
	at least 14 years		200 (43 %)	177 (39 %)
Family Size:	1 - 2 persons		33 (7 %)	21 (5 %)
	3 - 4 persons		121 (26 %)	117 (26 %)
	5 - 6 persons		194 (42 %)	202 (45 %)
	7 or more persons		112 (25 %)	111 (24 %)
Average Monthly Income		below A$ 250	148 (32 %)	125 (28 %)
		A$ 250 - 750	264 (57 %)	241 (53 %)
		above A$ 750	48 (11 %)	85 (19 %)

N.B. Except for the response rate, items enclosed by parentheses are percentage of people responding.

Respondents to the shampoo questionnaire tend to be more highly educated than those who answered the toothpaste questionnaire. A greater proportion (43 percent) of shampoo respondents have completed 14 years of education. However, there are more toothpaste respondents who have completed high school, equivalent to ten years of education. At least two-thirds of the respondents belong to a household with 3 to 6 persons, compared to the Metro Manila average of 4.7 persons (1995 Population Census). In addition, at least 63 percent of the respondents have ages below 26 years, whereas about 66 percent of the Metro Manila population is aged below 30 years.

It seems fair to say that the shampoo and toothpaste samples are representative of the urban population. At any rate, one needs to note two limitations which may result in sampling bias: being too orientated towards females and lower income people. However, these biases appear to be in the right direction. Whilst the population has almost equal ratio of females to males, it is generally the females who make the decision in purchasing personal care products like shampoo and toothpaste. This is particularly true for toothpaste, where mothers choose the toothpaste brand of their families (Personal Communication 2, 1996).

With regard to monthly average income, more than half of the respondents have incomes that is close to the average monthly family income of A$470 in Metro Manila, and A$345 in the Philippines (National Statistics Office, 1994 Family Income and Expenditure Survey). The same survey also found that 23.5 percent of Metro Manila families have monthly incomes below A$ 250; 37.8 percent have incomes between A$250-625; 34.9 percent with incomes between A$625-2080; and only 3.7 percent of families have monthly incomes exceeding A$ 2080.

6.3 The Consumer Attitudinal Profiles

Consumer attitudinal profiles are determined by scales that contain items to reflect "feelings" towards certain situations. The scale items and classification rules were discussed in Chapter 4. Table 6.3.1 indicates the number of respondents and the percentages classified by the scales to exhibit the attitudinal profile while Table 6.3.2 contains the results of the reliability analysis on the scales designed by other researchers.

The brand switching scale classifies 5 percent of the respondents as switchers implying that 95 percent are brand loyal. However, only 30 percent of shampoo respondents and 40 percent of the toothpaste respondents claim to be brand loyal. A hypothesis that can be drawn from this behaviour is that the consumers are loyal to two or three variants[16] of a brand and switch between

---

[16] Each brand variant has a unique ingredient, usually in terms of fragrances in shampoo and flavours for toothpaste. However, all brand variants generally have the same base formulation. Generally, variants have distinct personalities in terms of concepts and packaging labels. For example, a shampoo brand may have a variant for normal hair, and another one for dry hair. Another shampoo brand may have the same fragrance in all its variants, but the variants have different hair conditioning levels.

them occasionally. A major shampoo or toothpaste marketed under a brand name usually carries up to five variants. This hypothesis may not be plausible for shampoo data because the scale reliability is poor. Therefore, the brand switching results from were discarded because of the scale's low internal consistency. Section 6.4 further discusses the brand switching behaviour.

The brand innovativeness scale measures the perceived tendency of the consumer to try new brands. It shows that only 9 percent of the respondents can be categorised as variety seeking consumers. While it is true that this result agrees with the brand switching scale findings, anecdotal evidence proves otherwise (Personal Communication 2 and 3, 1996). Moreover, the low values of Cronbach's coefficient alpha (0.39 in shampoo and 0.17 in toothpaste) reveal that the scale has low internal consistency. Hence, no further analysis was made with this scale. The low alphas in both products merely confirm Wells and Tigert's (1971) finding. Thus, reliable measures of brand innovativeness or variety-seeking need to be designed.

Table 6.3.1

CONSUMER ATTITUDINAL PROFILES*

Attitudinal Profile	Shampoo Number (percent)	Toothpaste Number (percent)
Brand Switching	22 (4.8)	26 (5.8)
Brand Innovativeness	41 (8.9)	25 (5.5)
Purchase Decision Involvement	278 (60.4)	291 (64.5)
Social Consumption Motivation	83 (18.0)	60 (13.3)
Product Knowledgeability	128 (27.8)	68 (15.1)

*Percentages are based on sample sizes: shampoo, n = 460; toothpaste, n = 452.

Table 6.3.2

ATTITUDINAL SCALE RELIABILITY USING CRONBACH ALPHA

Attitudinal Profile Scale	Shampoo	Toothpaste
Brand Switching	0.2699	0.6154
Brand Innovativeness	0.3881	0.1710
Purchase Decision Involvement	0.8120	0.8057
Social Consumption Motivation	0.8522	0.8479
Product Knowledgeability	0.7654	0.7408

Around 60 percent of the respondents exhibit high involvement when making their shampoo or toothpaste purchase decision. This is a high percentage for a product classified in the literature as low-involvement, frequently purchased item. The computed alpha values have high reliability and lie within the 0.75 to 0.81 range reported by Ratchford (1987).

Higher scores on the consumption motivation scale indicate a high sensitivity of the respondents about the social visibility of their consumption. This scale reveals that only 13 to 18 percent claim to be motivated by friends, or other people when buying and using a particular brand. Both products have high alpha of 0.85 which is within the 0.74 to 0.85 range reported by Moschis (1981).

The product knowledgeability scale classifies 27.8 percent of the shampoo respondents to be familiar about various shampoo brands and hair problems, or liked watching shampoo television advertisements and listening to shampoo radio commercials. In the case of toothpaste, it is found to be as low as 15.1 percent. This scale is specially designed for this investigation. Alphas of 0.76 for shampoo and 0.74 for toothpaste infer that the scale is reliable.

6.4 Usage Patterns

A major element of consumption behaviour includes the product usage practices. An understanding that increasing consumption among the current users is less costly than capturing new customers is an invaluable information to the manufacturers and marketers. To improve product sales marketers generally identify the light, medium and heavy users and design specific marketing programs for each and every category. In addition, they may want to look at circumstances that may trigger the use of the product and then to check whether the product is actually used. Thus, this section attempts to fill a distinctive gap in usage studies.

This is achieved by first identifying the times that possibly require the usage of the product. Then given each circumstance where the washing or brushing activity is possibly performed, the consumers indicate their habitual usage. Accordingly when washing or brushing is performed, the product usage is also elicited. Such information enables marketers to create appropriate advertising and publicity programs to address the areas where consumption of the product is low.

6.4.1 Shampoo

The main survey reveals interesting insights into shampoo usage. About 78 percent of the respondents wash their hair once a day and 69 percent use shampoo every time they wash their hair. Moreover, 94 percent believe that it is important to use shampoo when washing hair. Table 5.4.1 details possible times requiring washing of hair and when shampoo is being used. The third column of the table is more important because it contains the difference between the two activities.

Table 6.4.1

INCIDENCE OF HAIR WASHING AND WASHING WITH SHAMPOO

Possible Hair Washing Time	Wash Hair? (percent)	Shampoo? (percent)	Difference (percent)
During morning bath	85.2	84.3	0.9
During evening bath	43.2	33.0	10.2
Before going out	61.6	57.9	3.7
Before seeing people	58.7	56.8	1.9
After travelling	44.5	41.7	2.8
During a hot and humid day	75.8	68.7	7.1
After working	29.9	26.6	3.3

High incidences of washing hair and heavy shampoo use occur during the morning bath. At this time, 84.3 percent of the consumers wash their hair with shampoo. By contrast, there is a low usage of shampoo during the evening. Among those who wash hair in the evening, 10.2 percent do not use shampoo. Similarly, washing hair without using shampoo is prevalent among 7.1 percent of the respondents during a hot and humid day. The difference between washing hair and shampoo use is about 2 to 3 percent for other circumstances.

Another relevant information is that about 67 percent buy shampoo for personal use, with only 42 percent purchasing shampoo for family use. Almost two thirds (62 percent) of the respondents claim to use a shampoo brand bought by others. Of this number, 237 people (83 percent) use the shampoo only if it was their chosen brand.

More than half (56 percent) of the respondents appear to buy several shampoo brands at the same time. This practice is possible in the Philippines because of the availability of shampoo in small-sized sachet packaging of 5 and 10 ml. In fact, a periodic audit in 1996 by a market research firm where a major Philippine shampoo manufacturer subscribes to, showed that 62 percent of the shampoo business is in sachets (Personal Communication 3, 1996). The remainder is packaged in bottle sizes of 100 and 200 ml. Such bottle sizes are comparably small by developed country standards. As observed by this researcher, 375-ml is the smallest bottle size sold by major shampoo brands in Melbourne supermarkets since 1994. Pantene is now selling in 200 ml size, but it is imported from Taiwan.

Brand switching behaviour is largely influenced by the availability of small sachets of most major brands in a saturated shampoo market. Although the brand switching scale did not give the expected result, three explicit questions of the survey probed for brand switching. The first two elicit past brand switching behaviour while the third one asks about switching intention. The responses to the three questions consistently show that brand switching is practiced by about 72 percent of the respondents. To confirm this result a separate question reveals that only 30 percent of the respondents claimed to be loyal to only one shampoo brand.

6.4.2 Toothpaste

About 90 percent of the respondents brush their teeth with toothpaste at least two times a day. Incidence of brushing with toothpaste three times a day is 53 percent. Not surprisingly, 98 percent believe that it is important to use toothpaste when brushing teeth. Table 6.4.2 contains incidence of brushing and brushing with toothpaste.

Table 6.4.2

INCIDENCE OF BRUSHING AND BRUSHING WITH TOOTHPASTE

Possible Brushing Time	Brush Teeth? (percent)	Use Toothpaste? (percent)	Difference (percent)
After getting out of bed	84.3	83.8	0.5
Before going to bed	93.6	93.3	0.3
Before going out	73.4	72.9	0.5
Before meeting people	68.3	68.1	0.2
After eating	90.9	90.7	0.2
After smoking	20.0	20.0	.0
After drinking alcohol	19.5	19.5	.0

Brushing is synonymous with using toothpaste. There is practically no difference between the percentage of those who brush their teeth and the percentage of those who use toothpaste during their brushing. Brushing with toothpaste is highest before going to bed at 93.3 percent and after eating at 90.7 percent. The low percentages for brushing after smoking and after drinking alcohol appear to be explained by very few smokers or drinkers in the sample that is dominated by females.

Another vital information is that about 43.5 percent buy toothpaste for their own use, while 63.4 percent claim to purchase toothpaste for family use. Unlike shampoo where users tend to have their personal brands, sharing of toothpaste is predominant in 327 people (72 percent). Of this number, 282 people (62.5 percent) use the toothpaste only if it was their chosen brand. This finding supports the view that even in urban areas of the Philippines a family still uses a particular toothpaste brand each time.

About 42 percent of the respondents seem to have a habit of buying several toothpaste brands at the same time. Like shampoo, toothpaste is also marketed in small-sized sachet packs of 5 and 10 ml. However, only about 15 percent of the toothpaste business is in sachets because of the proliferation of low priced brands (Personal Communication 2, 1996). The remaining packaging sizes are in tubes of 25, 50, 100 and 150 ml. Over sixty percent of the toothpaste respondents practice brand switching behaviour. In replying to a separate question, only 40.1 percent claim to be loyal to only one toothpaste brand.

6.5 Consideration Set

The determination of consideration set size utilises the concepts commonly used in advertising, the unaided and aided recall. Each respondent names as many shampoo brands she/he would consider buying in the future given his or her aided or unaided awareness of the brands. In the aided awareness method the respondent checks all candidate brands from a given list that might enter his or her consideration set.

A useful information to marketers is to know what percentages of the respondents include their brands in the consideration sets. In a saturated market like in Metro Manila, with over a hundred brands for shampoo and about fifty brands for toothpaste, the basic strategy is to first enter the consideration set of consumers. Roberts and Lattin (1991) explicated that most leading brands hold large share advantages by entering the consideration sets of more consumers than do their competitors.

Therefore it may be useful to study the relationship between these consideration numbers and the brand market shares in Metro Manila during the period of the survey (Tables 6.5.1 and 6.5.2). It must be noted, however, that market shares are already consumer choices and necessarily smaller than consideration set percentages. To gain more insight the table also includes the brands chosen by the consumers. Most of the minor brands slightly increase their percentage of being considered during the aided awareness method. The reverse is true for most major brands.

6.5.1 Shampoo

The highest number of brands in a consideration set in the sample is 19. When unaided, the average consideration set is 5.03 brands (median, mode = 4). When aided, the average consideration set is 5.19 (median = 4.5; mode = 4). This size of consideration set is slightly higher than the 3.4 shampoo brands determined by Reilly and Parkinson (1985). Pantene is included in the consideration set of 64.5 percent of respondents but the other brands are not far behind. There is a strong competition among the shampoo brands. This can be observed from Table 6.5.1 where eight brands belong to the evoked set of at least 30 percent of the respondents and no brand is dominant in market shares.

The difference between the brands chosen by the respondents to the actual market share is minimal. Pantene appears to be an exception, but Pantene's high consideration numbers could explain this phenomenon. In a market where only about thirty percent is brand loyal, there would be times when a brand suddenly increases market share temporarily because of a sales promotion or new television advertisement.

Table 6.5.1

CONSIDERATION AND BRAND CHOICE AMONG SHAMPOO USERS

BRAND	CONSIDERATION SET		ACTUAL	
	UNAIDED (percent)	AIDED (percent)	CHOSEN BRAND (percent)	MARKET SHARE (percent)
Dimension	2.0	5.0		
Flex	3.1	4.8		
Gee	5.3	7.0		
Gard	26.1	23.7		5.0
Head & Shoulders	33.3	33.1	11.3	6.0
Ivory	48.0	50.4	13.5	12.0
Johnson's Baby Shampoo	5.7	11.4		3.0
Lux	43.6	44.1	9.1	7.0
Nature's Way Aloe Vera	7.0	8.1		
Organics	17.3	19.1		4.0
Palmolive Naturals	52.9	44.1	11.7	14.0
Palmolive Optima	41.0	52.0	7.8	7.0
Pantene	70.2	64.5	22.4	12.0
Rejoice	53.3	55.5	11.5	10.0
Salon Selectives	3.1	6.6		
Sassoon Vidal	31.4	30.9		4.0
Selsun Blue	2.6	2.4		
SM Bonus	0.4	0.4		
Sunsilk	41.4	32.7	8.7	10.0
Wella Balsam	2.6	5.3		
Others	23.7	0.2	3.9	7.0

Table 6.5.2

CONSIDERATION AND BRAND CHOICE AMONG TOOTHPASTE USERS

BRAND	CONSIDERATION SET UNAIDED (percent)	CONSIDERATION SET AIDED (percent)	ACTUAL CHOSEN BRAND (percent)	ACTUAL MARKET SHARE (percent)
Beam Blue	8.6	14.2		
Beam White	34.1	17.7		
Total Beam[a]	41.5	24.6	3.3	5.0
Crest Junior	0.2	1.8		
Crest White	4.9	3.3		
Total Crest[a]	4.9	4.4		
Close-Up Green	13.5	44.8		
Close-Up Red	72.0	62.1		
Close-Up White	11.3	37.9		
Total Close-Up[a]	85.4	79.6	22.6	24.0
Fluocaril	5.3	4.9		
Colgate Fresh White	74.9	73.4		
Colgate Green	10.6	43.0		
Colgate Blue	12.2	44.1		
Colgate Mintirinse Blue	10.0	45.7		
Colgate Mintirinse Red	12.9	42.6		
Colgate Total	11.5	44.3		
Colgate Total Stripe	4.0	32.2		
Total Colgate[a]	97.6	96.0	63.1	45.0
Hapee Junior	2.0	10.6		
Hapee Green	9.5	20.8		
Hapee Red	10.0	21.1		
Hapee White	40.8	26.4		
Total Hapee[a]	57.4	44.8	8.4	18.0
Maxam	18.0	8.6		
Oral B	7.3	8.2		
Pepsodent Blue	8.9	13.5		
Pepsodent Pink	23.9	14.4		
Total Pepsodent[a]	31.7	22.0	1.3	1.0
Sensodyne	10.2	11.1		
Unique	5.1	0.2		
Kutitap	0.2	0.2		
Others	8.9	0.2	1.3	7.0

[a]A brand is considered when at least one of its flavour variants is chosen. When several variants of a brand were included in a respondent's consideration set, brand consideration was scored only once.

6.5.2 Toothpaste

The highest number of brand variants in a consideration set is 21. Given unaided awareness, the average consideration set is 4.33 variants (median = 4; mode = 3) while for aided awareness, the average consideration set is 6.47 (median = 5; mode = 3). Using the flavour variants in the awareness set, rather than the brand, explains the higher consideration set number obtained in the study. However, aggregating the considerations numbers of the variants into the brands yields consideration set sizes comparable to results of previous studies. The average consideration set size, given unaided awareness, is 3.75 brands (median = mode = 3) while for aided awareness, the average size is 3.05 brands (median = 3; mode = 2). These consideration numbers are comparable to 3.1 toothpaste brands found by Reilly and Parkinson (1985), and Campbell (1969), and 2 brands found by Narayana and Markin (1975).

In terms of consideration, two toothpaste brands are dominant. Colgate is included in the consideration set by 96.0 percent of the respondents while Close-Up is considered by 79.6 percent. On the other hand, the brand choice of the respondents appears to mirror the actual market share except for Colgate and Hapee. The percentage of respondents choosing Colgate is markedly higher that its actual market share. On the other hand, fewer respondents chose Hapee, a value less than its market share. The difference in measurement time may explain this discrepancy as the market shares are measured about six months before the survey. A major reason seems to be the price reduction in Colgate that occurred during the survey. Before the price reduction, Colgate was sold at 40 percent premium over Hapee. After the price reduction, the premium was reduced to 20 percent (Personal Communication 2, 1996).

6.6 Brand Choice and Brand Satisfaction Rating

Respondents ranked the brands in the given choice set. There were eight shampoo brands and five toothpaste brands. The highest ranked brand was considered as the brand choice. All respondents also rated their current brands on a scale of 1 to 7. A high satisfaction rating decreases the tendency to try new brands as the risk of dissatisfaction increases with untried brands.

6.6.1 Shampoo

According to frequency of use and purchase the respondents ranked the shampoo brands as: Pantene, Rejoice, Ivory, Palmolive Optima, Palmolive Naturals, Lux, Head & Shoulder, and Sunsilk. In terms of the next brand to be purchased, the order is: Pantene, Rejoice, Ivory, Palmolive Naturals, Lux, Head & Shoulders, Palmolive Optima, and Sunsilk.

Most of the respondents expressed a high degree of satisfaction with their current shampoo brands. On a scale of 1 to 7, the mean brand satisfaction rating is 5.66 with a standard deviation of 1.04. About 75 percent rate their current brand at least 5.

6.6.2 Toothpaste

According to frequency of use and purchase, the respondents ranked the toothpaste brands as: Colgate, Close-Up, Hapee, Beam, and Pepsodent. The same order applied in terms of the brand most respondents would most likely purchase next.

Most of the respondents were satisfied with their current toothpaste brands. On a scale of 1 to 7, the mean brand satisfaction rating is 5.77 with a standard deviation of 0.96. About 75 percent rate their current toothpaste brand at least 5.5.

6.7 Attribute Value and Ranking Systems

Any decision model will require not only the attributes or decision determinants but also the importance levels of each attribute. The study considered the importance levels by asking the consumer to assign ranks and values. Examination of the means identified the important attributes. It may be argued that this is very simple way of determining the important attributes. Discriminant and logit models would be used in identifying the important attributes in the succeeding chapters.

Using both ranks and values indicates that the five most important attributes in choosing a shampoo brand are: cleaning ability, body and shine, hair manageability, dandruff control, and gentleness or mildness to hair.

On the other hand, the five most important attributes for toothpaste as determined by both the ranking and value systems are: cleaning ability, cavity protection, whitening power, tartar reduction, and breath freshening. Price came out sixth as the most important attribute since the market is saturated with low priced toothpaste brands.

6.8 Summary

This chapter identified the demographic and attitudinal profiles that serve as independent variables in the logit models. It also contained the results of the reliability analysis of the attitudinal scales. Furthermore, the chapter described the shampoo and toothpaste market in Metro Manila, Philippines in terms of usage patterns and consideration set formation. It also identified five important attributes utilising the responses in the value and ranking systems. However, this findings are insufficient because it does not address how do these attributes influence brand choice.

To answer this question about saliency of the attributes, other analyses may be required. More specifically, these analyses employ models to represent the consumers' information processing when choosing their brands. It is expected that the modelling results would generate more useful information to management decision making. In this sense, the next stage is to investigate the causal relationships of the determinants of brand choice by developing and estimating the models.

The next three chapters present and discuss the model results using discriminant and logistic regression analyses. Chapters 7 and 8 outline the discriminant and logit model results for shampoo, while Chapter 9 includes the toothpaste findings from both discriminant and logit models.

CHAPTER 7
DISCRIMINANT MODELS FOR SHAMPOO

7.1 Introduction

This chapter attempts to model the relationships between shampoo brand choice and its determinants using discriminant analysis. Discriminant analysis is a useful tool in classifying respondents into their brands. It also identifies what variables are useful in the classification. Finally, through a territorial map generated in the analysis, brands that appear to be similar can be identified. The main objective of this chapter is to determine a discriminant model that best classifies the respondents into their chosen brands. Therefore, the main criterion for model selection is high predictive accuracy subject to the satisfaction of the underlying critical assumptions in model building.

Initially, the chapter presents the most common weighted additive model and its limitations. The first section on discriminant analysis deals with the linear function and its assumptions. It also presents the results of hypothesis tests to determine if there is any violation of assumptions. This leads to a section on the quadratic function and another section on nonparametric discriminant methods. Finally, the last section summarises the chapter.

7.2 The Weighted Additive Model

Using weighted additive models is a simple way of determining the brand choice of the consumer. Sometimes referred to as input-output models, they represent the basic structure of decision making, that of the relationship between inputs and outputs (Carrol and Johnson 1990). In marketing the most widely used technique is the Fishbein model (Ajzen and Fishbein 1975). While its popularity among the decision researchers has diminished, it is still useful as an initial working model.

The construction of a weighted additive model requires two inputs from the consumers. The first one is the allocation of importance rating to each attribute either by assigning values or ranks. The second input is the evaluation of each brand on every given attribute. The weighted score of each brand is simply the consumer ratings of each attribute multiplied by the rank or the value of that attribute. Hence, the total score for every brand is the sum of all weighted attribute ratings. The brand with the highest total score is the predicted choice. Therefore, one evaluates the prediction rate of the weighted additive model by simply comparing the predicted brand to the actual brand chosen by the consumer.

Table 7.2.1 contains the brand choice prediction rates of the two importance rating systems. When applied to the collected data, the highest prediction rate is only 50.7 percent using the values and 49.3 percent using the ranks. When compared to 12.50 percent prediction rate of a naive model, the prediction performance of the weighted additive model is very satisfactory.[17] Therefore, for this data, the weighted additive model fails to capture all the consumers' information processing during the selection of a shampoo brand. The following sections on discriminant analysis attempt to improve on this prediction.

Table 7.2.1

PREDICTION RATE OF THE WEIGHTED ADDITIVE MODEL: SHAMPOO

	Importance Rating System	
Brand Choice	Ranks (percent)	Values (percent)
Frequently Purchased Brand	49.3	50.7
Last Brand Bought	43.7	42.6
Next Brand To Be Purchased	47.4	47.8

7.3 The Linear Model

Hair, et. al (1995) stated that discriminant analysis is the appropriate statistical technique when the dependent variable is categorical (nominal or

[17] Since there were eight shampoo brands in the choice set, the probability of choosing each brand is 1 out of 8 or 12.50 percent.

nonmetric) and the independent variables are metric (interval or ratio data). In this study, discriminant analysis was utilised to describe the major differences among shampoo brands and to classify consumers into their chosen brands on one or more quantitative variables. Discriminant analysis achieves these objectives with parsimony of description and clarity of interpretation (Stevens 1992). There is parsimony because in comparing, say for example, five shampoo brands on thirteen variables, only four discriminant functions describe the difference between the brands. Moreover, there is clarity in interpretation because the separation of the groups along one function is unrelated and independent to the separation along a different function.

Sample size adequacy is an important factor to consider in designing a discriminant study. Two Monte Carlo studies implied that the sample size must be large enough relative to the number of variables so that the standardised coefficients and the correlations become stable (Barcikowski and Stevens 1975; Huberty 1975). The investigation employed 24 cases to every attribute which is slightly higher than the ideal ratio recommended by Stevens (1992) of twenty cases to every variable..

To simplify the analysis, only the top five shampoo brands in terms of market shares are included. The five shampoo brands are Ivory, Palmolive Naturals, Pantene, Rejoice, and Sunsilk. These five brands serve as groups or classes while the thirteen attributes are the independent variables. Chapter 5 gave a description of the attributes. After performing univariate analyses, the five attributes significant at 90 percent were used to generate the four canonical discriminant functions. An examination of the standardised coefficients identified the attributes that contribute most to the value of the discriminant function and useful in classifying consumers to their selected brands.

The SPSS Discriminant Procedure produced the following results. Table 7.3.1 outlines the variance explained by the discriminant functions. Figure 7.3.1 includes the test of equal group means using Wilks' lambda, the standardised coefficients, and the structure matrix. Finally, Figure 7.3.2 illustrates the territorial map that shows the separation between the brands.

Table 7.3.1 CANONICAL DISCRIMINANT FUNCTIONS: SHAMPOO

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr
1*	0.0738	52.80	52.80	0.2622
2*	0.0443	31.66	84.46	0.2059
3*	0.0206	14.77	99.22	0.1422
4*	0.0011	0.78	100.00	0.0330

*Marks the 4 canonical discriminant functions remaining in the analysis.

Figure 7.3.1 THE LINEAR DISCRIMINANT MODEL FOR SHAMPOO

TEST OF EQUAL GROUP MEANS USING WILK'S LAMBDA

After Fcn	Wilks' Lambda	Chi-square	df	Sig
0	0.872811	41.627	20	0.0031
1	0.937233	19.836	12	0.0703
2	0.978711	6.585	6	0.3609
3	0.998912	0.333	2	0.8466

STANDARDISED DISCRIMINANT FUNCTION COEFFICIENTS

Attribute	Func 1	Func 2	Func 3	Func 4
CLEAN	-.48099	.60388	-1.14473	1.11847
FRAGRANCE	-.15633	.61745	-.05423	-1.22821
GENTLE	1.04506	-.95100	.72377	.12462
STYLE	.59908	.57867	.45992	-.10328
VARIANT	-.90022	-.08156	.77487	.46567

STRUCTURE MATRIX

Pooled within-groups correlations between discriminating variables and canonical discriminant functions. Variables ordered by size of correlation within function.

	Func 1	Func 2	Func 3	Func 4
STYLE	.43781	.75728*	.40554	.24904
FRAGRANCE	.08247	.73847*	.44918	-.17964
CLEAN	.23250	.69998*	.14705	.54815
VARIANT	-.37762	.35336	.77007*	.31708
GENTLE	.49996	.30291	.56574*	.35579

*denotes largest absolute correlation between each variable and any discriminant function.

Figure 7.3.2

TERRITORIAL MAP FOR SHAMPOO

(Assuming all functions but the first two are zero)

```
      -3.0      -2.0      -1.0        .0       1.0       2.0       3.0
        +---------+---------+---------+---------+---------+---------+
C   3.0 +                            5334                           +
a       |                            5334                           |
n       |                            5334                           |
o       |                            53 34                          |
n       |                            53 34                          |
i       |                            53 34                          |
c   2.0 +         +         +        53 34      +         +         +
a       |                            53 34                          |
l       |                           53  34                          |
        |                           53  34                          |
D       |                           53  34                          |
i       |                           53  34                          |
s   1.0 +         +         +       53+ 34      +         +         +
c       |                           53  34                          |
r       |                           53  34                          |
i       |                           53  34                          |
m       |                          53   34                          |
i       |                        * 53  *34*                         |
n    .0 +         +         +      5333 34      +         +         +
a       |                         522*23344                         |
n       |                        52221*111144                       |
t       |                       51111      1144                     |
        |                     551            11444                  |
F       |                    511               11144                |
u  -1.0 +         +        551        +         + 1144    +         +
n       |                 511                       1144            |
c       |               551                           11444         |
t       |              511                              11144       |
i       |            551                                   1144     |
o       |           511                                      1144   |
n  -2.0 +         551       +         +         +         +   11444 +
        |        511                                            1114|
2       |      551                                                 1|
        |     511                                                   |
        |   551                                                     |
        |  511                                                      |
   -3.0 + 551                                                       +
        +---------+---------+---------+---------+---------+---------+
      -3.0      -2.0      -1.0        .0       1.0       2.0       3.0

                        Canonical Discriminant Function 1
```

Symbols used in territorial map

1	Ivory
2	Palmolive Naturals
3	Pantene
4	Rejoice
5	Sunsilk
*	indicates a group centroid

Function 1	represents basic consumer requirements in a shampoo
Function 2	represents cosmetic benefits

The first discriminant function explains 52.80 percent of variance. The standardised coefficients show that variables that contribute more to the overall discriminant function are gentleness and number of variants. On the other hand, the second discriminant function accounts for 31.66 percent of variance and identifies gentleness to have the largest contribution. Finally, the third discriminant function explains 14.77 percent of variance and identifies cleaning ability, gentleness, and number of variants as the variables which largely affect the value of the discriminant function. The fourth function is discarded because it only explained less than one percent of variance.

The structure matrix also indicates the contributions of variables. Although it explains the most variance, the largest absolute correlation values are not correlating with discriminant function 1. Thus, function 1 describes the basic requirements of a consumer in a shampoo. The variables with large correlations for discriminant function 2 are style, fragrance, and clean. Function 2 summarises the cosmetic benefits that satisfy consumers' need to have beautiful hair. On the other hand, function 3 identifies the fragrance variants.

The territorial map shows that both functions are important for classification. Function 1 is good at classifying Sunsilk (5) and Rejoice (4). For any value of discriminant 2, function 1 classifies the brand as Sunsilk when its value is negative and Rejoice when its value exceeds 0.40. On the other hand, function 2 is good at classifying Ivory (1). For any value of function 1, function 2 classifies a brand as Ivory when its value is negative. When function 2 is positive, the value of function 1 value is necessary to classify between Sunsilk (5), Pantene (3), and Rejoice (4).

In addition, the territorial map indicates that only the group centroids of Pantene, Rejoice are positive in function 1. In terms of function 2, only Pantene, Rejoice and Sunsilk are positive. Rejoice appears to be the best shampoo based on functions 1 and 2, although its group centroid is very close to Pantene, the most popular brand. Ivory and Palmolive Naturals do not seem to be rated well in function 2 which summarises the key attributes of hair manageability, fragrance, and cleaning ability.

Using equal group sizes as priors, the percent of correctly classified cases is only 31.59 percent or an error rate of 68.41 percent. A possible explanation for the low classification rate is a violation of one or two major assumptions of the linear discriminant function. These are: each group must be a sample from a multivariate normal population and the population covariance matrices must all be equal.

The test for equality of group covariance matrices (Box's $M = 94366$, $df = 60$, $p < 0.01$) shows a rejection of the null hypothesis which violates the second assumption of the linear function. The Levene Test for homogeneity of variance on every independent variable confirms this finding. At 95 percent level of confidence, the null hypothesis is rejected for three of the five variables: style, gentle, and variant. The one-way ANOVA test and the modified LSD (Bonferroni) test, however, suggest that there is no reason to reject the null hypothesis. Thus, the population means are equal but the variances are significantly different.

For linear discriminant function to be optimal, the population must have normal distribution. The SPSS EXPLORE Procedure has the Shapiro-Wilks' and Lilliefors tests for normality. Norusis (1993b) noted that whenever the sample size is large any goodness of fit test will result in the rejection of the null hypothesis. However, she argued that for most statistical tests it is sufficient that the data are approximately normally distributed. Thus, one needs to also examine the actual departure from normality. In this study, normal probability and detrended plots for the variables were examined for deviations from normality. This was present in the variable, *clean*. Therefore, the assumption of multivariate normality can not be made on the sample.

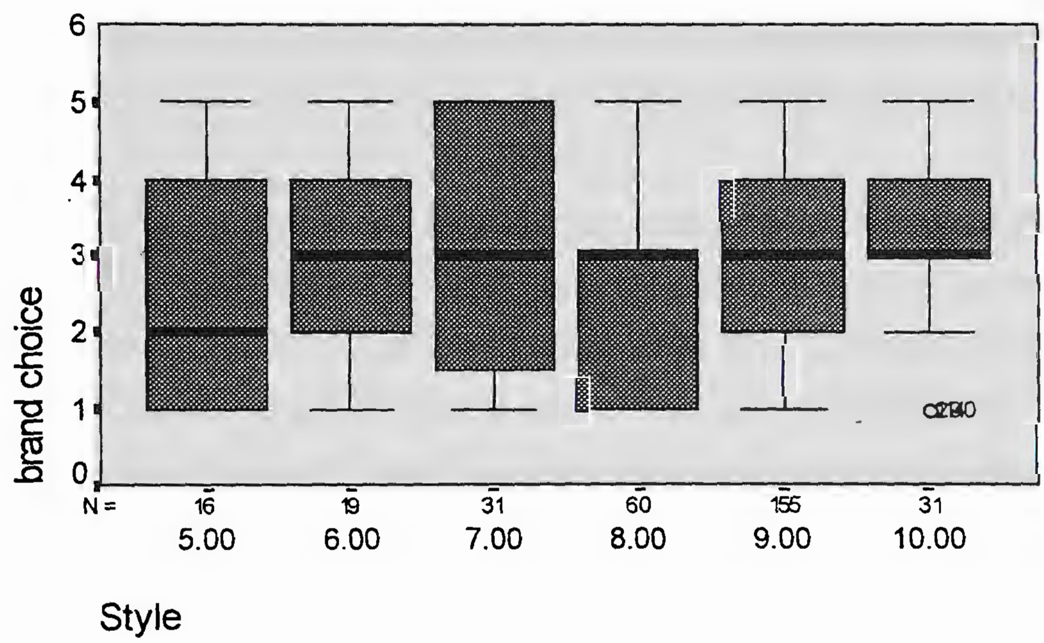
The boxplot better summarises the information about the distribution and the extent of differences between the brands. In Figure 7.3.3 consider a category of 155 respondents who gave a hair manageability rating of 9.0 to their brands. The median brand choice is Pantene (3) and the spread is between brands Palmolive Naturals (2) to Rejoice (4). It appears that Ivory (1) and Sunsilk (5) are not rated highly by this group of consumers. Respondents who gave their brands a rating of 8.0 for hair manageability have a median brand choice of

Pantene (3). The variability is confined to Ivory (1) and Pantene (3) while the distribution is negatively skewed.

Assuming that the shampoo sample is approximately normally distributed, still one assumption of the linear discriminant function is violated. If the covariance matrices are unequal but the joint distribution of the variables is still

Figure 7.3.3

BOXPLOTS FOR CLEAN DATA: SHAMPOO



multivariate normal, the optimum classification rule is the quadratic discriminant function (Norusis 1993c; Johnson and Wichern 1982). Therefore, the next step involves fitting the quadratic and nonparametric models.

7.4 The Quadratic and Nonparametric Models

The quadratic discriminant function has a more complicated classification rule than the linear function. When normality appears to hold and the assumption of equal covariance matrices is seriously violated, then the quadratic rule is applicable. However, Johnson and Wichern (1982) asserted that the normality assumption seems to be more critical to the quadratic rule rather than the linear rule. Furthermore, Huberty (1984) affirmed that the results of the quadratic classification rule are more unstable compared to those given by the linear rule when the samples are small and the normality assumption is not satisfied.

The SAS DISCRIM Procedure is able to determine the discriminant models using both parametric and nonparametric methods. Parametric methods assume that each group has a multivariate normal distribution. The procedure also computes the posterior probability of an observation belonging to each class. Consequently, the SAS DISCRIM procedure computes two error rates, the error count estimates and the posterior probability error rate. The error rate is simply the probability of misclassification. One must note, however, that when parametric method is used on a non-normal population the resulting posterior probability rate estimates may not be appropriate (SAS/STAT User's Guide 1990, p. 685).

The SAS analysis of five brands shows that the classification rate improved from 31.59 percent to 35.49 ~~percent by~~ using the quadratic function. In terms of posterior probability, the classification rate increases from 30.69 to 45.57 percent. Such small improvement indicates that even the normality assumption may not hold for the shampoo population. Thus, this finding suggests the application of the various nonparametric discriminant methods which do not require the normality assumption.

Nonparametric methods build distribution-free models and they are based on nonparametric estimates of group-specific probability densities. Two methods are available to generate a nonparametric density estimate in each group: the kernel method or the *k*-nearest neighbour method. The kernel method may use any one of uniform, normal, Epanechnikov, biweight, or triweight kernels to estimate the density. In the kernel method, Mahalanobis distances are based on either the individual within-group covariance matrices or pooled covariance matrix. On the other hand, the *k*-nearest neighbour rule uses the pooled covariance matrix to obtain the Mahalanobis distances (SAS/STAT User's Guide 1990, p. 683).

Values of *r* and *k* determine the shape and irregularity of the density function. As such they are called smoothing parameters. The *r* value specifies the radius for kernel density estimation while the k value is used with the k-nearest neighbour rule. Although there are various methods for choosing the smoothing parameters no simple solution is available to solve this problem.

Table 7.4.1 contains the classification and crossvalidation rates of both the parametric and nonparametric discriminant methods. The nonparametric methods outperform both the linear or quadratic functions in classification rates. The best classification rate of 75.13 percent utilises either the normal kernel method with equal bandwidth when $r = 0.10$ or k-nearest neighbour rule, when $k = 1$. Some researchers err in accepting the classification rate as the sole criterion in choosing the best model. But what has to be noticed is that this classification rate has an optimistic bias because the same data set is used to define and to evaluate the classification criterion. Thus, statisticians refer to the hit rate estimated under such conditions as apparent classification rate.

