

https://dspace.org/

The Importance of Branding in the

Marriott, Liesl

2011-05-16
http://hdl.handle.net/10539/9792

Downloaded from a DSpace repository. https://dspace.org/

The Importance of Branding in the South African Fuel Retail Industry

Liesl Marriott

A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

ABSTRACT

It is estimated that there are approximately 4900 fuel retail stations operating in South Africa. The industry is typically characterised by an oversupply of fuel retail stations, strong competition, a high degree of regulation and low retail margins.

In order to differentiate their product offering, oil companies and fuel retailers make use of branding of fuel retail outlets, the inclusion of fuel additives to petrol and diesel and diversification of services available at fuel retail stations (for example the addition of convenience stores) to increase their competitive advantage.

The purpose of this study is to determine the relative importance of branding in the South African fuel retail industry and to examine if certain demographic groups consider branding to be more important compared to other attributes.

The research found that there is a significant difference in the degree of importance the South African private fuel consumer attaches to brand, location, fuel specification, quality of convenience store and level of forecourt service when determining fuel retail station preference.

The private fuel consumer typically rates the fuel retail brand as the most important factor in his/her preference of a fuel retail station. The level of service, quality of the convenience store and the location of the fuel retail station also play an important role in determining fuel retail station preference. It was found that fuel specification played the least importance to the private consumer when selecting a fuel retail station.

It was also found that certain demographic groupings attached varying importances to these attributes. For example, it was found that the Indian population seemed to be more brand conscious compared to other races, and that in general, men are more brand loyal than women. Women, on the other hand, valued the level of service and the quality of the convenience store as more important than men.

A number of consumer clusters could be identified that attach different importances to the various fuel retail station attributes. From this cluster analysis, a group of respondents could be identified that base their fuel retail preference almost exclusively on brand.

DECLARATION

I, Liesl Marriott declare that this research report is my own, unaided work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other University.

_____

Liesl Marriott

10 May 2006

ACKNOWLEDGEMENTS

I wish to express my sincere thanks to:

- My supervisor, Anthony Stacey, for his time, support and valuable input to this research
- Danie Malan from Research in Action, for obtaining the data used for this research
- My husband, Paul Halley, for his love and support