To reduce the bias, the crossvalidation rates may be calculated using two methods in the SAS DISCRIM Procedure. The first method considers $n - 1$ observations to determine the discriminant functions and then applies them to classify the one observation left out (Lachenbruch and Mickey 1968). Thus, Huberty (1994) and Hair et al. (1995) also referred to this procedure as the leave-one-out (L-O-O) method[18]. This method is very useful whenever the sample size is small (Crask and Perreault 1977).

---

[18] The two approaches using the leave-one-out principle are the *U*-method and jackknife method. However, both methods have found limited use because only the BMDP (1992) statistical computer package provides them as a program option. For an extensive discussion of the two methods see Crask and Perreault (1977), pp. 60-68.

Table 7.4.1

PERCENTAGE CLASSIFICATION AND CROSSVALIDATION OF DISCRIMINANT METHODS

DISCRIMINANT MODELLING METHOD	CLASSIFICATION		CROSSVALIDATION Leave-One-Out Method		CROSSVALIDATION Using Holdout Sample	
	Hit Rates	Posterior Probability Hit Rate	Hit Rates	Posterior Probability Hit Rate	Hit Rates	Posterior Probability Hit Rate
Parametric Methods						
Linear function	31.59	30.69	28.61	30.60	28.45	33.33
Quadratic function	35.49	45.57	29.51	45.34	26.49	61.75
Nonparametric Methods						
Using the Kernel Method						
Kernel density with equal bandwidth*						
$r = 0.10$	75.13	74.50	17.86	74.06	21.90	77.70
$r = 0.20$	73.88	72.56	17.53	69.08	21.90	77.17
$r = 0.30$	74.07	66.82	16.76	59.02	21.92	64.45
$r = 0.40$	72.32	57.36	16.13	48.63	21.68	54.98
$r = 0.50$	68.43	48.58	17.25	41.27	20.46	47.20

*Uses the pooled covariance matrix in calculating the generalised squared distances. The use of equal bandwidths (smoothing parameters) does not constrain the density estimates to be of equal variance.

Table 7.4.1 - Continued.

DISCRIMINANT MODELLING METHOD	CLASSIFICATION		CROSSVALIDATION Leave-One-Out Method		CROSSVALIDATION Using Holdout Sample	
	Hit Rates	Posterior Probability Hit Rate	Hit Rates	Posterior Probability Hit Rate	Hit Rates	Posterior Probability Hit Rate
Kernel density with unequal bandwidth**						
$r = 0.10$	73.41	77.02	21.15	81.22	19.27	91.32
$r = 0.20$	71.94	75.33	21.37	75.08	20.52	85.68
$r = 0.30$	69.74	70.84	20.76	66.33	20.40	78.63
$r = 0.40$	66.57	63.66	21.82	56.93	23.46	70.94
$r = 0.50$	61.35	57.50	16.94	49.84	25.72	66.12
Epanechnikov kernel						
kernel density with equal bandwidth	47.90	35.43	16.80	31.80	17.34	32.17
kernel density with unequal bandwidth	46.07	45.57	25.13	39.20	19.71	53.41
Using the k-Nearest Neighbour Rule						
$k = 1$	75.13	75.13	17.86	76.65	21.90	78.33
$k = 2$	58.29	57.33	20.65	55.65	24.97	59.75
$k = 3$	50.37	48.64	21.23	46.99	21.42	48.00
$k = 4$	46.29	44.86	21.06	43.95	21.26	43.21

**Uses the individual within-group covariance matrices in calculating the distances.

The second method calls for splitting the data into two sets, one set (analysis sample) for deriving the discriminant function and the other set (holdout sample) for estimating the classification rate. Utilising the split-sample method requires adequate sample size which was not a problem in this study. It appears that the nonparametric models performed even poorly than the parametric methods with respect to crossvalidation rate and classification rate in the holdout sample. The crossvalidation numbers are comparable to the 20 percent prediction rate of the chance model.[19] Assuming that the sample does not depart too much from normality, the quadratic model is chosen as the best discriminant model for prediction. It has a L-O-O crossvalidation rate of 29.51 percent and a classification rate of 26.49 percent in the holdout sample.

An examination of the pairwise squared distances between the brands would demonstrate which brands are similar in terms of the five attributes of cleaning, styling, gentleness, fragrance, and variants (Table 7.4.2). Ivory is similar to Palmolive Naturals and significantly different to Pantene, Rejoice, and Sunsilk. On the other hand, Palmolive Naturals is closest to Pantene and Ivory and significantly different to Rejoice and Sunsilk. Meanwhile, Pantene is almost equally close to Palmolive Naturals and Rejoice but significantly different to Ivory and Sunsilk. Furthermore, Rejoice is similar to Pantene and significantly different to the other three brands. Although closest to Pantene in terms of squared distance, Sunsilk is significantly different to all other four brands.

---

[19] Since only five out of eight shampoo brands were analysed in the discriminant model, the prediction rate of the chance model is 20 percent. This is not to be confused with the 12.5 percent prediction rate of the chance model in Section 7.2.

Table 7.4.2

PAIRWISE SQUARED DISTANCES BETWEEN SHAMPOO BRANDS
USING NORMAL KERNEL METHOD AT $r = 0.10$

Squared Distance to BRAND

From BRAND	Ivory	Palnatl	Pantene	Rejoice	Sunsilk
Ivory	0				
Palnatl	0.19228	0			
Pantene	0.28740	0.14236	0		
Rejoice	0.39593	0.44440	0.14804	0	
Sunsilk	0.65518	0.51962	0.47610	0.95727	0

F Statistics, NDF=5, DDF=303 for Squared Distance to BRAND

From BRAND	Ivory	Palnatl	Pantene	Rejoice	Sunsilk
Ivory	0				
Palnatl	1.09548	0			
Pantene	2.19566[b]	0.99555	0		
Rejoice	2.23318[b]	2.34636[b]	1.02257	0	
Sunsilk	3.14447[a]	2.35693[b]	2.70764[b]	4.30747[a]	0

[a]The Prob > Mahalanobis[20] Distance for Squared Distance to BRAND is significant at $\alpha = 0.01$.
[b]The Prob > Mahalanobis Distance for Squared Distance to BRAND is significant at $\alpha = 0.05$.

[20] To consider both unequal variances and nonzero intercorrelations, the generalised distance index called Mahalonobis distance is used. The Mahalonobis squared distance (Δ^2_{AB}) between point A (defined by column vector X_A) and point B (defined by column vector X_B) is given by

$$\Delta^2_{AB} = [X_A - X_B]'\Sigma^{-1}[X_A - X_B]$$

where Σ is the population covariance matrix. Where the variables are uncorrelated with unit variances, and since the inverse of an identity matrix is an identity matrix, the Euclidean distance is a special case of the Mahalanobis distance index and is given by

$$d^2_{AB} = [X_A - X_B]'[X_A - X_B].$$

For more details refer to Huberty (1994), pp. 42-43.

7.5 Summary

This chapter presented the discriminant model results for shampoo. There are five shampoo attributes useful in classifying respondents into their chosen brands. These are cleaning ability, hair manageability, gentleness, fragrance, and variants. Although, the linear model gave some useful information, it had a low classification rate of 31.59 percent, as a result of the violation of the equal covariance matrices assumption. The nonparametric method using either the kernel or the k-nearest neighbour rule yielded a higher classification rate of 75.13 percent. However, the crossvalidation rates of the nonparametric models are lower than the parametric models. Thus, the quadratic model was chosen as the best model for prediction with an L-O-O crossvalidation rate of 29.51 percent and a classification rate of 26.49 percent in the holdout sample. The squared distances to the brand was also used to validate the conclusions drawn from the territorial map.

Discriminant analysis is a useful classification tool but the assumption of normality appears to be crucial. Although nonparametric methods have overcome this problem, there are several reasons that make logit modelling more advantageous. Besides having no assumption of normality, the multinomial logit model relates two brands to each other. Finally, a more compelling reason is that the use of a much wider range of predictors such as categorical variables is not possible with discriminant analysis. In view of this, the next chapter discusses the results of the logit modelling studies.

CHAPTER 8
LOGIT MODELS FOR SHAMPOO

8.1 Introduction

Logistic regression is more appropriate to use when the dependent variable can have only two values - an event occurring or not occurring. Brand choice is an example of a limited dependent variable where logit modelling is appropriate. A system of logit models differentiates several brands. Each logit model within the system describes the relationship between any two brands. Moreover, being regression models, some definitive statements can be made about the causality of the explanatory variables. In this chapter, logit models are employed to explain and predict the brand choice of shampoo.

Logistic regression requires fewer assumptions than discriminant analysis. It does not require the assumption of multivariate normality of the independent variables. Hence, the categorical variables can be utilised freely in a logit model. In addition, homogeneity of variances is not required.

A major assumption of logit modelling is that consumers are assumed to follow compensatory decision rules when choosing brands. However, most psychologists assume that consumers use information selectively and sequentially eliminate brands from their choice set (Restle 1961; Tversky 1972) which led to the development of attribute-based processing models discussed in Chapter 2. Another assumption of linear logit models described in Section 2.4.1 is Luce's (1959) independence of irrelevant alternatives (IIA) property.

This chapter begins with the description of the independent variables in Section 2 followed by a review of model estimation and interpretation in Section 3. Sections 4 and 5 present and discuss the multinomial and binary models' results, respectively. In Section 6, the models are validated through the prediction rates and the Akaike information criteria (AIC), while Section 7 summarises the chapter.

8.2 Model Formulation

The general form of the logistic regression model is

$$y = f(\text{attributes, profiles, demographic variables})$$

where y is the dependent variable and the attributes, profiles and demographic are sets of explanatory variables. The following sub-sections describe each set of the independent variables.

8.2.1 The Shampoo Attributes

In Chapter 5, thirteen shampoo attributes in the brand choice model were obtained by factor analysis. Every attribute was evaluated on a 0 to 10 continuous scale line while the current brand satisfaction rating was measured on a 1 to 7 Likert scale.

Table 8.2.1 includes the continuous variables and their particulars. On most of these attributes, shampoo consumers would tend to rate their preferred brand, higher over the other brands. Thus, brands with high market shares (Palmolive Naturals, Pantene, and Ivory) would likely have positive signs while the poor performing brands would have negative signs.

Table 8.2.1

THE SHAMPOO ATTRIBUTES

Variable	Specification
1. Body	ability to promote beautiful hair by giving to hair body and bounce, shine and good conditioning
2. Clean	ability to clean hair and scalp thoroughly
3. Style	ability to provide hair manageability, making hair easy to comb or style
4. Dandruff	ability to get rid of dandruff and build-up on scalp
5. Mildfrg	ability to give mild, non-irritating fragrance that is good for the entire family
6. Gentle	ability to give pH-balanced formula that is compatible to your hair and gentle to use everyday
7. Fragrance	ability to provide pleasant and lasting fragrance
8. Variants	ability to provide different fragrances to choose from
9. Feelrich	ability to make you feel rich, young and attractive
10. Endorse	endorsements of celebrity, hairdresser or hair expert
11. Price	affordable price
12. Packaging	easy-to-use and attractive packaging
13. Promo	regular sales promotion
14. RATING	current brand satisfaction rating

8.2.2 The Consumer Attitudinal Profiles

The second set of explanatory variables in the brand choice model are two consumer-attitudinal profiles. They provide a contextual description of the consumers choosing a particular brand of shampoo. Scale rules in Chapter 4 outlined the classification criteria for these attitudinal profiles. As these predictors are characteristics of the decision maker rather than of alternative brands, they enter the model as dummy variables. Table 8.2.2 gives the explanatory attitudinal variables and their dummy assignments.

Table 8.2.2

THE CONSUMER ATTITUDINAL VARIABLES

Variable	Specification
1. SWITCH	1 if classified as a brand switcher, and 0 otherwise
2. INVOLVE	1 if classified as highly involved in purchase decision, and 0 otherwise

Brand switching and purchase decision involvement were chosen to be the best attitudinal variables for the Philippine situation. No shampoo brand dominates the market, so brand switching is expected. Unfortunately, the results from the brand switching and variety seeking scales have to be discarded in Chapter 6, because of low internal consistency. However, the brand switching variable was introduced in the model using direct consumer responses to a brand loyalty measure.

On the other hand, purchase decision involvement was given priority over social consumption motivation and product knowledgeability, because the involvement scale classified at least 60 percent of the respondents as highly involved (Table 6.3.1). By contrast, only a small proportion of the respondents were classified as strongly motivated by friends (18 percent), or highly knowledgeable about the products (27.8 percent). The social motivation and product knowledgeability scales could be still used as additional dummy variables. However, the small sample size and the need for parsimony in this study precludes using too many dummy variables (Amemiya 1981).

A positive sign in brand switching and purchase involvement is expected for brands with high market shares (Palmolive Naturals, Pantene, and Ivory), while the brands with low market shares would likely have negative signs.

8.2.3 The Demographic Variables

Traditional microeconomic models of brand choice available from panel data literature (i.e., based on Guadagni and Little 1983) do not usually account for demographic variables. Recent models using scanner panel data have incorporated demographic variables such as family size, presence of children, and income (Gupta and Chintagunta 1994; Kalyanam and Putler 1997).

The third set of predictors contains three demographic variables which were measured using a categorical scale and four variables treated as if they were continuous variables. Similar to the attitudinal profiles, demographic variables characterise the decision maker rather than the choice. Dummy variables represent the categorical demographic variables in the logit model. Table 8.2.3 provides the assignment of the demographic dummy variables and their specifications.

Table 8.2.3

THE CATEGORICAL DEMOGRAPHIC VARIABLES

Variable	Specification
1. FEMALE	1 when respondent is female, 0 if male
2. STATUS	1 when respondent is unmarried, and 0 otherwise
3. CHILD	1 when respondent has children, and 0 otherwise

The small sample size of this study prevented the use of more dummy variables in the models. Li (1977) estimated a logit model, explaining the probability of owning a home, with eleven dummy variables. However, Li's (1977) study utilised more than 400,000 households, far exceeding the 30 observations per cell recommended by Amemiya (1981). However, Kalyanam and Putler (1997) utilised as many as 63 parameters in one set of their logit models on a sample of 661 households for ketchup and 279 households for coffee.

To further reduce the number of parameters in the model, the standard linear hypothesis, as described by Amemiya (1981, p. 1500), was employed. Table 8.2.4 outlines the modifications made with categorical variables: age, education, family size, and income. These variables are interval variables when the exact values are elicited from the respondents. However, to simplify data collection, ordered categories were utilised during the survey.

Table 8.2.4

THE MODIFIED DEMOGRAPHIC VARIABLES

Variable	Specification
1. AGE	12.0, when respondent is aged under 15 years;
(in years)	20.5, when respondent is aged between 16-25 years;
	30.5, when respondent is aged between 26-35 years;
	40.5, when respondent is aged between 36-45 years;
	55.0, when respondent is aged over 45 years.
2. EDUC	6.0, when respondent has completed elementary school;
(in years)	10.0, when respondent has completed high school;
	14.0, when respondent has completed a college degree;
	17.0, when respondent has completed a masters or PhD degree.
3. FSIZE	2, when family size is one to two individuals;
	4, when family size is three to four individuals;
	6, when family size is five to six individuals;
	8, when family size is seven to eight individuals;
	10, when family size is over eight individuals.
4. INC	125, when average monthly income is below A$250;
(in A$)	500, when average monthly income is between A$250-750;
	1,000, when average monthly income is between A$750-1,250;
	1,875, when average monthly income is between A$1,250-2,500;
	3,000, when average monthly income exceeds A$2,500.

A unique independent variable that does not belong to either of the three groups is the last brand bought. As a dummy variable, *LastBrand*, has a value of 1, when the subject brand being modelled was the last brand bought by the consumer. When another brand was previously purchased, the dummy variable is zero. Thus, *LastBrand* measures the lagged brand choice (Rajendran and Tellis 1994).

To summarise, there are twenty-four predictors in the shampoo brand choice models resulting from the combination of attributes, attitudinal profiles, and demographic variables. There are 18 ordinal variables and 6 dummy variables. All of these predictors were jointly introduced in building the models.

8.3 Model Estimation

Recall from Chapter 2, equation 2.5 that the general form of the logit model is

$$\mathrm{Pr}\left(\frac{i}{S}\right) = \frac{e^{Vi}}{\sum_j e^{Vj}} = \frac{e^{\beta X_i}}{\sum_j e^{\beta X_j}}, \quad j \in S \tag{8.3.1}$$

where X_i's are the attribute weights that vary across alternatives or choices. Let W_i contain the characteristics of the decision maker which is the same for all the choices. By incorporating this into the model the equation becomes

$$Pr(Y{=}j) = \frac{e^{\beta X_i + \alpha w}}{\sum_j e^{\beta X_j + \alpha w}} \tag{8.3.2}$$

This is now a mixed logit model containing both the characteristics of the chooser and the characteristics of the choices. Originally referred to by McFadden (1974) as a conditional logit model, it is now usually called the multinomial logit model. To estimate the model, the equation is modified by taking logarithm on both sides into

(8.3.3) $$\log_e\left(\frac{P_i}{P_j}\right)=(a_{oi}-a_{oj})+\sum_{n=1}^{N}a_n(X_{ni}-X_{nj})$$

where i = 1, j = 2 (binomial case),

i = 1, 2, ..., M-1 (multinomial case),

P_i = probability of selecting alternative i,

M = number of alternatives,

N = number of attributes or variables,

X_{ni} = value of nth attribute for alternative i, and

a's = parameters to be estimated.

Since the explanatory variables that are classified as characteristics of choice distinguish the alternative brands, the attribute score (X_{nj}) of the base brand, j is subtracted from attribute score (X_{ni}) of the subject brand.

Agresti (1990) described that two methods are available in fitting logit models: the simultaneous and separate fitting approaches. Generalised logit models are fitted by maximising the likelihood while simultaneously satisfying J-1 equations that specify the model. Simultaneous fitting uses convergence iterative procedures such as Newton-Raphson method. An alternative approach fits logit models separately for J-1 pairings of responses treating each pair as a binary model. The separate fitting method utilises procedures such as iteratively reweighted least squares (IRLS) algorithm.

The estimators using the separate fitting approach are less efficient than those of the logit model fitted simultaneously. However, Begg and Gray (1984) claimed that estimates are not very inefficient unless the probability of classification in the baseline category is very small. They advocated that when there is no natural baseline category, it is best to use the response category with the highest occurrence as the baseline in the separate fitting approach. The investigation employed the separate fitting approach because it is commonly used by many researchers and it is available in many software packages.

Among the eight rated brands, the distinctive anti-dandruff positioning of brand 1 (Head & Shoulders) makes it an ideal reference brand. On the other hand, the seven remaining brands are positioned differently, have more fragrance variants, some even including an anti-dandruff variant. Hence, the seven multinomial logit models are estimated for brands 2 to 8.

The SAS Logistic Procedure fits linear logistic regression models for binary response or ordinal response data. It uses iteratively reweighted least squares (IRLS) algorithm to compute the parameter estimates of the model. To estimate the models all selection methods available in the SAS Logistic Procedure were utilised. The simplest is the default method which fits the basic logistic model. The other three methods are FORWARD for forward selection, BACKWARD for backward elimination, and STEPWISE for stepwise selection. The investigator can choose the best method by comparing the three criteria calculated by the logistic procedure. These three statistical criteria consist of -2 Log Likelihood (-2 Log L), Akaike Information Criterion (AIC), and Schwartz Criterion (SC). Lower values of the statistic indicate that the model is more desirable. When the best model is chosen, it is necessary to check for any multicollinearity[21] and nonlinearity in all the continuous variables.

When quasi or complete separation occurs in a model this indicates that the maximum likelihood may not or does not exist. It is necessary to identify the confounding variable/s causing the separation problem by performing univariate analyses on each of the explanatory variables as recommended by Hosmer and Lemeshow (1989). During the study only predictor variables having a *p*-value less than 0.25 were selected for multivariate analysis. Some researchers who used the value of 0.25 as screening criterion for selection of candidate variables are Bendel and Afifi (1977) for linear regression, and Mickey and Greenland (1989) for logistic regression. They demonstrated that utilising a more traditional level (such as 0.05) often fails to identify variables known to be important.

---

[21] Multicollinearity was evaluated by inspecting the correlation matrices of all the models. There is collinearity between any two predictors when the correlation coefficient is greater than 0.80. Since no multicollinearity was found in the shampoo models, interaction terms were not required.

Upon estimating the multinomial logit models it is now easy to derive the relationships between any two brands among brands 2 to 8. Suppose

(8.3.4) $$\log\left(\frac{P_2}{P_1}\right) = a_{21} + b_{21}BODY + c_{21}CLEAN$$

(8.3.5) $$\log\left(\frac{P_3}{P_1}\right) = a_{31} + b_{31}BODY + c_{31}CLEAN$$

then the relationship between brands 2 and 3 is

(8.3.6) $$\log\left(\frac{P_3}{P_2}\right) = (a_{31} - a_{21}) + (b_{31} - b_{21})BODY + (c_{31} - c_{21})CLEAN$$

where brand 2 now becomes the base brand. Furthermore, one can analyse brand 1 by simply reversing the relationship into

(8.3.7) $$\log\left(\frac{P_2}{P_1}\right) = -\log\left(\frac{P_1}{P_2}\right)$$

The interpretation of any fitted model enables the researcher to draw practical inferences from the estimated coefficients in the model. Hosmer and Lemeshow (1989) identified two critical issues in the interpretation. Firstly, determine the functional relationship between dependent variable and the predictor variable (the link function) and secondly, appropriately define the unit of change for the predictor variable.

To apply these interpretation issues, consider first the linear regression model. The link function is simply the identity function since the dependent variable is linear in the parameters (where $y = y$). For any value of x, the slope coefficient is the difference between the value of dependent variable at x+1 and the value of the dependent variable at x. Therefore, the linear model coefficient is interpreted as the resulting change in the measurement scale of the dependent variable for a unit change in the independent variable.

However, in the logistic regression model, the link function is the logit transformation $g(x) = \ln\{\pi(x)/[1-\pi(x)]\} = \beta_0 + \beta_1 x$. Thus in the logistic model $\beta_1 = g(x+1) - g(x)$, the slope coefficient represents the change in the logit for every unit change in the independent variable x. While the interpretation of the linear regression model coefficients is straightforward, extra care must be observed in interpreting the logit model coefficients.

The odds ratio, denoted by psi (ψ), is the ratio of the odds for $g(x+1)$ to the odds for $g(x)$. Such measure of association approximates how more likely (or unlikely for a negative coefficient) is the outcome to be present among those with predictor $x+1$ than among those with predictor x. The odds ratio value is simply found by taking the exponent of the parameter estimate.

Table 8.3.1 supplies the parameter estimates and odds ratios for Pantene, the brand chosen by most respondents.

Table 8.3.1

COEFFICIENT ESTIMATES FOR PANTENE

Logit	Predictor Variable	Estimated Coefficient	Standard Error	Standardised Estimate	Odds Ratio
P6/P1	Intercept	-3.1621[c]	1.6527	.	.
	Clean	0.3632[a]	0.1182	0.5493	1.438
	Endorse	0.2765[a]	0.1066	0.3376	1.319
	SWITCH	0.6237	0.4386	0.1569	1.866
	AGE	-0.0915[a]	0.0314	-0.4062	0.913
	EDUC	0.2149[a]	0.0871	0.2744	1.240
	FSIZE	0.3271[a]	0.0999	0.3985	1.451

[a]Significant at $\alpha = 0.01$
[b]Significant at $\alpha = 0.05$
[c]Significant at $\alpha = 0.10$

DF = 10
-2 Log-likelihood = 192.839
Score Statistic = 54.454 at p = 0.0001

There is a very significant relationship between brand choice and the predictors as indicated by the score statistic. Demographic variables AGE, EDUC, and FSIZE are significant. The odds ratio of EDUC means that the odds of choosing Pantene over Head & Shoulders (HS) is 1.240 times more likely for every year an individual completes a year of education. In the case of FSIZE, it is 1.451 times more likely that a Pantene would be chosen over HS when the family size increases by 1 unit. The negative sign for AGE means that it is 0.913 times more unlikely that Pantene would be chosen over HS when age increases by 1 year. To illustrate the interpretation of a dummy variable, consider the case of SWITCH. It is 1.866 times more likely that Pantene is chosen over HS, when the respondent was classified as a brand switcher.

It is necessary to check the slope scale in the logit of continuous variables since they may be non-linear. The Box-Tidwell (1962) transformation was used on every significant continuous variable in the model. This requires adding the term $x\ln(x)$ to the model and regressing again. The significance of $x\ln(x)$ coefficient is evidence of non-linearity. When non-linearity was found the scale is determined using methods described by Hosmer and Lemeshow (1989). The coefficient of *Clean* was found to be linear in logit. It is 1.438 times more likely that Pantene is chosen over Head & Shoulders, when the individual rates Pantene one scale higher in cleaning hair.

After reviewing the interpretation issues, the next two sections present the logit modelling results.

8.4 Model Results - Multinomial Models

The dataset for this analysis was randomly divided into two parts: the calibration data (Part 1) and the validation data (Part 2). This data division is also necessary in evaluating the model fit in the next section. Consequently, three models were estimated for both parts of the data. The first two models have brand choice as the dependent variable defined as the brand most frequently bought. The second model has the same predictors as the first model, except for the addition of the last brand bought as another predictor. The third model used the last brand bought as the dependent variable to test the question that it could serve as a surrogate to brand choice or not.

Tables 8.4.1 to 8.4.6 summarise the parameter estimates of the multinomial models. Tables 8.4.1 to 8.4.3 contain the logit models for part 1 data while Tables 8.4.4 to 8.4.6 have models for part 2 data. The tables only include the independent variables which are significant up to ninety percent.

Some interesting facts were uncovered about the variables explaining the brand choice. The first set of models considers frequently bought brand as the criterion variable. In Table 8.4.1, gentleness is a significant attribute (at α = 0.05) that would increase by 1.536 times the odds of selecting Ivory over Head & Shoulders (HS). Dandruff control is also very significant at 95 percent with an odds ratio of 1.276. Thus, it seems likely that Ivory would be chosen over HS when a person rates Ivory one scale higher over HS in controlling dandruff. By contrast, the demographic variable, FEMALE, has a negative sign. This means that the odds ratios are less than 1, and should be interpreted differently. It is 0.350 times more unlikely that a female respondent would choose Ivory over HS. The validation model in Table 8.4.4 shows *Body* and *Variant* as significant explanatory variables. It is 1.458 times more likely that Ivory is preferred over HS when the consumer rates Ivory one scale higher for giving body to hair.

In the case of Lux, the estimation model in Table 8.4.1 has two significant variables: regular sales promotions (at α = 0.01) with an odds ratio of 1.635, and giving body to hair, with odds ratio of 1.186. On the other hand, the validation model in Table 8.4.4 shows gentleness as a significant predictor having an odds ratio of 1.741. Demographic variables, AGE and FEMALE have negative signs. Lux is 0.881 times more unlikely chosen over HS by older respondents, and 0.376 times more unlikely chosen by females. It appears that Lux may be registering a distinct personality in gentleness and this brand is associated with promotions.

Cleaning and mild fragrance are important attributes for Palmolive Naturals in Table 8.4.1. The estimated odds of selecting Palmolive Naturals instead of HS is 1.338 times higher when cleaning ability is rated one scale higher. Similarly, it is 1.290 times more likely that Naturals is chosen over HS when its mild fragrance is rated one scale higher. On the other hand, the validation model in Table 8.4.4, shows that dandruff control is a significant predictor. Palmolive Naturals is 1.335 times more likely chosen over HS, when Naturals is perceived to perform better in preventing dandruff.

Table 8.4.1

MULTINOMIAL LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: SHAMPOO PART1 DATA
DEPENDENT VARIABLE - FREQUENTLY USED BRAND

PARAMETER	P2/P1* IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
Intercept	-0.6709 (0.6626)	-3.7768^{a} (0.8333)	-5.5994^{a} (2.0814)	-2.9889^{a} (0.7813)	-3.1621^{c} (1.6527)	1.0577 (1.2498)	2.0003 (2.3697)
1 Body		0.1706^{c} (0.1009)		0.3677^{a} (0.1495)			
		1.186		1.444			
2 Clean			0.2909^{a} (0.0967)	-0.3117^{b} (0.1388)	0.3632^{a} (0.1182)		0.3746^{a} (0.1478)
			1.338	0.732	1.438		1.454
3 Style				0.4182^{a} (0.1597)		0.3672^{a} (0.1102)	0.3520^{b} (0.1450)
				1.519		1.444	1.422
4 Dandruff	0.2438^{b} (0.1071)						-0.2454^{c} (0.1406)
	1.276						0.782
5 Mildfrg			0.2548^{b} (0.1148)				
			1.290				
6 Gentle	0.4292^{b} (0.1771)			-0.2999^{c} (0.1835)			
	1.536			0.741			
9 Feelrich	-0.2871^{c} (0.1739)					-0.2052^{c} (0.1197)	
	0.750					0.814	
10. Endorse					0.2765^{a} (0.1066)		
					1.319		
12 Packaging						0.2469^{b} (0.1248)	
						1.280	

*Base brand = Head & Shoulders; ^{a}Significant at $\alpha = 0.01$; ^{b}Significant at $\alpha = 0.05$; ^{c}Significant at $\alpha = 0.10$

First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8.4.1 - Continued.

PARAMETER	P2/P1* IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
13 Promo		0.4921[a] (0.1622) 1.635					
SWITCH						-1.3895[a] (0.4908) 0.249	1.3390[b] (0.6970) 3.815
INVOLVE				-0.3117[c] (0.1388) 0.732		-1.0478[b] (0.4795) 0.341	
AGE					-0.0915[a] (0.0314) 0.913		
FEMALE	-1.0487[b] (0.4295) 0.350						
EDUC					0.2149[a] (0.0871) 1.240		-0.2412[c] (0.1263) 0.786
FSIZE					0.3721[a] (0.0999) 1.451	-0.2346[c] (0.1342) 0.791	-0.3028[b] (0.1461) 0.739
CHILD							-2.4741[c] (1.4604) 0.084
DF	5	4	3	10	10	7	11
SCORE	31.14 (p=0.0001)	23.26 (p=0.0001)	24.81 (p=0.0001)	32.28 (p=0.0004)	54.45 (p=0.0001)	29.26 (p=0.0001)	42.79 (p=0.0001)
AIC	161.744	129.755	99.253	127.722	214.839	147.167	127.284
SC	182.425	146.989	113.040	165.636	252.754	174.741	168.645
-2 LOG L	149.744	119.755	91.253	105.722	192.839	131.167	103.284

*Base brand = Head & Shoulders; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$

First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8.4.2

MULTINOMIAL LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: SHAMPOO PART1 DATA WITH LAST BRAND BOUGHT AS PREDICTOR

PARAMETER	P2/P1* IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
Intercept	-11.3160[a](3.0730)	-0.3882 (1.8618)	-7.3073[a] (1.7761)	0.3611 (2.3424)	-7.1708[a] (2.0553)	-4.0903 (2.7160)	-0.4371 (2.2830)
Last Brand	6.8440[a] (1.1342) 938.234	5.5909[a] (0.9657) 267.977	8.5855[a] (2.0745) 999.000	5.7041[a] (1.1240) 300.100	4.1768[a] (0.6077) 65.159	4.1832[a] (0.6889) 65.573	5.6058[a] (1.1803) 272.007
1 Body		0.3100[b] (0.1613) 1.363	-0.7070[c] (0.3914) 0.493	0.2066[c] (0.1094) 1.229			
2. Clean			1.0684[a] (0.3701) 2.911		0.4433[a] (0.1542) 1.558		
3 Style						0.2790[b] (0.1187) 1.322	
4 Dandruff	0.3005[b] (0.1384) 1.351						
5 Mildfrg			0.7963[a] (0.3235) 2.208				
6 Gentle			-0.6204[c] (0.3729) 0.538				
7 Fragrance					-0.2408[c] (0.1361) 0.786		0.3692[c] (0.2275) 1.447
10 Endorse			0.8050[b] (0.3487) 2.237		0.3637[a] (0.1457) 1.439		
13 Promo		0.4341 (0.2458) 1.543					

*Base brand = Head & Shoulders; [a]Significant at $\alpha = 0.01$ [b]Significant at $\alpha = 0.05$ [c]Significant at $\alpha = 0.10$

First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8.4.2 - Continued

PARAMETER	P2/P1 IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
RATING		-0.8799^{b} (0.3768) 0.415					
SWITCH	1.4059^{c} (0.8413) 4.079			-1.9808^{b} (0.8296) 0.138	1.3498^{b} (0.6008) 3.857	-1.3112^{b} (0.6628) 0.270	
INVOLVE				-1.4197^{b} (0.7352) 0.242			
EDUC	0.4099^{a} (0.1563) 1.507				0.2543^{b} (0.1266) 1.290		
FEMALE	-1.9960^{a} (0.7568) 0.136			1.5678^{c} (0.8660) 4.796			
STATUS	3.8822^{b} (1.7039) 48.531						
FSIZE					0.3652^{a} (0.1337) 1.441		
INC				0.0023^{b} (0.0009) 1.002			
DF	9	5	7	8	10	8	10
SCORE	138.49(p=0.0001)	126.40(p=0.0001)	137.78(p=0.0001)	100.94(p=0.0001)	129.04(p=0.0001)	103.79(p=0.0001)	127.38(p=0.0001)
AIC	90.285	72.343	44.949	85.920	142.168	99.011	83.148
SC	124.753	93.024	72.522	116.941	180.082	130.032	121.062
-2 LOG L	70.285	60.343	28.949	67.920	120.168	81.011	61.148

*Base brand = Head & Shoulders; ^{a}Significant at $\alpha = 0.01$ ^{b}Significant at $\alpha = 0.05$ ^{c}Significant at $\alpha = 0.10$

First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8.4.3

MULTINOMIAL LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: SHAMPOO PART1 DATA
DEPENDENT VARIABLE - LAST BRAND BOUGHT

PARAMETER	P2/P1* IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
Intercept	5.8289^b (2.7650)	-4.0904^c (2.1778)	-3.8454^a (0.6543)	-5.1725^a (1.9442)	-6.4278^a (1.9849)	-1.8750^a (0.3135)	3.7914 (2.4103)
2 Clean				-0.2790^b (0.1269) 0.757	0.1995^c (0.1067) 1.221		0.4506^a (0.1513) 1.569
3 Style						0.2330^a (0.0860) 1.262	
4 Dandruff		0.1876^c (0.1060) 1.206			0.2693^b (0.1113) 1.309		
5 Mildfrg				0.2898^c (0.1693) 1.336			
6 Gentle	0.4332^b (0.2026) 1.542			-0.3181^c (0.1921) 0.728			0.4849^a (0.1916) 1.624
7 Fragrance			0.3260^b (0.3260) 1.385				
9 Feelrich			-0.3315^b (0.1699) 0.718				
10 Endorse					0.1753^c (0.1038) 1.192	0.1982^b (0.0945) 1.219	
11 Price							-0.5623^a (0.2056) 0.570
13 Promo		0.4244^a (0.1441) 1.529					0.5749^a (0.1877) 1.777

*Base brand = Head & Shoulders; ^{a}Significant at $\alpha = 0.01$; ^{b}Significant at $\alpha = 0.05$; ^{c}Significant at $\alpha = 0.10$
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8.4.3 - Continued

PARAMETER	P2/P1* IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
RATING		0.5164^{c} (0.3101)					-0.6849^{a} (0.2735)
		1.676					0.504
SWITCH	-1.2105^{c} (0.5267)						1.3042^{c} (0.7275)
	0.301						3.685
INVOLVE						-0.6590^{c} (0.4006)	
						0.517	
AGE		-0.0926^{c} (0.0512)			-0.1051^{a} (0.0424)		
		0.912			0.900		
EDUC	-0.2273^{b} (0.1102)				0.2119^{b} (0.0927)		-0.2082^{c} (0.1187)
	0.796				1.236		0.812
STATUS	-3.1517^{b} (1.3620)				2.8080^{a} (0.9441)		
	0.042				16.577		
FSIZE	-0.2493^{c} (0.1306)				0.2885^{a} (0.1004)		-0.3191^{b} (0.1616)
	0.779				1.344		0.727
CHILD					2.3615^{a} (0.8986)		
					10.607		
DF	11	5	5	7	10	4	11
SCORE	46.30 (p=0.0001)	16.58 (p=0.0054)	22.32 (p=0.0001)	32.07 (p=0.0001)	47.58 (p=0.0001)	19.07 (p=0.0008)	36.32 (p=0.0001)
AIC	142.799	123.623	115.418	112.535	206.946	180.891	120.133
SC	184.160	144.304	136.099	140.109	244.860	198.124	161.494
-2 LOG L	118.799	111.623	103.418	96.535	184.946	170.891	96.133

*Base brand = Head & Shoulders; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$

First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8.4.4

MULTINOMIAL LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: SHAMPOO PART2 DATA
DEPENDENT VARIABLE - FREQUENTLY USED BRAND

PARAMETER	P2/P1* IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
Intercept	-2.9499[a] (0.4675)	0.3870 (1.4120)	-2.1142[a] (0.3520)	-5.1015[a] (1.7948)	-1.3897[c] (0.7595)	-5.1392[a] (1.1814)	-1.1443 (1.2175)
1 Body	0.3773[a] (0.0939)						0.2410[c] (0.1421)
	1.458						1.273
3 Style					0.1708[b] (0.0747)		
					1.186		
4 Dandruff			0.2891[a] (0.0895)		0.2071[a] (0.0801)		
			1.335		1.230		
6 Gentle		0.5546[a] (0.1801)				0.2969[a] (0.1114)	
		1.741				1.346	
7 Fragrance							
8 Variant	0.2307[c] (0.1360)			0.2513[b] (0.1008)			
	1.259			1.286			
10 Endorse			-0.2546[b] (0.1143)				
			0.775				
11 Price				0.2950[a] (0.1156)			
				1.343			
SWITCH				-1.6155[b] (0.6649)			
				0.199			

*Base brand = Head & Shoulders; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8.4.4 - Continued.

PARAMETER	P2/P1* IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
AGE		-0.1270[b] (0.0628) 0.881				0.0582[c] (0.0306) 1.060	
EDUC							-0.1787[c] (0.1085) 0.836
FEMALE		-0.9792[c] (0.5429) 0.376					
STATUS						1.1255[b] (0.5823) 3.082	
FSIZE					-0.1636[c] (0.0899) 0.849		
DF	5	6	5	6	5	7	5
SCORE	35.10 (p=0.0001)	30.01 (p=0.0001)	19.04 (p=0.0001)	23.14 (p=0.0007)	27.17 (p=0.0001)	22.63 (p=0.0020)	20.56 (p=0.0010)
AIC	154.052	116.995	195.643	105.003	217.729	157.635	106.618
SC	174.601	140.970	216.192	128.978	238.278	185.035	126.652
-2 LOG L	142.052	102.995	183.643	91.003	205.729	141.635	94.102

*Base brand = Head & Shoulders; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8:4.5

MULTINOMIAL LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: SHAMPOO PART2 DATA
WITH LAST BRAND BOUGHT AS PREDICTOR

PARAMETER	P2/P1* IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
Intercept	-6.8885[a] (1.5555)	-3.5165[a] (0.4143)	-1.1702 (1.2371)	-3.0703 (3.1915)	-3.0944[a] (0.3821)	-6.1586 (4.0002)	-9.4176[a] (3.3300)
Last Brand	4.3449[a] (0.6294)	4.5461[a] (0.6656)	6.2983[a] (1.0434)	8.2552[a] (1.9279)	4.3916[a] (0.5295)	9.6552[a] (2.7735)	11.3696[a] (3.9593)
	77.084	94.264	543.647	999.000	80.770	999.000	999.000
1 Body					0.1646[c] (0.0926)		
					1.179		
2 Clean							0.9604[b] (0.4449)
							2.613
4 Dandruff	0.2064[b] (0.1030)		0.4372[a] (0.1300)	-0.3780[b] (0.1693)		0.3436[c] (0.1888)	
	1.229		1.548	0.706		1.410	
5. Mildfrg				0.7307[a] (0.2523)			0.6028[c] (0.3465)
				2.076			1.827
6 Gentle						0.6936[a] (0.2516)	
						2.001	
7 Fragrance			0.2140[c] (0.1317)				
			1.239				
8 Variant						-0.4642[c] (0.2671)	-0.7032[b] (0.3324)
						0.629	0.495
9 Feelrich			-0.7411[a] (0.2046)				
			0.477				
11 Price				0.5057[b] (0.2254)			
				1.658			

*Base brand = Head & Shoulders; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8.4.5 - Continued.

PARAMETER	P2/P1* IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
12 Packaging			0.4564[a] (0.1492) 1.578				
RATING			-0.4970[b] (0.2257) 0.608			-0.8563[b] (0.3715) 0.425	
SWITCH				-2.5664[b] (1.2081) 0.077		3.6248[c] (2.1748) 37.516	
INVOLVE			1.1379[c] (0.6375) 3.120				
AGE				-0.1934[c] (0.1062) 0.824			
EDUC						-0.3718[b] (0.1776) 0.689	
STATUS	3.1090[b] (1.3829) 22.398					1.7936[c] (1.0959) 6.011	
FSIZE						0.4710[b] (0.2306) 1.602	
CHILD	3.5159[a] (1.3810) 33.646						
DF	5	1	9	8	2	13	6
SCORE	116.78(p=0.0001)	108.62(p=0.0001)	114.70(p=0.0001)	122.22(p=0.0001)	136.14(p=0.0001)	128.16(p=0.0001)	135.64(p=0.0001)
AIC	104.584	80.275	118.845	51.491	119.108	79.876	39.899
SC	125.134	87.125	153.095	82.315	129.383	127.826	63.874
-2 LOG L	92.584	76.275	98.845	33.491	113.108	51.876	25.899

*Base brand = Head & Shoulders; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$

First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8.4.6

MULTINOMIAL LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: SHAMPOO PART2 DATA
DEPENDENT VARIABLE - LAST BRAND BOUGHT

PARAMETER	P2/P1* IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
Intercept	-0.7297 (1.5973)	4.7387[b] (2.2850)	-7.6063[a] (2.1672)	-4.2890[a] (0.9805)	-0.4963 (0.6627)	-3.1072[a] (1.1601)	2.2768 (1.9683)
1 Body	0.4213[a] (0.0988)		0.1878[c] (0.1107)				
	1.523		1.206				
6 Gentle		0.7262[a] (0.1813)	0.2817[b] (0.1277)				
		2.067	1.325				
8 Variant		-0.2900[b] (0.1477)		0.1447[c] (0.0931)			0.1512[c] (0.0891)
		0.748		1.156			1.163
9 Feelrich						0.1478[c] (0.0940)	
						1.190	
10 Endorse			-0.2961[b] (0.1269)				
			0.744				
11 Price	0.2583[b] (0.1292)						
	1.295						
12 Packaging			-0.1873[c] (0.1128)				
			0.829				
RATING		-0.3917[c] (0.2233)	0.4087[b] (0.2502)				
		0.676	1.505				
SWITCH					0.7582[c] (0.4400)	-1.3128[a] (0.4411)	
					2.135	0.269	

*Base brand = Head & Shoulders; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8.4.6 - Continued.

PARAMETER	P2/P1* IVORY	P3/P1 LUX	P4/P1 NATURALS	P5/P1 OPTIMA	P6/P1 PANTENE	P7/P1 REJOICE	P8/P1 SUNSILK
AGE		-0.1921[b] (0.0824) 0.825			1.3540[b] (0.7119) 3.873		
EDUC			0.1780[c] (0.1051) 1.194				-0.1854[c] (0.1005) 0.831
FEMALE					-0.6122[c] (0.3724) 0.542		
STATUS			1.0893[b] (0.5114) 2.972				-2.2586[c] (1.2776) 0.104
FSIZE					-0.2668[a] (0.0976) 0.766		
INC		-0.0041[a] (0.0016) 0.996					0.0011[c] (0.0007) 1.001
DF	6	5	8	2	7	4	7
SCORE	41.18 (p=0.0001)	27.83 (p=0.0001)	28.19 (p=0.0004)	4.50 (p=0.1053)	34.98 (p=0.0001)	22.96 (p=0.0001)	23.69 (p=0.0013)
AIC	139.420	101.779	156.996	101.314p	204.825	156.283	142.951
SC	163.394	122.329	187.821	111.589	232.225	173.408	170.351
-2 LOG L	125.420	89.779	138.996	95.314	188.825	146.283	126.951

*Base brand = Head & Shoulders; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$

First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Second row items are odds ratios.

Table 8.4.1 shows that giving body to hair and hair manageability are important attributes of Optima over HS. It was found that the estimated odds of choosing Optima instead of HS is 1.444 times higher when Optima is rated higher in giving body to hair. It is 1.519 times more likely that Optima is preferred over HS when it is rated one scale higher in hair styling. However, Head and Shoulders is perceived to perform better over Optima, in terms of cleaning hair, and being gentle to hair, as shown by the negative signs in the parameter estimates. The validation model in Table 8.4.4 indicates that availability of variants is a very significant attribute. The estimated odds of choosing Optima over HS is 1.286 times higher when Optima is rated higher. In addition, it is 1.343 times more likely that Optima is chosen over HS, when the price of Optima is rated to be more reasonable than HS. Brand switchers are not likely to choose Optima over HS.

Table 8.4.1 identifies Pantene's two significant attributes: cleaning ability and endorsements. The image of Pantene as a treatment shampoo with ingredients that are endorsed by hair experts appears to be well positioned in the consumers' mind. It is 1.438 times more likely that Pantene is preferred over HS, when its cleaning ability is rated higher. Likewise, it is 1.319 times more likely that Pantene is chosen because of the endorsements of hair experts. This brand would be chosen 1.240 times more likely over HS by more educated people (EDUC) and 1.451 times over HS by individuals belonging to larger families (FSIZE). At 95 percent level, the significant attributes in the validation model in Table 8.4.4 are hair styling and dandruff control.

Table 8.4.1 shows that Rejoice appears to be 1.444 times (at $\alpha = 0.01$) more likely chosen over HS for its hair manageability. Respondents also prefer Rejoice over HS by at least 1.280 times for its packaging. By contrast, the validation model in Table 8.4.4 has gentleness as an important attribute. The estimated odds of choosing Rejoice instead of HS is 1.346 times higher when Optima is rated more positively in gentleness to hair. In addition, unmarried (STATUS) and older consumers (AGE) would be more likely choosing Rejoice over HS.

Table 8.4.1 indicates that Sunsilk users view that cleaning ability, hair manageability, and dandruff control are significant attributes. It also appears that brand switchers would be 3.815 times more likely choosing Sunsilk over HS. In view of the negative signs of demographic predictors, EDUC, FSIZE, and CHILD, more educated people, those belonging to bigger families, and those with children would more unlikely choose Sunsilk over HS. The validation model in Table 8.4.4 confirms the finding on EDUC, and shows giving body to hair as a significant attribute.

The second set of models included the last brand bought, *LastBrand* as one of the predictors. As shown in Tables 8.4.2 and 8.4.5, the last brand bought is a very significant predictor (at $\alpha = 0.01$) in all the models with odds ratios ranging from 65.159 to 999.000. Since *LastBrand* is measured such a way that both the dependent variable and the predictor refer to the same brand, the odds ratios may serve as an indication of brand loyalty when the other brand shampoo brand is Head & Shoulders. Hence for the first half sample in Table 8.4.2, Ivory and Naturals users appear to have very high brand loyalty while Lux, Optima and Sunsilk have intermediate brand loyalty. On the other hand, Table 8.4.5 shows Naturals, Optima, Rejoice and Sunsilk users tend to have high brand loyalty. This provides strong evidence that the last brand bought may replace the brand most frequently purchased as the brand choice. In addition, the effects of the other predictors decrease as shown by the smaller number of significant explanatory variables entering the models.

The finding that the last brand bought is equivalent to brand choice was confirmed by using it as the dependent variable. The models are different from mathematical point of view. However, there appears to be some similarities between the significant explanatory variables in the models. Therefore, in countries where scanner panel data are unavailable, it is prudent to assume that the last brand bought is the brand choice of the consumer. Section 6 further discusses this finding as it evaluates the goodness of fit of the models.

Now using the relationships in equations 8.3.4 to 8.3.6, the reference brand was eliminated to make comparisons between two other brands. More specifically, a paired comparison among the three shampoo brands with highest market shares would be examined. Table 8.4.7 and 8.4.8 contains the derived parameter estimates and odds ratios for the brand choice models.

When the brand choice is the frequently bought brand, Table 8.4.7 shows that Naturals is significantly preferred over Pantene for its mild fragrance and by older people. However, Pantene is chosen over Naturals by more educated people and those belonging to bigger families. Pantene is also regarded more highly than Naturals in terms of endorsements. Alternatively, the validation sample in Table 8.4.8 shows dandruff control favouring Naturals over Pantene. The negative sign for endorsements confirms that Pantene is perceived to hold advantage over Naturals in this aspect. However, the effect of FSIZE is inconclusive because the positive sign in FSIZE contradicts the finding in Table 8.4.7.

On the other hand, Naturals is chosen over Ivory in terms of cleaning ability, mild fragrance, ability to give rich feelings (Table 8.4.7). It is 2.854 times more likely that females would choose Naturals or Pantene over Ivory. Respondents belonging to bigger families (FSIZE) prefer Pantene over Ivory. However, Ivory is preferred over Naturals and Pantene for its gentleness and dandruff control. This confirms Ivory's image as a mild shampoo, which was communicated through television advertisements during the time of the survey.

When Naturals was the last brand bought, Table 8.4.7 shows that it is 82.162 times preferred over Pantene and 5.706 times chosen over Ivory. Table 8.4.8 confirms these findings at lower levels of odd ratios. This high probability indicates that Naturals' users might be more brand loyal. However, between Pantene and Ivory, the effect of last brand bought appears to be mixed with opposite signs in the calibration and validation samples. Cleaning ability, mild fragrance, pleasant fragrance, and endorsements are variables that explain the choice of Naturals over Pantene. By contrast, giving body to hair and gentleness are attributes that can explain the choice of Pantene over Naturals.

Table 8.4.7

DERIVED MULTINOMIAL LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: SHAMPOO PART1 DATA

PARAMETR	FREQUENTLY BOUGHT BRAND Natl/Pantene (P4/P6)	FREQUENTLY BOUGHT BRAND Natl/Ivory (P4/P2)	FREQUENTLY BOUGHT BRAND Pantene/Ivory (P6/P2)	FREQUENTLY BOUGHT BRAND* Natl/Pantene (P4/P6)	FREQUENTLY BOUGHT BRAND* Natl/Ivory (P4/P2)	FREQUENTLY BOUGHT BRAND* Pantene/Ivory (P6/P2)	LAST BRAND BOUGHT Natl/Pantene (P4/P6)	LAST BRAND BOUGHT Natl/Ivory (P4/P2)	LAST BRAND BOUGHT Pantene/Ivory (P6/P2)
Last Brand				4.4087	1.7415	-2.6672			
				[82.162]	[5.706]	[0.069]			
1 Body				-0.7070	-0.7070				
				[0.493]	[0.493]				
2 Clean	-0.0723	0.2909	0.3632	0.6251	1.0684	0.4433	-0.1995		0.1995
	[0.930]	[1.338]	[1.438]	[1.868]	[2.911]	[1.558]	[0.819]		[1.221]
4 Dandruff		-0.2438	-0.2438		-0.3005	-0.3005	-0.2693		0.2693
		[0.784]	[0.784]		[0.740]	[0.740]	[0.764]		[1.309]
5 Mildfrg	0.2548	0.2548		0.7963	0.7963				
	[1.290]	[1.290]		[2.208]	[2.208]				
6 Gentle		-0.4292	-0.4292	-0.6204	-0.6204			-0.4332	-0.4332
		[0.651]	[0.651]	[0.538]	[0.538]			[0.648]	[0.648]
7 Fragrance				0.2408		-0.2408	0.3260	0.3260	
				[1.272]		[0.786]	[1.385]	[1.385]	
9 Feelrich		0.2871	0.2871				-0.3315	-0.3315	
		[1.332]	[1.332]				[0.718]	[0.718]	

*With Last brand bought as additional predictor. First row items are derived parameter estimates. Second row items in brackets are odds ratios.

Table 8.4.7 - Continued.

PARAMETR	FREQUENTLY BOUGHT BRAND Natl/Pantene (P4/P6)	FREQUENTLY BOUGHT BRAND Natl/Ivory (P4/P2)	FREQUENTLY BOUGHT BRAND Pantene/Ivory (P6/P2)	FREQUENTLY BOUGHT BRAND* Natl/Pantene (P4/P6)	FREQUENTLY BOUGHT BRAND* Natl/Ivory (P4/P2)	FREQUENTLY BOUGHT BRAND* Pantene/Ivory (P6/P2)	LAST BRAND BOUGHT Natl/Pantene (P4/P6)	LAST BRAND BOUGHT Natl/Ivory (P4/P2)	LAST BRAND BOUGHT Pantene/Ivory (P6/P2)
10 Endorse	-0.2765		0.2765	0.4413	0.8050	0.3637	-0.1753		0.1753
	[0.758]		[1.319]	[1.555]	[2.237]	[1.439]	[0.839]		[1.192]
SWITCH				-1.3498	-1.4059	-0.0561		1.2105	1.2105
				[0.259]	[0.245]	[0.945]		[3.355]	[3.355]
AGE	0.0915		-0.0915				0.1051		-0.1051
	[1.096]		[0.913]				[1.111]		[0.900]
EDUC	-0.2149		0.2149	-0.2543	-0.4099	-0.1556	-0.2119	0.2273	0.4392
	[0.807]		[1.240]	[0.775]	[0.664]	[0.856]	[0.809]	[1.255]	[1.551]
FEMALE		1.0487	1.0487		1.9960	1.9960			
		[2.854]	[2.854]		[7.360]	[7.360]			
STATUS					-3.8822	-3.8822	-2.8080	3.1517	5.9597
					[0.021]	[0.021]	[0.060]	[23.376]	[387.494]
FSIZE	-0.3721		0.3721	-0.3652		0.3652	-0.2885	0.2493	0.5378
	[0.689]		[1.451]	[0.694]		[1.441]	[0.749]	[1.283]	[1.712]
CHILD							-2.3615		2.3615
							[0.094]		[10.067]
INC				-1.4023		1.4023			
				[0.246]		[4.065]			

*With Last brand bought as additional predictor. First row items are derived parameter estimates. Second row items in brackets are odds ratios.

Table 8.4.8

DERIVED MULTINOMIAL LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: SHAMPOO PART2 DATA

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	Natl/Pantene (P4/P6)	Natl/Ivory (P4/P2)	Pantene/Ivory (P6/P2)	Natl/Pantene (P4/P6)	Natl/Ivory (P4/P2)	Pantene/Ivory (P6/P2)	Natl/Pantene (P4/P6)	Natl/Ivory (P4/P2)	Pantene/Ivory (P6/P2)
Last Brand				1.9067	1.9534	0.0467			
				[6.731]	[7.052]	[1.048]			
1 Body		-0.3773		-0.1646		0.1646	0.1878	-0.2335	-0.4213
		[0.686]		[0.848]		[1.179]	[1.206]	[0.792]	[0.656]
3 Style	-0.1708		0.1708						
	[0.843]		[1.186]						
4 Dandruff	0.0820	0.2891	-0.2071	0.4372	0.2308	-0.2064			
	[1.085]	[1.335]	[0.813]	[1.548]	[1.260]	[0.814]			
6 Gentle							0.2817	0.2817	
							[1.325]	[1.325]	
7 Fragrance				0.2140	0.2140				
				[1.239]	[1.239]				
8 Variants		-0.2307	-0.2307						
		[0.794]	[0.794]						
9 Feelrich				-0.7411	-0.7411				
				[0.477]	[0.477]				
10 Endorse	-0.2546	-0.2546					-0.2961	-0.2961	
	[0.775]	[0.775]					[0.744]	[0.744]	
11 Price								-0.2583	-0.2583
								[0.772]	[0.772]

*With Last brand bought as additional predictor. First row items are derived parameter estimates. Second row items in brackets are odds ratios.

Table 8.4.8 - Continued.

PARAMETR	FREQUENTLY BOUGHT BRAND Natl/Pantene (P4/P6)	Natl/Ivory (P4/P2)	Pantene/Ivory (P6/P2)	FREQUENTLY BOUGHT BRAND* Natl/Pantene (P4/P6)	Natl/Ivory (P4/P2)	Pantene/Ivory (P6/P2)	LAST BRAND BOUGHT Natl/Pantene (P4/P6)	Natl/Ivory (P4/P2)	Pantene/Ivory (P6/P2)
12 Packaging				0.4564	0.4564		-0.1873	-0.1873	
				[1.578]	[1.578]		[0.829]	[0.829]	
RATING				-0.4970	-0.4970		0.4087	0.4087	
				[0.608]	[0.608]		[1.505]	[1.505]	
SWITCH							-0.7582		0.7582
							[0.468]		[2.135]
INVOLVE				1.1379	1.1379				
				[3.120]	[3.120]				
AGE							-1.3540		1.3540
							[0.258]		[3.873]
EDUC							0.1780	0.1780	
							[1.194]	[1.194]	
FEMALE							0.6122		-0.6122
							[1.844]		[0.542]
STATUS					-3.1090	-3.1090	1.0893	1.0893	
					[0.045]	[0.045]	[2.972]	[2.972]	
FSIZE	0.1636		-0.1636				0.2668		-0.2668
	[1.178]		[0.849]				[1.306]		[0.766]
CHILD					-3.5159	-3.5159			
					[0.030]	[0.030]			

*With Last brand bought as additional predictor. First row items are derived parameter estimates. Second row items in brackets are odds ratios.

When the last brand bought is the dependent variable, pleasant fragrance is Naturals' attribute that explains its choice over Pantene and Ivory. Naturals is negatively perceived over Ivory in gentleness and ability to give rich feelings. Pantene is chosen over Naturals in terms of cleaning ability, dandruff control, ability to give rich feelings, and endorsements. The effects of the demographic variables are also mixed because of different signs.

In summary, this section has shown that logit analysis is a useful technique in explicating the brand choice of shampoo. Paired comparisons between any two brands can be easily done after estimating the system of logit models using a single reference brand. The last brand bought is the most significant predictor of brand choice. Depending on the brands being compared, other attributes, psychographic, and demographic variables are also significant to a lesser degree. The next section discusses the more general binary models.

8.5 Model Results - Binary Models

Binary models have no specific reference brand. Instead they estimate the probability of choosing a particular brand over all other brands. This would be useful if the objective is to isolate the brand from comparison with the base brand in a multinomial model. Similar to the multinomial models, an interesting discussion can be made on the significant variables for Pantene shampoo. This section, however, evaluates the saliency of using importance rating measures.

Tables 8.5.1 contains the binary model estimates for Pantene when using the total data set.[22] The models that incorporate the importance weights to the attributes are included under the ranks and values columns.

---

[22] Appendix 7 contains models using the calibration data (Table A7.1) and validation data (Table A7.2). The conclusions drawn from these tables confirmed the findings in this section.

Table 8.5.1

PANTENE'S BINARY LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS- USING TOTAL DATA

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
Intercept	-7.1255[a]	-5.9184[a]	-5.5197[a]	-5.6005[a]	-4.8799[a]	-5.2426[a]	-6.6049[a]	-5.7771[a]	-7.0433[a]
	(1.4877)	(0.8352)	(1.0378)	(1.3974)	(1.2924)	(1.3140)	(0.9733)	(0.7752)	(1.1522)
Last Brand				4.1655[a]	4.3069[a]	4.2256[a]			
				(0.3798)	(0.3946)	(0.3957)			
				64.424	74.209	68.412			
1 Body			0.2051[b]					0.2312[a]	0.3339[a]
			(0.1045)					(0.0877)	(0.1102)
			1.228					1.260	1.396
2 Clean	0.3659[a]	0.1787[c]	0.3002[b]			0.2962[c]	0.3925[a]	0.1848[c]	
	(0.1312)	(0.0944)	(0.1416)			(0.1781)	(0.1385)	(0.1004)	
	1.442	1.196	1.350			1.345	1.481	1.203	
3 Style	0.3586[a]	0.3375[a]	0.6707[a]	0.4256[a]	0.4204[a]	0.5179[c]		0.2214[b]	0.5464[a]
	(0.1388)	(0.1022)	(0.2236)	(0.1519)	(0.1138)	(0.2962)		(0.1042)	(0.2195)
	1.431	1.401	1.956	1.531	1.523	1.678		1.248	1.727
4 Dandruff	0.1762[c]								0.4391[c]
	(0.1043)								(0.2444)
	1.193								1.551

*With Last brand bought as additional predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table 8.5.1 - Continued.

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
7 Fragrancc		0.1553^{c}	1.0571^{a}					0.1478^{c}	0.6835^{b}
		(0.0823)	(0.3916)					(0.0800)	(0.3686)
		1.168	2.878					1.159	1.981
9 Feelrich				0.1899^{c}	0.2534^{a}	1.2354^{b}			
				(0.1171)	(0.0916)	(0.5846)			
				1.209	1.288	3.440			
11 Price		-0.1320^{b}		-0.1828^{c}	-0.1864^{c}				
		(0.0675)		(0.0981)	(0.0998)				
		0.876		0.833	0.830				
12 Pkgg					-0.2030^{c}		-0.1915^{b}		
					(0.1083)		(0.0833)		
					0.816		0.826		
FEMALE		-0.4197^{c}	-0.4672^{c}						-0.4814^{c}
		(0.2581)	(0.2610)						(0.2668)
		0.657	0.627						0.618
STATUS	1.3359^{c}						0.5799^{b}		1.1716^{c}
	(0.7358)						(0.2692)		(0.7123)
	3.803						1.786		3.227
FSIZE		0.1052^{c}		0.1646^{c}	0.2031^{b}	0.1817^{b}			
		(0.0625)		(0.0879)	(0.0890)	(0.0898)			
		1.111		1.179	1.225	1.199			

*With Last brand bought as additional predictor. ^{a}Significant at $\alpha = 0.01$; ^{b}Significant at $\alpha = 0.05$; ^{c}Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table 8.5.1 - Continued.

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
FEMALE		-0.4197^{c}	-0.4672^{c}						-0.4814^{c}
		(0.2581)	(0.2610)						(0.2668)
		0.657	0.627						0.618
STATUS	1.3359^{c}						0.5799^{b}		1.1716^{c}
	(0.7358)						(0.2692)		(0.7123)
	3.803						1.786		3.227
FSIZE		0.1052^{c}		0.1646^{c}	0.2031^{b}	0.1817^{b}			
		(0.0625)		(0.0879)	(0.0890)	(0.0898)			
		1.111		1.179	1.225	1.199			
DF	10	11	11	7	7	10	7	8	8
SCORE	59.746	62.615	58.625	257.553	260.603	257.948	51.948	51.844	50.324
	(p=0.0001)	(p=0.0001)	(p=0.0001)	(p=0.0001)	(p=0.0001)	(p=0.0001)	(p=0.0001)	(p=0.0001)	(p=0.0001)
AIC	429.405	436.553	435.512	258.780	253.350	260.246	412.323	417.454	414.463
SC	474.824	486.101	485.008	291.813	286.382	305.617	445.356	454.616	451.586
-2LOGL	407.405	412.553	411.512	242.780	237.350	238.246	396.323	399.454	396.463
% Correct	78.2	79.1	77.7	90.8	90.6	90.6	79.3	79.5	78.8

*With Last brand bought as additional predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

The weakness of using ranks has been frequently mentioned because this is only a good ordering procedure and assumes equal distances between each attribute being ranked. For example, a consumer assumes that the attribute ranked as one is twice as important as the one ranked as two, and three times as important as the attribute ranked as three.

The values may be better in assigning importance levels but this too, has some limitations. Consumers have more difficulty in assigning values rather than ranks. Attitudinal profiles and demographic variables remain unaffected by the weighting of the attributes through ranks and values. However, there would be some differences in parameter estimates because all the predictors are jointly estimated in the model.

Table 8.5.1 shows that models with unweighted attributes have almost identical significant variables as the models weighted by values and ranks. When the dependent variable is the frequently bought brand, the common significant variables are cleaning ability, hair styling, fragrance, and FEMALE. When *LastBrand* is brought in as a predictor, the model with unweighted attributes is almost similar to the model having attributes weighted by values (except for additional significant variable, Pkgg). On the other hand, the model weighted by ranks has more predictors but does not appear to be different. The same observations can be gathered when the last brand bought becomes the dependent variable.

The best comparison is shown by the statistical criteria in choosing the best model. The AIC, SC and -2 LogL values are not too far from each other. When last brand is not a predictor, the model with unweighted attributes has lower AIC and SC values than the models with attributes weighted by values and ranks. The model weighted by values, however, gives the highest value of maximum likelihood. When last brand is added as a predictor, the model with attributes weighted by values is the best performing. It has the highest value of maximum likelihood and has the lowest AIC and SC values.

These findings reveal that researchers need not collect the importance ratings of consumers and still have useful brand choice models. When importance rating is deemed necessary, only one should be collected to minimise burden on the respondents and also reduce response time.

8.6 Model Validation and Diagnostics

Amemiya (1981) cited several statistics available for evaluating the goodness of fit of a logit model. These are: accuracy of prediction, examination of residuals, log likelihood function, and information theoretic measures. Only the first, third, and fourth measures recommended by Malhotra (1984) were utilised in the study.

The measures of prediction accuracy compare the observed data with corresponding predictions by the estimated model. The term prediction rate is synonymous to the classification rate in discriminant analysis and SAS Logistic Procedure. Since the sample size is sufficiently large to be split into halves two measures of predictive accuracy are calculated. The first measures the prediction rate of the model on the data set used to estimate the model - the calibration sample. The second evaluates the prediction rate of the model on an independent data set, the holdout sample, to validate the model. This process can then be reversed where the validation model is tested on the calibration sample.

Hosmer and Lemeshow (1989) outlined the procedure to decide whether the predicted outcome is correct or not. Since the dependent variable of the logit model is either 0 or 1, a cutpoint c, must be defined. If the estimated probability exceeds c then the derived variable equals 1; otherwise it is equal to zero. The SAS Logistic Procedure calculates the classification rates for c-values from 0 to 1 at increments of 0.02. The study, however, employed the most commonly used value for c which is 0.5. As the midpoint of 0 and 1, it is unbiased and has intuitive appeal.

Table 8.6.1 includes the prediction rate of the calibration and validation models when the choice is the frequently purchased brand. The prediction rates are generally high ranging from 73.4 percent to 92.7 percent. Table 8.6.2 shows that the last brand bought is a very good predictor of the brand choice. The prediction rates are higher when the lagged brand choice is added as a predictor than the models in Table 8.6.1 and 8.6.3. Likewise, Table 8.6.3 suggests that the last brand bought could act as a the surrogate of the brand choice of the consumer because of the comparable prediction rates with Table 8.6.1. Thus, this finding is consistent with the common belief in marketing research that the last brand bought is the brand choice of the consumer.

Table 8.6.1

PREDICTIVE ACCURACY OF SAMPLES

DEPENDENT VARIABLE: FREQUENTLY PURCHASED BRAND

Logit Model*	*Sample One Parameters Used* Sample One Predictions	Sample Two Predictions	*Sample Two Parameters Used* Sample One Predictions	Sample Two Predictions
Ivory	87.5	86.3	85.9	86.7
Lux	90.5	89.9	90.3	89.7
Naturals	92.7	81.5	81.1	88.1
Optima	89.7	90.7	93.4	91.0
Pantene	76.3	78.0	78.4	73.4
Rejoice	89.2	85.5	87.7	86.7
Sunsilk	90.1	91.6	92.1	90.6

*Reference shampoo brand is Head & Shoulders.

Table 8.6.2

PREDICTIVE ACCURACY OF SAMPLES

LAST BRAND BOUGHT AS PREDICTOR OF CHOICE

Logit Model*	*Sample One Parameters Used* Sample One Predictions	Sample Two Predictions	*Sample Two Parameters Used* Sample One Predictions	Sample Two Predictions
Ivory	94.4	86.3	92.1	94.4
Lux	95.7	93.8	95.2	95.3
Naturals	96.6	87.7	89.0	89.7
Optima	93.1	93.4	96.5	93.6
Pantene	88.8	88.5	92.5	88.8
Rejoice	92.7	90.3	93.0	88.0
Sunsilk	94.4	93.8	96.5	94.0

*Reference shampoo brand is Head & Shoulders.

Table 8.6.3

PREDICTIVE ACCURACY OF SAMPLES

LAST BRAND BOUGHT AS DEPENDENT VARIABLE

Logit Model*	*Sample One Parameters Used* Sample One Predictions	Sample Two Predictions	*Sample Two Parameters Used* Sample One Predictions	Sample Two Predictions
Ivory	87.5	87.2	86.8	88.0
Lux	91.8	91.6	91.2	90.6
Naturals	92.7	83.3	86.8	89.3
Optima	92.2	92.5	94.3	92.3
Pantene	79.7	92.5	81.1	76.8
Rejoice	86.2	85.9	87.2	85.0
Sunsilk	88.4	86.3	89.4	89.7

*Reference shampoo brand is Head & Shoulders.

Another measure of model fit is the maximised log-likelihood function. This is useful when comparing the same number of parameters in models with the same dependent variable. The Akaike (1973) information criterion and Schwartz Criterion (SC) are more appropriate when comparing models with different numbers of parameters. A comparison of the AIC's in Tables 8.4.1 and 8.4.2 or Tables 8.4.4 and 8.4.5 for the multinomial logit shows that the models with last brand bought as predictor have much lower AIC and SC values than models where *LastBrand* is absent. In the binary models of Table 8.5.1, the AIC and SC values are also lower when *LastBrand* is a predictor. Hence, adding the last brand bought as predictor improves the brand choice models.

8.7 Summary

This chapter has discussed the results of the logit modelling for shampoo. The chapter began by defining the attributes, attitudinal profile and demographic explanatory variables. The procedure in estimating the models and interpreting the parameter estimates was outlined before presenting the model results. The discussion of results included a description of each brand in terms of the important predictors and to what extent these variables can influence choice through the odds ratios. Finally, the goodness of fit of each estimated model was evaluated through the prediction rates and AICs.

For the shampoo sample it is reasonable to say that the last brand bought is a significant predictor of brand choice. Moreover, the comparable prediction rates has also shown that the last brand bought can replace the brand most frequently purchased as a dependent variable. The important attributes in determining the choice of the top three brands are giving body to hair, cleaning ability, dandruff control, fragrance, gentleness to hair, and endorsements. Brand switching and purchase decision involvement also enter the models. Of the seven demographic variables, only age was not significant, while the years of completed education, sex, marital status, family size, children, and monthly income are significant.

The results from binary models showed that researchers need not collect the importance ratings of consumers and still have useful brand choice models. When importance rating is deemed necessary, only one should be collected to minimise burden on the respondents and also to reduce response time.

The high prediction rates of the logit models in the estimation and holdout samples suggest that the independence of irrelevant alternatives property was not violated (Malhotra 1984). Moreover, the high prediction rates and the low values of AIC and SC show that the logit models are reasonably successful at predicting brand choice. The fitted models can therefore be useful in explaining and predicting the brand choice of shampoo.

The next chapter presents the results of the discriminant and logit modelling studies for toothpaste.

CHAPTER 9

DISCRIMINANT AND LOGIT MODELS FOR TOOTHPASTE

9.1 Introduction

This chapter presents the discriminant and logit modelling results for toothpaste. Since most of the model estimation and interpretation issues were already discussed in Chapters 7 and 8, this chapter will immediately present and discuss the results for toothpaste, while noting any significant differences from shampoo. Beforehand, it is important to differentiate the characteristics of toothpaste against shampoo.

Whilst both shampoo and toothpaste belong to the personal care products category, the nature of the purchasing decision may be different. Chapter 6 showed that the incidence of brand loyalty among toothpaste users is higher than among shampoo users. Moreover, about 60 percent of respondents buy their own shampoo. By contrast, only 40 percent of toothpaste users purchase toothpaste for personal use. This implies that toothpaste is mainly shared within a household. Hence, it is possible that respondents who are not the toothpaste buyers may be indifferent to the brand chosen by their family representatives.

However, the main difference between the two products lies in the consumer perception of the primary benefits. Shampoo primary benefits are more perceivable than toothpaste. On the other hand, some primary benefits of toothpaste like cavity prevention or tartar reduction are inherently hard for customers to evaluate even after long usage. This phenomenon has led Park and Srinivasan (1994) to conclude that toothpaste consumers are far more susceptible to correct or incorrect claims made by the manufacturers. Contrary to the belief held by most consumers, a Wall Street Journal (1992) article says that many dentists view brushing with water and no paste, flossing and gargling with fluoride rinse accomplish the same results as using a toothpaste. Therefore, toothpaste is a classic example of a "credence good" (Darby and Karni 1973).

The chapter initially presents the most common weighted additive model and its limitations. Section 3 deals with parametric and nonparametric discriminant models. Section 4 discusses the logit model results while Section 5 summarises major points of the chapter.

9.2 The Weighted Additive Model

The prediction rate of the weighted additive model is evaluated by comparing the predicted brand to the actual brand chosen by the consumer as discussed in Section 7.2. Table 9.2.1 contains the predictive accuracy of the model. In the case of toothpaste, the 65 percent prediction rate of the weighted additive model is better than the 50 percent prediction rate found in shampoo and the 20 percent prediction rate of the chance model[23].

Table 9.2.1

PREDICTION RATE OF THE WEIGHTED ADDITIVE MODEL: TOOTHPASTE

	Importance Rating System	
Brand Choice	Ranks (percent)	Values (percent)
Frequently Purchased Brand	65.7	65.3
Last Brand Bought	54.2	54.9
Next Brand To Be Purchased	64.9	64.9

9.3 Toothpaste Discriminant Models

9.3.1 The Linear Model

The analysis considered only three toothpaste brands having the best market shares namely Colgate, Close-Up, and Hapee. In the study, the toothpaste brands serve as groups or classes while the twelve attributes act as independent variables as described in Chapter 5.

[23] Since there were five toothpaste brands investigated, the probability of choosing a brand is 20 percent.

Performing univariate analyses screened out three attributes, not significant at 90 percent, to generate two canonical discriminant functions. The following tables and figures were produced by the SPSS Discriminant Procedure as results of the analysis. Table 9.3.1 outlines the variance explained by the discriminant functions. Figure 9.3.1.1 includes the test of the null hypothesis that there is no difference between the population group means using Wilks' lambda, the standardised coefficients, and the structure matrix. Finally, Figure 9.3.1.2 illustrates the territorial map that shows the separation between the brands.

Table 9.3.1

CANONICAL DISCRIMINANT FUNCTIONS: TOOTHPASTE

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr
1*	.1212	65.72	65.72	.3287
2*	.0632	34.28	100.00	.2438

*Marks the 2 canonical discriminant functions remaining in the analysis.

The first discriminant function explains 65.72 percent of variance. An examination of the standardised coefficients reveals that cleaning ability, tartar reduction, and confidence contribute most to the overall discriminant function. On the other hand, the second discriminant function accounts for 34.28 percent of variance and identifies taste and cavity protection as the largest contributors.

The structure matrix also indicates the contributions of variables. Most attributes correlate to discriminant function 1 and the variables with at least 0.50 correlation are clean, dentist, tartar, and cavity. Whilst taste is also highly correlated with function 1, it has a higher absolute correlation with function 2. Thus, function 1 summarises the functional and cosmetic benefits that a toothpaste must have. In the case of function 2, the taste and flavour variants have the largest absolute correlations. These two attributes can be summarised as sensory benefits, which may include pleasant taste during brushing and lingering mouthfeel after brushing.

Figure 9.3.1.1

THE LINEAR DISCRIMINANT MODEL FOR TOOTHPASTE

TEST OF EQUAL GROUP MEANS USING WILK'S LAMBDA

After Fcn	Wilks' Lambda	Chi-square	df	Sig
0	0.838918	73.419	18	0.0000
1	0.940555	25.617	8	0.0012

STANDARDISED DISCRIMINANT FUNCTION COEFFICIENTS

Attribute	Func 1	Func 2
CAP	-0.17551	-0.20974
CAVITY	-0.26863	-0.74044
CLEAN	0.88520	0.05933
CONFIDENT	-0.78853	0.04824
DENTIST	0.64221	-0.33846
FLAVOUR	-0.17680	0.24335
TARTAR	0.72354	-0.19170
TASTE	0.35415	1.38127
WHITE	-0.39720	0.02703

STRUCTURE MATRIX

Pooled within-groups correlations between discriminating variables and canonical discriminant functions. Variables ordered by size of correlation within function.

	Func 1	Func 2
CLEAN	0.70312*	0.13740
DENTIST	0.60574*	0.05399
TARTAR	0.59206*	-0.11201
CAVITY	0.54114*	-0.10633
CAP	0.38627*	0.13955
WHITE	0.37415*	0.03441
CONFIDENT	0.28293*	0.27306
TASTE	0.50003	0.60526*
FLAVOUR	0.18104	0.36595*

*denotes largest absolute correlation between each variable and any discriminant function.