TABLE OF CONTENTS

1. INTRODUCTION 1

1.1 CONTEXT OF THE STUDY 1

1.2 PURPOSE OF THE STUDY 1

1.3 ASSUMPTIONS 2

1.4 DELIMITATIONS 3

1.5 DEFINITIONS 4

1.6 RESEARCH PROBLEM AND SUB-PROBLEMS 4

1.6.1 Research Problem 4

1.6.2 Sub-problems 4

2. LITERATURE REVIEW 5

2.1 THE FUEL RETAIL INDUSTRY IN SOUTH AFRICA 5

2.1.1 Background 5

2.1.2 Fuel Pricing 5

2.1.3 The Oil Companies 7

2.1.4 The Fuel Retailers 8

2.1.5 Value-adding services 8

2.2 DEFINITION OF BRANDING 9

2.3 BRAND EQUITY 10

2.3.1 Definition of brand equity 10

2.3.2 Measurement and management of brand equity 12

2.3.3 The advantages of strong brand equity. 14

2.4 BRAND LOYALTY 15

2.4.1 Strategic value of brand loyalty 15

2.4.2 Brand loyalty in competitive markets 16

2.5 BRANDING OF A COMMODITY 17

2.5.1 Defining market orientation of commodities 17

2.5.2 Corporate branding in a commodity environment 19

2.6 MARKET SEGMENTATION FOR COMPETITIVE BRANDS 20

2.6.1 Principles of segmentation 20

2.6.2 Brand segmentation 20

3. RESEARCH PROPOSITIONS AND HYPOTHESES 22

4. RESEARCH METHODOLOGY 23

4.1 RESEARCH METHOD 23

4.1.1 Quantitative vs. qualitative approach 23

4.1.2 Conjoint analysis overview 24
4.1.3 Conjoint analysis design 24
4.1.4 Conjoint analysis attributes and levels 25
4.1.5 Demographic segmentation 28
4.2 RESEARCH POPULATION AND SAMPLE 28
4.2.1 Research population 28
4.2.2 Sampling methodology 29
4.2.3 Sample size 29
4.3 DATA COLLECTION 29
4.3.1 Method 29
4.3.2 Questionnaire administration 30
4.4 VALIDITY AND RELIABILITY 31
4.4.1 Internal validity 31
4.4.2 External validity 31
4.4.3 Reliability 32
4.4.4 The pilot test 32
4.5 DATA ANALYSIS 33
4.5.1 Fuel retail station attribute preferences 33
4.5.2 Perceived brand loyalty 34
4.5.3 Demographic information 34
5. PRESENTATION OF RESULTS 35
5.1 SUMMARY OF SAMPLE DEMOGRAPHICS 35
5.2 OVERALL IMPORTANCE OF THE FUEL RETAIL STATION ATTRIBUTES 35
5.3 PART WORTH UTILITIES OF THE FUEL RETAIL STATION ATTRIBUTES 36
5.4 SEGMENTING THE MARKET 40
5.4.1 Differences in conjoint importances between demographic groups 40
5.5 PREFERENCE BASED CLUSTERS 42
5.5.1 Cluster analysis 42
5.5.2 Description of the clusters based on importances and part worth utilities 43
5.5.3 Demographics of clusters 49
5.6 THE PERCEPTION OF BRAND LOYALTY 50
6. CONCLUSIONS 51
6.1 THE LEVEL OF IMPORTANCE OF FUEL RETAIL STATION ATTRIBUTES 51
6.2 THE LEVEL OF IMPORTANCE OF FUEL RETAIL STATION ATTRIBUTES 52
6.3 ATTRIBUTE PREFERENCES RELATING TO DEMOGRAPHIC GROUPINGS 53
6.4 CLUSTERS LINKED TO ATTRIBUTE PREFERENCES 54
6.5 THE PERCEPTION OF BRAND LOYALTY 56

6.6 LIMITATIONS 57
7. IMPLICATIONS AND RECOMMENDATIONS 58
7.1 MANAGERIAL IMPLICATIONS 58
7.2 SUGGESTIONS FOR FUTURE RESEARCH 60
REFERENCES 61
APPENDIX A: QUESTIONNAIRE 64
APPENDIX B: SAMPLE DEMOGRAPHICS 67
APPENDIX C: HYPOTHESIS TESTS FOR IMPORTANCES 69
APPENDIX D: HYPOTHESIS TESTS FOR PART WORTH UTILITIES 71
APPENDIX E: HYPOTHESIS TESTS FOR CONJOINT IMPORTANCES PER DEMOGRAPHIC GROUPING 73
APPENDIX F: CLUSTER ANALYSIS REPORT 104
APPENDIX G: HYPOTHESIS TESTS FOR IMPORTANCES PER CLUSTER 107
APPENDIX H: CLUSTER MEANS FOR IMPORTANCES AND PART WORTH UTILITIES IN THE FUEL RETAIL INDUSTRY 114
APPENDIX I: CROSS-TABULATIONS OF CLUSTERS AND DEMOGRAPHIC VARIABLES 115
APPENDIX J: HYPOTHESIS TEST OF INDEPENDENCE OF CLUSTERS AND AGE 118
APPENDIX K: CLUSTER DEMOGRAPHICS 119

LIST OF TABLES

Table 1: % Share of Volumes for Oil Companies of Service Stations 7
Table 2: Attributes and utilities selected for conjoint analysis 26
Table 3: Hypothesis test selected for analysing conjoint data 34
Table 4: Hypothesis tests for significant differences in importances* 36
Table 5: Hypothesis tests for significant differences in part worth utilities* 40
Table 6: Hypothesis tests of conjoint importances across demographic groups* 40
Table 7: Mean conjoint importances across significant demographic groups* 41
Table 8: Mean conjoint importances per cluster 43
Table 9: Kruskal-Wallis hypothesis tests for significant differences in importances per cluster* 44
Table 10: Mean conjoint importance and part worth utilities per cluster* 45
Table 11: Hypothesis tests of independence of clusters and demographic groups* 49
Table 12: Summary of primary demographic identities per cluster* 50
Table 13: Ranking of importances for fuel retail station attributes 51
Table 14: Cluster characteristics 55
Table 15: Examples of steps to attract and retain cluster-specific customers 59

LIST OF FIGURES

Figure 1: 93 Octane leaded petrol: Gauteng retail price 361,0 c/l in June 2003 6
Figure 2: The awareness pyramid 11
Figure 3: The loyalty pyramid 12
Figure 4: The relationship between brand equity and market power 13
Figure 5: The management of brand equity 13
Figure 6: A model of determinants of industrial competitive structure with expected levels of environment characteristics and market orientation. 17
Figure 7: Examples of respondent's questionnaire 27
Figure 8: Overall conjoint importances* 35
Figure 9: Overall part worth utility for Brand 37
Figure 10: Overall part worth utility for Location 37
Figure 11: Overall part worth utility for Fuel specification 38
Figure 12: Overall part worth utility for Convenience store 38
Figure 13: Overall part worth utility for Service 39
Figure 14: Scree plot of percentage of variation explained by number of clusters* 42
Figure 15: Mean importances for Brand and Convenience store 47
Figure 16: Mean importances for Service and Convenience Store 47
Figure 17: Mean importances for Fuel specification and Brand 48
Figure 18: Mean importances for Location and Convenience store 48
Figure 19: Respondents answers to question related to the perception of brand loyalty 50

1. INTRODUCTION

1.1 CONTEXT OF THE STUDY

The South African Petroleum Industry Association (Sapia) estimates that there are approximately 4900 service stations operating in South Africa, of which only 3000 are trading profitably (Jacks, 2005). The industry is typically characterised by an oversupply of fuel retail stations, strong competition, a high degree of regulation and low retail margins.

Petrol and diesel can be defined as commodity products as the opportunity to differentiate these goods are minimal. In addition, the price of petrol in South Africa is regulated; therefore price differentiation is not available as a marketing opportunity.

Over the years, oil companies and fuel retailers have introduced the following three steps in their attempt to differentiate their products and services, thereby increasing their competitive advantage:

- Branding of fuel retail outlets
- Inclusion of fuel additives to petrol and diesel
- Diversification of services available at fuel retail stations, for example the addition of convenience stores, ATMs and car-wash facilities

It is proposed that branding may build up a level of awareness, knowledge and trust within the consumer that may create repeat purchase with the company. This brand loyalty would therefore be a competitive advantage for any fuel retailer.

1.2 PURPOSE OF THE STUDY

The study aims to determine to what extent branding influences the fuel retail station selection of a typical private South African consumer.

There are many factors that may have an impact on the consumer's buying decision, for example: location, fuel specifications, the availability and quality of convenience stores and level of forecourt service. This research will attempt to determine the relative importance of branding relative to these other factors.

In addition, the study will investigate if possible correlations exist between certain demographic groups in the South African consumer market and fuel retail preferences.

If oil companies and fuel retailers can determine how consumers go about selecting their preferred fuel retail stations, they may be in a better position to design these

attributes in new (or existing) fuel retail stations as to improve consumer loyalty and therefore profitability.

The market segmentation information obtained from this research may also be crucial in directing and focusing marketing efforts by oil companies and fuel retailers.

1.3 ASSUMPTIONS

The first assumption made in this study is that the sample of respondents used for the purposes of this research is representative of the population of private fuel consumers in South Africa. The sample of fuel retail station selected was located in the Rivonia/Morningside area in Johannesburg. This may be considered a reasonable assumption since the majority of fuel retail station consumers are most probably situated in metropolitan/urban areas. However, the area selected for sampling may be considered to be a more affluent area when compared to other areas in Johannesburg and South Africa. Therefore certain assumptions regarding consumer preferences may not be valid when extended to other regions.

If it is found that the sample cannot be considered representative of all South African consumers, the study results, conclusions and recommendations will be limited to private fuel consumers in the Northern Johannesburg area. At the very least, some generalisations concerning specific demographic groupings may be made from this research.

The second assumption made is that the sampling distribution between peak and off-peak times will not have a significant effect on the overall research conclusions. However, if it is found that the ratio of peak time customers over off-peak time customers of the population is significantly different compared to the sample, the relative importances found in the research may be skewed towards the sample preferences. This assumption may also impact on the relative size and distribution of the various clusters found, if these clusters are biased towards peak or off-peak consumers.

The third assumption made is that in the completion of the conjoint analysis survey, people evaluate concepts by adding up their evaluations of the concept's individual attribute levels. It is assumed that the individual attributes are not excessively redundant and that there is no interaction between the attributes selected (Aaker, Kumar & Day, 1995).

Research has suggested that consumers tend to perceive a product from an overall perspective, associating all the attributes of the product with the brand name (Murphy, 1990). Thus a consumer's evaluation of the individual product attributes could be conditioned or influenced regarding the brand evaluated. This would have an impact on this research since it has been assumed that the brand name can be evaluated separately from other product attributes, such as fuel specification. However, it has been found that consumers are usually able to evaluate each of the product and brand name attributes separately (Leuthesser, Kohli & Harich, 1995; Keller, 2003). This is essential for market research aimed at investigating differential advantages.

The fourth assumption made is that the combination of attributes for each of the hypothetical fuel retail stations created in the survey is feasible and possible. This can be considered a reasonable assumption since all attributes selected for the conjoint analysis survey can exists independently from each other and all hypothetical fuel retail stations selected for this research are feasible.

1.4 DELIMITATIONS

Due to the nature of this research's sampling framework, the generalisability of the conclusions and results of the importance of branding in the South African fuel retail industry is limited to a specific segment of the South African consumer market.

Therefore, the results of the research are applicable to a segment of the market that is most likely made up of private consumers living in residential/suburban areas in Gauteng and own their own private vehicles.

Consumer preferences of market segments such as the commercial markets were not included in this research, such as the following markets or industries:

- public transport
- mining
- construction and industrial
- commercial (for example trucks and commercial vehicles)
- agriculture

It is estimated that private fuel retail stations market approximately 92% of the country's petrol and 13% of the country's diesel oil (SBAB, 2001). Therefore, the

results of this research will only apply to this segment (excluding commercial purchases).

In addition to the above delimitations, only consumer preferences close to residences were investigated and preferences regarding large petrol station "cities" such as Ultra-cities next to main highways were not included in this research. In these cases it is expected that location would be the primary driver for fuel purchase at such an outlet and branding would be an insignificant factor in the purchasing decision.