Figure 9.3.1.2

TERRITORIAL MAP FOR TOOTHPASTE

```
       -3.0      -2.0      -1.0        .0       1.0       2.0       3.0
          +---------+---------+---------+---------+---------+---------+
C    3.0 +                                                          112+
a        |                                                        1122 |
n        |                                                       122   |
o        |                                                     112     |
n        |                                                   1122      |
i        |                                                  122        |
c    2.0 +          +         +         +         +       112          +
a        |                                              1122           |
l        |11                                           122             |
         |33111                                      112               |
D        |  33311                                  1122                |
i        |     3311                               122                  |
s    1.0 +       33111        +         +       112         +          +
c        |         33311                       122                     |
r        |            33111                  112                       |
i        |              33311              1122                        |
m        |                 3311      *    122                          |
i        |                   33111      112                            |
n     .0 +          +         +33311  1122*       +         +          +
a        |                        331122                               |
n        |                          332                                |
t        |                     *     32                                |
         |                            32                               |
F        |                            32                               |
u   -1.0 +          +         +        32         +         +          +
n        |                             32                              |
c        |                              32                             |
t        |                               32                            |
i        |                               32                            |
o        |                                32                           |
n   -2.0 +          +         +         + 32      +         +          +
         |                                 32                          |
2        |                                  32                         |
         |                                  32                         |
         |                                   32                        |
         |                                   32                        |
    -3.0 +                                    32                       +
          +---------+---------+---------+---------+---------+---------+
       -3.0      -2.0      -1.0        .0       1.0       2.0       3.0

                     Canonical Discriminant Function 1
```

Symbols used in territorial map

1	Close-Up
2	Colgate
3	Hapee
*	indicates a group centroid

Function 1	represents functional and cosmetic benefits
Function 2	represents sensory benefits

Meanwhile, the territorial map in Figure 9.3.1.2, shows that both functions are important for classification. Function 1 is good at classifying Hapee (3) and Colgate (2). For any value of function 2, function 1 classifies the brand as Hapee when its value is negative and Colgate when its value is positive. On the other hand, function 2 is good at classifying Close-Up (1) and Hapee. For any value of function 1, function 2 classifies a brand as Hapee when its value is negative and Close-Up when its value is positive. The classification between Close-Up and Colgate requires both functions.

Furthermore, the territorial map indicates that Colgate's group centroid has the highest and only positive value for function 1. Thus, it appears that Colgate is the toothpaste that provides the highest utility to the consumers. Most likely, Colgate is the consumers' benchmark for toothpaste and each brand is evaluated and compared against Colgate. However in function 2, the Close-Up group centroid has higher value than Colgate. At least for this sample, the consumers are rating the taste of Close-Up higher than Colgate. Hapee's group centroid appears on the third quadrant, where both functions have negative values. It appears that Hapee does not meet the consumers' requirements in a toothpaste. Consumers are only choosing Hapee because of its low price.

These are externally valid findings as they closely mirror the realities in the Philippine toothpaste market. Close-Up accounts for the cosmetic segment and it is patronised by younger people mostly aged 16-30 years. On the other hand, Colgate dominates the therapeutic segment and it is popular among people with families. Colgate is the toothpaste brand preferred by most mothers (Personal Communication 2, 1996). Although the sample chosen in this study has Close-Up bias, Colgate is still rated higher than Close-Up in terms of functional benefits. Therefore, it is expected that on some occasions Close-Up users may be switching to Colgate as shown by the closeness of the group centroids of the two brands.

Using equal group sizes as priors, the percent of correctly classified cases is only 60.94 percent or an error rate of 39.06 percent. Although the prediction rate is above 50 percent it is necessary to check for the assumptions of multivariate normality and variance homogeneity. The test for equality of group covariance matrices (Box's $M = 922.98249$, $df = 90$, $p < 0.01$) rejects the null hypothesis of equal population covariances. This is a violation of one assumption of the linear function. Moreover, a Levene test for homogeneity of variance on every independent variable confirms this finding. At 95 significance level, the null hypothesis of equal variances is rejected for five of the nine variables: cap, clean, dentist, tartar, and white. However, one-way ANOVA and the modified LSD (Bonferroni) tests suggest that no two groups are significantly different. Thus, the means are equal but there is heterogeneity of variances.

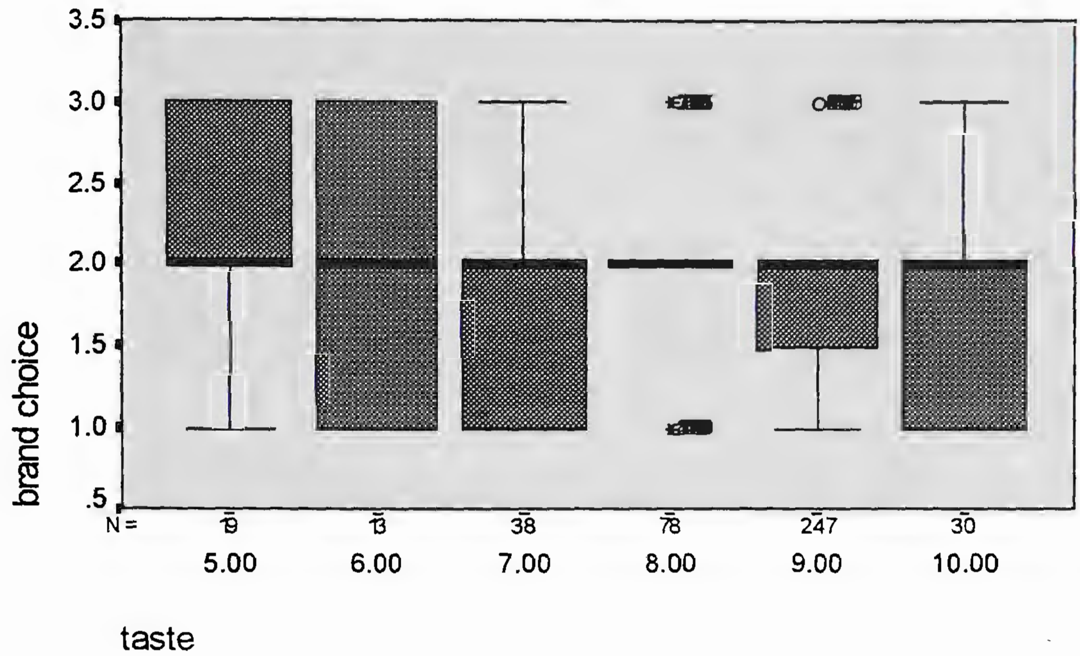
Multivariate normality is a necessary condition to ensure optimality in the linear discriminant function. Shapiro-Wilks' and Lilliefors normality tests, including normality plots, show that in all the nine independent variables, the assumption of multivariate normality is reasonable.

To understand the extent and character of differences between the brands in terms of the variable taste Figure 9.3.3 displays six boxplots. Consider the boxplot of 247 respondents who gave a taste rating of 9.0 to their brands. The median brand choice is Colgate (2) and the spread is between 1.5 and 2.0. The distribution is negatively skewed as shown by the median line at the top of the box. The first quartile marked by a whisker shows that Close-Up (1) users comprise the outliers. Colgate is the dominant brand among the 78 people who gave a taste rating of 8.0. Close-Up and Hapee users are just outliers. It is interesting that all the boxplots have Colgate as the median brand. Moreover, the variability of those who rated their brands above 7.0 is just between Colgate and Close-Up. Hence, it seems that Hapee (3) is not rated highly for its taste.

In conclusion, while there is multivariate normality, the variances are not homogeneous. Hence, the fitted linear model may not be optimal. The next section presents the results for the quadratic and nonparametric models.

Figure 9.3.3

BOXPLOTS FOR TASTE DATA: TOOTHPASTE



9.3.2 The Quadratic and Nonparametric Models

The quadratic discriminant function relaxes the equal covariance matrices assumption of the linear function but still requires normality. Using the quadratic function has improved the classification rate from 60.94 to 67.06 percent (see Table 9.3.2.1). On the other hand, nonparametric models are appropriate for non-normal population distributions. Table 9.3.2.1 contains the classification or hit rates of both the parametric and nonparametric discriminant methods. Higher hit rates are produced by nonparametric methods than either the linear or quadratic function. The best classification rate is 89.12 percent from either the kernel method with equal bandwidth at $r = 0.10$ or the k-nearest neighbour rule at $k = 1$. However, when the crossvalidation rates were examined, the best discriminant model for prediction is the kernel method with unequal bandwidth at $r = 0.10$. It has a L-O-O crossvalidation rate of 56.01 percent and a classification rate of 39.08 percent in the holdout sample.

Table 9.3.2.1

PERCENTAGE CLASSIFICATION AND CROSSVALIDATION OF DISCRIMINANT METHODS

DISCRIMINANT MODELLING METHOD	CLASSIFICATION		CROSSVALIDATION Leave-One-Out Method		CROSSVALIDATION Using Holdout Sample	
	Hit Rates	Posterior Probability Hit Rate	Hit Rates	Posterior Probability Hit Rate	Hit Rates	Posterior Probability Hit Rate
Parametric Methods						
Linear function	60.94	53.04	49.75	52.59	43.03	57.31
Quadratic function	67.06	78.04	43.66	77.71	38.10	75.01
Nonparametric Methods						
Using the Kernel Method						
Kernel density with equal bandwidth*						
$r = 0.10$	89.12	89.12	36.80	87.75	38.64	90.94
$r = 0.20$	89.12	89.11	37.81	85.93	38.15	88.41
$r = 0.30$	89.12	88.76	38.54	82.69	37.66	84.43
$r = 0.40$	89.06	86.80	40.65	76.87	38.64	79.07
$r = 0.50$	88.08	82.55	41.42	70.67	39.32	74.73

* Uses the pooled covariance matrix in calculating the generalised squared distances. The use of equal bandwidths (smoothing parameters) does not constrain the density estimates to be of equal variance.

Table 9.3.2.1 - Continued.

DISCRIMINANT MODELLING METHOD	CLASSIFICATION		CROSSVALIDATION Leave-One-Out Method		CROSSVALIDATION Using Holdout Sample	
	Hit Rates	Posterior Probability Hit Rate	Hit Rates	Posterior Probability Hit Rate	Hit Rates	Posterior Probability Hit Rate
Kernel density with unequal bandwidth**						
$r = 0.10$	86.78	96.00	56.01	96.87	39.08	93.85
$r = 0.20$	86.78	95.98	56.15	95.10	37.06	92.56
$r = 0.30$	86.78	95.56	56.33	91.55	39.74	90.39
$r = 0.40$	85.47	93.75	54.74	87.13	39.49	88.63
$r = 0.50$	82.62	91.86	55.81	82.93	39.25	85.33
Epanechnikov kernel						
kernel density with equal bandwidth	78.03	74.43	29.45	41.50	27.99	41.69
kernel density with unequal bandwidth	76.76	87.31	36.78	55.82	26.20	40.60
Using the *k*-Nearest Neighbour Rule						
$k = 1$	89.12	89.12	36.80	89.12	38.89	91.17
$k = 2$	80.17	77.72	39.48	81.59	34.23	82.35

**Uses the individual within-group covariance matrices in calculating the distances.

An examination of the pairwise squared distances between the brands would demonstrate which brands are similar in terms of the nine significant toothpaste attributes (Table 9.3.2.2). Close-Up is similar to Colgate and both brands are significantly different to Hapee. However, the difference between Colgate and Hapee is greater than that between Close-Up and Hapee. These findings are consistent with the conclusions drawn from the territorial map.

Table 9.3.2.2

PAIRWISE SQUARED DISTANCES BETWEEN TOOTHPASTE BRANDS USING NORMAL KERNEL METHOD AT $r = 0.10$

Squared Distance to BRAND

From BRAND	Close-Up	Colgate	Hapee
Close-Up	0		
Colgate	0.44116	0	
Hapee	1.13319	1.36751	0

F Statistics, NDF=9, DDF=414 for Squared Distance to BRAND

From BRAND	Close-Up	Colgate	Hapee
Close-Up	0		
Colgate	3.61227[a]	0	
Hapee	3.41982[a]	4.99805[a]	0

[a]The Prob > Mahalanobis Distance for Squared Distance to BRAND is significant at $\alpha = 0.01$.

9.4 Toothpaste Logit Models

9.4.1 Logit Model Formulation

Recall from Chapter 8 that the general form of the logistic regression model is

$$y = f(\text{attributes, profiles, demographic variables})$$

where y is the dependent variable and the attributes, profiles and demographic are sets of explanatory variables. The same attitudinal profiles (Table 8.2.2) and demographic variables (Tables 8.2.3 and 8.2.4) in the shampoo models were employed in the toothpaste models. However, the attributes were different as shown in Table 9.4.1.

Table 9.4.1

THE TOOTHPASTE ATTRIBUTES

Variable	Specification
1. Clean	ability to clean teeth thoroughly
2. White	ability to give smooth and white teeth
3. Cavity	ability to prevent cavities (tooth decay)
4. Tartar	ability to reduce tartar
5. Breath	ability to give long-lasting fresh breath
6. Cap	ability to allow easy opening or closing of cap
7. Taste	ability to give pleasant minty taste
8. Flavours	ability to provide different flavours to choose from
9. Confident	ability to make you feel happy and confident among your friends
10. Dentist	approval of dentists
11. Price	affordable price
12. Promo	regular sales promotion
13. RATING	current brand satisfaction rating

In conclusion, there are twenty-three predictors in the toothpaste brand choice models resulting from the combination of attributes, attitudinal profiles, demographic variables, and last brand bought. All of these predictors were jointly introduced in building the models. Since the model estimation and interpretation issues were already discussed in Chapter 8, the toothpaste model results are immediately presented in the next section.

9.4.2 Model Results - Multinomial Models

Beam was assigned as the reference brand because it has fewer variants and low price positioning. On the other hand, the four remaining toothpaste brands have different product positioning because of more flavour variants. Hence, the four multinomial logit models were estimated for brands 2 to 5.

As in the shampoo analysis, the dataset was randomly divided into two parts: the calibration data (Part 1) and the validation data (Part 2). The dependent variable of the first two models is the most frequently bought brand. On the other hand, the dependent variable of the third model is the last brand bought to test the question whether it could serve as a surrogate to brand choice or not.

Tables 9.4.2.1 to 9.4.2.6 summarise the parameter estimates of the multinomial models. Tables 9.4.2.1 to 9.4.2.3 contain the logit models for part 1 data while Tables 9.4.2.4 to 9.4.2.6 have models for part 2 data. The tables only include the independent variables that are significant up to ninety percent.

There are interesting observations about the variables explaining the brand choice. In Table 9.4.2.1, flavour variants and ability to give confident feeling are very significant attributes (at $\alpha = 0.01$) affecting the choice between Close-Up and Beam. It is 1.710 times more likely that Close-Up would be chosen over Beam when Close-Up is rated one scale higher for its ability to give a confident feeling after brushing. It is reasonable to assume that Close-Up is chosen 1.201 times over Beam when it is rated one scale higher for its dental endorsement. Females appear to be 0.520 times more unlikely selecting Close-Up over Beam.

Table 9.4.2.1

MULTINOMIAL LOGIT MODELS
PARAMETER ESTIMATES AND ODDS RATIOS: TOOTHPASTE-PART1 DATA
DEPENDENT VARIABLE - FREQUENTLY USED BRAND

PARAMETER	P2/P1* CLOSEUP	P3/P1 COLGATE	P4/P1 HAPEE	P5/P1 PEPSODENT
INTERCEPT	-0.6393 (0.8065)	-0.2122 (0.5282)	2.9424 (2.5539)	-39.460^c (22.370)
4 TARTAR			0.5661^b (0.2642) 1.761	
6 CAP			0.6265^a (0.1913) 1.871	
7 TASTE			-0.3943^c (0.2297) 0.674	
8 FLAVOUR	-0.6106^a (0.2014) 0.543			
9 CONFIDENT	0.5364^a (0.1619) 1.710			
10 DENTISTS	0.1833^c (0.1057) 1.201			
11 PRICE			0.3432^c (0.2060) 1.409	
12 PROMO			-0.5455^b (0.2414) 0.580	
SWITCH		-0.6630^b (0.3005) 0.515		
AGE		0.0435^b (0.0192) 1.044		
FEMALE	-0.6540^c (0.3582) 0.520			
EDUC			-0.3389^b (0.1698) 0.713	
FSIZE				1.5609^c (0.8555) 4.763
DF	8	7	8	3
SCORE	35.367 (p = 0.0001)	16.983 (p = 0.0175)	35.502 (p = 0.0001)	11.523 (p = 0.0092)
AIC	225.950	299.370	108.008	18.491
SC	256.970	326.944	139.029	32.278
-2 LOG L	207.950	283.370	90.008	10.491

*Base brand, P1= Beam; ^{a}Significant at $\alpha = 0.01$; ^{b}Significant at $\alpha = 0.05$; ^{c}Significant at $\alpha = 0.10$
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics.
Second row items are odds ratios.

Table 9.4.2.2

MULTINOMIAL LOGISTIC REGRESSION MODELS
PARAMETER ESTIMATES AND ODDS RATIOS: TOOTHPASTE PART1 DATA
WITH LAST BRAND BOUGHT AS PREDICTOR

PARAMETER	P2/P1* CLOSEUP	P3/P1 COLGATE	P4/P1 HAPEE	P5/P1 PEPSODENT
INTERCEPT	-2.9157[a] (1.0215)	0.0478 (0.3521)	2.7983 (3.1193)	-14.7710[a] (5.1473)
LAST BRAND	4.7664[a] (0.6606) 117.499	3.0653[a] (0.4051) 21.440	4.4082[a] (0.9330) 82.125	4.2805[c] (2.3047) 72.279
2 WHITE			-0.8271[c] (0.4377) 0.437	
3 CAVITY			1.0875[b] (0.4890) 2.967	
6 CAP			0.5416[b] (0.2281) 1.719	
8 FLAVOUR	-0.6098[a] (0.2034) 0.543			
9 CONFIDENT	0.8490[a] (0.2278) 2.337			
10 DENTISTS	0.5851[a] (0.1835) 1.795			
12 PROMO			-0.6557[b] (0.2962) 0.519	
EDUC			-0.5166[b] (0.2171) 0.597	
FSIZE	1.3665[b] (0.6444) 3.922			
CHILD		-1.1189[b] (0.5690) 0.327	1.9616[c] (1.0254) 7.111	
INC			-0.0018[c] (0.0011) 0.988	
DF	10	4	11	3
SCORE	119.761 (p = 0.0001)	80.933 (p = 0.0001)	62.072 (p = 0.0001)	26.034 (p = 0.0001)
AIC	141.290	222.821	86.814	18.902
SC	179.204	240.055	128.175	32.689
-2 LOG L	119.290	212.821	62.814	10.902

*Base brand, P1= Beam; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics.
Second row items are odds ratios.

Table 9.4.2.3

MULTINOMIAL LOGISTIC REGRESSION MODELS
PARAMETER ESTIMATES AND ODDS RATIOS: TOOTHPASTE PART1 DATA
DEPENDENT VARIABLE - LAST BRAND BOUGHT

PARAMETER	P2/P1* CLOSEUP	P3/P1 COLGATE	P4/P1 HAPEE	P5/P1 PEPSODENT
INTERCEPT	0.2101 (1.1329)	-3.2586[a] (1.0999)	-1.1750 (0.8365)	1.2570 (3.4896)
1 CLEAN	0.1656[c] (0.0960)			
	1.180			
4 TARTAR		0.1668[c] (0.0932)		
		1.182		
6 CAP	0.2249[b] (0.1101)	-0.1918[a] (0.0775)	0.3710[a] (0.1482)	
	1.252	0.826	1.449	
7 TASTE	0.2755[c] (0.1444)		-0.5494[a] (0.1597)	
	1.317		0.577	
8 FLAVOUR	-0.2999[b] (0.1451)		0.2659[b] (0.1114)	
	0.741		1.305	
9 CONFIDENT			-0.2946 (0.1774)	
			0.745	
10 DENTISTS				0.4940[b] (0.2394)
				1.639
11 PRICE	0.1463[c] (0.0809)			
	1.157			
RATING		0.2932[c] (0.1635)		-3.5571[a] (1.3327)
		1.341		0.029
SWITCH	0.7381[b] (0.3842)			3.3593[c] (1.8314)
	2.092			28.768
AGE		0.0507[a] (0.0182)		
		1.052		
EDUC				1.0343[b] (0.4893)
				2.813
FEMALE			0.7371[c] (0.4562)	
			2.090	
STATUS			-1.0515[b] (0.4468)	-2.4969[b] (1.2893)
			0.349	0.082
CHILD	-1.3399[b] (0.6723)	1.1884[a] (0.4553)	-1.8354[b] (0.8471)	
	0.262	3.282	0.160	
INC				-0.0069[c] (0.0036)
				0.993
DF	11	9	10	7
SCORE	27.811(p=0.0035)	30.435(p=0.0004)	38.500(p=0.0001)	39.892(p=0.0001)
AIC	229.858	308.703	179.790	41.335
SC	271.219	343.170	217.704	68.909
-2 LOG L	205.858	288.703	157.790	25.335

*Base brand, P1= Beam; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics.
Second row items are odds ratios.

Table 9.4.2.4

MULTINOMIAL LOGISTIC REGRESSION MODELS
PARAMETER ESTIMATES AND ODDS RATIOS: TOOTHPASTE PART2 DATA
DEPENDENT VARIABLE - FREQUENTLY USED BRAND

PARAMETER	P2/P1* CLOSEUP	P3/P1 COLGATE	P4/P1 HAPEE	P5/P1 PEPSODENT
INTERCEPT	-0.7837 (1.6672)	-1.6389 (0.9885)	-1.0632 (1.0386)	-6.4899[a] (1.4797)
2 WHITE			0.3967[a] (0.1581) 1.487	
3 CAVITY			-0.3450[c] (0.1840) 0.708	
6 CAP	0.2204[a] (0.0758) 1.247	-0.1890[b] (0.0849) 0.828		
9 CONFIDENT		0.2030[b] (0.0951) 1.225		
12 PROMO			0.2150[c] (0.1239) 1.240	
RATING	0.3790[c] (0.2023) 1.461			
AGE			-0.0692[b] (0.0427) 0.933	0.0825[b] (0.0386) 1.086
EDUC	-0.1628[c] (0.0894) 0.850			
FEMALE		0.5228[c] (0.2941) 1.687		
FSIZE	-0.2673[a] (0.1067) 0.765			
DF	5	7	7	1
SCORE	30.083 (p = 0.0001)	16.452 (p = 0.0213)	25.410 (p = 0.0006)	5.770 (p = 0.0163)
AIC	213.482	288.030	129.578	39.970
SC	233.816	315.142	156.691	46.748
-2 LOG L	201.482	272.030	113.578	35.970

*Base brand, P1= Beam; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics.
Second row items are odds ratios.

Table 9.4.2.5

MULTINOMIAL LOGISTIC REGRESSION MODELS
PARAMETER ESTIMATES AND ODDS RATIOS: TOOTHPASTE PART2 DATA
WITH LAST BRAND BOUGHT AS PREDICTOR

PARAMETER	P2/P1* CLOSEUP	P3/P1 COLGATE	P4/P1 HAPEE	P5/P1 PEPSODENT
INTERCEPT	-2.8170[a] (0.5478)	-0.4649 (1.1134)	-7.5671[a] (2.1824)	-10.2705[a](3.5562)
LAST BRAND	4.6764[a] (0.6040) 107.378	4.2964[a] (0.5697) 73.436	4.1831[a] (0.7042) 65.567	6.0895[a] (2.1559) 441.220
2 WHITE	0.3205[c] (0.1677) 1.378		0.2609[b] (0.1319) 1.298	
8 FLAVOUR		-0.2425[b] (0.1242) 0.785		
9 CONFIDENT		0.5143[a] (0.1627) 1.673		
AGE				0.1406[c] (0.0743) 1.151
FEMALE	-1.0840[c] (0.5880) 0.338	1.1403[a] (0.4344) 3.128		
DF	5	9	4	2
SCORE	130.682 (p = 0.0001)	106.494 (p = 0.0001)	92.894 (p = 0.0001)	58.075 (p = 0.0001)
AIC	118.059	178.974	84.613	24.513
SC	138.393	212.864	101.558	34.680
-2 LOG L	106.059	158.974	74.613	18.513

*Base brand, P1= Beam; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics.
Second row items are odds ratios.

Table 9.4.2.6

MULTINOMIAL LOGISTIC REGRESSION MODELS
PARAMETER ESTIMATES AND ODDS RATIOS: TOOTHPASTE PART2 DATA
DEPENDENT VARIABLE - LAST BRAND BOUGHT

PARAMETER	P2/P1* CLOSEUP	P3/P1 COLGATE	P4/P1 HAPEE	P5/P1 PEPSODENT
INTERCEPT	-0.6015 (1.6242)	-2.5336 (0.9472)	-0.1954 (1.3704)	-3.1892[a] (0.7094)
1 CLEAN				-0.4362[c] (0.2421) 0.646
2 WHITE			0.2895[b] (0.1275) 1.336	
6 CAP	0.2553[a] (0.0671) 1.291	-0.1385[b] (0.0688) 0.871		
11 PRICE		0.0859[c] (0.0518) 1.090	-0.1991[c] (0.1161) 0.819	
12 PROMO			0.4093[a] (0.1374) 1.506	
RATING	0.4686[b] (0.2106) 1.598			
EDUC	-0.1995[b] (0.0891) 0.819	0.1481[b] (0.0686) 1.160	-0.2287[b] (0.1164) 0.796	
STATUS				-1.2052[c] (0.7408) 0.300
FSIZE	-0.2208[b] (0.1017) 0.802	0.1313[c] (0.0795) 1.140		
INC	1.3750[a] (0.5480) 3.955			
DF	5	5	7	4
SCORE	27.210 (p = 0.0001)	13.073 (p = 0.0227)	27.860 (p = 0.0002)	5.815 (p = 0.2134)
AIC	222.967	302.064	151.545	78.783
SC	243.302	322.399	178.658	95.728
-2 LOG L	210.967	290.064	135.545	68.783

*Base brand, P1 = Beam; [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics.
Second row items are odds ratios.

Table 9.4.2.4 using the Part 2 data is a different model describing the CloseUp-Beam relationship. In this case, the estimates of *Cap*, RATING, EDUC, and FSIZE are significant. Thus, it is highly likely that Close-Up would be chosen over Beam when Close-Up's closure and brand satisfaction rating is rated one scale higher. However, more educated individuals and those belonging to bigger families would more unlikely choose Close-Up over Beam.

At 95 percent level, Table 9.4.2.1 shows that SWITCH and AGE are significant predictors in the choice of Colgate over Beam. Brand switchers would more unlikely choose Colgate over Beam, but older individuals would prefer Colgate. Moreover, Table 9.4.2.4 shows that *Cap*, ability to give confident feeling, and FEMALE are significant. The negative sign for *Cap* is quite surprising considering that Colgate, being the market leader, is a more popular brand with a high quality image. However, FEMALE has the expected positive sign. This finding reinforces Colgate's image as a family brand that is purchased by most mothers (Personal Communication 2, 1996).

Hapee's tartar prevention, cap, taste, price, and sales promotions are significant attributes in the choice of Hapee over Beam (Table 9.4.2.1). It is 1.871 times more likely that Hapee is chosen over Beam when its cap is rated one scale higher. Unlike Beam, Hapee has the advantage of having a fliptop cap which does not need manual unscrewing. More educated people would unlikely choose Hapee over Beam. The demographic variables reveal important characteristics of Hapee users. At 95 percent level of significance, the validation model in Table 9.4.2.4 indicates that Hapee is 0.933 times more unlikely preferred over Beam by those older individuals.

Hapee and Beam are dominant players in the low priced toothpaste segment. The findings confirm the general preference of consumers for Hapee over Beam and this is also shown in the market shares. Hapee has 18 percent while Beam only has 5 percent. Although, income (INC) is not significant, the demographic variables summarise the typical household with limited disposable income: younger and less educated people.

In the calibration model of Table 9.4.2.1, family size (FSIZE) is the only significant (at $\alpha = 0.15$) distinguishing attribute between Pepsodent and Beam users. It is 4.763 times more likely that Pepsodent is preferred over Beam by people belonging to bigger families. However, the validation model in Table 9.4.2.4 shows that age as the significant variable. Older individuals would prefer Pepsodent over Beam by 1.086 times.

The second set of models has last brand bought as one of the predictors. As a dummy variable, a value of 1 means that the last brand bought is the same as the brand most frequently purchased. *LastBrand* is a very significant (at α =0.01) predictor in all the models of Tables 9.4.2.2 and 9.4.2.5 with odds ratios ranging from 21.440 to 441.220. Since *LastBrand* is measured such a way that both the dependent variable and predictor refer to the same brand, the odds ratios may serve as an indication of brand loyalty when the other brand toothpaste brand is Beam. Hence for the sample, Close-Up users have very high brand loyalty while Colgate and Hapee users may have intermediate brand loyalty.

The addition of last brand bought as a predictor produces a more externally valid model for Colgate in Table 9.4.2.5. The positive coefficients of attributes such as the ability to give a confident feeling after brushing and FEMALE are more consistent with Colgate's image.

To confirm the finding that the last brand bought is equivalent to brand choice, it is used as the dependent variable. There appears to be some similarities between the significant explanatory variables in the models. For instance for Close-Up, flavour and is significant, although at varying degrees and have the same signs in the calibration models in Tables 9.4.2.1 and 9.4.2.3. Both cap and taste are attributes that remain significant in the choice of Hapee over Beam. Colgate's model becomes even more valid with the appearance of attributes like tartar prevention, brand satisfaction rating and AGE. The addition of last brand bought as predictor produces other significant variables in the choice of Pepsodent and Beam. Such variables are DENTISTS, RATING, SWITCH, EDUC, STATUS and INC. Similarly, the same conclusions may be drawn by comparing the significant variables in the validation models found in Tables 9.4.2.4 and 9.4.2.6. The prediction rates given in Section 9.4.3 provide a more superior comparison of the performance of last brand bought as a predictor or as a dependent variable.

Paired comparisons among the three toothpaste brands with highest markets shares will be examined. Tables 9.4.2.7 and 9.4.2.8 contain the parameter estimates and odds ratios for the brand choice models.

When the brand choice is the frequently purchased brand, Table 9.4.2.7 shows that Colgate is significantly preferred over Close-Up for its availability of flavour variants, and chosen by older individuals, and females. Close-Up is preferred over Colgate in terms of ability to give confident feeling, dental approval, and brand switchers. More educated people (EDUC) prefer either Colgate or Close-Up over Hapee. Colgate is chosen over Hapee for its regular sales promotions and minty taste. Conversely, Hapee is preferred over Colgate for its tartar prevention, cap, and price. On the other hand, Close-Up is preferred over Hapee by respondents with higher education (EDUC) and for attributes such as taste, ability to give confident feeling, dental endorsement, and sales promotion.

When Colgate was the last brand bought, Colgate is 0.182 times more unlikely preferred over Close-Up, and 0.261 times more unlikely chosen over Hapee. By contrast, Close-Up is 1.431 times the probable brand choice over Hapee when it was the previous brand bought. This shows that incidence of brand switching among Colgate users may be higher than among Close-Up and Hapee users.

When last brand bought is the dependent variable, the odds ratios of the demographic variables need to be highlighted. Table 9.4.2.7 shows that for individuals with children (CHILD), Colgate is 12.532 times preferred over Close-Up and 20.569 times chosen over Hapee. Older respondents prefer Colgate over Close-Up by 1.052 times. In addition, Table 9.4.2.8 indicates that FSIZE has positive sign in the choice between Colgate and Close-Up, or Colgate and Hapee. These findings are consistent with Colgate's image as a family brand.

Table 9.4.2.7

DERIVED MULTINOMIAL LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: TOOTHPASTE PART1 DATA

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	Colg/Clo-Up (P3/P2)	Colgate/Hape (P3/P4)	Clo-Up /Hape (P2/P4)	Colg/Clo-Up (P3/P2)	Colgate/Hape (P3/P4)	Clo-Up /Hape (P2/P4)	Colg/Clo-Up (P3/P2)	Colgate/Hape (P3/P4)	Clo-Up /Hape (P2/P4)
LAST BRND				-1.7011	-1.3429	0.3582			
				[0.182]	[0.261]	[1.431]			
1 CLEAN							-0.1656		0.1656
							[0.847]		[1.180]
2 WHITE					0.8271	0.8271			
					[2.287]	[2.287]			
3 CAVITY					-1.0875	-1.0875			
					[0.337]	[0.337]			
4 TARTAR		-0.5661	-0.5661				0.1668	0.1668	
		[0.568]	[0.568]				[1.182]	[1.182]	
6 CAP		-0.6265	-0.6265		-0.5416	-0.5416	-0.4167	-0.5628	-0.1461
		[0.534]	[0.534]		[0.582]	[0.582]	[0.659]	[0.570]	[0.864]
7 TASTE		0.3943	0.3943				-0.2755	0.5494	0.8249
		[1.483]	[1.483]				[0.759]	[1.732]	[2.282]
8 FLAVOUR	0.6106		-0.6106	0.6098		-0.6098	0.2999	-0.2659	-0.5658
	[1.841]		[0.543]	[1.840]		[0.543]	[1.350]	[0.766]	[0.568]
9 CONFIDNT	-0.5364		0.5364	-0.8490		0.8490		0.2946	0.2946
	[0.584]		[1.710]	[0.428]		[2.337]		[1.342]	[1.342]
10 DENTIST	-0.1833		0.1833	-0.5851		0.5851			
	[0.832]		[1.201]	[0.557]		[1.795]			

*With Last brand bought added as predictor. First row items are derived parameter estimates. Second row items in brackets are odds ratios.

Table 9.4.2.7 - Continued.

PARAMETR	FREQUENTLY BOUGHT BRAND Colg/Clo-Up (P3/P2)	 Colgate/Hape (P3/P4)	 Clo-Up /Hape (P2/P4)	FREQUENTLY BOUGHT BRAND* Colg/Clo-Up (P3/P2)	 Colgate/Hape (P3/P4)	 Clo-Up /Hape (P2/P4)	LAST BRAND BOUGHT Colg/Clo-Up (P3/P2)	 Colgate/Hape (P3/P4)	 Clo-Up /Hape (P2/P4)
11 PRICE		-0.3432	-0.3432				-0.1463		0.1463
		[0.709]	[0.709]				[0.864]		[1.157]
12 PROMO		0.5455	0.5455		0.6557	0.6557	-0.1508		0.1508
		[1.725]	[1.725]		[1.926]	[1.926]	[0.860]		[1.163]
RATING							0.2932	0.2932	
							[1.341]	[1.341]	
SWITCH	-0.6630	-0.6630					-0.7381		0.7381
	[0.515]	[0.515]					[0.478]		[2.092]
AGE	0.0435	0.0435					0.0507	0.0507	
	[1.044]	[1.044]					[1.052]	[1.052]	
EDUC		0.3389	0.3389		0.5166	0.5166			
		[1.403]	[1.403]		[1.676]	[1.676]			
FEMALE	0.6540							-0.7371	-0.7371
	[1.923]							[0.478]	[0.478]
STATUS								1.0515	1.0515
								[2.861]	[2.861]
FSIZE				-1.3665		1.3665			
				[0.255]		[3.922]			
CHILD				-1.1189	-3.0805	-1.9616	2.5283	3.0238	0.4955
				[0.327]	[0.046]	[0.141]	[12.532]	[20.569]	[1.641]
INC					0.0018	0.0018			
					[1.002]	[1.002]			

*With Last brand bought added as predictor. First row items are derived parameter estimates. Second row items in brackets are odds ratios.

Table 9.4.2.8

DERIVED MULTINOMIAL LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: TOOTHPASTE PART2 DATA

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	Colg/Clo-Up (P3/P2)	Colgate/Hape (P3/P4)	Clo-Up /Hape (P2/P4)	Colg/Clo-Up (P3/P2)	Colgate/Hape (P3/P4)	Clo-Up /Hape (P2/P4)	Colg/Clo-Up (P3/P2)	Colgate/Hape (P3/P4)	Clo-Up /Hape (P2/P4)
LAST BRND				-0.3800	0.1133	0.4933			
				[0.684]	[1.120]	[1.638]			
2 WHITE		-0.3967	-0.3967	-0.3205	-0.2609	0.0596		-0.2895	-0.2895
		[0.672]	[0.672]	[0.726]	[0.770]	[1.061]		[0.749]	[0.749]
3 CAVITY		0.3450	0.3450						
		[1.412]	[1.412]						
6 CAP	-0.4094	-0.1890	0.2204				-0.3938	-0.1385	0.2553
	[0.664]	[0.828]	[1.247]				[0.674]	[0.871]	[1.291]
8 FLAVOUR				-0.2425	-0.2425				
				[0.785]	[0.785]				
9 CONFIDNT	0.2030	0.2030		0.5143	0.5143				
	[1.225]	[1.225]		[1.673]	[1.673]				
11 PRICE							0.0859	0.2850	0.1991
							[1.090]	[1.330]	[1.220]
12 PROMO		-0.2150	-0.2150					-0.4093	-0.4093
		[0.806]	[0.806]					[0.664]	[0.664]

First row items are derived parameter estimates. Second row items in brackets are odds ratios.

Table 9.4.2.8 - Continued.

PARAMETR	FREQUENTLY BOUGHT BRAND Colg/Clo-Up (P3/P2)	 Colgate/Hape (P3/P4)	 Clo-Up /Hape (P2/P4)	FREQUENTLY BOUGHT BRAND* Colg/Clo-Up (P3/P2)	 Colgate/Hape (P3/P4)	 Clo-Up /Hape (P2/P4)	LAST BRAND BOUGHT Colg/Clo-Up (P3/P2)	 Colgate/Hape (P3/P4)	 Clo-Up /Hape (P2/P4)
RATING	-0.3790 [0.684]		0.3790 [1.461]				-0.4686 [0.625]		0.4686 [1.598]
AGE		0.0692 [1.072]	0.0692 [1.072]						
EDUC	0.1628 [1.177]		-0.1628 [0.850]				0.3476 [1.416]	0.3768 [1.458]	0.0292 [1.030]
FEMALE	0.5228 [1.687]	0.5228 [1.687]		2.2243 [9.247]	1.1403 [3.128]	-1.0840 [0.338]			
FSIZE	0.2673 [1.306]		-0.2673 [0.765]				0.3521 [1.422]	0.1313 [1.140]	-0.2208 [0.802]
INC							-1.3750 [0.253]		1.3750 [3.955]

*With Last brand bought added as predictor. First row items are derived parameter estimates. Second row items in brackets are odds ratios.

This section has shown that logit models can explain the brand choice of toothpaste. It is possible to make paired comparisons between any two brands after estimating the system of models using a single reference brand. Confirming the findings in shampoo, the last brand bought is the most significant predictor of brand choice. The next section discusses the more general binary models.

9.4.3 Model Results - Binary Models

Since binary models have no specific reference brand, they estimate the probability of choosing a particular brand over all other brands. The objectives of this section and the outline of discussion are similar to Section 8.5 in Chapter 8. The results are immediately discussed. Tables 9.4.3.1 provides the binary model estimates for Colgate brand using the total dataset in the analysis.[24]

When brand choice is the frequently bought brand, Table 9.4.3.1 shows that the significant (at $\alpha = 0.01$) unweighted attributes are cleaning ability and tartar prevention. Colgate is chosen 1.296 times over all other brands for its cleaning ability and 1.440 times for preventing tartar. When *LastBrand* is added to the model, it is a significant predictor of brand choice with an odds ratio of 1.0772. Tartar prevention, fresh breath, and ability to give confident feeling become significant explanatory variables.

When the attributes are weighted by values, cleaning ability, tartar prevention, cap, and ability to give confident feeling are significant. The model where the last brand bought is the dependent variable only identifies cleaning ability, price, and AGE as significant. On the other hand, using ranks as importance ratings highlight more variables than when using values. Cavity prevention, fresh breath, and regular sales promotion are the additional variables.

[24] Appendix 6 contains models using the calibration data (Table A7.3) and validation data (Table A7.4). The conclusions drawn from these tables confirmed the findings in this section.

Table 9.4.3.1

COLGATE'S BINARY LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: TOTAL DATA

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
Intercept	-3.2576[a]	-1.6119[a]	-2.9958[a]	3.0731[a]	-1.7695[b]	-3.1342[a]	-4.4684[a]	-3.4296[a]	-4.1940[a]
	(0.7903)	(0.6156)	(0.7331)	(1.0772)	(0.8446)	(0.9682)	(1.0944)	(1.0028)	(1.0623)
Last Brand				3.4637[a]	3.4274[a]	3.5586[a]			
				(0.3219)	(0.3140)	(0.3281)			
				31.934	30.796	35.115			
1 Clean	0.2592[a]	0.1142[c]	0.2771[a]				0.2928[a]	0.1938[a]	0.3301[a]
	(0.0907)	(0.0707)	(0.0934)				(0.1045)	(0.0627)	(0.0946)
	1.296	1.121	1.319				1.340	1.214	1.391
3 Cavity			0.3603[b]			0.5071[b]			
			(0.1877)			(0.2260)			
			1.434			1.660			
4 Tartar	0.3643[a]	0.2173[a]		0.3721[a]	0.2714[a]				
	(0.1346)	(0.0719)		(0.1386)	(0.0744)				
	1.440	1.243		1.451	1.312				
5 Freshbr			-0.4715[c]	-0.2836[c]					
			(0.2601)	(0.1586)					
			0.624	0.753					
6 Cap		-0.1206[b]						-0.0863[b]	
		(0.0564)						(0.0404)	
		0.886						0.917	

*With Last brand bought added as predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table 9.4.3.1 - Continued.

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
7 Taste						0.7843^{c} (0.4306) 2.191			
9 Confident		0.1086^{c} (0.0605) 1.115	0.9798^{a} (0.3588) 2.664	0.3461^{a} (0.1406) 1.414		1.2877^{a} (0.4796) 3.625			
11 Price							0.0901^{c} (0.0553) 1.094		
12 Promo			1.0308^{b} (0.4610) 2.803			1.1688^{b} (0.5988) 3.218			
RATING								0.1770^{c} (0.1049) 1.194	
SWITCH			-0.4387^{b} (0.2202) 0.645					-0.3422^{c} (0.2020) 0.710	
AGE	0.0222^{c} (0.0124) 1.022	0.0206^{c} (0.0122) 1.023	0.0225^{c} (0.0126) 1.023				0.0213^{c} (0.0113) 1.022	0.0210^{c} (0.0112) 1.021	0.0215^{c} (0.0113) 1.022

*With Last brand bought added as predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table 9.4.3.1 - Continued.

PARAMETR	FREQUENTLY BOUGHT BRAND UNWTD	VALUES	RANKS	FREQUENTLY BOUGHT BRAND* UNWTD	VALUES	RANKS	LAST BRAND BOUGHT UNWTD	VALUES	RANKS
FEMALE				0.5680[b]	0.4776[c]	0.4941[c]			
				(0.2674)	(0.2600)	(0.2739)			
				1.765	0.749	1.639			
DF	7	7	10	9	6	11	12	9	11
SCORE	38.446	28.054	49.993	188.076	181.703	194.831	34.423	27.784	33.045
	(p = 0.0001)	(p = 0.0002)	(p = 0.0001)	(p = 0.0001)	(p = 0.0001)	(p = 0.0001)	(p = 0.0002)	(p = 0.0010)	(p = 0.0005)
AIC	569.016	579.710	562.369	394.161	398.543	386.328	614.574	616.346	614.441
SC	601.908	612.602	607.596	435.275	427.323	435.665	668.023	657.461	663.778
-2LOGL	553.016	563.710	540.369	374.161	384.543	362.328	588.574	596.346	590.441
% Correct	66.3	62.3	66.1	79.4	79.6	80.3	58.3	56.3	59.4

*With Last brand bought added as predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Generally, the significant variables of the models weighted by values are similar to models with unweighted variables. On the other hand, models with variables weighted by ranks appear to contain more significant variables. These findings are similar to those in shampoo in Chapter 8.

Moreover, an examination of the Akaike Information Criterion (AIC) and Schwartz Criterion (SC) numbers shows that three models are equivalent. The AIC numbers indicate that assigning ranks is slightly better than allocating values. By contrast, the SC values reveal a different finding that values are better. Two lessons from this experience are: using only one importance rating system would suffice, and researchers need not collect importance rating data as this would not largely affect the findings. This confirms the conclusions drawn from the shampoo binary models.

9.4.4 Logit Model Validation and Diagnostics

Table 9.4.4.1 and 9.4.4.2 include the prediction rates of two models when the dependent variable is the frequently purchased brand. The prediction rates are generally high except for Colgate. It seems that the predictors introduced in the models are not good enough to explain the brand choice of Colgate. Other choice factors such as brand equity may not have been captured by the logit model. [25]

As first toothpaste brand in the Philippines, Colgate had the first-mover advantage of having "Colgate" brand name as generic with toothpaste. The association is so predominant to the extent that when a consumer thinks of toothpaste, the word "Colgate" comes to mind. It is not unusual even now for a consumer to mention the word "Colgate" while intending to buy another toothpaste brand. In a small neighbourhood store a rough English translation of the buyer's language would be, "I would like to buy a <u>Colgate</u> named Close-Up." which actually means "I would like to buy a toothpaste with a Close-Up brand name".

The market share of the brands is also related to the predictive accuracy. In a small sample, brands with larger market shares would tend to have lower

[25] For a discussion on measuring brand equity applied to toothpaste and mouthwash refer to Park and Srinivasan (1994), and Swait, et al. (1993).

predictive accuracy because the probability of brand switching would most likely come from high-market-share brands. Thus, in Tables 9.4.4.1 to 9.4.4.3, the brands were arranged in descending order, starting with Colgate, the brand with the largest market share.

Table 9.4.4.1

PREDICTIVE ACCURACY OF SAMPLES

DEPENDENT VARIABLE: FREQUENTLY PURCHASED BRAND

	Sample One Parameters Used		Sample Two Parameters Used	
Logit Model*	Sample One Predictions	Sample Two Predictions	Sample One Predictions	Sample Two Predictions
Colgate	66.4	45.2	60.3	63.9
Close-Up	77.2	74.9	79.9	73.0
Hapee	91.4	84.0	90.0	91.8
Pepsodent	99.1	97.7	98.2	98.7

*Reference brand is Beam.

Table 9.4.4.2

PREDICTIVE ACCURACY OF SAMPLES

LAST BRAND BOUGHT ADDED AS PREDICTOR OF CHOICE

	Sample One Parameters Used		Sample Two Parameters Used	
Logit Model*	Sample One Predictions	Sample Two Predictions	Sample One Predictions	Sample Two Predictions
Colgate	64.7	60.3	81.3	72.5
Close-Up	87.1	86.8	91.3	87.6
Hapee	94.0	87.7	93.2	90.1
Pepsodent	98.7	98.6	98.6	98.7

*Reference brand is Beam.

Table 9.4.4.3

PREDICTIVE ACCURACY OF SAMPLES

LAST BRAND BOUGHT AS DEPENDENT VARIABLE

Logit Model*	Sample One Parameters Used		Sample Two Parameters Used	
	Sample One Predictions	Sample Two Predictions	Sample One Predictions	Sample Two Predictions
Colgate	59.9	56.6	55.7	54.1
Close-Up	77.6	42.5	78.1	77.7
Hapee	84.9	85.4	87.2	83.3
Pepsodent	96.6	93.2	95.9	96.6

*Reference brand is Beam.

Table 9.4.4.2 shows that the last brand bought is a very good predictor of the brand choice. There is an improvement from Table 9.4.4.1 of at least 10 percent in the prediction rates of Close-Up and Colgate. Likewise Table 9.4.4.3 suggests that last brand bought could act as a the surrogate of the brand choice of the consumer. The models in Table 9.4.4.3 have lower but comparable prediction rates than the models having frequently purchased brand as dependent variable in Table 9.4.4.1. Thus, this finding is partially supports the common belief in marketing research that the last brand bought is the brand choice of the consumer.

Another measure of model fit is the maximised log-likelihood function. This is useful when comparing the same number of parameters in models with the same dependent variable. The Akaike (1973) information criterion (AIC), Schwartz criterion (SC), and the maximum likelihood estimates are more appropriate when comparing models with the same dependent variable but with different numbers of parameters. Tables 9.4.2.1 and 9.4.2.2 or Tables 9.4.2.4 and 9.4.2.5 for multinomial models and also Table 9.4.3.1 for the binary models show that models with last brand bought as predictor have much lower AICs, SCs and -2LogL values than when this predictor is excluded. Hence, adding the last brand bought as predictor has improved the brand choice models.

In addition, the models with the last brand bought as a dependent variable perform only slightly worse than models with frequently purchased brand as can be seen from Tables 9.4.2.1 and 9.4.2.3 or Tables 9.4.2.4 and 9.4.2.6 and even Table 9.4.3.1. Nevertheless, it is reasonable to assume that the last brand bought can replace the frequently purchased brand as the brand choice.

9.5 Summary

This chapter has presented the discriminant and logit model results for toothpaste. There are nine attributes that discriminate between the brands namely cleaning ability, cap, cavity protection, confident feeling, dentists' approval, flavour variants, tartar reduction, taste, and whitening power. The linear model has a classification rate of 60.94 percent but nonparametric methods such as the kernel method or the *k*-nearest neighbour rule yield a higher classification rate of 89.12 percent. However, an examination of the crossvalidation rates has revealed that the best classification model utilises the kernel method with unequal bandwidth when $r = 0.10$. The squared distances show that Close-Up and Colgate appear to be similar while Hapee is significantly different to both brands. These findings are consistent with the conclusions drawn from the territorial map.

The multinomial logit model results describe each brand in terms of the important predictors and to what extent these variables can influence choice through the odds ratios. With the exception of Colgate, the goodness of fit of the estimated models is generally high as shown by the prediction rates and Akaike Information Criterion (AIC) numbers. Binary model results validate the shampoo finding that models having unweighted attributes are still useful because they are comparable to those weighted by ranks or values. Finally, in a result similar to shampoo, the comparable prediction rates, AICs, and Schwartz Criterion (SC) numbers have also shown that the last brand bought is a significant predictor of brand choice. This variable can also replace the brand most frequently purchased as a dependent variable of the brand choice models.

In the light of these findings, the final part of the dissertation attempts to provide a discussion of the results from the previous four chapters. A common framework is utilised to compare the results for shampoo and toothpaste products. Such a comparison is also extended to the findings of other researchers using similar methodology.

PART IV

DISCUSSION

CHAPTER 10
DISCUSSION OF EMPIRICAL FINDINGS

10.1 Introduction

The objectives of this chapter are threefold. First, this chapter summarises and discusses the results for shampoo and toothpaste products. It also highlights the major outcomes arising from the previous five chapters and attempts to interpret them in the context of the prevailing urban Philippine market. The second objective is to validate the findings of the study by comparing them to empirical results from previous work. This is achieved by comparing the range of the classification rates of the developed models. This chapter also attempts to identify the limitations of the study and make suggestions for future research.

To this end, the chapter is organised as follows. The comparison of the results is made in Section 2 by describing the nature of the purchase decision and product consumption of shampoo and toothpaste. This section suggests two hypotheses that can explain the choice of shampoo or toothpaste brands. To validate the generated hypotheses, Section 3 highlights the significant explanatory variables of brand choice. Section 4 compares the findings of the study to the empirical results of other researchers. Section 5 outlines the limitations of the study and suggests areas for future research. Finally, Section 6 summarises the major points of the chapter.

10.2 The Nature of the Purchasing Decision and Product Consumption

In consumption analysis, shampoo and toothpaste are classified as frequently purchased, low involvement products. The purchases of both products are repetitive so that learning and attitude formation processes can be used to repeat previous choice decision or modify later behaviour. Moreover, the purchase decision is relatively unimportant, that the search for information is not as extensive as in high involvement durable products or in personal decisions. Generally, consumers choose a brand at point-of-purchase, and past experience with a brand may affect the purchasing decision. Consumers are exposed to advertising and promotion which may affect brand choice, but consumers do not seem to consciously process this information. Ultimately, the product performance of brand and consumer satisfaction are the key factors in the choice of frequently purchased low involvement products.

Both shampoo and toothpaste are categorised as personal care products but there are subtle differences in the nature of the purchasing decision in the context of the urban Philippine market. In Chapter 6, it was shown that 67 percent of respondents buy their own shampoo while 43.5 percent of toothpaste users purchase toothpaste for personal use. Hence, purchasing a shampoo appears to be an individual decision while that of toothpaste is a household decision. This finding is consistent with higher brand loyalty in toothpaste at 40 percent than in shampoo at 30 percent. Thus, the toothpaste brand choice is more constrained because the needs of other family members may have to be satisfied. It is possible that non-toothpaste buying respondents may be indifferent to the brand chosen by their family representatives. However, about 62.5 percent of the respondents claimed to use a toothpaste brand only if it was their chosen brand. Therefore, consumers seem to express their personalities in their choice of shampoo than in toothpaste brands. This finding may have some implications to the marketing strategies of shampoo and toothpaste especially in the positioning of brands and determining creative themes to communicate advertising messages.

In Chapter 9, it was mentioned that consumers perceive the primary benefits in a shampoo much more than in a toothpaste. Some primary benefits of toothpaste like cavity prevention or tartar reduction are inherently hard for customers to evaluate even after long usage. In this sense, toothpaste consumption is more "private" as it reflects the decision maker's feeling of self-worth and concern for family. Thus, toothpaste consumption may be considered as a regular part of the personal hygiene regimen, where having healthier teeth and gums is more important than having white teeth.[26] Indeed, a majority of the

---

[26] Younger people who tend to value cosmetic benefits equally or more than the therapeutic benefits are the exception. This is almost a quarter of the toothpaste market.

urban Philippine consumers look for more clinical or therapeutic benefits, rather than cosmetic ones.

On the other hand, consumption of shampoo is more conspicuous and more socially orientated. Shampoo users tend to choose a brand reflecting their personalities and lifestyles. This implies that the intended use is not only to satisfy themselves but also to satisfy others. Hence, it is expected that the choice of a shampoo would be largely affected by cosmetic benefits.

10.3 Variables Explaining Brand Choice

Discriminant and logit model results seem to support the hypotheses whether therapeutic or cosmetic benefits are the important variables in the brand choice of shampoo and toothpaste.

Discriminant results for shampoo in Chapter 7 revealed that hair manageability, fragrance and cleaning ability are the shampoo attributes that summarise the need to have beautiful hair. The benefits are perceivable by senses of touch, smell, and sight, both to the shampoo user and to other people. Except for cleaning ability, such attributes are more cosmetic and tend to support the hypotheses on conspicuous consumption. By contrast, in Chapter 9, the discriminant results for toothpaste highlighted therapeutic benefits like cleaning ability, tartar prevention, cavity protection, and dental approval. Such clinical benefits explain 73.4 percent of the variance. Whitening power, a cosmetic benefit, and ability to give a feeling of confidence among friends are entering at lower levels. This evidence supports the hypothesis that consumers tend to favour therapeutic over cosmetic benefits in toothpaste.

Logit models that include the last brand bought as one of the predictors are more useful in drawing conclusions. These models yield higher prediction rates and lower Akaike Information Criterion (AIC) and Schwartz Criterion (SC) values. The shampoo logit models in Tables 8.4.7 and 8.4.8 showed that cosmetic benefits such as giving body to hair, fragrance, and hair manageability explain the brand choice between Naturals and Pantene, Naturals and Ivory, and Pantene and Ivory. The need for conspicuous consumption is present in functional benefits like dandruff control, cleaning ability, and gentleness to hair.

Dandruff control is a clinical benefit but a person with dandruff problems has a social stigma often featured in television advertisements of anti-dandruff shampoos in the Philippines. Dirty hair, dry and brittle hair, and split ends are hair problems that have social relevance. Conspicuous consumption and lifestyling can also be found in another important attribute, endorsement of celebrity or hairdresser.

By contrast, the toothpaste logit models in Table 9.4.2.7 and 9.4.2.8 included the therapeutic benefits, such as cavity protection and dental approval, in the choice between Colgate and Close-Up, Colgate and Hapee, or Close-Up and Hapee. In addition, the ability to give a feeling of confidence after brushing was a significant attribute. Functional benefits like convenient opening and closing of cap, and flavour variants' availability were also important. Price did not appear to be significant in toothpaste brand choice, although the lower priced brands currently capture almost 30 percent of market share. However, price was a factor when the last brand is not included in the predictors in the choice between Colgate and Hapee, or Colgate and Close-Up. Price reflects the value consumers place on a product. Although consumers might perceive less value in low priced toothpaste, they may continue to purchase cheaper brands, because of limited disposable household incomes. Nevertheless, the demographic variables can be useful in identifying those who buy cheaper toothpaste brands.

As expected, brand switching is a psychographic attitudinal variable that was significant in the choice of the top three shampoo brands but not in toothpaste brands. This finding supports the higher incidence of brand switching in shampoo than in toothpaste, that was elicited from the behavioural intention question in the survey. Switching may not be high in the toothpaste market because the market segments are clear-cut: therapeutic segment dominated by Colgate; cosmetic segment dominated by Close-Up; and low priced segment, dominated by Hapee.

The second psychographic variable, purchase decision involvement, was significant for shampoo in Table 8.4.8, but not in toothpaste. The involvement scale in Table 4.4.3.2 measures the degree of importance a person places on the purchase decision and the amount of attention devoted to it. The scale classified about 60.4 percent of the shampoo respondents to be highly involved in the purchase decision (see Section 6.3). The importance of the involvement variable appears to support the hypothesis of conspicuous consumption in shampoo.

In terms of demographics, the logit models for toothpaste have fewer significant demographic variables than the shampoo models. In toothpaste, the important variables were years of education completed, sex, family size, presence of children, and income. In addition to the five variables, shampoo models also had marital status as significant. These findings seem to support the hypothesis that shampoo purchase is an individual decision while the toothpaste purchase is a group decision.

Furthermore, the demographic variables in toothpaste models provide evidence on what type of respondents would choose therapeutic over cosmetic benefits. Education and average monthly income seem to be important variables in determining whether an individual places more importance on therapeutic, rather than cosmetic benefits in toothpaste brand choice. Education may also influence job type and the average monthly income. More educated people tend to prefer Colgate, a brand that has a therapeutic image, by 1.676 times over Hapee, while Close-Up, a cosmetic brand is preferred 1.676 times over Hapee. For every A$ of extra monthly income, Colgate and Close-Up are preferred over Hapee by 1.002 times. This result is fairly consistent with the Philippine situation. Indirectly, the importance of education as a choice determinant in the Philippines had been investigated by Ong (1980) in his study of consumers and consumerism in the Philippines. In his nationwide survey of 2,499 consumers in 1978, Ong indicated that education has a positive impact on consumer behaviour viewed from context of desiring government protection and inclination to complain about unsatisfactory products.

The explanatory variables appear to support the hypotheses about the nature of purchase decision and product consumption in shampoo and toothpaste. Buying shampoo is a personal decision driven by conspicuous consumption and the need to please others besides self. Thus, cosmetic benefits such as giving body to hair, cleaning ability, fragrance, and hair manageability are main determinants of brand choice. However, the importance of functional benefits like cleaning ability and gentleness to hair should also be considered. On the other hand, purchasing a toothpaste in urban Philippines is a household decision. It is driven by private feeling of self-worth and concern for family. As a result, the brand choice is mainly influenced by therapeutic benefits like cleaning capability, cavity protection, tartar prevention, and dental approval.

10.4 Validation of Model Results

The most important predictor of brand choice, as shown by the logit models in both shampoo and toothpaste products, appears to be the last brand bought. There is a significant improvement in the model prediction rates when the last brand bought is added as a predictor. Moreover, lower values of information theoretic measures like AIC and SC result when this predictor is present. This finding is consistent with the work of Rajendran and Tellis (1994) who utilised the same lagged choice measure in their study applied to saltine crackers. However, they employed time series scanner panel data while this investigation used cross sectional survey data. However, the results differ from Schneider's (1988) conclusion that previous purchase decision is relatively unimportant in explaining the current purchase decision. Her research focused on explaining the impact of promotions on consumer decision strategies. The difference in conclusions may be explained by Schneider's definition of the previous purchase decision, not only in terms of the brand purchased but also included purchase quantity and inter-purchase time. She also used individuals as units of analysis, that were employed in this study.

Although, there are numerous brand choice studies, very few have considered the context of less developed countries. Moreover, there is no direct comparison between the prediction rates of this study with previous discriminant and logit models because of differences in theory, measures and methods. Table 10.4.1 shows that the classification rates of the multiple discriminant model are comparable to the rates found in two other studies. On the other hand, Table 10.4.2 shows that the logit model prediction rates are not too different from the results of two other studies.

Table 10.4.1

DISCRIMINANT MODEL VALIDATION

	Percent Correctly Classified	
	Discriminant Model	Random Model
This Study		
Shampoo	35.49	20.0
Toothpaste	86.78*	33.3
Bucklin, Gupta and Han (1995) Segments within Coffee Brands		
Hills Brothers	52.6	25.0
Folgers	45.0	20.0
Maxwell House	38.8	20.0
Chock Full O' Nuts	47.4	20.0
Roberts and Lattin (1991) Breakfast Cereal Concepts		
Concept A	68.0	33.3
Concept B	54.0	33.3
Concept C	60.0	33.3

*Uses a nonparametric model.

Table 10.4.2

LOGIT MODEL VALIDATION

	Percent Correctly Classified	
	Calibration Sample	Holdout Sample
This Study		
Shampoo	76.2 - 92.7	74.7 - 88.0
Toothpaste	76.3 - 92.2	78.1 - 91.8
Rajendran and Tellis (1994)		
Saltine Crackers	90 - 92	
Gensch (1987)		
Electrical equipment		
Logit	46 - 62	49 - 61
Two-stage model	65 - 78	66 - 80

10.5 Limitations of the Study and Directions for Future Research

Like any other research, this study has its limitations, mainly associated with the methodology used and data collected. The survey methodology utilised questionnaires administered by personal interviewers. In spite of the care taken during the training of interviewers, some bias may still occur in the explaining the instructions and other items in the questionnaire. Sampling bias may also occur in the interviewers' choice of respondents. However, the sample taken is still considered as representative of the urban population of the Philippines. Sampling bias may be evident in toothpaste, where most of the respondents were young, had lower literacy levels and income, and thus seemed to favour a brand. However, the results of the study were not affected and the conclusions were still externally valid.

Another limitation of the study is the use of cross sectional data. Although the models developed are more reliable in explaining brand choice, the predictive power of the models is not as strong as the models formulated using historical scanner panel data. Furthermore, the cross sectional nature of the data implies that the findings of the study are valid only for a limited period in the future. Hence, the results of the study can be used during the next two to three years because, in the long run, changes are likely to occur in consumers' preferences and lifestyles.

Finally, price is a very important variable to consumers and manufacturers. To limit the scope of the study, other measures that would have enabled the calculation of price elasticities were excluded. Therefore, this study tends to be a more exploratory study of the aggregate shampoo and toothpaste market in urban Philippines.

The investigation focused on the brand choice of shampoo and toothpaste at a macro or aggregate level. There are market segments within each product, and each segment can be described by a choice model. Management may further benefit by conducting micro level studies related to the identified salient attributes. For instance, the attribute giving body to hair can be related to shampoo conditioning levels acceptable to consumers. Such a relationship can be useful to product development researchers. Price can be also investigated in more detail than in this study. With the future availability of scanner panel data in developing countries, choice models that have better predictive power may be developed.

Future researchers are encouraged to consider the context of less developed countries. In each country, some distinct socio-cultural traditions may influence brand choice. Hence, it may be more appropriate to build brand choice behaviour models for every country rather than a general model for less developed countries. Academic researchers in developed countries can apply their theories and techniques in collaboration with researchers in less developed countries. In this manner, the boundaries around applicability of brand choice behaviour theories are extended even as a more comprehensive understanding of consumers is enhanced.

10.6 Summary

This chapter has provided a comparison and discussion of the results of shampoo and toothpaste. Considering that shampoo purchase decision is more individual than group oriented, it was suggested that shampoo users consider the cosmetic benefits more than the toothpaste users. On the other hand, the toothpaste decision makers tend to rely more on therapeutic benefits. Shampoo consumption was described as more conspicuous than toothpaste consumption. The significant explanatory variables in the discriminant and logit models, highlighted in Section 3, tend to support these hypotheses.

The finding that the last brand bought is a significant predictor of brand choice supports Rajendran and Tellis' (1994) conclusion but differs from that of Schneider's (1988). Finally, the prediction rates of the models are comparable to other researchers' empirical findings.

This chapter ended by identifying the limitations of the study and the validity of the results. Limitations lie mainly in the survey methodology used and nature of the data collected. In the Philippines, future studies on the identified salient product attributes can be made at a micro level. Furthermore, future researchers are also directed to build brand choice models in less developed countries to account for peculiarities in socio-cultural traditions.

The final chapter summarises the conclusions of the study and identifies their implications to management practitioners and academic researchers.

CHAPTER 11
SUMMARY OF CONCLUSIONS

11.1 Introduction

This final chapter summarises the main conclusions of the study and identifies their implications to management and academia. First, the chapter presents the development of the study by revisiting the dissertation objectives, methods used, and primary results. Second, Section 3 summarises the main conclusions and identifies their implications to management mainly to marketing strategy formulation in urban Philippines. Finally, Section 4 outlines the methodological lessons from this study and evaluates their implications to academic researchers.

11.2 Objectives and Findings of the Study

The main purpose of this thesis was to investigate the dynamics of brand choice behaviour in two personal care products, shampoo and toothpaste, from a less developed country context. In reporting the results of the study, the twelve chapters of this dissertation were organised into four parts namely the literature review, research methodology and design, results, and discussion.

The first part consisted of two literature review chapters. Chapter 2 provided a theoretical framework of the research problem. To describe the state of play in the area of modelling brand choice behaviour, three modelling techniques namely multidimensional scaling, conjoint analysis and multi-attribute choice models, were described and analysed for their suitability to the research problem. The chapter concluded that when there are more than six explanatory variables and several brands, multi-attribute models are more appropriate for brand choice research. Chapter 3 synthesised the review by systematically analysing the empirical brand choice studies in terms of data, methodology and findings. The first part of the thesis showed that brand choice literature is dominated by American researchers, who mainly utilise scanner panel data. It also highlighted the absence of brand choice studies that consider the context of less developed countries, where conditions are very much different from the United States. Five aspects where less developed countries differ were noted in Chapter 1: low average household disposable income, wide income disparity between rich and poor families, youths represent more than two-thirds of the population, low literacy level, and poor access to a wide variety of mass media.

Methodological and design issues has been discussed thoroughly in Chapter 4. Two brand preference measures were identified - the frequently purchased brand and the last brand bought. The first specific objective was to identify and measure the determinants of brand choice. These determinants of brand choice were reviewed and summarised using the framework developed by Sheth, Newman and Gross (1991). To capture consumer heterogeneity, five attitudinal scales and demographic variables were employed. Factor analysis results of the pilot study obtained thirteen attributes for shampoo, and twelve attributes for toothpaste. These attributes have valid measurement properties. The Cronbach alphas ranged from 0.71 to 0.92 and can be considered adequate (DeVellis 1991; Nunnaly 1978).

The second objective was the formulation and estimation of the relationship between brand choice and its determinants. Mathematical choice models using discriminant and logit analyses were built to explain and predict brand choice in the third part of the dissertation. Chapter 6 discussed the consumer attitudinal profiles and demographic variables that were introduced as additional predictors of the brand choice models. Two attitudinal scales on purchase decision involvement and social consumption motivation received support in this study. The results for brand switching (Raju 1980) and brand innovativeness (Wells and Tigert 1971) scales were discarded because of unacceptably low Cronbach alphas. The product knowledgeability scale created for this study had a Cronbach alpha of 0.76 for shampoo, and 0.74 for toothpaste.

In terms of usage patterns, heavy shampoo usage occurs during the morning bath. During the evening, less than half of the respondents wash their hair and at least 10.2 percent fewer do not use shampoo. By contrast, brushing is synonymous to using toothpaste. Incidence of brushing with toothpaste is highest before going to bed (93.3 percent) and after eating (90.7 percent). In addition, the consideration numbers reflect the market shares of most brands. Competition in shampoo is very intense with no particular brand dominating other brands as can be seen from the market shares and consideration set percentages. In the toothpaste market, however, three brands hold 87 percent of the market. Colgate, the number-one brand, is considered by 96.0 percent of the respondents while Close-Up, the second ranked brand, is considered by 79.6 percent. Most respondents were highly satisfied with their current shampoo or toothpaste brands. The brand satisfaction rating is slightly higher for toothpaste than in shampoo and this supports the incidence of higher brand loyalty found in toothpaste.

Consequently, Chapters 7 and 8 presented the modelling results for shampoo while Chapters 9 described the findings for toothpaste using discriminant and logit analyses. Parametric and nonparametric models were developed using SPSS and SAS Discriminant Procedures. The best discriminant model was chosen after examination of both classification and crossvalidation rates. In addition, multinomial and binary logit models, using all four selection methods of the SAS Logistic Procedure, were built. All the logit models were evaluated for predictive adequacy in terms prediction rates and information theoretic measures. During the logit modelling of brand choice, two brand preference measures were validated - frequently purchased brand and last brand bought. The last brand purchased became the single most important predictor of brand choice and its inclusion greatly improved the models' fit.

Finally, the major findings of the investigation were discussed in the last part of the dissertation. Chapter 10 discussed the main findings for shampoo and toothpaste and tested hypotheses about the nature of the purchasing decision and product consumption. The significant variables explaining brand choice in the developed models seemed to support the hypotheses. In Chapter 10, the results of the study were compared to the empirical findings of other researchers. Chapter 10 ended by identifying limitations of the study and directions for future research.

11.3 Implications to Management

Buying shampoo was found to be a personal decision driven by conspicuous consumption. Thus, cosmetic benefits such as giving body to hair, fragrance, and hair manageability seemed to be the main determinants of brand choice. The shampoo's cleaning ability is a significant functional benefit. On the other hand, purchasing a toothpaste in urban Philippines is a household decision that is driven by private feeling of self-worth and concern for family. Thus, toothpaste brand choice appeared to be mainly influenced by therapeutic benefits like cleaning ability, cavity protection, tartar prevention, and dental approval.

The above results have a number of important implications to marketing management. First, it identifies the salient product attributes perceived by the consumers. It is true that the salient attributes can be indirectly found by an analysis of the brand market shares and the segmentation among the brands. However, this study provides a more useful picture because it utilises direct consumer responses.

Second, product managers may have the opportunity to know the strengths and weaknesses of their brands by examining the boxplots of the important variables. The analyses could be brought down to a micro level by determining the attitudes and demographics of people who are predisposed to certain product attributes.

Third, the territorial maps and the pairwise squared distances between brands, generated by multiple discriminant analyses, may serve as product positioning maps that summarise the consumer evaluations of the product brands in terms of the perceptual attributes. In shampoo, the brands perceived to be similar to each other are: Naturals-Ivory, and Pantene-Rejoice. Sunsilk was found to be significantly different from the four brands. The keen competition as shown in the market shares and consideration numbers makes it difficult to assign shampoo brands into clear-cut segments. This is not true for toothpaste where segmentation shown by the territorial map is crystal clear. Colgate owns the therapeutic segment while Close-Up whose taste was rated higher captures the cosmetic segment. Hapee dominates the low price segment. Since the three toothpaste brands are targeting different customers, manufacturers of each brand can be confident that competition from the other brands would not seriously affect their business.

Fourth, a knowledge of the attributes that consumers perceive to be important may prove useful in the concept development of marketing communications such as television and radio advertisements. Since cosmetic benefits and conspicuous consumption seem to characterise shampoo purchase, marketing communications emphasising lifestyles may prove to be more effective in shampoo than in toothpaste. However, for toothpaste, communicating therapeutic benefits and providing assurance on product quality is critical. Cosmetic benefits and lifestyles may be more appropriate for Close-Up, rather than Colgate. Moreover, research and development teams may benefit by knowing the important consumer attributes as they develop new product formulations and packaging.

Finally, the mathematical choice models may guide management in explaining and predicting brand choice of competing brands and support them in developing competitive strategies. However, management must not consider these models to be the truly representing the brand choice because of the assumptions inherent in the use of the mathematical modelling techniques. The models' diagnostics must be validated by other methods, and further refinements may need to be made.

The models developed in this study should serve as an initial analysis of the shampoo and toothpaste markets in urban Philippines. It should lead to a regular, model-based monitoring-and-control procedure, possibly on an annual basis. Management must avoid modelling myopia - the feeling that once model-based analysis is done, further modelling in future periods is no longer necessary.

11.4 Implications to Academic Research

In addition to the management contributions, this research contributes to academic researchers studying brand choice for several reasons. First, it is one of the few academic brand choice studies that considers the context of less developed countries. The design of instruments was adopted to the literacy level in developing countries by using backtranslation methods common to cross cultural studies. While backtranslation methods are prevalent in sociological and anthropological research, brand choice studies using these methods are rare as can be seen by proliferation of academic research utilising historical panel data in Northern America. Capturing consumer heterogeneity, a significant development in scanner panel research, was adopted in the study's survey methodology by incorporating attitudinal and demographic variables in the models.

Second, the study utilises triangular methods in the validation of brand choice measures. The brand choice models were estimated with and without the last brand bought as predictor. Later, the last brand bought was tested as a surrogate of the frequently purchased brand. The finding that the last brand bought is a significant predictor of brand choice validated the results of Rajendran and Tellis (1994). Future brand choice researchers are alerted about the importance of this variable. During the discriminant and logit analyses, split-sampling was used, in addition to the total sample, to estimate and validate the models. The study also showed how multiple discriminant analysis and logistic regression techniques can complement each other.

Third, the study evaluated two importance rating measures - rank ordering and value allocation by comparing the results to models using attributes that are not weighted by importance ratings. The study found that researchers need not collect importance ratings from consumers and still have useful brand choice models. Rank ordering and value allocation were found to generate similar models. When importance rating is deemed necessary, only one measure should be collected to minimise burden on respondents by reducing response time as well as minimising data collection costs.

Finally, this study has attempted to link perceptual consumer evaluations with objective data (e.g. market shares and consideration numbers). This study has also shown that academic research collaboration with management represented by a major Philippine shampoo and toothpaste manufacturer can be beneficial to both parties. Academic research is enhanced by considering inputs from management practitioners especially during the design of measurement instruments. Product managers also help in clarifying research design by guiding researchers as to what objectives would benefit management most. On the other hand, management practice benefits from the analytical techniques available in academic research. Most management practitioners in less developed countries simply ignore these analyses because of inadequate academic background and skill to take full advantage of the capabilities of multivariate methods of analysis.

Therefore the conclusions and the methodological lessons from the study would be beneficial to those who intend to undertake brand choice research of manufactured products in less developed countries.

APPENDIX 1

Table A1.1

DEMOGRAPHIC AND ECONOMIC DATA FOR THE PHILIPPINES

Indicator	Data	Reference Date
Population	68,614,162	1995
Metro Manila	9,454,040	1995
Land Area (sq km)	300,000	
Metro Manila	636	
Density (Persons/sq km)	228.7	1995
Metro Manila	14,864.8	1995
Average Household Size	5.3	1995
Metro Manila	4.7	1995
Literacy Rate (Flemms '94)	93.90%	1994
Life Expectancy at Birth (years)	-	
Male	64.9	1995
Female	70.2	1995
GNP (in million pesos)*		
(at current prices)	1,967,743	1995
(at constant 1988 prices)	829,495	
Growth rate over previous year		
1996	5.8%	Feb. 1996
1997	6.8%	Feb. 1997
Annual Average Family Income (at current prices)	Ps83,161	1994
Metro Manila	173,669	
Urban Areas	113,121	
Rural Areas	53,483	
Annual Average Family Expenditures (at current prices)	67,661	1994
Metro Manila	138,427	
Urban Areas	91,115	
Rural Areas	44,427	

*January 1998 exchange rates: One Australian dollar is equivalent to 28.30 Philippine pesos and one U.S. dollar buys 42.35 Philippine pesos.

Appendix 1, Continued.

Indicator	Data	Reference Date
Consumer Price Index (1988 = 100)		
Philippines	230.6	Aug. 1996
Metro Manila (MM)	249.5	
Areas Outside MM	224.5	
Purchasing Power of the Peso	0.43	
Inflation Rate	7.9%	
	5.2%	Jan. 1997
Labor and Employment		
Total labor force (million)	30.7	April 1996
Labor force participation rate	69.10%	
Employment rate	89.10%	
Unemployment rate	10.90%	
Telephone Density Per 100 Population	2.671	1995
Metro Manila	12.394	

Source: Quickstat: A Monthly Update of NSO's Most Requested Statistics, National Statistics Office, Manila, Philippines, September 1996.