1.5 DEFINITIONS

For the purposes of this research, a "fuel retail station" will be defined as a retail station selling petrol, diesel and other services in residential areas only.

1.6 RESEARCH PROBLEM AND SUB-PROBLEMS

1.6.1 Research Problem

The purpose of this study is to determine the relative importance of branding to the South African fuel retail industry. In addition, this research will also examine if certain demographic groups consider branding to be more important compared to other attributes and if brand importance is associated with perceived brand loyalty.

1.6.2 Sub-problems

The first sub-problem is to determine the relative importance of branding in the South African fuel retail industry, compared to the following attributes: location, quality of the convenience store, level of forecourt service and fuel quality.

The second sub-problem is to determine the importance of branding to certain pre-defined demographic groups.

The third sub-problem is to determine if certain consumer groupings (or "clusters") value brand as a more significant attribute compared to other attributes.

The fourth sub-problem is to determine if an association exists between brand importance (when compared to other attributes), and perceived brand loyalty.

2. LITERATURE REVIEW

The literature review will aim to provide a background of the South African fuel retail industry, as well as certain marketing elements that will be applicable to this research, namely: brand equity, branding of commodities, brand loyalty and market segmentation.

2.1 THE FUEL RETAIL INDUSTRY IN SOUTH AFRICA

2.1.1 Background

There are between 4500 and 5000 fuel retail outlets in South Africa, although the number changes relatively frequently due to service stations that are continuously closing and new ones opening (Hadland, 2002). The South African Petroleum Industry Association (Sapia) estimates that there are around 4900 service stations operating in the country, of which only 3000 are trading profitably (Jacks, 2005). Most of these fuel retail outlets are located in Gauteng (31%), Kwa-Zulu Natal (19%) and the Western Cape (16%) (Hadland, 2002).

The fuel retail industry is generally characterised by an extremely competitive environment with low retail margins and high stock turnover rates (SBAB, 2001).

2.1.2 Fuel Pricing

There are two main constituents of the prices of petrol, diesel and paraffin. There are:

- External factors – such as the dollar price of the liquid fuel in the world market and the rand:dollar exchange rate.
- Internal factors – such as the oil company marketing margins, retail margins, transport costs and taxes and levies.

The external factors change constantly and account for the monthly movement in fuel price. Both the world market price for oil and the dollar exchange rate are outside the control of the South African fuel industry (Sapia, 2003).

Until March 2003, the basic price of fuel was calculated from an “In Bound Landed Cost” (IBLC) formula. This formula was based on the daily average of the 5 published world oil prices, namely three refineries in Singapore, an assessment of the Singapore stock market price and the posted price of a refinery in Bahrain.

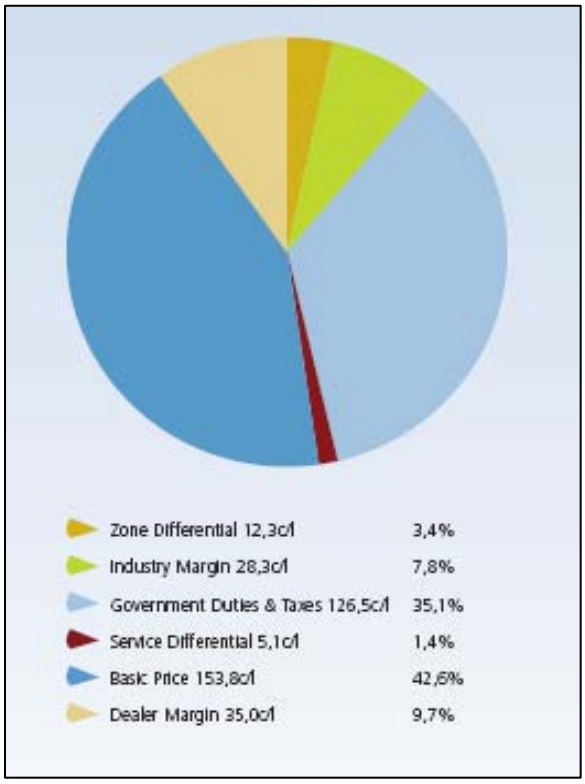
In April 2003 the system was changed to use spot prices instead of posted prices. This new system was named the “Basic Fuel Price” (BFP) formula. The spot prices now used are:

- 50% Mediterranean and 50% Singapore (for petrol) and
- 50% Mediterranean and 50% Arabian Gulf (for diesel and paraffin)

The cost of shipping and related import costs are then added to these prices. The resultant US dollar “basic price” is then converted to Rand at the daily exchange rate. Due to the fact that would be logistically very cumbersome to change these prices on a daily basis, the net increase/decrease of the price is determined on a monthly basis (Sapia, 2003).

A breakdown of the retail petrol price as in June 2003 is provided in Figure 1.

Figure 1: 93 Octane leaded petrol: Gauteng retail price 361,0 c/l in June 2003



Source: (Sapia, 2003)

From Figure 1 it can be seen that the BFP makes up only 42.6% of the petrol retail price. The balance is made up of government taxes and levies and industry margins (Sapia, 2003).

It is illegal to sell petrol at any price other than the government-approved price (SBAB, 2001).

2.1.3 The Oil Companies

The majority of South Africa's 4900 service stations, almost 90% are associated with 5 multi-national oil companies: Shell, BP, Caltex, Engen and Total. Smaller companies, such as Tepco, Excel and Sasol supply around 200 sites, or less than 5% of the total (Sapia, 2003). However, with Sasol's recent drive to expand its number of fuel retail stations this number is expected to increase during the next few years.

A breakdown of percentage fuel volumes for oil companies in South Africa is provided in Table 1.

Table 1: % Share of Volumes for Oil Companies of Service Stations

Company	1997		1998		1999		2000		2001		2002	
	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel
Afric Oil	0.70	0.18	0.67	0.07	0.05	0.55	0.02	0.19	0.04	0.99	0.09	1.46
BP	15.80	15.92	15.92	15.60	16.13	15.28	15.98	15.38	16.24	15.73	16.37	14.95
Caltex	17.67	18.23	17.71	18.19	18.05	16.50	17.89	15.82	17.43	16.69	17.09	16.69
Engen	24.20	24.60	24.10	24.07	24.17	23.33	26.78	27.95	27.02	27.25	27.10	25.95
Excel	0.26	0.69	0.80	2.40	1.38	3.80	1.86	4.98	2.23	4.84	2.79	5.84
Sasol	6.67	0.92	6.35	0.51	6.30	0.48	6.12	0.65	6.06	0.85	4.62	0.37
Shell	18.94	19.87	18.24	19.04	17.99	18.99	17.90	18.33	17.53	17.80	17.78	17.89
Tepco	0.08	0.34	0.23	0.85	0.40	2.36	0.38	2.90	0.33	2.22	0.32	2.68
Total	13.09	14.76	13.47	14.75	13.07	14.07	13.07	13.80	13.12	13.63	13.84	14.17
Zenex	2.59	4.49	2.51	4.52	2.46	4.64	-	-	-	-	-	-
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: (Sapia, 2003)

Notes:

1. In 2000, Engen acquired Zenex

2. In 2002, Shell acquired Tepco

3. % share of volumes for Sasol was expected to increase post 2002

These oil companies are multi-national corporations, powerful, highly resourced and have institutional know-how, international experienced and economic influence and power. The oil companies in South Africa do not compete with each other as they do in many other countries in the world and it is accepted that consumers are generally unspecific regarding the type of fuel they put into their petrol tanks. This means that oil companies are more often concerned with their image and with branding than with the product specifications itself (Hadland, 2002).

It is widely accepted that a product such as petrol is undifferentiated and that cars generally perform better or worse according to the octane rating, rather than the brand (Leach & Reekie, 1996). However, different petrol retailers do claim that they include different additives to their petrol. It would seem unlikely that these additives are of much consequence to consumers and that the selection of fuel retailing station is more likely to be determined by advertising and branding (Leach & Reekie, 1996).

Proposition 1: The South African consumer considers fuel quality as insignificant and rates the brand and image of the fuel retail outlet as more important.

2.1.4 The Fuel Retailers

Most of South Africa's 4900 petrol stations are run by individual owners or managers with attendants assisting at the pumps. As the retail margin is fixed by the government, gross profits are directly related to pump volumes (Hadland, 2002).

The average South African petrol station pumps around 250,000 litres per month, with about 80% of the service stations are in the 150,000 to 300,000 monthly litres sales category (SBAB, 2001).

Approximately half of the service stations are operated by independent dealers and the other half are franchisees that pay rent to the oil company for the lease of the property, but operate the station themselves (Hadland, 2002).

2.1.5 Value-adding services

One of the most recent trends in the fuel retail industry has been the diversification of services offered at a fuel retail station. This has resulted in petrol stations providing additional value adding services such as Automatic Teller Machines (ATMs), convenience stores, restaurants, fast food outlets, car-wash facilities and Lotto ticket sales in order to generate alternative and more profitable income streams for the fuel outlets (Hadland, 2002). According to the South African Chamber of Business study

in 2001 there is a clear shift from the core business, the sale of fuel and related products and services (SBAB, 2001).

Research conducted in Switzerland has also indicated that the quality of value-added services is an important antecedent of brand equity. These services enrich a product in different ways and enhance the quality of the brand (Bamert & Wehrli, 2005).

Proposition 2: Value-adding services at fuel retail stations (such as convenience stores and improved customer service) are more important than branding in the South African consumer market.

2.2 DEFINITION OF BRANDING

Aaker (Aaker, 1991:7) defines as brand as a "distinguishable name and/or symbol (such as a logo, trademark, or package design) intended to identify the goods or services of either one seller or a group of sellers, and to differentiate those goods or services from those of competitors". A brand therefore identifies the source of the goods or services to the customer so that it can be differentiated from a competitor's goods or services (Aaker, 1991).