APPENDIX 2

THE SAMPLING PLAN

Multistage sampling was used to reduce the normal sampling variation associated with simple random sampling and sytematic sampling.

Stage 1.

The primary sampling units under the sampling design are the 17 geographic areas within Metro Manila. The areas consist of 9 cities and 8 municipalities.

Stage 2.

Within each primary sampling unit at the first stage, a predetermined number of households were selected at the second stage using a systematic random selection procedure with equal probability.

Sampling Plan

The sampling area has 1,987,659 households based on the 1995 Census of Population of the National Statistics Office in the Philippines. The desired sample is 600 households or 0.0302%. This is equivalent to 30 households per 100,000 households. For the companion sample of 100 households, the probability of selection at Stage 2 is 0.0050%. When the mail survey was found to be unworkable, a replacement sample of 500 households for personal interviewing was taken. For this replacement sample, the probability of each household being taken at Stage 2 is 0.0252%. Refer to Table A2.1.

Table A2.1

PLANNED AND ACTUAL SAMPLING SIZE BY CITY/MUNICIPALITY

		PLANNED SAMPLE			ACTUAL SAMPLE	
Geographic Area	Number of Households	Mail	Compa-nion	Replace-ment	Shampoo	Tooth-paste
1. Quezon City	415,788	126	21	105	105	105
2. Manila City	347,173	105	17	87	86	91
3. Caloocan City	215,122	65	11	54	50	51
4. Pasig City	104,242	32	5	26	27	22
5. Makati City	100,922	30	5	25	27	25
6. Valenzuela	94,377	28	5	24	21	16
7. Pasay City	86,253	26	5	22	19	19
8. Muntilupa City	83,341	25	4	21	17	19
9. Paranaque	82,692	25	4	21	20	21
10. Las Pinas	82,618	25	4	21	16	16
11. Taguig	79,219	24	4	20	14	14
12. Malabon	74,657	23	4	19	12	10
13. Marikina City	73,617	22	4	18	15	12
14. Mandaluyong	61,096	18	3	15	18	19
15. Navotas	49,471	15	2	13	6	5
16. San Juan	25,694	8	1	6	5	4
17. Pateros	11,377	3	1	3	2	2
	Sample Size	600	100	500	460	451

APPENDIX 3

PILOT STUDY QUESTIONNAIRE

THE SHAMPOO BRAND ATTRIBUTES QUESTIONNAIRE

The *Shampoo Brand Attributes Questionnaire* seeks your personal feelings and opinions on issues related to your choice of shampoo brands. It is not concerned with rating the available shampoo brands in the market.

Please work through the questionnaire and mark the response that corresponds to your opinion. *There are no right or wrong answers.* If you are undecided about your answer to a particular question, mark the response that most closely matches your view of the item.

The following questions are about different product attributes and choice situations in shampoo brand purchase and usage.

PART ONE

Check the spaces that reflect your own personal feelings and opinions.

1. Do you consider yourself a brand-loyal user of

Head & Shoulders?	_____	Pantene?	_____
Ivory?	_____	Rejoice?	_____
Lux?	_____	Sunsilk?	_____
Palmolive Naturals?	_____	Others, pls. specify.	_____
Palmolive Optima?	_____		

2. When you wash your hair, how often do you use shampoo?

Everytime	_____	Every other day	_____
Once a day	_____	Less than three times a week	_____

	YES	NO
3. Have you ever engaged in any of the following behaviours?		
a. Used a brand and then stopped	_____	_____
b. Stopped using a brand and then started again	_____	_____
c. Always used your brand	_____	_____
4. Would you ever consider switching to another brand of shampoo?	_____	_____
5. Do you consider using shampoo when washing your hair important?	_____	_____

THE SHAMPOO BRAND ATTRIBUTES QUESTIONNAIRE

PART TWO

Please indicate the extent to which you agree or disagree with the following statements using the following scale: 1=strongly disagree; 2=moderately disagree; 3=slightly disagree; 4=neutral; 5=slightly agree; 6=moderately agree; and 7=strongly agree.

Please indicate whether you agree or disagree that the following benefits or problems are associated with using your shampoo brand. My brand of shampoo...

1. protects my hair from UV rays.	1	2	3	4	5	6	7
2. gets rid of dandruff.	1	2	3	4	5	6	7
3. makes my hair and scalp healthy.	1	2	3	4	5	6	7
4. leaves hair soft and smooth.	1	2	3	4	5	6	7
5. cleans hair thoroughly.	1	2	3	4	5	6	7
6. prevents dry, brittle hair.	1	2	3	4	5	6	7
7. leaves hair tangle-free.	1	2	3	4	5	6	7
8. gives hair a clean smell after use.	1	2	3	4	5	6	7
9. moisturises hair.	1	2	3	4	5	6	7
10. cleans scalp thoroughly.	1	2	3	4	5	6	7
11. rinses easily.	1	2	3	4	5	6	7
12. leaves hair easy to style/manage.	1	2	3	4	5	6	7
13. does not cause falling hair.	1	2	3	4	5	6	7
14. has good conditioners.	1	2	3	4	5	6	7
15. leaves hair easy to comb when wet.	1	2	3	4	5	6	7
16. gives body to my hair.	1	2	3	4	5	6	7
17. leaves no build-up/residue on the scalp.	1	2	3	4	5	6	7
18. leaves hair bouncy.	1	2	3	4	5	6	7
19. makes my hair shiny and beautiful.	1	2	3	4	5	6	7
20. has the colour I like.	1	2	3	4	5	6	7
21. is endorsed by a hair scientist/expert.	1	2	3	4	5	6	7
22. is good for my family.	1	2	3	4	5	6	7
23. does not have irritating fragrance.	1	2	3	4	5	6	7
24. is economical.	1	2	3	4	5	6	7
25. has different fragrances to choose from.	1	2	3	4	5	6	7

THE SHAMPOO BRAND ATTRIBUTES QUESTIONNAIRE

My brand of shampoo...

26. is mild/not harsh to hair.	1	2	3	4	5	6	7
27. has attractive and prestigious packaging.	1	2	3	4	5	6	7
28. has mild fragrance.	1	2	3	4	5	6	7
29. is compatible with my hair.	1	2	3	4	5	6	7
30. has a pleasant fragrance I like.	1	2	3	4	5	6	7
31. has pH-balanced formula.	1	2	3	4	5	6	7
32. is gentle to use everyday.	1	2	3	4	5	6	7
33. is endorsed by a hairdresser.	1	2	3	4	5	6	7
34. has lasting fragrance.	1	2	3	4	5	6	7
35. offers convenient opening/closing.	1	2	3	4	5	6	7
36. contains vitamins.	1	2	3	4	5	6	7
37. is affordable.	1	2	3	4	5	6	7
38. is endorsed by a celebrity.	1	2	3	4	5	6	7
39. is made from natural ingredients	1	2	3	4	5	6	7
40. is enriched with protein.	1	2	3	4	5	6	7

PART THREE

Not everybody uses your brand of shampoo. Which of the following groups of people do you believe are most likely to use your shampoo brand?

41. Children	1	2	3	4	5	6	7
42. Rich people	1	2	3	4	5	6	7
43. College/high school students	1	2	3	4	5	6	7
44. Females	1	2	3	4	5	6	7
45. Government workers	1	2	3	4	5	6	7
46. Men/women with families	1	2	3	4	5	6	7
47. Blue-collar workers	1	2	3	4	5	6	7
48. Unemployed people	1	2	3	4	5	6	7
49. Males	1	2	3	4	5	6	7
50. People going out on dates	1	2	3	4	5	6	7
51. Those who buy the best things in life	1	2	3	4	5	6	7
52. Old/mature people	1	2	3	4	5	6	7

THE SHAMPOO BRAND ATTRIBUTES QUESTIONNAIRE

PART FOUR

Certain conditions motivate people to behave differently than their regular behaviour or habit. Do you believe that the following conditions might cause you to *switch* to other brands?

53. When price of your brand increases	1	2	3	4	5	6	7
54. When quality of your brand decreases	1	2	3	4	5	6	7
55. When you need a new flagrance	1	2	3	4	5	6	7
56. When you are given a free sample	1	2	3	4	5	6	7
57. When friends stop using your brand	1	2	3	4	5	6	7
58. When your salary increases	1	2	3	4	5	6	7
59. When your brand is not available in the store	1	2	3	4	5	6	7
60. When there is a new shampoo	1	2	3	4	5	6	7
61. When other brands have sales promotion	1	2	3	4	5	6	7
62. After viewing a convincing television advertisement	1	2	3	4	5	6	7
63. When a prestigious department store sells another brand.	1	2	3	4	5	6	7

PART FIVE

People sometimes use a shampoo brand for personal or emotional reasons. Please indicate whether you personally experience any of the following feelings associated with your decision to use your shampoo brand.

64. I feel *confident* when I use my brand.	1	2	3	4	5	6	7
65. I feel *happy* when I use my brand.	1	2	3	4	5	6	7
66. I feel I am *rich* when I use my brand.	1	2	3	4	5	6	7
67. I feel I'm using a *high fashion* brand.	1	2	3	4	5	6	7
68. I feel *young* when I use my brand.	1	2	3	4	5	6	7
69. I feel *professional* when I use my brand	1	2	3	4	5	6	7
70. I feel *attractive* when I use my brand	1	2	3	4	5	6	7
71. I feel I am *taking good care of my hair* when I use my brand.	1	2	3	4	5	6	7

THE SHAMPOO BRAND ATTRIBUTES QUESTIONNAIRE

72. I feel *guilty* when I use my brand	1	2	3	4	5	6	7
73. I feel *clean* when I use my brand	1	2	3	4	5	6	7
74. I feel *contented* when I use my brand	1	2	3	4	5	6	7

PART SIX

Some people use a particular shampoo brand because they are curious about it, or simply bored with their previous brand. Do you use your current shampoo brand for any of the following reasons?

75. Just curious to try them	1	2	3	4	5	6	7
76. Friends use this brand	1	2	3	4	5	6	7
77. Liked the package design	1	2	3	4	5	6	7
78. The brand was on sale	1	2	3	4	5	6	7
79. Liked the advertisement	1	2	3	4	5	6	7
80. For a change of pace	1	2	3	4	5	6	7
81. Because of information I heard about it	1	2	3	4	5	6	7
82. To get a better smell/fragrance	1	2	3	4	5	6	7
83. New brands always interest me	1	2	3	4	5	6	7

If you have anything which you would like to add about choosing your shampoo brand, please describe them below.

THE SHAMPOO BRAND ATTRIBUTES QUESTIONNAIRE

PART SEVEN: PERSONAL DETAILS

The following questions will put your responses to the questionnaire into proper perspective and provide some demographic information. Please encircle the number corresponding to the appropriate response.

1. Age	1	Under 15 years
	2	16 to 25 years
	3	26 to 35 years
	4	36 to 45 years
	5	Over 45 years
2. Sex	1	Male
	2	Female
3. Marital Status	1	Single
	2	Married
	3	Living together
	4	Separated
	5	Widowed

4. *Highest Educational Qualification*

	1	Elementary School Graduate
	2	High School Graduate
	3	College Graduate
	4	Masters/PhD Graduate

5. Occupation ______________________________
(Please specify)

6. On average, *how much do you earn every month?*

	1	Below Ps 5,000
	2	Ps 5,001 to 15,000
	3	Ps 15,001 to 25,000
	4	Ps 25,001 to 50,000
	5	Above Ps 50,000

Thank you for completing the *Shampoo Brand Attributes Questionnaire.*

THE TOOTHPASTE BRAND ATTRIBUTES QUESTIONNAIRE is almost identical to the Shampoo Questionnaire, except for Part Two.

PART TWO

Please indicate whether you agree or disagree that the following benefits or problems are associated with using your toothpaste brand.

My brand of toothpaste...							
1. protects my teeth from cavities.	1	2	3	4	5	6	7
2. freshens my breath.	1	2	3	4	5	6	7
3. gives me confidence when I go out.	1	2	3	4	5	6	7
4. protects my gums.	1	2	3	4	5	6	7
5. leaves mouth feeling clean and healthy	1	2	3	4	5	6	7
6. reduces plaque.	1	2	3	4	5	6	7
7 . working even after brushing.	1	2	3	4	5	6	7
8. leaves teeth feeling smooth.	1	2	3	4	5	6	7
9. cares for all dental problems.	1	2	3	4	5	6	7
10. reduces tartar build-up.	1	2	3	4	5	6	7
11. makes my mouth feel just like coming from my dentist after brushing with it.	1	2	3	4	5	6	7
12. helps to make teeth shiny.	1	2	3	4	5	6	7
13. cleans my teeth thoroughly.	1	2	3	4	5	6	7
14. leaves long-lasting fresh breath.	1	2	3	4	5	6	7
15. helps strengthen teeth.	1	2	3	4	5	6	7
16. helps to keep my teeth white.	1	2	3	4	5	6	7
17. makes my teeth strong and healthy.	1	2	3	4	5	6	7
18. has a pleasant minty taste I like.	1	2	3	4	5	6	7
19. offers convenient opening/closing.	1	2	3	4	5	6	7
20. helps encourage children to brush their teeth regularly.	1	2	3	4	5	6	7
21. is affordable.	1	2	3	4	5	6	7
22. is approved by dentists.	1	2	3	4	5	6	7
23. contains new ingredients.	1	2	3	4	5	6	7
24. is made by a leading manufacturer.	1	2	3	4	5	6	7
25. has a low price.	1	2	3	4	5	6	7
26. is good for the whole family.	1	2	3	4	5	6	7
27. has different flavours to choose from.	1	2	3	4	5	6	7
28. is good for every day use.	1	2	3	4	5	6	7
29. contains fluoride to fight tooth decay.	1	2	3	4	5	6	7
30. is recommended by dentists.	1	2	3	4	5	6	7
31. is good value for money.	1	2	3	4	5	6	7
32. good for sensitive teeth.	1	2	3	4	5	6	7
33. has attractive paste/gel colour	1	2	3	4	5	6	7

APPENDIX 4

MAIN QUESTIONNAIRE - FILIPINO VERSION

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

Ang kuwestiyonaryong ito ay humihingi ng inyong mga opinyon tungkol sa pagpili ng inyong marka o brand ng shampoo. Ito rin ay nauukol sa pag-grado ng mga shampoo na mabibili ngayon. Basahin ang mga tanong at markahan ang sagot na nagsasaad ng inyong opinyon. *Wala pong tama o maling sagot.* Kung nahirapan kayo sa pagpili, piliin lang ang sagot na pinakamalapit sa inyong opinyon.

(This questionnaire seeks your personal feelings and opinions on issues related to your choice of shampoo brands. It is also concerned with rating the available shampoo brands in the market. Please work through the questionnaire and mark the response that corresponds to your opinion. There are no right or wrong answers. If you are undecided about your answer to a particular question, mark the response that most closely matches your view of the item.)

PART ONE

Ang mga sumusunod na tanong ay tungkol sa ibat-ibang katangian at situwasyon sa pagbili at paggamit ng shampoo. Markahan ng tsek ☑ ang mga patlang na nagsasaad ng inyong nararamdaman o opinyon.

(The following questions are about different product attributes and choice situations in shampoo brand purchase and usage. Check ☑ the spaces that reflect your own personal feelings and opinions.)

1. Gaano kadalas ang paghugas ng inyong buhok?

   [ ] Hindi naghuhugas
   [ ] Napakadalang
   [ ] Sa bawat paghugas
   [ ] Sa makalawang araw
   [ ] Isang beses sa isang araw
   [ ] Kulang sa tatlong beses sa isang linggo

2. Sa paghugas ng inyong buhok, gaano kadalas ang paggamit ninyo ng shampoo?

   [ ] Hindi naghuhugas
   [ ] Napakadalang
   [ ] Sa bawat paghugas
   [ ] Sa makalawang araw
   [ ] Isang beses sa isang araw
   [ ] Kulang sa tatlong beses sa isang linggo

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

3. Kailan kayo naghuhugas ng inyong buhok?

Tick the square ☑.	Lagyan ng tsek. Yes	No		Lagyan ng tsek. Yes	No
Kapag naliligo, pagkagising	[ ]	[ ]	Gumagamit ng shampoo?	[ ]	[ ]
Kapag naliligo, bago matulog	[ ]	[ ]	Gumagamit ng shampoo?	[ ]	[ ]
Bago lumabas	[ ]	[ ]	Gumagamit ng shampoo?	[ ]	[ ]
Bago makipagkita sa ibang tao	[ ]	[ ]	Gumagamit ng shampoo?	[ ]	[ ]
Pagkatapos bumiyahe	[ ]	[ ]	Gumagamit ng shampoo?	[ ]	[ ]
Kung mainit at maalinsangan ang panahon	[ ]	[ ]	Gumagamit ng shampoo?	[ ]	[ ]
Pagkatapos magtrabaho	[ ]	[ ]	Gumagamit ng shampoo?	[ ]	[ ]

Lagyan ng tsek ☑ ang nararapat na sagot.	YES	NO
4. Bumibili ka ba ng shampoo para sa sariling gamit lamang? Kapag oo, sagutin ang tanong sa 6.	[ ]	[ ]
Kapag hindi, bumibili ba kayo ng shampoo para sa inyong pamilya?	[ ]	[ ]
5. Gumagamit ba kayo ng shampoo na nabili ng iba?	[ ]	[ ]
Kapag oo, ang shampoo ba na ito ay inyong napili?	[ ]	[ ]
6. Bumibili at gumagamit ba kayo ng mahigit sa isang marka ng shampoo sa inyong pamilya ng sabay-sabay?	[ ]	[ ]
7. Nagawa na ba ninyo sa marka ng shampoo ang mga sumusunod na bagay?		
a. Gumamit ng isang brand at tumigil sa paggamit nito.	[ ]	[ ]
b. Tumigil sa paggamit ng isang brand at nagsimula uli sa paggamit nito.	[ ]	[ ]
c. Hindi kailan man nagbago sa paggamit ng marka ng shampoo.	[ ]	[ ]

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

	YES	NO
8. Kung nagkataon ba, maiisip ninyo bang bumago sa ibang marka ng shampoo? Kapag oo, sagutin ang tanong sa 10-11. Kung hindi, laktawan ang tanong sa 10-11.	[ ]	[ ]
9. Naniniwala ba kayo na importante ang paggamit ng shampoo sa paghugas ng inyong buhok? Kapag oo, sagutin ang tanong sa 12. Kung hindi, laktawan ang tanong sa 12.	[ ]	[ ]

Markahan ang kahit saang puwesto sa linya kung kayo ay sumasang-ayon o tutol sa mga sumusunod na pangungusap tungkol sa mga marka ng shampoo: (1 = malakas ang inyong pag-tutol, 7=malakas ang inyong pagsang-ayon).

Please mark any point on the line to indicate whether you agree or disagree with the following statements about shampoo brands (1=strongly disagree, 7=strongly agree).

10.

a. Nasisiyahan ako sa pagsubok ng iba-ibang marka ng shampoo para maikumpara ang mga ito. 1___2___3___4___5___6___7

b. Mas gusto kong gamitin ang marka ng shampoo na palaging kong binibili kaysa subukan ang ibang markang hindi ako sigurado. 1___2___3___4___5___6___7

c. Kahit na ang mga shampoo ay nabibili sa iba-ibang bango, palagi akong bumibili ng parehong bango. 1___2___3___4___5___6___7

d. Hindi ako nasisiyahan sa pagbili ng parehong marka ng shampoo, kahit na magaling ang mga ito. 1___2___3___4___5___6___7

e. Kung nagustohan ko ang marka ng shampoo, bihira na akong bumago para masubukan ang mga ibang marka. 1___2___3___4___5___6___7

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

11.

a. Kapag may bagong marka ng shampoo sa pamilihan, palagi akong bumibili para masubukan ito. 1___2___3___4___5___6___7

b. Sa pagsubok ng mga bagong marka ng shampoo, palagi akong nauuna sa aking mga kaibigan at kapitbahay. 1___2___3___4___5___6___7

c. Mas gusto kong maghintay hanggang ang isang marka ng shampoo ay subok na bago ko bilhin ito. 1___2___3___4___5___6___7

d. Gusto kong subukan ang mga bago at naiibang bagay. 1___2___3___4___5___6___7

12. Graduhan ang pagpili ng inyong marka ng shampoo sa mga sumusunod. Maari kayong maglagay ng marka sa kahit saang puwesto ng linya.

a.	hindi importante na desisyon	1___2___3___4___5___6___7	importante na desisyon
b.	hindi kailangan pag-isipang mabuti ang desisyon	1___2___3___4___5___6___7	kailangan pag-isipang mabuti ang desisyon
c.	walang mawawala kung mapili ang maling marka	1___2___3___4___5___6___7	maraming mawawala kung mapili ang maling marka

13. Markahan ang kahit saang puwesto sa linya kung kayo ay sumasang-ayon o tutol sa mga sumusunod na pangungusap:
(1 = malakas ang inyong pag-tutol, 7=malakas ang inyong pagsang-ayon).

(Please indicate whether you agree or disagree with the following statements by marking any point on the line (1=strongly disagree, 7=strongly agree).

Bago bumili ng marka ng shampoo, importante na malaman kung:

a. Anu-ano ang nasa isip ng mga kaibigan tungkol sa mga iba-ibang marka ng shampoo. 1___2___3___4___5___6___7

b. Anu-anong klase ng mga tao ang bumibili ng mga ganitong marka ng shampoo. 1___2___3___4___5___6___7

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

c. Anu-ano ang iisipin at sasabihin ng mga ibang tao sa mga taong gumagamit ng ganitong marka ng shampoo. 1___2___3___4___5___6___7

d. Anu-anong marka ng shampoo ang dapat bilhin para mapabuti sa tingin ng iba. 1___2___3___4___5___6___7

14. Graduhan ang inyong sarili sa mga sumusunod na pangungusap: 1=kaunti lamang ang nalalaman, at 7=marami ang nalalaman.
(Please rate yourself in each of the following statements: 1=very little knowledge, and 7=nearly complete knowledge).

a. Marami akong nalalaman tungkol sa problema ng buhok at anit. 1___2___3___4___5___6___7

b. Kabisado ko ang mga marka ng shampoo sa pamilihan. 1___2___3___4___5___6___7

c. Alam ko ang mga marka ng shampoo na magaling sa pagpigil ng mga problema sa buhok at anit. 1___2___3___4___5___6___7

d. Palagi akong nanonood ng mga komersiyal ng mga shampoo sa telebisyon. 1___2___3___4___5___6___7

e. Palagi akong nakikinig ng mga komersiyal ng mga shampoo sa radyo. 1___2___3___4___5___6___7

PART TWO

1. Sa mga shampoo brands na mabibili ngayon sa Metro Manila, anu-ano ang maari ninyong bilhin? Maari po kayong magbigay ng kahit ilang brand na gusto ninyo. Huwag lang po ninyong tignan ang tanong sa 2 hanggang hindi po ninyo matapos sagutin ito.
(Among the shampoo brands available in Metro Manila today, which brands would you consider buying? Name as many brands as you like. Please do not go to question 2 until you have answered question 1.)

_______________ _______________ _______________

_______________ _______________ _______________

_______________ _______________ _______________

_______________ _______________ _______________

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

2. Alin sa mga shampoo brands na ito ang magugustohan ninyong bilhin? Maari po ninyong markahan ang higit sa isa.

(Which among the following shampoo brands would you consider buying? Check as many as you like.)

[ ] Dimension
[ ] Flex
[ ] GeeYour Hair Smells Terrific
[ ] Gard
[ ] Head and Shoulders
[ ] Ivory
[ ] Johnsons Baby
[ ] Lux
[ ] Natures Way Aloe Vera
[ ] Organics
[ ] Palmolive Naturals
[ ] Palmolive Optima
[ ] Pantene
[ ] Rejoice
[ ] Salon Selectives
[ ] Sassoon Vidal
[ ] Selsun Blue
[ ] SM Bonus
[ ] Sunsilk
[ ] Wella Balsam

PART THREE

Gawin muna ang pagayos ng mga rango. Pagkatapos gawin ang pagbigay ng mga halaga.

1. *Pagpili ng Rango.* Sa pagpili ng shampoo brand, ayusin po ninyo ang mga sumusunod na bagay mula sa pinakamataas (1=importante) hanggang sa pinakamababa (13=hindi importante). Kung mayroong mga bagay na hindi importante sa inyo, huwag po ninyong isama sa pag-ayos. Ilagay lang po ang mga numero sa hanay ng mga rango.

2. *Pagbigay ng mga Halaga.* Lagyan ninyo ng halagang 100 puntos ang bagay na napili ninyong pinakaimportante o bilang 1. Ngayon tignan po ninyo ang mga naiwang bagay, gaano kaimportante ang bawat isa kung ikinumpara ang mga ito sa napili ninyong pinakaimportanteng bagay? Halimbawa, kung naisip ninyong ang isang bagay ay kalahati lamang ang pagka-importansiya sa pinakaimportanteng bagay, bigyan ninyo ito ng halagang 50 puntos lamang. Ilagay lang po ang mga puntos sa hanay ng mga halaga.

(First, work on the ranking. Once ranking is completed, then assign the values.

1. *To Choose the Rank.* When choosing your shampoo brand, rank the following factors from 1=most important to 13=least important. If there are any factors you consider unimportant, do not include them during ranking. Place your choice under the *rank* column.

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

2. *To Assign the Value.* Assign a value of 100 points to the most important factor you have ranked as 1. Now consider the remaining factors included during the ranking. How important is each of the remaining factor relative to the factor ranked as number 1? For example, if you feel that a factor is only half as important as the factor ranked as number 1, assign it 50 points as the value to that factor. Place values to the other factors under the *value* column.)

	Rango (Rank)	**Halaga (Value)**
1. Kakayang magbigay ng magandang buhok sa pamamagitan ng pagbigay sa buhok ng hugis o katawan, kintab at maayos na kundisyoning.	_____	_____
2. Kakayahang linising mabuti ang buhok at anit.	_____	_____
3. Kakayahang magbigay ng madaling pag-aayos sa buhok at sa pagsuklay nito.	_____	_____
4. Kakayahang alisin ang mga balakubak at naipong dumi sa anit.	_____	_____
5. Kakayahang magbigay ng banayad at hindi masagwang bango na mabuti sa buong pamilya.	_____	_____
6. Kakayahang magbigay ng pH-balanced na pormula na hiyang sa inyong buhok at banayad gamitin araw-araw.	_____	_____
7. Kakayahang magbigay ng maaliwalas at tumatagal na bango.	_____	_____
8. Kakayahang magdulot ng iba-ibang bangong mapagpipilian.	_____	_____
9. Kakayahang magbigay sa inyo ng pakiramdam ng pagiging mayaman, bata at maganda.	_____	_____

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

	Rango (Rank)	Halaga (Value)
10. Mga suporta ng mga artista, tagaayos ng buhok o eksperto sa buhok.	_____	_____
11. Abot-kayang halaga.	_____	_____
12. Madaling gamitin at may kaaya-ayang lalagyan.	_____	_____
13. Madalas na sales promosyon.	_____	_____

PART FOUR

Graduhan ang mga Marka ng Shampoo. Graduhan ninyo (0=hindi pasado o hindi nasisiyahan, at 10=pasado o lubos na nasisiyahan) ang bawat marka ng shampoo sa mga bagay na napili ninyong importante sa Part Three. Kapag hindi pa ninyo nasubukan ang iba sa mga ito, graduhan ninyo sila sa pamamagitan ng inyong narinig, nabasa o nalaman tungkol sa mga ito. Maari ninyong piliin ang mga bilang. Kung nais ninyong piliin ang nasa pagitan ng dalawang bilang, maari ninyong markahan ang kahit saang puwesto sa linya na gusto ninyo.

Halimbawa, ang markang "*" ay inilagay sa gitna ng dalawang bilang.

Shampoo X 0___1___2___3___4___5___6___*_7___8___9___10
Shampoo Y 0___1___2___3___4___5___6___7___8___9_*__10

(Evaluate the Shampoo Brands. Using a scale of 0 to 10 (0=Unsatisfactory; 10=Satisfactory), rate each shampoo brand with respect to the factors in Part Three which you have considered important. If you have not tried any of the brands yet, rate them according to what you have heard of, read, or known about them. You may choose the exact numbers. If you wish to choose the values between the numbers, put a mark anywhere on the line where you think it's appropriate.

For example, the mark, "" is placed between the numbers.)*

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

Para ma-graduhan ang bawat marka ng shampoo, markahan ang kahit saang puwesto sa linya: (0=hindi nasisiyahan, at 10=lubos na nasisiyahan).
(Using a scale of 0 to 10 (0=Unsatisfactory; 10=Satisfactory), rate each shampoo brand by placing a mark anywhere on the line where you think it's appropriate.)

1. Kakayang magbigay ng magandang buhok sa pamamagitan ng pagbigay sa buhok ng hugis o katawan, kintab at maayos na kundisyoning.
(Ability to promote beautiful hair by giving to hair body and bounce, shine and good conditioning.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

2. Kakayahang linising mabuti ang buhok at anit.
(Ability to clean hair and scalp thoroughly.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

3. Kakayahang magbigay ng madaling pag-aayos sa buhok o pagsuklay nito.
(Ability to provide hair manageability, making hair easy to comb or style.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

Para ma-graduhan ang bawat marka ng shampoo, markahan ang kahit saang puwesto sa linya: (0=hindi nasisiyahan, at 10=lubos na nasisiyahan).
(Using a scale of 0 to 10 (0=Unsatisfactory; 10=Satisfactory), rate each shampoo brand by placing a mark anywhere on the line where you think it's appropriate.)

4. Kakayahang alisin ang mga balakubak at naipong dumi sa anit.
(Ability to get rid of dandruff and build-up on scalp.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

5. Kakayahang magbigay ng banayad at hindi masagwang bango na mabuti sa buong pamilya.
(Ability to give mild, no irritating fragrance that is good for the entire family.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

6. Kakayahang magbigay ng pH-balanced na pormula na hiyang sa inyong buhok at banayad gamitin araw-araw.
(Ability to give pH-balanced formula that is compatible to your hair and gentle to use everyday.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

Para ma-graduhan ang bawat marka ng shampoo, markahan ang kahit saang puwesto sa linya. *Using a scale of 0 to 10 (0=Unsatisfactory; 10=Satisfactory), rate each shampoo brand by placing a mark anywhere on the line where you think it's appropriate.*

7. Kakayahang magbigay ng maaliwalas at tumatagal na bango.
(Ability to provide pleasant and lasting fragrance.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

8. Kakayahang magdulot ng iba-ibang bangong mapagpipilian.
(Ability to provide different fragrances to choose from.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

9. Kakayahang magbigay sa inyo ng pakiramdam ng pagiging mayaman, bata at maganda.
(Ability to make you feel rich, young and attractive.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

Para ma-graduhan ang bawat marka ng shampoo, markahan ang kahit saang puwesto sa linya: (0=hindi nasisiyahan, at 10=lubos na nasisiyahan).
Using a scale of 0 to 10 (0=Unsatisfactory; 10=Satisfactory), rate each shampoo brand by placing a mark anywhere on the line where you think it's appropriate.

10. Mga suporta ng mga artista, tagaayos ng buhok o eksperto sa buhok.
(Endorsements of celebrity, hairdresser or hair expert.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

11. Abot-kayang halaga.
(Affordable price.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

12. Madaling gamitin at kaaya-ayang lalagyan.
(Easy-to-use and attractive packaging.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

Para ma-graduhan ang bawat marka ng shampoo, markahan ang kahit saang puwesto sa linya: (0=hindi nasisiyahan, at 10=lubos na nasisiyahan). *Using a scale of 0 to 10 (0=Unsatisfactory; 10=Satisfactory), rate each shampoo brand by placing a mark anywhere on the line where you think it's appropriate.*

13. Madalas na sales promosyon.
    (Regular sales promotion.)

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

PART FIVE

1. Aling shampoo brand ang madalas ninyong bilhin at gamitin? Graduhan ang bawat marka ng shampoo (1=hindi kailan binibili; 2=madalang na binibili; 3=paminsan-minsan lang binibili; at 4=palaging binibili).

   (Which of the following shampoo brands do you purchase and use frequently? Label each shampoo brand according to the following scale: 1=never, 2=rarely, 3=sometimes, and 4=always.)

____ Head & Shoulders	_____ Pantene
____ Ivory	_____ Rejoice
____ Lux	_____ Sunsilk
____ Palmolive Naturals	_____ Others, please specify.
____ Palmolive Optima	____________

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

2. Aling shampoo brand ang huli ninyong nabili? Pumili lamang po ng isa.
   (Which shampoo brand did you last purchase? Choose only one.)

____ Head & Shoulders	_____ Pantene
____ Ivory	_____ Rejoice
____ Lux	_____ Sunsilk
____ Palmolive Naturals	_____ Others, please specify
____ Palmolive Optima	___________

3. Tignan ninyo ang lahat ng bagay sa inyong marka ng shampoo ngayon. Gaano kayo ka-kontento sa ginagamit ninyong marka ng shampoo? Graduhan ninyo ang inyong marka ng shampoo sa pamamagitan ng pagmarka ng kahit saang puwesto sa linya.

   (Considering all factors, to what extent are you satisfied with your current shampoo brand. Rate your shampoo brand by placing a mark anywhere on the line: 0=Unsatisfactory; and 7=Satisfactory).

Hindi Nasisiyahan 0____1____2____3____4____5____6____7 Lubos na Nasisiyahan

4. Aling marka ng shampoo ang bibilhin ninyo sa susunod? Ayusin po ninyo ang mga sumusunod na marka ng shampoo mula sa pinakamataas (1=siguradong bibilhin) hanggang sa pinakamababa (8=hindi kailanman bibilhin).

   (Which of the following shampoo brands are you going to purchase next? Rank each shampoo brand from the highest (1=most likely) to the lowest (8=most unlikely).

____ Head & Shoulders	_____ Pantene
____ Ivory	_____ Rejoice
____ Lux	_____ Sunsilk
____ Palmolive Naturals	_____ Others, please specify.
____ Palmolive Optima	___________

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

PART SIX ABOUT YOURSELF

Ang mga sumusunod ng tanong ay para makakuha ng ilang inpormasyong demograpika at pang-ekonomiya ukol sa kasagutan ng mga mamimili. Lagyan lamang po ng tsek ang nararapat na sagot.
(The following questions aim to obtain a few basic economic and demographic information relevant to consumer responses. Please check appropriate response.)

1. Gulang(taon) *Age* (years) [ ] Under 15 [ ] 16 - 25 [ ] 26 - 35 [ ] 36 - 45 [ ] Over 45	2. Pinakamataas na Napag-aralan *(Highest Level of Education)* [ ] Elementary school [ ] High School [ ] College degree [ ] Masters/PhD degree [ ] Other (specify)	3. Kasarian *(Sex)* [ ] Lalaki (Male) [ ] Babae (Female)
4. Katayuan Kasado *(Marital Status)* [ ] Single [ ] Married [ ] Balo (Widowed) [ ] Hiwalay (Separated) [ ] Other (specify)	5. Laki ng Pamilya *(Family Size -number of persons)* [ ] 1 - 2 [ ] 3 - 4 [ ] 5 - 6 [ ] 7 - 8 [ ] 9 or more	6. Gulang ng Pinakamatandang Anak *(Age of the Eldest Child in Your Care (years)* [ ] Under 5 [ ] 5 - 12 [ ] 13 - 19 [ ] Over 19 [ ] Not applicable
7. Bilang ng mga Anak na Kulang sa Limang Taong Gulang *(Number of Children Under 5 Years of Age)* [ ] Wala (None) [ ] One [ ] Two or more	8. Trabaho *(Occupation Please specify)* ________________	9. Gaano kalaki ang kita po ninyo bawat buwan? *(On average, how much do you earn every month? (in pesos))* [ ] Below Ps5,000 [ ] Ps 5,001 - 15,000 [ ] Ps15,001 - 25,000 [ ] Ps25,001 - 50,000 [ ] Above Ps50,000

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

10. Kung mayroon pa kayong mga importanteng bagay sa pagpili ng inyong marka ng shampoo, pakilarawan lang po sa ibaba.

(If you have any other factor that you feel important about choosing your shampoo brand, please describe them below.)

Nasiyahan ba kayo sa pagsagot ng kuwestiyonaryong ito? Markahan lang ang tamang puwesto sa linya.

Hindi Nasiyahan 0____1____2____3____4____5____6____7 Lubos na Nasiyahan

Tapos na po. Marami pong salamat sa pagsagot ninyo sa kuwestiyonaryong ito. Maari po bang sigurohin ninyo na lahat ng mga tanong ay inyong nasagutan at lahat ng mga marka ng shampoo ay nagradohan. Pagkatapos, pakilagay lang po ang mga nasagutang kuwestiyonaryo at consent form sa nakalakip na reply envelope at ibigay ito sa Post Office. Bayad na po ang selyo nito. Reply Permit No. 4053-96-NCR, c/o Roxas District Post Office, 1103 Quezon City.

(Thank you for completing the Shampoo Evaluation Questionnaire. Please check to make sure that you have not skipped any questions, and then return the questionnaire and the consent form through the reply paid envelope provided.)

If you have any questions, please do not hesitate to telephone or write to me.
BEN PAUL B. GUTIERREZ
12 Gumamela St., Roxas Dist., 1103 Quezon City, Philippines
Telephone 411-9492; or 521-1114 local 8, 9AM -3PM, MWF only

N.B. The **TOOTHPASTE BRAND EVALUATION QUESTIONNAIRE** is almost identical to the Shampoo Questionnaire except for the toothpaste brands rated and the twelve attributes.

APPENDIX 5

MAIN QUESTIONNAIRE - ENGLISH TRANSLATION

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

This questionnaire seeks your personal feelings and opinions on issues related to your choice of shampoo brands. It is also concerned with rating the available shampoo brands in the market. Please work through the questionnaire and mark the response that corresponds to your opinion. *There are no right or wrong answers.* If you are undecided about your answer to a particular question, mark the response that most closely matches your view of the item.

PART ONE

The following questions are about different product attributes and choice situations in shampoo brand purchase and usage. Check the spaces that reflect your own personal feelings and opinions.