Kotler (2003) considers a brand as a commitment by the seller to constantly deliver a specific set off features, benefits and services to customers and promises a specific standard of quality.

Keller (2003:3) defines a brand as a "name, term, sign, symbol, or design, or combination of them which is intended to identify the goods and services of one seller or group of sellers and to differentiate them from those of competition". However, Keller (2003) also states that most managers also define a brand in terms of having created a certain amount of awareness, reputation and prominence in the marketplace.

Wood (2000:666) has drawn together many of the available brand definitions in literature to provide the following integrated definition: "A brand is a mechanism for achieving competitive advantage for firms, though differentiation (purpose). The attributes that differentiate a brand provide the customer with satisfaction and benefits for which they are willing to pay (mechanism)".

Lastly, Neumeier (2003:2) provides perhaps the most succinct definition of a brand: "a brand is a person's gut feeling about a product, service or company".

From the above definitions it is evident that the concept of a brand is a complex and critical component of marketing because it is a primary method for distinguishing

products and services from a competitor. More importantly, brands take on a special meaning to consumers and provide a shorthand device for their product decisions (Keller, 2003).

Effective branding therefore allows firms to charge a premium for their products or services due to this differentiation and implied perceived quality.

2.3 BRAND EQUITY

2.3.1 Definition of brand equity

Aaker (1991:15) defines brand equity as a "set of brand assets and liabilities linked to a brand that may add or subtract from the value provided by the product or services provided to the customer". Myers (2003) defines brand equity simply as the extra value obtained from having a brand.

Since these definitions of brand equity are often differently interpreted by accountants and marketers, Feldwick (1996) provides a classification for the various meanings of brand equity as:

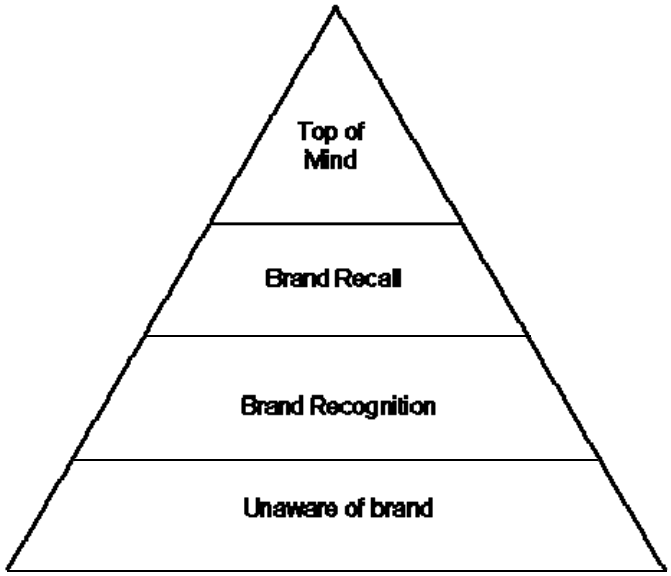
- Brand value: the total value of a brand as a separate asset, as considered on the balance sheet.
- Brand strength (or brand loyalty): the measure of attachment to the brand by consumers
- Brand image: a description of the association that a consumer has about the brand.

Aaker (1991) has established a useful model to describe the major asset categories of brand equity. These assets provide value to the customer by enhancing the customer's interpretation of the product/service information, confidence in the purchasing decision and use satisfaction.

The major asset categories of brand equity are:

- Brand name awareness – the ability of the potential buyer to recognize or recall a brand and it involves a span from an uncertain feeling that the brand is recognised, right up to a belief that it is the only one in the product class. This continuum can be represented by Figure 2.

Figure 2: The awareness pyramid

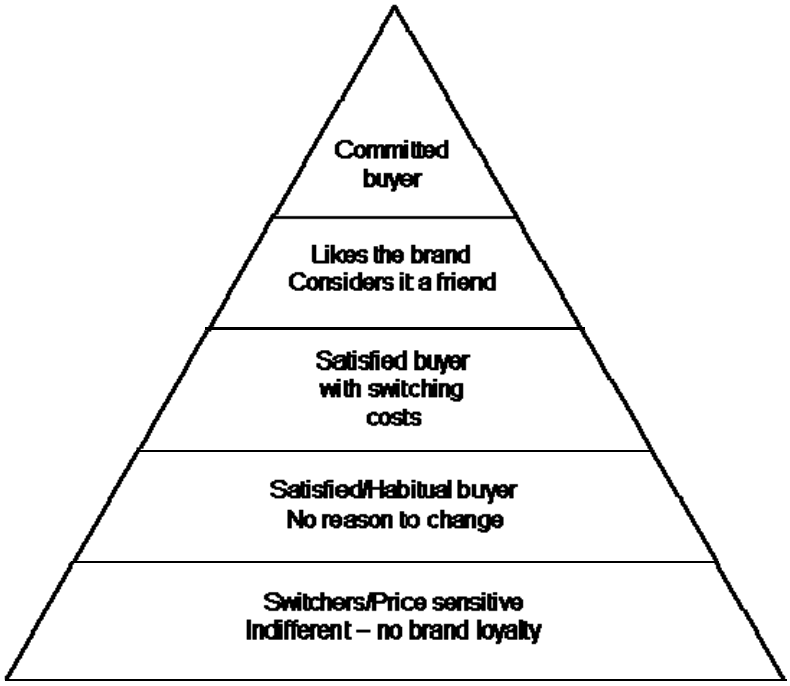


Source: (Aaker, 1991)