1. How often do you wash your hair?

[ ] Not at all	[ ] Everytime	[ ] Every other day
[ ] Very infrequently	[ ] Once a day	[ ] Less than three times a week

2. When you wash your hair, how often do you use shampoo?

[ ] Not at all	[ ] Everytime	[ ] Every other day
[ ] Very infrequently	[ ] Once a day	[ ] Less than three times a week

3. When do you wash your hair?

	Tick the square.			Tick the square.	
	Yes	No		Yes	No
While taking a bath after getting out of bed	[ ]	[ ]	Use shampoo?	[ ]	[ ]
While taking a bath before going to bed	[ ]	[ ]	Use shampoo?	[ ]	[ ]
Before going out	[ ]	[ ]	Use shampoo?	[ ]	[ ]
Before meeting people	[ ]	[ ]	Use shampoo?	[ ]	[ ]
After traveling	[ ]	[ ]	Use shampoo?	[ ]	[ ]
During a warm humid day	[ ]	[ ]	Use shampoo?	[ ]	[ ]
After working	[ ]	[ ]	Use shampoo?	[ ]	[ ]

	Yes	No
4. Do you buy a shampoo brand for your own use only?	[ ]	[ ]
If yes, go to question 6.		
If no, do you buy a shampoo brand for other members of the family?	[ ]	[ ]

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

	YES	NO
5. Do you use a shampoo brand bought for you by somebody else?	[ ]	[ ]
If yes, is the shampoo brand you are using your choice?	[ ]	[ ]
6. Do you buy and use more than one shampoo brands in your family at the same time?	[ ]	[ ]
7. Have you ever done any of the following behaviours with shampoo?		
a. Used a brand and then stopped	[ ]	[ ]
b. Stopped using a brand and then started again	[ ]	[ ]
c. Always used your brand	[ ]	[ ]
8. Would you ever consider switching to another shampoo brand? If yes, answer questions 10-11. If no, skip questions 10-11.	[ ]	[ ]
9. Do you believe using shampoo is important when washing your hair? If yes, answer question 12. If no, skip question 12.	[ ]	[ ]

Please mark any point on the line to indicate whether you agree or disagree with the following statements about shampoo brands (1=strongly disagree, 7=strongly agree).

10.

a. I enjoy sampling different shampoo brands for the sake of comparison. 1___2___3___4___5___6___7

b. I would rather stick with a brand I usually buy than to try something I am not sure of. 1___2___3___4___5___6___7

c. Even though shampoo is available in different fragrances, I always tend to buy the same fragrance. 1___2___3___4___5___6___7

d. I get bored with buying the same shampoo brands even if they are good. 1___2___3___4___5___6___7

e. If I like the brand, I rarely switch from it just to try something different. 1___2___3___4___5___6___7

11.

a. When I see a new shampoo brand at the store I often buy it just to see what it's like. 1___2___3___4___5___6___7

b. I often try new shampoo brands before my friends and neighbors do. 1___2___3___4___5___6___7

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

c. I like to wait until a brand has been proven before I try it. 1___2___3___4___5___6___7

d. I like to try new and different things. 1___2___3___4___5___6___7

12. Please rate the process of choosing your shampoo brand on each of the following scales. You can put a mark anywhere along the line.

a. very unimportant decision	1___2___3___4___5___6___7	very important decision
b. decision requires little thought	1___2___3___4___5___6___7	decision requires a lot of thought
c. little to lose if you choose the wrong brand	1___2___3___4___5___6___7	a lot to lose if you choose the wrong brand

13. Please indicate the whether you agree or disagree with the following statements by marking any point on the line (1=strongly disagree, 7=strongly agree).

Before purchasing a shampoo brand it is important to know:

a. What friends think of different brands. 1___2___3___4___5___6___7

b. What kinds of people buy certain brands. 1___2___3___4___5___6___7

c. What others think of people who use certain brands. 1___2___3___4___5___6___7

d. What shampoo brands to buy to make good impressions on others. 1___2___3___4___5___6___7

14. Please rate yourself in each of the following statements (1=very little knowledge, and 7=nearly complete knowledge).

a. I know a lot about hair and scalp problems. 1___2___3___4___5___6___7

b. I am familiar with most shampoo brands in the market. 1___2___3___4___5___6___7

c. I know which shampoo brands are good to prevent hair and scalp problems. 1___2___3___4___5___6___7

d. I often watch shampoo television commercials. 1___2___3___4___5___6___7

e. I usually like to listen to shampoo radio commercials. 1___2___3___4___5___6___7

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

PART TWO

1. Among the shampoo brands available in Metro Manila today, which brands would you consider buying? Name as many brands as you like. Please do not go to question 2 until you have answered question 1.

____________	____________	____________
____________	____________	____________
____________	____________	____________
____________	____________	____________
____________	____________	____________

2. Which among the following shampoo brands would you consider buying? Check as many as you like.

[ ] Dimension
[ ] Flex
[ ] GeeYour Hair Smells Terrific
[ ] Gard
[ ] Head and Shoulders
[ ] Ivory
[ ] Johnsons Baby
[ ] Lux
[ ] Natures Way Aloe Vera
[ ] Organics
[ ] Palmolive Naturals
[ ] Palmolive Optima
[ ] Pantene
[ ] Rejoice
[ ] Salon Selectives
[ ] Sassoon Vidal
[ ] Selsun Blue
[ ] SM Bonus
[ ] Sunsilk
[ ] Wella Balsam

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

PART THREE
First, work on the ranking. Once ranking is completed, then assign the values.

1. *To Choose the Rank.* When choosing your shampoo brand, rank the following factors from 1=most important to 13=least important. If there are any factors you consider unimportant, do not include them during ranking. Place your choice under the *rank* column.
2. *To Assign the Value.* Assign a value of 100 points to the most important factor you have ranked as 1. Now consider the remaining factors included during the ranking. How important is each of the remaining factor relative to the factor ranked as number 1? For example, if you feel that a factor is only half as important as the factor ranked as number 1, assign it 50 points as the value to that factor. Place values to the other factors under the *value* column.

	Rank	**Value**
1. Ability to *promote beautiful hair* by giving to hair body, shine and good conditioning.	_____	_____
2. Ability to *clean hair and scalp* thoroughly.	_____	_____
3. Ability to *provide hair manageability*, making hair easy to comb or style.	_____	_____
4. Ability to *get rid of dandruff* and build-up on scalp.	_____	_____
5. Ability to give *mild, no irritating fragrance* that is good for the entire family.	_____	_____
6. Ability to give *pH-balanced formula* that is *compatible to your hair* and *gentle to use* everyday.	_____	_____
7. Ability to provide *pleasant and lasting fragrance*.	_____	_____
8. Ability to provide *different fragrances to choose from*.	_____	_____
9. Ability to make you *feel rich, young and attractive*.	_____	_____
10. *Endorsements* of celebrity, hairdresser or hair expert.	_____	_____
11. *Affordable price*	_____	_____
12. *Easy-to-use and attractive packaging*.	_____	_____
13. Regular *sales promotion*.	_____	_____

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

PART FOUR

Evaluate the Shampoo Brands. Using a scale of 0 to 10 (0=Unsatisfactory; 10=Satisfactory), rate each shampoo brand with respect to the factors in Part Three which you have considered important. If you have not tried any of the brands yet, rate them according to what you have heard of, read, or known about them. You may choose the exact numbers. If you wish to choose the values between the numbers, put a mark anywhere on the line where you think it's appropriate.

For example, the mark, "*" is placed between the numbers.

Shampoo X	0___1___2___3___4___5___6__*_7___8___9___10
Shampoo Y	0___1___2___3___4___5___6___7___8_____9_*__10

1. Ability to promote beautiful hair by giving to hair body, shine and good conditioning.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

2. Ability to clean hair and scalp thoroughly.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

Using a scale of 0 to 10 (0=Unsatisfactory; 10=Satisfactory), rate each shampoo brand by placing a mark anywhere on the line where you think it's appropriate.

3. Ability to provide hair manageability, making hair easy to comb or style.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

4. Ability to get rid of dandruff and build-up on scalp.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

5. Ability to give mild, no irritating fragrance that is good for the entire family.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

Using a scale of 0 to 10 (0=Unsatisfactory; 10=Satisfactory), rate each shampoo brand by placing a mark anywhere on the line where you think it's appropriate.

6. Ability to give pH-balanced formula that is compatible to your hair and gentle to use everyday.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

7. Ability to provide pleasant and lasting fragrance.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

8. Ability to provide different fragrances to choose from.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

Using a scale of 0 to 10 (0=Unsatisfactory; 10=Satisfactory), rate each shampoo brand by placing a mark anywhere on the line where you think it's appropriate.

9. Ability to make you feel rich, young and attractive.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

10. Endorsements of celebrity, hairdresser or hair expert.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

11. Affordable price.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

Using a scale of 0 to 10 (0=Unsatisfactory; 10=Satisfactory), rate each shampoo brand by placing a mark anywhere on the line where you think it's appropriate.

12. Easy-to-use and attractive packaging.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

13. Regular sales promotion.

Head & Shoulders	0___1___2___3___4___5___6___7___8___9___10
Ivory	0___1___2___3___4___5___6___7___8___9___10
Lux	0___1___2___3___4___5___6___7___8___9___10
Palmolive Naturals	0___1___2___3___4___5___6___7___8___9___10
Palmolive Optima	0___1___2___3___4___5___6___7___8___9___10
Pantene	0___1___2___3___4___5___6___7___8___9___10
Rejoice	0___1___2___3___4___5___6___7___8___9___10
Sunsilk	0___1___2___3___4___5___6___7___8___9___10

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

PART FIVE

1. Which of the following shampoo brands do you purchase and use frequently? Label each shampoo brand according to the following scale: 1=never, 2=rarely, 3=sometimes, and 4=always.

____ Head & Shoulders	_____ Pantene
____ Ivory	_____ Rejoice
____ Lux	_____ Sunsilk
____ Palmolive Naturals	_____ Others, please specify.
____ Palmolive Optima	___________

2. Which shampoo brand did you last purchase? Choose only one.

____ Head & Shoulders	_____ Pantene
____ Ivory	_____ Rejoice
____ Lux	_____ Sunsilk
____ Palmolive Naturals	_____ Others, please specify
____ Palmolive Optima	___________

3. Considering all factors, to what extent are you satisfied with your current shampoo brand. Rate your shampoo brand by placing a mark anywhere on the line: 0=Unsatisfactory; and 7=Satisfactory.

Unsatisfactory 0____1____2____3____4____5____6____7 Satisfactory

4. Which of the following shampoo brands are you going to purchase next? Label each shampoo brand according to the following scale: 1=most unlikely, 2=unlikely, 3=maybe, 4=likely, and 5=most likely.

____ Head & Shoulders	_____ Pantene
____ Ivory	_____ Rejoice
____ Lux	_____ Sunsilk
____ Palmolive Naturals	_____ Others, please specify.
____ Palmolive Optima	___________

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

PART SIX ABOUT YOURSELF

The following questions aim to obtain a few basic economic and demographic information relevant to consumer responses. Please check the appropriate response.

1. Age (years)

[ ] Under 15
[ ] 16 - 25
[ ] 26 - 35
[ ] 36 - 45
[ ] Over 45

2. Highest Completed Level of Education

[ ] Elementary School
[ ] High School
[ ] College Degree
[ ] Masters/PhD Degree
[ ] Other (specify)

3. Sex

[ ] Male
[ ] Female

4. Marital Status

[ ] Single
[ ] Married
[ ] Widowed
[ ] Separated
[ ] Other (specify)

5. Family Size (number of persons)

[ ] 1 - 2
[ ] 3 - 4
[ ] 5 - 6
[ ] 7 - 8
[ ] 9 or more

6. Age of the Eldest Child in Your Care (years)

[ ] Under 5
[ ] 5 - 12
[ ] 13 - 19
[ ] Over 19
[ ] Not applicable

7. Number of Preschool Children (under 5 Years of Age)

[ ] None
[ ] One
[ ] Two or more

8. Occupation (Please specify)

____

9. On average, how much do you earn every month? (in pesos)

[ ] Below Ps5,000
[ ] Ps 5,001 - 15,000
[ ] Ps15,001 - 25,000
[ ] Ps25,001 - 50,000
[ ] Above Ps50,000

THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE

7. If you have any other factor that you feel important about choosing your shampoo brand, please describe them below.

Thank you for completing **THE SHAMPOO BRAND EVALUATION QUESTIONNAIRE.** Please check to make sure that you have not skipped any questions, and then return the questionnaire through the reply paid envelope provided.

N.B. The **TOOTHPASTE BRAND EVALUATION QUESTIONNAIRE** is almost identical to the Shampoo Questionnaire except for the five toothpaste brands rated over the twelve attributes.

APPENDIX 6

A BRIEF REVIEW OF FACTOR ANALYSIS

A6.1 Theory and Procedure

Factor analysis is a multivariate statistical method which is primarily useful in reducing the information contained in a number of original variables into a smaller set of new composite dimensions called factors with minimum loss of information (Hair, et al. 1995). The variables correlating with one another but largely independent of other subsets of variables are combined into factors. The assumption is the factors represent one underlying construct.

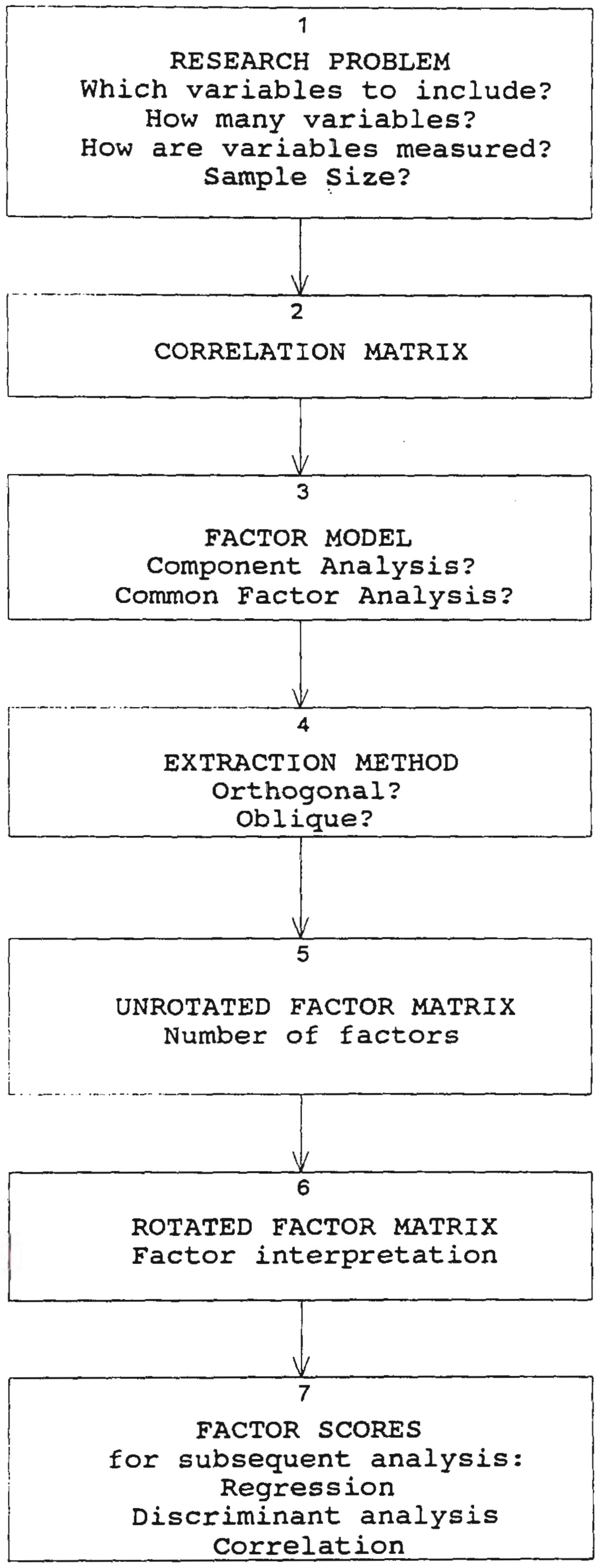
Factor analysis can be applied either from exploratory or confirmatory perspective. Many researchers consider the role of factor analysis as only exploratory because this technique is useful in searching for a structure among a set of variables (R factor analysis). During the early stages of the research, exploratory factor analysis was found to be a good tool to identify and consolidate variables from a much larger set of variables for subsequent regression and discriminant analysis.

When a researcher has a fairly clear idea at the outset about the structure of the data based on theory or prior research, the approach is confirmatory. The objective is to evaluate the degree to which the data meet the expected structure of the researcher. Tabachnick and Fidel (1989) maintained that confirmatory factor analysis is a much more sophisticated technique to test the theory about latent processes. Such approach is useful when investigating the hypothesised differences in the latent processes between groups of subjects (Q factor analysis). This present study did not utilise the confirmatory approach for two reasons. There was no available study on toothpaste and shampoo products that considers urban Philippine conditions from which a hypothesis on the data structure can be made. Moreover, the research objective is variable reduction rather than combining numbers of people into distinct groups.

Figure A6.1 illustrates a general procedure when using factor analysis. It shows the sequence starting from the research problem to the factor scores for subsequent analysis. There is a wide range of references available in the area of

Figure A6.1

THE FACTOR PROCEDURE



Adopted from Hair, et al. (1995), *Multivariate Analysis with Readings*, Prentice-Hall, Englewood Cliffs, NJ, p. 369-70.

factor analysis. Comrey (1992) provided a fairly detailed discussion of factor analysis for beginners while Harman (1976) and Gorsuch (1983) are ideal references for those with good mathematical background. Finally, Stewart (1981) reviewed the application and misapplication of factor analysis in marketing research.

A6.2 Assumptions and Limitations

All researchers must pay careful attention to some principles about the proper design of the factor procedure. These principles embody the scales of measurement, the number of variable items, and the sample size. Any variables considered relevant to the research problem can be included. However, the first requirement is that variables should be continuously measured using an interval scale and be normally distributed. Avoid dichotomous variables wherever possible since they bring less reliable correlations and are subject to distortions (Stevens 1946; Kim and Mueller 1978; Comrey 1992).

The second aspect in designing a factor study relates to the number of variable items. It should be several times as large as the number of anticipated factors. Comrey (1992) recommended using at least five good marker variables for each anticipated factor. The third decision a factor analyst makes concerns the sample size. It should be large enough so that correlation coefficient estimates are reliable. The following scale provides a rough evaluation of the adequacy of the sample size: 50 - very poor; 100 - poor; 200 - fair; 300 - good; 500 - very good; and 1000 or more - excellent (Comrey 1992). Other investigators suggest that a sample size in the range of 100 to 200 is good enough for most exploratory studies. Tabachnick and Fidel (1989) suggested having at least five cases for each observed variable. They argued that the sample size depends on the magnitude of population correlations and the number of factors. Thus, if there are strong, reliable correlations and few, distinct factors, they asserted that a sample size of 50 may be adequate, provided that there are notably more cases than factors.

A6.3 Factor Extraction and Rotation

The process of factor extraction involves identifying the hypothetical latent variables (factors) that can account for patterns of correlation among variable items. Several criteria are available to determine how many factors to extract in the analysis. Some of them are Kaiser's eigenvalue rule, Cattel's (1966) scree test, alpha factoring, image factoring and maximum likelihood factoring. Together with the factor interpretation, the number of factors to extract requires a some degree of researcher subjectivity. In fact, no computer program is capable of reliably determining the optimal number of factors since the decision is ultimately subjective (SAS/STAT User's Guide 1990, p. 794). Thus, there are no clear-cut rules. The number of factors extracted by the different analyses in the study were not simply accepted by default but made after a careful judgment of the research requirements. All that is essentially required in this situation is to capture the variables that are salient in choosing a shampoo or toothpaste brand.

It is difficult to interpret the factors extracted by the analysis unless it is accompanied by rotation. In rotation, the reference axes of the factors are turned about the origin until a suitable position is reached. Different methods of rotation would yield similar results when the pattern of correlations is fairly clear. Two major types of rotation are orthogonal and oblique. An obliquely rotated solution is difficult to interpret and useful only when some correlation between factors is suspected. In contrast, orthogonal rotation assumes the factors are uncorrelated and as such they are easily interpreted, described and reported.

Hair, et al. (1995) claimed that there is no compelling analytical reason to favor one rotational method over another and suggested that the choice should be made on the basis of the particular needs of a given research problem. They recommended that when the objective is to utilize the factor results in a subsequent statistical analysis, the analyst should always select an orthogonal rotation procedure to eliminate collinearity. Among the three common orthogonal approaches (QUARTIMAX, VARIMAX, and EQUIMAX), the Varimax approach seems to give a clearer separation of the factors. Thus, this study uses the most common orthogonal varimax rotation.

Most researchers consider a 0.30 loading as minimum criterion for correlation after orthogonal rotation (Comrey 1992; Hair, et al. 1995; Tabachnick and Fidel 1989). A squared value $(0.30)^2$ gives 0.09, which means that an item variable correlating with the factor for less than 0.30 has less than 10 percent of its variance in common with the factor. Hair, et al. (1995) included another useful criterion that relates sample size and significance levels. When the sample size is 100, loadings of at least +0.19 and +0.26 are recommended for the 5-percent and 1-percent significance levels respectively. Recognising the subjectivity of factor interpretation, the investigator exercised more caution by utilising a higher minimum criterion of 0.40, which was recommended by Nunnally (1978). All items that met the 0.40 standard were used in interpreting and labelling the factor.

APPENDIX 7

EVALUATION OF IMPORTANCE RATINGS

Table A7.1

PANTENE'S BINARY LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS - USING PART 1 DATA

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
Intercept	-9.8479[a]	-11.0692[a]	-9.6236[a]	-7.8196[a]	-9.4039[a]	-8.2675[a]	-10.6585[a]	-10.6468[a]	-12.2282[a]
	(2.7821)	(2.4609)	(2.3983)	(2.5226)	(2.8149)	(2.6928)	(2.7663)	(2.3108)	(2.3915)
Last Brand				4.5657[a]	4.7436[a]	4.3424[a]			
				(0.6282)	(0.6931)	(0.6223)			
				96.128	114.845	76.894			
1 Body									0.3658[b]
									(0.1721)
									1.442
2 Clean	0.6346[a]	0.2994[b]	0.5772[a]			0.5897[b]	0.7191[a]	0.3814[b]	
	(0.2085)	(0.1524)	(0.2003)			(0.2716)	(0.1745)	(0.1334)	
	1.886	1.349	1.781			1.803	2.053	1.464	
3 Style	0.4588[b]	0.6085[a]	0.8832[a]	0.8226[a]	0.8827[a]	1.0218[a]		0.2490[c]	
	(0.2059)	(0.1524)	(0.3017)	(0.2413)	(0.2166)	(0.3811)		(0.1316)	
	1.582	1.838	2.419	2.276	2.417	2.778		1.283	
5 Mildfrg		-0.3178[a]	-1.0193[b]		-0.5384[a]	-1.1741[c]			
		(0.1276)	(0.4596)		(0.1955)	(0.6312)			
		0.728	0.361		0.584	0.309			

*With Last brand bought as additional predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table A7.1 - Continued.

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
7 Fragrance	-0.4232^{a}			-0.8002^{a}					
	(0.1720)			(0.2287)					
	0.655			0.449					
9 Feelrich		0.2805^{a}		0.6898^{a}	0.6647^{a}	1.7457^{b}			
		(0.0976)		(0.2033)	(0.1774)	(0.7551)			
		1.324		1.993	1.944	5.730			
10 Endorse							0.3363^{c}		
							(0.1757)		
							1.400		
11 Price		-0.3056^{a}	-2.3328^{a}		-0.3945	-2.8595^{a}			
		(0.0997)	(0.7483)		(0.1417)	(0.9990)			
		0.737	0.097		0.674	0.635			
12 Packaging	-0.3376^{c}			-0.3587^{b}			-0.3818^{b}	-0.2392^{b}	
	(0.1785)			(0.1783)			(0.1582)	(0.1114)	
	0.714			0.699			0.683	0.787	
RATING	-0.3664^{c}	-0.3490^{c}	-0.3509^{c}						
	(0.2103)	(0.2074)	(0.2059)						
	0.693	0.705	0.704						
AGE	-0.0864^{c}						-0.1046^{b}	-0.0754	
	(0.0467)						(0.0480)	(0.0436)	
	0.917						0.901	0.927	
EDUC	0.2779^{a}	0.1870^{b}	0.2317^{a}			0.2214^{c}	0.2080^{b}	0.1807^{b}	0.1749^{b}
	(0.0467)	(0.0953)	(0.0921)			(0.1234)	(0.0989)	(0.0935)	(0.0905)
	1.320	1.206	1.261			1.248	1.231	1.198	1.191

*With Last brand bought as additional predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table A7.1 - Continued.

PARAMETR	FREQUENTLY BOUGHT BRAND UNWTD	VALUES	RANKS	FREQUENTLY BOUGHT BRAND* UNWTD	VALUES	RANKS	LAST BRAND BOUGHT UNWTD	VALUES	RANKS
STATUS	2.3754[b]	2.4814[b]	2.5180[b]				3.3582[a]	2.8623[a]	3.4437[a]
	(1.1625)	(1.1242)	(1.1687)				(1.0632)	(0.9964)	(1.0504)
	10.755	11.958	12.404				28.739	17.501	31.303
FSIZE	0.4547[a]	0.5031[a]	0.4822[a]	0.4051[a]	0.5755[a]	0.5137[a]	0.3721[a]	0.3683[a]	0.3652[a]
	(0.1150)	(0.1130)	(0.1149)	(0.1460)	(0.1586)	(0.1586)	(0.1122)	(0.1060)	(0.1111)
	1.576	1.654	1.620	1.499	1.778	1.672	1.451	1.445	1.441
CHILD	1.9563[c]						2.6153[a]	2.1437	2.1064[b]
	(1.1609)						(1.0413)	(0.1060)	(0.9701)
	7.073						13.672	8.531	8.219
DF	15	10	10	8	9	11	13	9	11
SCORE	59.931	57.555	50.050	130.275	132.967	136.054	47.315	45.752	42.564
	(p = 0.0001)	(p = 0.0001)	(p = 0.0001)	(p = 0.0001)	(p = 0.0001)	(p = 0.0001)	(p = 0.0001)	(p = 0.0001)	(p = 0.0001)
AIC	207.872	201.255	210.300	128.612	123.432	136.054	202.471	202.693	207.799
SC	263.020	239.169	248.166	159.632	157.899	177.363	250.725	237.161	249.108
-2LOGL	175.872	179.255	188.300	110.612	103.432	112.054	174.471	182.693	183.799
% Correct	78.0	78.4	78.8	90.1	88.4	89.2	79.7	80.2	77.5
Validation	68.7	71.4	70.9	87.7	58.1	85.5	73.6	72.2	73.1

*With Last brand bought as additional predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table A7.2

PANTENE'S BINARY LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS - USING PART 2 DATA

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
Intercept	-6.9107^a (2.1386)	-5.4555^a (1.3975)	-6.6921^a (1.4373)	-8.1978^a (2.1616)	-5.0260^a (1.2873)	-5.4636^a (1.2721)	-5.1591^a (1.8418)	-2.3743 (2.0116)	-5.7438^a (1.8286)
Last Brand				4.5439^a (0.6250) 94.061	4.5143^a (0.5935) 91.312	4.4814^a (0.5894) 88.355			
1 Body								0.4061^a (0.1529) 1.501	
2 Clean		0.2465^c (0.1508) 1.280			0.3208^c (0.1795) 1.378	0.4055^c (0.2449) 1.500	0.4214^c (0.2218) 1.524		
3 Style	0.3958^c (0.2220) 1.486		0.8678^a (0.3523) 2.832				0.4137^c (0.2185) 1.512	0.3638^b (0.1675) 1.439	1.3417^a (0.4109) 3.826
4 Dandruff	0.2524^c (0.1504) 1.287								0.8741^b (0.4005) 2.397
7 Fragrance	0.4240^b (0.1788) 1.528	0.2205^b (0.1078) 1.247	1.6824^a (0.5591) 5.379	0.5457^b (0.2458) 1.726		1.9672^a (0.7223) 7.151			1.0867^b (0.5996) 2.964

*With Last brand bought as additional predictor. ^{a}Significant at $\alpha = 0.01$; ^{b}Significant at $\alpha = 0.05$; ^{c}Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table A7.2 - Continued.

PARAMETR	FREQUENTLY BOUGHT BRAND UNWTD	VALUES	RANKS	FREQUENTLY BOUGHT BRAND* UNWTD	VALUES	RANKS	LAST BRAND BOUGHT UNWTD	VALUES	RANKS
8 Variant				-0.3944^{c}					
				(0.2326)					
				0.674					
12 Pkgg					-0.2067^{c}				
					(0.1248)				
					0.813				
13 Promo	-0.2199^{b}								
	(0.1045)								
	0.803								
SWITCH							0.8202^{c}	0.9888^{b}	0.8480^{c}
							(0.4684)	(0.4904)	(0.5009)
							2.271	2.688	2.335
AGE									2.1936^{a}
									(0.8560)
									8.967
EDUC									-0.1968^{b}
									(0.0972)
									0.565
FEMALE							-0.8032^{b}	-0.6834^{c}	
							(0.3990)	(0.4030)	
							0.448	0.505	

*With Last brand bought as additional predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table A7.2 - Continued.

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
STATUS								-2.7225[b] (1.4422) 0.066	
FSIZE	-0.2671[a] (0.1006) 0.766	-0.1776[c] (0.0961) 0.837	-0.1664[c] (0.0949) 0.847				-0.3793[a] (0.1103) 0.684	-0.3030[a] (0.1071) 0.739	-0.3063[a] (0.1082) 0.736
DF	10	9	6	6	5	5	8	10	9
SCORE	38.656 (p = 0.0001)	34.863 (p = 0.0001)	37.630 (p = 0.0001)	140.391 (p = 0.0001)	138.758 (p = 0.0001)	138.573 (p = 0.0001)	40.006 (p=.0001)	40.219 (p=0.0001)	47.210 (p=0.0001)
AIC	195.596	209.996	196.871	112.231	118.088	116.091	186.503	191.464	178.368
SC	233.271	244.246	220.815	136.206	138.637	136.614	217.328	229.138	212.573
-2LOGL	173.596	189.996	182.871	98.231	106.088	104.091	168.503	169.464	158.368
% Correct	82.4	78.9	78.8	93.0	92.5	92.5	78.4	78.0	80.5
Validation	67.0	72.5	73.4	86.3	89.3	88.8	72.5	75.5	73.8

*With Last brand bought as additional predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table A7.3

COLGATE'S BINARY LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: PART1 DATA

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
Intercept	-2.5526[b]	-0.5944	-3.1910[a]	-2.1872[b]	-0.7650	-2.4100[a]	-3.8394[a]	-3.1200[a]	-3.8877[a]
	(1.2043)	(0.8098)	(1.0873)	(1.0946)	(1.0059)	(0.9721)	(1.4192)	(1.2397)	(1.3233)
Last Brand				3.0874[a]	3.2421[a]	3.5131[a]			
				(0.4286)	(0.4371)	(0.4777)			
				21.921	25.587	33.553			
1 Clean	0.3441[b]		0.2746[b]				0.5186[a]	0.1937[c]	0.3106[a]
	(0.1507)		(0.1321)				(0.1959)	(0.1038)	(0.1149)
	1.411		1.316				1.680	1.214	1.364
3 Cavity			0.5626[b]			0.7855[a]			
			(0.2793)			(0.3058)			
			1.755			2.194			
4 Tartar	0.8859[a]	0.4134[a]	0.5890[c]	0.7556[a]	0.3608[b]		0.6332[a]	0.1607[c]	
	(0.2295)	(0.1050)	(0.3329)	(0.2514)	(0.1514)		(0.2185)	(0.0982)	
	2.425	1.512	1.802	2.129	1.435		1.884	1.174	
5 Freshbr			-0.7918[b]	-0.4184[c]		-0.8290[c]			
			(0.3775)	(0.2381)		(0.4937)			
			0.453	0.634		0.436			

*With Last brand bought added as predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table A7.3 - Continued.

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
6 Cap							-0.3323^{b}		
							(0.1654)		
							0.717		
7 Taste						0.9592^{c}			-1.0396^{b}
						(0.5439)			(0.4391)
						2.610			0.354
8 Flavour							0.2946^{c}		
							(0.1739)		
							1.343		
9 Confident			0.9203^{c}			1.3900^{b}	-0.3611^{c}		
			(0.5041)			(0.6860)	(0.2111)		
			2.510			4.015	0.697		
10 Dentists					-0.2251^{b}	-1.1279^{c}	-0.3783^{c}		
					(0.1104)	(0.6864)	(0.2210)		
					0.798	0.324	0.685		
SWITCH	-0.6059^{b}	-0.5597^{c}	-0.7159^{b}			-0.6688^{c}	-0.5140^{c}		
	(0.3136)	(0.3040)	(0.3248)			(0.3880)	(0.3085)		
	0.546	0.571	0.489			0.512	0.598		
AGE	0.0457^{b}	0.0319^{c}	0.0411^{b}				0.0463^{a}	0.0486^{a}	0.0570^{a}
	(0.0208)	(0.0188)	(0.0198)				(0.0189)	(0.0180)	(0.0185)
	1.047	1.032	1.042				1.047	1.050	1.059

*With Last brand bought added as predictor. ^{a}Significant at $\alpha = 0.01$; ^{b}Significant at $\alpha = 0.05$; ^{c}Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table A7.3 - Continued.

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
STATUS				-0.7252[c]		-0.7198[c]			0.5393[c]
				(0.3837)		(0.4016)			(0.3188)
				0.393		0.487			1.715
CHILD							1.0619[b]	1.1061[b]	1.0368[b]
							(0.4648)	(0.4555)	(0.4612)
							2.892	3.023	2.820
DF	8	6	11	7	9	11	13	10	11
SCORE	36.238	24.615	32.558	91.028	91.080	96.859	39.339	29.646	33.603
	(p = 0.0001)	(p = 0.0004)	(p = 0.0006)	(p = 0.0001)	(p = 0.0001)	(p = 0.0001)	(p = 0.0002)	(p = 0.0010)	(p = 0.0004)
AIC	280.728	290.781	290.196	212.432	216.559	209.669	304.932	311.638	309.139
SC	311.749	314.908	331.557	240.006	251.027	251.030	353.186	349.552	350.500
-2LOGL	262.728	276.781	266.196	196.432	196.559	185.669	276.932	289.638	285.139
% Correct	69.4	67.2	65.1	74.6	77.2	80.2	58.6	59.9	63.8
Validation	58.0	63.0	60.7	79.5	78.1	78.1	52.1	53.9	53.9

*With Last brand bought added as predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table A7.4

COLGATE'S BINARY LOGIT MODEL PARAMETER ESTIMATES AND ODDS RATIOS: PART 2 DATA

	FREQUENTLY BOUGHT BRAND			FREQUENTLY BOUGHT BRAND*			LAST BRAND BOUGHT		
PARAMETR	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS	UNWTD	VALUES	RANKS
Intercept	-3.9576[a]	-2.9033[a]	-4.0238[a]	-4.6309[a]	-2.5440[c]	-3.1000[a]	-5.3299[a]	-4.0440[a]	-4.6730[a]
	(1.4523)	(1.0292)	(1.1397)	(1.8929)	(1.3503)	(0.7232)	(1.3923)	(1.2053)	(1.3312)
Last Brand				4.1427[a]	4.1149[a]	4.1814[a]			
				(0.5648)	(0.5417)	(0.5667)			
				62.975	61.247	65.455			
1 Clean		0.1873[c]	0.2123[c]					0.2275[b]	0.3716[a]
		(0.1026)	(0.1225)					(0.0967)	(0.1352)
		1.206	1.236					1.255	1.450
2 White							0.2467[b]		
							(0.1275)		
							1.280		
6 Cap		-0.1759[b]	-0.8347[b]			-1.0846[b]		-0.1629[b]	
		(0.0834)	(0.3567)			(0.5050)		(0.0778)	
		0.839	0.434			0.338		0.850	
7 Taste						1.4227[b]			
						(0.7114)			
						4.148			
8 Flavour					-0.2310[b]	-1.3988[c]			
					(0.1055)	(0.7391)			
					0.794	0.247			

*With Last brand bought added as predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table A7.4 - Continued.

PARAMETR	FREQUENTLY BOUGHT BRAND UNWTD	 VALUES	 RANKS	FREQUENTLY BOUGHT BRAND* UNWTD	 VALUES	 RANKS	LAST BRAND BOUGHT UNWTD	 VALUES	 RANKS
9 Confident	0.4930[a] (0.1326) 1.637		0.9788[c] (0.5151) 2.661	0.8965[a] (0.2325) 2.451	0.1736[c] (0.1074) 1.190	1.7465[a] (0.6975) 5.734			
11 Price							0.1376[c] (0.0732) 1.148		0.9733[b] (0.4982) 2.647
12 Promo			1.6188[b] (0.7124) 5.047	-0.3102[b] (0.1461) 0.733		2.3881[a] (0.9331) 10.893			
RATING				-0.4742[b] (0.2245) 0.622					
EDUC							0.1252[c] (0.0683) 1.133	0.1242[c] (0.0682) 1.132	0.1208[c] (0.0688) 1.128
FEMALE				1.0902[a] (0.4371) 2.975	0.8033[b] (0.4041) 2.233	1.0458[b] (0.4330) 2.846			
FSIZE		0.1464[c] (0.2944) 1.158					0.1438[c] (0.0806) 1.155	0.1724[b] (0.0811) 1.188	0.1428[c] (0.0806) 1.153

*With Last brand bought added as predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

Table A7.4 - Continued.

PARAMETR	FREQUENTLY BOUGHT BRAND UNWTD	VALUES	RANKS	FREQUENTLY BOUGHT BRAND* UNWTD	VALUES	RANKS	LAST BRAND BOUGHT UNWTD	VALUES	RANKS
DF	6	6	8	7	7	7	4	5	5
SCORE	27.052 (p = -.0001)	19.240 (p = 0.0038)	33.777 (p = 0.0001)	105.815 (p = 0.0001)	102.607 (p = 0.0001)	107.899 (p = 0.0001)	17.595 (p = 0.0015)	17.111 (p = 0.0043)	19.541 (p = 0.0015)
AIC	274.489	283.662	271.060	173.173	181.363	169.685	294.840	297.759	294.589
SC	298.212	307.386	301.562	200.285	208.476	196.798	311.785	318.094	314.923
-2LOGL	260.489	269.662	253.060	157.173	165.363	153.685	284.840	285.759	282.589
% Correct	67.6	65.3	68.0	80.8	81.7	83.1	60.7	60.7	61.2
Validation	61.8	62.2	63.1	74.7	75.5	75.5	52.8	52.4	52.8

*With Last brand bought added as predictor. [a]Significant at $\alpha = 0.01$; [b]Significant at $\alpha = 0.05$; [c]Significant at $\alpha = 0.10$;
First row items are parameter estimates. Items in parenthesis are asymptotic t-statistics. Third row items are odds ratios.