Getting consumers to recognise and recall a brand can considerably enhance brand equity. However, the role of brand awareness in brand equity will depend on upon both the context and upon which level awareness is achieved. Simple recognition, or familiarity, is only part of the awareness challenge. The strongest brands are managed for strategic awareness and not just general awareness: it is important to remember a brand for specific and right reasons.

- Brand loyalty – is a measure of attachment that a customer has to a brand and reflects how likely a customer will be to switch to another brand, especially when that brand makes a change in product feature or price. Since brand loyalty directly translates into future sales, it is often the core of a brand's equity as it is linked to profits of a company. There are several levels of loyalty, as represented in Figure 3.
- Perceived quality – the customer's perception of the overall quality or superiority of a product or service with respect to its intended purpose, relative to alternatives. Perceived quality is an intangible, overall feeling about a brand.
- Brand associations – is anything "linked" in memory to a brand. These associations represent bases for purchase decisions and can create value to the customer by helping to retrieve information, creating positive attitude and feelings and differentiating the brand.

Figure 3: The loyalty pyramid



Source: (Aaker, 1991)

These brand asset categories defined by Aaker (1991) are also supported by Keller (2003) who states that brand equity occurs when the consumer has a high level of awareness and familiarity with the brand and holds some strong, favourable and unique brand associations in memory.

2.3.2 Measurement and management of brand equity

The measurement and management of brand equity have become top priority marketing issues in recent years, as evident by the growing amount of literature on the subject. This literature has highlighted the fact that a long-term, strategic and holistic perspective is required within brand management (Wood, 2000).

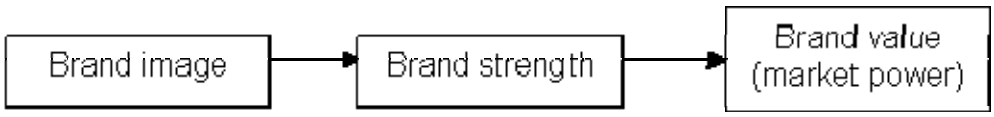
Since brand equity is defined as a set of assets, the management of brand equity involves the investment and enhancement of these assets. Since each brand equity asset creates value in a variety of different ways, it is important to understand and be sensitive to the way in which brands create value (Aaker, 1991).

Myers (2003) divides brand equity into two primary components: dimensions that can be measured (tangible) for example financial measures and consumer-related dimensions that cannot be measured (intangible). This is related to the classification of brand equity by Feldwick (1996) since “brand value” and “brand strength” are

typically quantifiable and therefore easily measured, whilst “brand image” is tailored to the needs and wants of the target market (See par. 2.3.1).

However, it is typically this “brand image” that ultimately determines the “brand strength” and “brand value” (Woods, 2000). This relationship is outlined in Figure 4.

Figure 4: The relationship between brand equity and market power



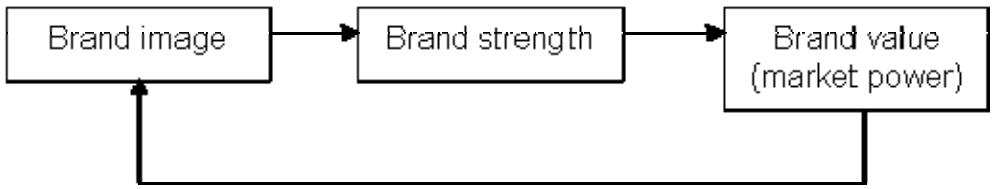
Source: (Woods, 2000)

This immediately poses a problem to the manager, since it is extremely difficult to develop strategies and manage a dimension such as “brand image” that is intangible. If the dimension cannot be measured, it is also difficult to ascertain whether or not a brand investment is making the brand stronger, weaker or has no effect.

The solution to this problem provides two schools of thought: Firstly, Myers (2003) proposes that management attempts to obtain some measure of all the assets of brand equity, even if this means that the result is only estimated, or even if all of the individual equity components cannot be measured. This is of critical importance, since research has demonstrated that this intangible equity dimension might contribute more to brand equity compared to tangible dimension (Myers, 2003).

However, Woods (2000) recognises that the measurement of brand strength and brand value provides information, albeit indirectly, that may improve the way that brand image is defined and/or managed (see Figure 5).