REFERENCES

Abe, Makoto (1995), "A Nonparametric Density Estimation Method for Brand Choice Using Scanner Data," *Marketing Science*, 14 (3), 300-25.

Agarwal, James (1993), "A Dimensional and Holistic Model of Consumer Choice: A Validation Study," Unpublished Ph.D Dissertation, Georgia Institute of Technology.

Agresti, Alan (1990), *Categorical Data Analysis*, John Wiley, New York.

Akaike, Hirotugu (1973), "Information Theory and an Extension of the Maximum Likelihood Principle," in *Second International Symposium on Information Theory*, B. N. Petrov and F. Csaski, eds. Akademiai Kiado, Budapest.

________ (1987), "Factor Analysis and AIC," *Psychometrika,* 52 (September), 317-32.

Allenby, Greg M. and Peter J. Lenk (1995), "Reassessing Brand Loyalty, Price Sensitivity, and Merchandising Effects on Consumer Brand Choice," *Journal of Business and Economic Statistics*, 13 (July), 281-89.

Amemiya, Takeshi (1981), "Qualitative Response Models: A Survey," *Journal of Economic Literature*, 19 (December), 1483-536.

Andrews, Rick L. and T.C. Srinivasan (1995), "Studying Consideration Effects in Empirical Choice Models Using Scanner Panel Data," *Journal of Marketing Research*, 32 (February), 30-41.

Anwar, Syed Tariq (1988), "Consumer Preferences for National Brand and Generic Brand Grocery Products in the Greater San Diego Area (California)," Unpublished D.B.A. Dissertation, United States International University.

Assar, Amardeep (1987), "Consumer Product Class Knowledge: A Typology and Impact on Information Search and Evaluation," Unpublished Ph.D Dissertation, University of Florida.

Barcikowski, R. and J. P. Stevens (1975), "A Monte Carlo Study of the Stability of Canonical Correlations, Canonical Weights and Canonical Variate-Variable Correlations," *Multivariate Behavioral Research,* 10, 353-64.

Bawa, Kapil (1984), "Modeling Inertia and Variety-Seeking Tendencies in Brand Choice Behavior," Unpublished Ph.D Dissertation, Columbia University.

Bayer, Judy Arlene (1985), "ADS - A Model of Brand Choice Response to Advertising and Price," Unpublished Ph.D Dissertation, New York University.

Begg, C. B. and R. Gray (1984), "Calculation of Polychotomous Logistic Regression Parameters Using Individualized Regressions," *Biometrika,* 71, 11-18.

Belonax, Joseph J., Jr. and Rajshekhar G. Javalgi (1989), "The Influence of Involvement and Product Class Quality on Consumer Choice Sets," *Journal of the Academy of Marketing Science*, 17 (Summer), 209-16.

Bendel, R. B. and A. A. Afifi (1977), "Comparison of Stopping Rules in Forward Regression," *Journal of the American Statistical Association*, 72, 46-53.

Bettman, James R. (1979), *An Information Processing Theory of Consumer Choice,* Addison-Wesley, Reading, Massachusetts.

Biehal, Gabriel and Dipankar Chakravarti (1986), "Consumers' Use of Memory and External Information in Choice: Macro and Micro Perspectives," *Journal of Consumer Research*, 12 (March), 382-405.

BMDP Statistical Software, Inc. (1992), *BMDP Statistical Software Manual Release 7,* Volumes 1 and 2, Los Angeles.

Box, G. E. P. and P. W. Tidwell (1962), Transformation of the Independent Variables," *Technometrics*, 4, 531-50.

Boyle, Peter Joseph (1994), "Expertise in a Constructive Product-Choice Process," Unpublished Ph.D Dissertation, Cornell University.

Brislin, R. W. (1986), "The Wording and Translation of Research Instruments," in *Field Methods in Cross-Cultural Research*, W. J. Lonner and J. W. Berry, eds., Sage Publications, Beverly Hill, California, 137-64.

Bruner, Gordon C. and Paul J. Hensel (1992), *Marketing Scales Handbook: A Compilation of Multi-item Measures*, American Marketing Association, Chicago.

Bucklin, Randolph E., Sunil Gupta, and Sangman Han (1995), "A Brand's Eye View of Response Segmentation in Consumer Brand Choice Behavior," *Journal of Marketing Research*, 32 (February), 66-74.

Bucklin, Randolph E. and V. Srinivasan (1991), "Determining Interbrand Substitutability Through Survey Measurement of Consumer Preference Structures," *Journal of Marketing Research*, 28 (February), 58-71.

Buzzel, R. D. and B. T. Gale (1987), *The PIMS Principles: Linking Strategy to Performance*, Collier Macmillan, New York.

Campbell, B. M. (1969), "The Existence of Evoked Sets and Determinants of its Magnitude in Brand Choice Behavior," Unpublished Ph.D Dissertation, Columbia University.

Carlson, Les and Sanford Grossbart (19881), "Parental Style and Consumer Socialization of Children," *Journal of Consumer Research*, 15 (June), 77-94.

Carrol, Cathryn Ann (1996), "Applications of Economic Theory To Outpatient Prescription Markets," Unpublished Ph.D Dissertation, University of Kansas.

Carrol, John S. and Eric J. Johnson (1990), *Decision Research: A Field Guide,* Sage Publications, Newbury Park, California.

Carroll, J. Douglas and Paul E. Green (1995), "Psychometric Methods in Marketing Research: Part I, Conjoint Analysis," *Journal of Marketing Research*, 32 (November), 385-91.

________ and ________ (1997), "Psychometric Methods in Marketing Research: Part II, Multidimensional Scaling," *Journal of Marketing Research*, 34 (May), 193-204.

Cattel, R. B. (1966), "The Scree Test for the Number of Factors," *Multivariate Behavioral Research*, 1 (April), 245-76.

Cattin, Philippe, Alan E. Gelfand, and Jeffrey Danes (1983), "A Simple Bayesian Procedure for Estimation in a Conjoint Model," *Journal of Marketing Research*, 20 (February), 29-35.

Chapman, Randall G. and Richard Staelin (1982), "Exploiting Rank Ordered Choice Set Data Within the Stochastic Utility Model," *Journal of Marketing Research*, 19 (August), 288-301.

Chaterji, Chandra Sekhar (1980), "Perceived Risk as Influenced by Reference Group Functions in Selecting Brands: An Exploratory Study," Unpublished Ph.D Dissertation, University of Kansas.

Chiang, Jeongwen (1991), "A Simultaneous Approach to the Whether, What and How Much to Buy Questions," *Marketing Science*, 10 (Fall), 297-315.

Chintagunta, Pradeep K. (1992), "Estimating a Multinomial Probit Model of Brand Choice Using the Method of Simulated Moments," *Marketing Science*, 11 (Fall), 386-407.

________ (1993), "Investigating Purchase Incidence, Brand Choice and Purchase Quantity Decisions of Households," *Marketing Science*, 12 (Spring), 184-208.

________ (1994), "Heterogeneous Logit Model Implications for Brand Positioning," *Journal of Marketing Research*, 31 (May), 304-11.

________ and Bo E. Honore (1996), "Investigating the Effects of Marketing Variables and Unobserved Heterogeneity in a Multinomial Probit Model," *International Journal of Research in Marketing*, 13 (February), 1-15.

Choi, Louis Inhyok (1993), "Consumer Choice of Brand/Store and External Search Effort in Purchase of a Durable Good: An Integrative Approach," Unpublished Ph.D Dissertation, Columbia University.

Clifford, D. K. and R. E. Cavanagh (1985), *The Winning Performance: How America's High Growth Midsize Companies Succeed*, Sidgwick and Jackson, London.

Cobb, Cathy Jean (1983), "Consumer Choice Tactics for Low Involvement Products: The Influence of Individual and Situational Factors," Unpublished Ph.D Dissertation, The University of Texas at Austin.

Coeyman, Marjorie (1993), "Working Harder To Stay in The Game," *Chemical Week*, 152 (4), 36-38.

Comrey, Andrew Lawrence (1993), *A First course in Factor Analysis,* 2nd ed., Lawrence Erlbaum, Hillsdale, New Jersey.

Coombs, Clyde H. (1952), *A Theory of Psychological Scaling,* Engineering Research Institute, University of Michigan Press, Ann Harbor.

________ (1964), *A Theory of Data,* John Wiley, New York.

Costley, Carolyn L. (1988), "Memory and Selective Information Use in Consumer Choice," Unpublished Ph.D Dissertation, The University of North Carolina at Chapel Hill.

Crask, M. and W. Perreault (1977), "Validation of Discriminant Analysis in Marketing Research," *Journal of Marketing Research*, 14 (February), 60-68.

Cronbach, L. J. (1951), "Coefficient Alpha and the Internal Structure of Tests," *Psychometrika,* 16, 297-334.

Cropper, Maureen L., Leland Deck, Nalin Kishor, and Kenneth E. McConnell (1993), "Valuing Product Attributes Using Single Market Data: A Comparison of Hedonic and Discrete Choice Approaches," *The Review of Economics and Statistics*, 75 (May), 225-32.

Currim, Imran S. (1982), "Predictive Testing of Consumer Choice Models Not Subject to Independence of Irrelevant Alternatives," *Journal of Marketing Research*, 19 (May), 208-22.

________ and Rakesh K. Sarin (1989), "Prospect Versus Utility," *Management Science*, 35 (January), 22-41.

Dabholkar, Pratibha A. (1994), "Incorporating Choice into an Attitudinal Framework: Analyzing Models of Mental Comparison Processes," *Journal of Consumer Research*, 21 (June), 100-18.

Dalal, S. R. and R. W. Klein (1988), "A Flexible Class of Discrete Choice Models," *Marketing Science*, 7 (3), 232-51.

Darby, Michael R. and Edi Karni (1987), "Free Competition and the Optimal Amount of Fraud," *Journal of Law and Econometrics,* 16 (April), 67-88.

Darden, William R. and William D. Perreault, Jr. (1976), "Identifying Interurban Shoppers: Multiproduct Purchase Patterns and Segmentation Profiles," *Journal of Marketing Research*, 13 (February), 51-60.

Degeratu, Alexandru Mihail (1996), "A Model of Dynamic Choice with Correlated Initial Conditions: A Learning and Forgetting Perspective," Unpublished Ph.D Dissertation, The University of Iowa.

Delener, Nejdet (1990), "The Effects of Religious Factors on Perceived Risk in Durable Goods in Purchase Decisions," *Journal of Consumer Marketing,* 7 (Summer), 27-38.

DeSarbo, Wayne S., Geert De Soete, and Kamel Jedidi (1989), "Probabilistic Multidimensional Scaling Models for Analyzing Consumer Choice Behavior," in *New Developments in Psychological Choice Modeling,* Geert de Soete, Hubert Feger, and Karl C. Klauer, eds., Elsevier Science Publishers B.V., North-Holland, Amsterdam, 291-315.

DeVellis, Robert F. (1991), *Scale Development,* Sage Publications, Newbury Park, California.

Dickerson, Mary D. and James W. Gentry (1983), "Characteristics of Adopters and Non-Adopters of Home Computers," *Journal of Consumer Research*, 10 (September), 225-35.

Divakar, Suresh (1993), "Measuring Brand Loyalty with Structural State Dependence Models: An Investigation of Some Issues," Unpublished Ph.D Dissertation, The University of Iowa.

Doyle, Peter (1994), "Branding," in *The Marketing Book,* Michael J. Baker, ed., Butterworth-Heinemann, Oxford, 471-83.

Duffus, Lee Roy Melendy (1979), "An Empirical Study of the Congruence Between Nationalism and Preference for National Versus Imported Substitute Products," Unpublished Ph.D Dissertation, Purdue University.

Dunn, Mark G., Patrick E. Murphy, and Gerald U. Skelly (1986), "The Influence of Perceived Risk on Brand Preference for Supermarket Products," *Journal of Retailing*, 6 (Summer), 204-16.

East, Robert (1990), *Changing Consumer Behaviour*, Cassel Educational Limited, London.

Eaton, Howard (1996), "Cognitive and Affective Responses to Repeated Exposures of Television Commercials," Unpublished Ph.D Dissertation, Yale University.

Ehrenberg, A. S. C. (1972), *Repeat Buying Theory and Applications*, North-Holland, New York.

Eliashberg, Jejoshua and Ajay K. Manrai (1992), "Optimal Positioning of New Product-Concepts: Some Analytical Implications and Empirical Results," *European Journal of Operational Research*, 63, 376-97.

Elrod, Terry, Jordan J. Louviere, and Krishnakumar S. Davey (1992), "An Empirical Comparison of Ratings-Based and Choice-Based Conjoint Models," *Journal of Marketing Research*, 29 (August), 368-77.

Elrod, Terry and Michael P. Keane (1995), "A Factor-Analytic Probit Model for Representing the Market Structure in Panel Data," *Journal of Marketing Research*, 32 (February), 1-16.

Engel, James F., Roger D. Blackwell, and Paul W. Miniard (1995), *Consumer Behavior*, 8th ed., The Dryden Press, Forth Worth, Texas. .

Engel, James F., David T. Kollat, and Roger D. Blackwell (1968), *Consumer Behavior*, Holt, Rinehart & Winston, New York.

Fader, Peter S. and James M. Lattin (1993), "Accounting for Heterogeneity and Nonstationarity in a Cross-Sectional Model for Consumer Purchase Behavior," *Marketing Science*, 12 (Summer), 304-17.

Feinberg, Fred M., Barbara E. Kahn, and Leigh McAlister (1994), "Implications and Relative Fit of Several First-Order Markov Models of Consumer Variety Seeking," *European Journal of Operational Research*, 76, 309-20.

Fish, Kelly Esson (1995), "A Comparative Study of Artificial Neural Networks and Multinomial Logit for the Estimation of Discrete Choice," Unpublished Ph.D Dissertation, The University of Mississippi.

Fowler, Floyd J. and Thomas W. Mangione (1990), *Standardized Survey Interviewing: Minimizing Interviewer-Related Error*, Sage Publications, Newbury Park, California.

Foxall, Gordon R. (1983), *Consumer Choice*, St. Martin's Press, New York.

Gaudry, M. J. I., and M. G. Dagenais (1979), "The DOGIT Model," *Transportation Research*, 12B (2), 105-12.

Gensch, Dennis H. (1987), "A Two-Stage Disaggregate Attribute Choice Model," *Marketing Science*, 6 (Summer), 223-39.

________ and S. Ghose (1992), "Elimination by Dimensions," *Journal of Marketing Research*, 29 (4), 417-29.

________ and J. A. Svestka (1979), "An Exact Hierarchical Algorithm for Determining Aggregate Statistics from Individual Choice Data," *Management Science*, 25 (10), 939-52.

Gorsuch, R. L. (1983), *Factor Analysis*, Lawrence Erlbaum, Hillsdale, New Jersey.

Green, Paul E. and Abba M. Krieger (1989), "Recent Contributions to Optimal Product Positioning and Buyer Segmentation," *European Journal of Operational Research*, 41, 127-41.

________, ________, and Catherine H. Schaffer (1993), "A Hybrid Conjoint Model with Individual Level Interaction," *Advances in Consumer Research*, 20, 1-6.

Green, Paul E. and V. Srinivasan (1978), "Conjoint Analysis in Consumer Research: Issues and Outlook," *Journal of Consumer Research*, 5 (September), 103-23.

________ and ________ (1990), "Conjoint Analysis in Marketing: New Developments With Implications for Research and Practice," *Journal of Marketing*, 54 (October), 3-19.

Grewal, Dhruv and Julie Baker (1994), "Do Retail Store Environmental Factors Affect Consumers' Price Acceptability? An Empirical Examination," *International Journal of Research in Marketing*, 11, 107-15.

Gonul, Fusun and Kannan Srinivasan (1993), "Modeling Multiple Sources of Heterogeneity in Multinomial Logit Models: Methodological and Managerial Issues," *Marketing Science*, 12 (Summer), 213-29.

Guadagni, Peter M. and John D. C. Little (1983), "A Logit Model of Brand Choice Calibrated on Scanner Data," *Marketing Science*, 2 (Summer), 203-38.

Gupta, Sunil (1988), "Impact of Sales Promotions on When, What, and How Much to Buy," *Journal of Marketing Research*, 25 (November), 342-55.

________ and Pradeep K. Chintagunta (1994), "On Using Demographic Variables to Determine Segment Membership in Logit Mixture Models," *Journal of Marketing Research*, 32 (February), 17-29.

Hair, Joseph F., Rolph E. Anderson, Ronald L. Tatham, and William C. Black (1995), *Multivariate Data Analysis with Readings*, 4th ed., Prentice-Hall, Englewood Cliffs, New Jersey.

Hardie, Bruce G. S., Eric J. Johnson, and Peter S. Fader (1993), "Modeling Loss Aversion and Reference Dependence Effects on Brand Choice," *Marketing Science*, 12 (Fall), 378-94.

Hariharan, Sivaramakrishnan (1992), "A Disaggregate Household Model of Brand Loyalty: Estimation and Implications for Brand Management," Unpublished Ph.D Dissertation, The University of Iowa.

Harman, H. H. (1976) *Modern Factor Analysis*, University of Chicago Press, Chicago.

Hauser, J. R. (1978), "Consumer Preference Axioms: Behavioral Postulates for Describing and Predicting Stochastic Choice," *Management Science*, 24 (September), 1331-41.

Hausman, Jerry A. and Daniel McFadden (1981), "Specification Tests for Multinomial Logit Model," Working Paper, Department of Economics, Massachusetts Institute of Technology.

Hausman, Jerry A. and David Wise (1978), "A Conditional Probit Model for Qualitative Choice, Discrete Decisions Recognizing Interdependence and Heterogeneous Preferences," *Econometrica*, 46 (March), 403-26.

Hite, Cynthia F. and Robert E. Hite (1995), "Reliance on Brand by Young Children," *Journal of the Market Research Society*, 37 (April), 185-93.

Higgins, Susan K. (1989), "An Evaluation of Aggregation Effects in Conditional Logit Estimation of Brand Choice," Unpublished Ph.D Dissertation, The University of Texas at Dallas.

Horowitz, Joel L. (1981), "Testing the Multinomial Logit Model Against the Multinomial Probit Model Without Estimating the Probit Parameters," *Transportation Science*, 15 (May), 156-62.

________ and Jordan J. Louviere (1993), "Testing Predicted Choices Against Observations in Probabilistic Discrete-Choice Models," *Marketing Science*, 12 (Summer), 270-79.

________ and ________ (1995), "What Is The Role of Consideration Sets in Choice Modeling?," *International Journal of Research in Marketing*, 12, 39-54.

Hosmer, David W. and Stanley Lemeshow (1989), *Applied Logistic Regression*, John Wiley, New York.

Howard, J. A. and J. N. Sheth (1969), *The Theory of Buyer Behavior*, John Wiley, New York.

Hoyer, Wayne D. and Steven P. Brown (1990), "Effects of Brand Awareness on Choice for a Common, Repeat-Purchase Product," *Journal of Consumer Research*, 17 (September), 141-48.

Huber, George P. (1974), "Multi-Attribute Utility Models: A Review of Field and Field-like Studies," *Management Science*, 20 (June), 1393-402.

Huber, Joel, Dick R. Wittink, John A. Fiedler, and Richard Miller (1993), "The Effectiveness of Alternative Preference Elicitation Procedures in Predicting Choice," *Journal of Marketing Research*, 30 (February), 105-14.

Huberty, Carl J. (1975), "The Stability of Three Indices of Relative Variable Contribution in Discriminant Analysis," *Journal of Experimental Education*, 59-64.

________ (1984), "Issues in the Use and Interpretation of Discriminant Analysis," *Psychological Bulletin*, 95, 156-71.

________ (1994), *Applied Discriminant Analysis*, John Wiley, New York.

Imbens, Guido M. (1992), "An Efficient Method of Moments Estimator for Discrete Choice Models with Choice-Based Sampling," *Econometrica*, 60 (September), 1187-214.

Jain, Dipak C. (1986), "Studies in Stochastic Choice Models with Implications for Market Structure," Unpublished Ph.D Dissertation, The University of Texas at Dallas.

________, Naufel J. Vilcassim, and Pradeep K. Chintagunta (1994), "A Random-Coefficients Logit Brand-Choice Model Applied to Panel Data," *Journal of Business and Economic Statistics*, 12 (July), 317-28.

John, Deborah Roedder and Ramnanth Laksmi-Ratan (1992), "Age Differences in Children's Choice Behavior: The Impact of Available Alternatives," *Journal of Marketing Research*, 29 (May), 216-26.

Johnson, Eric J., Robert J. Meyer, and Sanjoy Ghose (1989), "When Choice Models Fail: Compensatory Models in Negatively Correlated Environments," *Journal of Marketing Research*, 26 (August), 255-70.

Johnson, N. and D. Wichern (1988), *Applied Multivariate Statistical Analysis*, Prentice-Hall, Englewood Cliffs, New Jersey.

Kaas, K. P. (1977), *Empirische Preisabsatzfunktionen bei Konsumgutern*, Springer, Berlin.

Kalwani, Manohar U., Robert J. Meyer, and Donald G. Morrison (1994), "Benchmarks for Discrete Choice Models," *Journal of Marketing Research*, 31 (February), 65-75.

Kalyanam, Kirthi and Daniel S. Putler (1997), "Incorporating Demographic Variables in Brand Choice Models: An Indivisible Alternatives Framework," *Marketing Science*, 16 (2), 166-81.

Kanetkar, Vinay (1989), "The Effect of Television Advertising on Consumer Price Sensitivity: An Investigation of Frequently Purchased Products," Unpublished Ph.D Dissertation, The University of British Columbia (Canada).

Keillor, Bruce D., Stephen R. Parker, and Allan Schaefer (1996), "Influences on Adolescent Brand Preferences in the United States and Mexico," *Journal of Advertising Research*, 36 (May/June), 47-56.

Keller, K. L., and R. Staelin (1989), "Assessing Biases in Measuring Decision Effectiveness and Information Overload," *Journal of Consumer Research*, 15 (March), 504-08.

Kim, Jae-on and Charles W. Mueller (1978), *Factor Analysis: Statistical Methods and Practical Issues*, Sage Publications, Beverly Hills, California.

Koslow, Scott (1990), "A Theory of Deterministic Consumer Choice Behavior: Applying Generalizability Theory of Measurement to Consumer Panel Data," Unpublished Ph.D Dissertation, The University of Southern California.

Kotler, P. (1986), *Principles of Marketing*, 3rd. ed., Prentice-Hall, Englewood Cliffs, NJ.

Krishnamurthi, Lakshman and S. P. Raj (1988), "A Model of Brand Choice and Purchase Quantity Price Sensitivities," *Marketing Science*, 7 (Winter), 1-20.

________ and ________ (1991), "An Empirical Analysis of the Relationship Between Brand Loyalty and Consumer Price Elasticity," *Marketing Science*, 10 (Spring), 172-83.

Kumar, Uday R. (1994), "Intertemporal Brand and Quantity Choice Behavior: A Theoretical and Empirical Analysis," Unpublished Ph.D Dissertation, State University of New York at Buffalo.

Lachenbruch, P. A. and M. A. Mickey (1968), "Estimation of Error Rates in Discriminant Analysis," *Technometrics,* 10, 1-10.

Lancaster, Kelvin (1991), *Modern Consumer Theory*, Edward Elgar Publishing, Hants, England.

Landwehr, Jane Talmage (1986), "Two Stage Model of Brand Choice," Unpublished Ph.D Dissertation, The University of North Carolina at Chapel Hill.

Lane, Ronald John (1991), "The Implications of Consumer Buyer Behaviour for Performance in Australian Consumer Goods Manufacturing Industries," Unpublished Ph.D Dissertation, University of Melbourne, Australia.

Lattin, James M. and Randolph E. Bucklin (1989), "Reference Effects of Price and Promotion on Brand Choice Behavior," *Journal of Marketing Research*, 26 (August), 299-310.

Levitt, T. (1983), *The Marketing Imagination*, Collier Macmillan, New York.

Li, M. M. (1977), "A Logit Model of Homeownership," *Econometrica*, July, 1081-98.

Lilien, Gary L., Philip Kotler, and K. Sridhar Moorthy (1992), *Marketing Models*, Prentice-Hall, Englewood Cliffs, New Jersey.

Luce, R. D. (1959), *Individual Choice Behavior: A Theoretical Analysis*, John Wiley, New York.

McFadden, D. (1974), "Conditional Logit Analysis of Qualitative Choice Behavior," in *Frontiers in Econometrics*, P. Zarembka, ed., Academic Press, New York, 105-42.

________ (1976), "Quantal Choice Analysis: A Survey," *Annals of Economic and Social Measurement*, 5, 363-90.

________ (1978), "Modeling the Choice of Residential Locations," in *Spatial Interaction Theory and Residential Location*, A. Karlquist, et al., eds., North-Holland, Amsterdam, 75-96.

________ (1981), "Econometric Models of Probabilistic Choice," in *Structural Analysis of Discrete Data with Econometric Applications*, C. Manski and D. McFadden, eds., MIT Press, Cambridge, Ma.

Maddala, G. S. (1983), *Limited-Dependent and Qualitative Variables in Econometrics*, Cambridge University Press, Cambridge.

Mahajan, Vijay, Paul E. Green, and Stephen M. Goldberg (1982), "A Conjoint Model for Measuring Self- and Cross-Price/Demand Relationships," *Journal of Marketing Research*, 19 (August), 334-42.

Malhotra, Naresh K. (1984), "The Use of Linear Logit Models in Marketing Research," *Journal of Marketing Research*, 21 (February), 20-31.

Manrai, Ajay K. (1995), "Mathematical Models of Brand Choice Behavior," *European Journal of Operational Research*, 82, 1-17.

________ and P. K. Sinha (1989), "Elimination-by-Cutoffs," *Marketing Science*, 8 (2), 133-52.

Massy, William F., David B. Montgomery, and Donald G. Morrison (1970), *Stochastic Models of Buying Behavior*, MIT Press, Cambridge.

Mathur, Sharat Kumar (1992), "A Multi-Method Approach to Study Process Representation and Predictive Accuracy of Consumer Choice Models in Marketing," Unpublished Ph.D Dissertation, The University of Iowa.

Mickey, J. and S. Greenland (1989), "A Study of the Impact of Confounder-Selection Criteria on Effect Estimation," *American Journal of Epidemiology*, 129, 125-37.

Moller, Kristian K. E. (1979), "Perceived Uncertainty and Consumer Characteristics in Brand Choice: Investigation With Durable and Nondurable Products," Unpublished D.Sc. Dissertation, Helsinki School of Economics (Finland).

Moschis, George P. (1981), "Patterns of Consumer Learning," *Journal of the Academy of Marketing Science*, 9 (2), 110-26.

Nantel, Jacques Antoine (1985), "A Study of Some Determinants of Preference Formation Strategies," Unpublished D.B.A. Dissertation, Indiana University.

Narayana, C. L. and R. J. Markin (1975), "Consumer Behavior and Product Performance: An Alternative Conceptualization," *Journal of Marketing*, 39, 1-6.

National Statistics Office (1994), Family Income and Expenditure Survey, Series No. 80, Republic of the Philippines, Manila.

________ (1995), Census of Population, Republic of the Philippines, Manila.

Nedungadi, Prakash (1990), "Recall and Consumer Consideration Sets: Influencing Choice Without Altering Brand Evaluations," *Journal of Consumer Research*, 17 (December), 263-76.

Nicosia, Francesco A. (1966), *Consumer Decision Processes*, Prentice-Hall, Englewood Cliffs, New Jersey.

Norusis, Marija J. (1993), *SPSS for Windows Advanced Statistics Release 6.0*, SPSS Inc., Chicago.

________ (1993), *SPSS for Windows Base System User's Guide Release 6.0*, SPSS Inc., Chicago.

________ (1993), *SPSS for Windows Professional Statistics Release 6.0*, SPSS Inc., Chicago.

Nunnally, Jum C. (1978), *Psychometric Theory*, 2nd ed., McGraw-Hill, New York.

Ong, Jaime Salvador (1980), "Consumers and Consumerism in the Philippines," Unpublished Ph.D Dissertation, Stanford University.

Papatla, Purushottam and Lakshman Krisnamurthi (1996), "Measuring the Dynamic Effects of Promotions on Brand Choice," *Journal of Marketing Research*, 33 (February), 20-35.

Park, Changwon (1995), "Estimation of Household Brand-Size Choice Models for Spaghetti Products with Scanner Data," Unpublished Ph.D Dissertation, University of Minnesota.

Park, Chan Su and V. Srinivasan (1994), "A Survey-Based Method for Measuring and Understanding Brand Equity and Its Extendibility," *Journal of Marketing Research*, 31 (May), 271-88.

Park, Seong Yong (1996), "Modeling Dynamic Choice Behavior: Empirical Analysis Using Multinomial Logit and Multiperiod Probit Models," Unpublished Ph.D Dissertation, University of Washington.

Pearman, A. D. (1993), "Establishing Dominance in Multiattribute Decision Making Using Ordered Metric Method," *Journal of Operational Research Society*, 44 (5), 461-69.

Personal Communication with Manager 1 (1995), Major Shampoo and Toothpaste Manufacturer, 22 November, Manila, Philippines.

Personal Communication with Manager 2 (1996), Major Shampoo and Toothpaste Manufacturer, 5 November, Manila, Philippines.

Personal Communication with Manager 3 (1996), Major Shampoo and Toothpaste Manufacturer, 6 November, Manila, Philippines.

Putler, Daniel S. (1992), "Incorporating Reference Price Effects Into a Theory of Consumer Choice," *Marketing Science*, 11 (Summer), 287-309.

Rajendran, K. N. and Gerard J. Tellis (1994), "Contextual and Temporal Components of Reference Price," *Journal of Marketing,* 58 (January), 22-34.

Raju, P. S. (1980), "Optimum Stimulation Level: Its Relationship To Personality, Demographics, and Exploratory Behavior," *Journal of Consumer Research,* 7 (December), 272-82.

Ramaswami, Seshan (1992), "Measuring Price Sensitivity: A Model of Consumer Price Inertia," Unpublished Ph.D Dissertation, University of Florida.

Rand Corporation (1955), *A Million Random Digits with 100,000 Normal Deviates*, The Free Press, p. 7.

Ratchford, Brian T. (1987), "New Insights About the FCB Grid," *Journal of Advertising Research*, 27 (August/September), 341-42.

Restle, F. (1961), *Psychology of Judgment and Choice: A Theoretical Essay,* John Wiley, New York.

Reilly, M. and T. L. Parkinson (1985), "Individual and Product Correlates of Evoked Set Size for Consumer Package Goods," *Advances of Consumer Research,* 12, 492-97.

Rhi-Perez, Pablo (1989), "A Cross Cultural Study of Attitudes Toward Advertising and Consumer Brand Choice Strategies Among Mexicans, Mexican-Americans and Anglos," Unpublished Ph.D Dissertation, The University of Texas at Austin.

Roberts, John H. and James M. Lattin (1991), "Development and Testing of a Model of Consideration Set Composition," *Journal of Marketing Research,* 28 (November), 429-40.

Roberts, John H. and James M. Lattin (1991), "Development and Testing of a Model of Consideration Set Composition," *Journal of Marketing Research*, 28 (November), 429-40.

Roberts, John H. and G. Urban (1988), "Modelling Multiattribute Utility, Risk and Belief Dynamics For New Consumer Durable Brand Choice," *Management Science*, 34 (February), 167-85.

Rosen, Dennis L. and Richard W. Olshavsky (1987), "The Dual Role of Informational Social Influence: Implications for Marketing Management," *Journal of Business Research*, 15 (April), 123-44.

Rossiter, John R. and Larry Percy (1987), *Advertising and Promotion Management*, McGraw-Hill, New York.

Rossiter, John R. and G. L. Urban (1988), "Modeling Multiattribute Utility, Risk, and Belief Dynamics for New Consumer Durable Brand Choice," *Management Science*, 34 (2), 167-85.

Rust, Roland T. and Naveen Donthu (1995), "Capturing Geographically Localized Misspecification Error in Retail Store Choice Models," *Journal of Marketing Research*, 32 (February), 103-10.

SAS Institute, Inc. (1990), *SAS/Stat User's Guide,* Version 6, 4th ed., Volumes 1 and 2, Cary, NC.

Schiffman, Leon G., and Leslie L. Kanuk (1994), *Consumer Behavior*, 5th ed., Prentice-Hall, Englewood Cliffs, New Jersey.

Schiffman, Leon G., David Bednall, Judith Watson, and Leslie L. Kanuk (1997), *Consumer Behaviour*, Prentice-Hall, Sydney.

Schneider, Linda Gay (1988), "The Impact of Promotion on Consumer Decision Strategies," Unpublished Ph.D Dissertation, Claremont Graduate School.

Sheth, Jagdish N. (1974), "A Theory of Family Buying Decisions," in *Models of Buying Behavior,* J. N. Sheth, ed., Harper & Row, New York, 17-33.

________, Bruce I. Newman, and Barbara L. Gross (1991), *Consumption Values and Market Choices: Theory and Applications,* South-Western Publishing, Cincinnati, Ohio.

Shiv, Baba (1996), "The Effects of Negative Versus Positive Advertising on Brand Attitudes and Choice in a Constructive World," Unpublished Ph.D Dissertation, Duke University.

Shugan, Steven M. (1987), "Estimating Brand Positioning Maps Using Supermarket Scanning Data," *Journal of Marketing Research*, 13 (February), 1-18.

Slama, Mark E. and Armen Tashchian (1987), "Validating the S-O-R Paradigm for Consumer Involvement With a Convenience Good," *Journal of the Academy of Marketing Science*, 15 (Spring), 36-45.

Soofi, Ehsan S. and Dennis H. Gensch (1994), "Bootstrap Method For Measuring Accuracy of Probabilistic-Choice Models," *European Journal of Operational Research*, 76 (July), 321-30.

Srinivasan, V. (1988), "A Conjunctive-Compensatory Approach To The Self-Explication of Multiattributed Preferences," *Decision Sciences*, 19 (2), 295-305.

Stevens, James (1992), *Applied Multivariate Statistics for the Social Sciences*, Lawrence Erlbaum, Hillsdale, New Jersey.

Stevens, S. S. (1946), "On the Theory of Scales of Measurements," *Science,* 103, 677-80.

Stewart, D. W. (1981), "The Application and Misapplication of Factor Analysis in Marketing Research," *Journal of Marketing Research,* 18 (February), 51-62.

Swait, Joffre, Tulin Erdem, Jordan Louviere, and Chris Dubelaar (1993), "The Equalization Price: A Measure of Consumer-Perceived Brand Equity," *International Journal of Research in Marketing*, 10, 23-45.

Swait, Joffre and Jordan Louviere (1993), "The Role of the Scale Parameter in the Estimation and Comparison of Multinomial Logit Models," *Journal of Marketing Research*, 30 (August), 305-14.

Swanson, Kathi Jordan (1987), "The Effects of Familiarity on Children's Product Choices: An Information-Processing Perspective," Unpublished Ph.D Dissertation, Texas A&M University.

Tabachnick, Barbara G. and Linda S. Fidel (1989), *Using Multivariate Statistics,* 2nd ed., HarperCollins Publishers, New York.

Thurstone, L. L. (1959), *The Measurement of Values,* University of Chicago Press, Chicago.

Tidwell, Paula Marcella (1993), "Compensatory Versus Non-Compensatory Choice Strategies in Limited Problem-Solving Consumer Behavior: Engel-Kollat-Blackwell Versus Howard Models," Unpublished Ph.D Dissertation, Memphis State University.

Turksen, I. Burhan and Ian A. Willson (1995), "A Fuzzy Set Model for Market Share and Preference Prediction," *European Journal of Operational Research*, 82 (April), 39-52.

Tversky, Amos (1972), "Elimination by Aspects: A Theory of Choice," *Psychological Review*, 79 (4), 281-99.

________ and Daniel Kahneman (1991), "Loss Aversion in Riskless Choice: A Reference-Dependent Model," *Quarterly Journal of Economics*, 106 (November), 1039-61.

________ and S. Sattath (1979), "Preference Trees," *Psychological Review*, 86 (6), 542-73.

von Neumann, J. and O. Morgenstern (1947), *The Theory of Games and Economic Behavior*, Princeton University Press, Princeton, NJ.

Wagner, Udo and Alfred Taudes (1987), "Stochastic Models of Consumer Behaviour," *European Journal of Operational Research*, 29, 1-23.

Wahlers, Russel Gordon (1981), "The Consumer's Selection of an Evaluation Process Strategy in Response to Information Encompassing Varying Numbers of Product Class Choice Alternatives and Product Characteristics," Unpublished D.B.A. Dissertation, Kent State University.

Wall Street Journal (1992), "Tooth-Brushers Take a Shine to Baking Soda," March 2, B1.

Wells, William D. and Douglas Tigert (1971), "Activities, Interest and Opinions," *Journal of Advertising Research*, 11 (August), 27-35.

Wilson, Richard M. S., Colin Gilligan, and David J. Pearson (1992), *Strategic Marketing Management: Planning, Implementation and Control*, Butterworth-Heinemann, Oxford.

Winer, Russel S. (1986), "A Reference Price Model of Brand Choice for Frequently Purchased Products," *Journal of Consumer Research*, 13 (September), 250-56.

Winter, Franz L. and John R. Rossiter (1989), "Pattern-Matching Purchase Behavior and Stochastic Brand Choice: A Low Involvement Model," *Journal of Economic Psychology*, 10 (4), 559-85.

Wittink, Dick R. and Philippe Cattin (1989), "Commercial Use of Conjoint Analysis: An Update," *Journal of Marketing*, 53 (July), 91-96.

Wright, Peter (1975), "Consumer Choice Strategies: Simplifying Vs. Optimizing," *Journal of Marketing Research*, 12 (February), 60-67.

Young S. and B. Feigin (1975), "Using the Benefit Chain for Improved Strategy Formulation," *Journal of Marketing*, 39 (3), 61-70.

Zufryden, Fred S. (1988), "Using Conjoint Analysis to Predict Trial and Repeat-Purchase Patterns of New Frequently Purchase Products," *Decision Sciences*, 19, 55-71.