Figure 5: The management of brand equity



Source: (Woods, 2000)

The actual brand equity approach is ultimately situation specific and depends on the ability to measure the intangible assets, such as brand image.

2.3.3 The advantages of strong brand equity.

Keller (2003) lists some of the following advantages of having brands with a high level of awareness and a positive brand image:

- Greater loyalty and less vulnerability to competitive marketing actions and crises since familiarity with a brand has been shown to increase consumer confidence, attitude toward the brand and purchase intention.
- Larger margins since brands with positive brand equity can command a price premium. Consumers would also have a fairly inelastic response to price increases if they support a brand. In addition, research has indicated that consumers loyal to a brand are less likely to switch in the face of price competition.
- Greater trade cooperation and support in the case where wholesalers and retails play an important role in the selling of the product. If a brand has a positive brand image with consumers, it is more likely to receive favourable treatment from the trade.
- Increased marketing communication effectiveness since a brand with a great deal of equity has already created some knowledge structures and confidence in the consumers' minds.
- Possible licensing opportunities, where a company may choose to license its name, logo or other trademark item to another company.
- Additional brand extension opportunities, for example new line extensions (the current brand name is used to enter a new market segment) or category extensions (the current brand name is used for a different product class). In both cases, a positive brand name would facilitate new product acceptance and increase the efficiency of promotional and marketing activities.
- Other benefits, such as attracting better employees, generating greater interest from investors and garnering more support from shareholders. Studies have founds that brand equity can be directly related to corporate stock price.

Brand equity can also create associations that can drive market positions, persist over extended periods and be capable of resisting aggressive competitors (Aaker, 1991).

2.4 BRAND LOYALTY

2.4.1 Strategic value of brand loyalty

Aaker (1996:322) defines brand loyalty as "…a direct measure of how willing customers are to stick to a brand". This includes the likelihood of future purchases or renewal of service contracts or how likely it is that the consumer will switch to another brand or service provided.

The main objective for establishing and developing a brand is to provide a unique identity for a product in relation to how the product is perceived by the consumer. Normally this brand communicates a single, or a range of positive and tangible attributes relating to the product or service.

Consequently, the primary purpose of branding is to distinguish a specific product or service from its competitors, thereby providing an effective entry barrier to potential competitors. This notion is related to the belief that consumers will build up a level of confidence and familiarity with the product and become habitual purchasers of the same product (Betts, 1994).

According to Aaker (1991:41) "a set of habitual buyers has considerable value because they represent a revenue stream that can go forward for a long time."

Branding therefore builds up a level of awareness and knowledge within the consumer that may create repeat purchase with the company. Selnes (1993) also confirmed that brand reputation has a strong effect on customer loyalty.

Customers may be loyal owing to high switching barriers relating to technical, economical or psychological factors or because customers are satisfied with the brand and would like to continue the relationship. However, as most barriers tend to be limited in nature, companies cannot rely purely on this strategy to ensure brand loyalty and only customer satisfaction can be seen as an effective long term strategy (Selnes, 1993).

Therefore brand loyalty can be seen as a significant competitive advantage as the loyalty of the customer base reduces vulnerability to competitive action (Aaker, 1991). It may be more difficult for competitors to attract these loyal and satisfied customers and would have to spend relative more resources compared to non-loyal customers.

The following additional strategic values of brand loyalty have been identified by Aaker (1991):

- Reduced marketing costs: a set of customers who are loyal to a particular brand reduces the marketing cost of doing business as it is much less costly to retain customers than to attract new ones.
- Trade leverage: a brand that has a broad and loyal following can increase its trade leverage. In the case of products and services that are traded at fuel retail stations (for example restaurants and car-washing facilities), a loyal customer base may increase the trade leverage of that specific fuelling station.
- Attracting new customers: a brand with a loyal and satisfied customer base can provide assurance to a prospective new customer.
- Time to respond to competitive threats: brand loyalty provides a firm with time to respond to competitive strategies as a loyal following will allow for more time needed to respond to these advances.

2.4.2 Brand loyalty in competitive markets

The following generalisations have been developed regarding the performance of competitive brands in competitive markets (Wright, Sharp & Sharp, 1998):

- penetration varies a lot between brands, however the average purchase frequency does not vary much
- repeat-purchase loyalty measures tend to vary together with market penetration and increases as market penetration and market share increases
- few brand buyers are 100% loyal and typically they are not particularly heavy purchasers
- most people buy a particular brand relatively infrequently and other brands more often

From the above generalisations, the following proposition can be formulated:

Proposition 3: Customers who are perceived as brand loyal make up a relatively small portion of the consumer base.

Research conducted by Wright *et al.* (1998) regarding brand loyalty in the Australian and New Zealand retail fuel market found that retail fuel markets have greater consumer loyalty compared to other markets (such as supermarkets and department stores). This implies opportunities for marketing programmes different from those used in other competitive markets.

2.5 BRANDING OF A COMMODITY

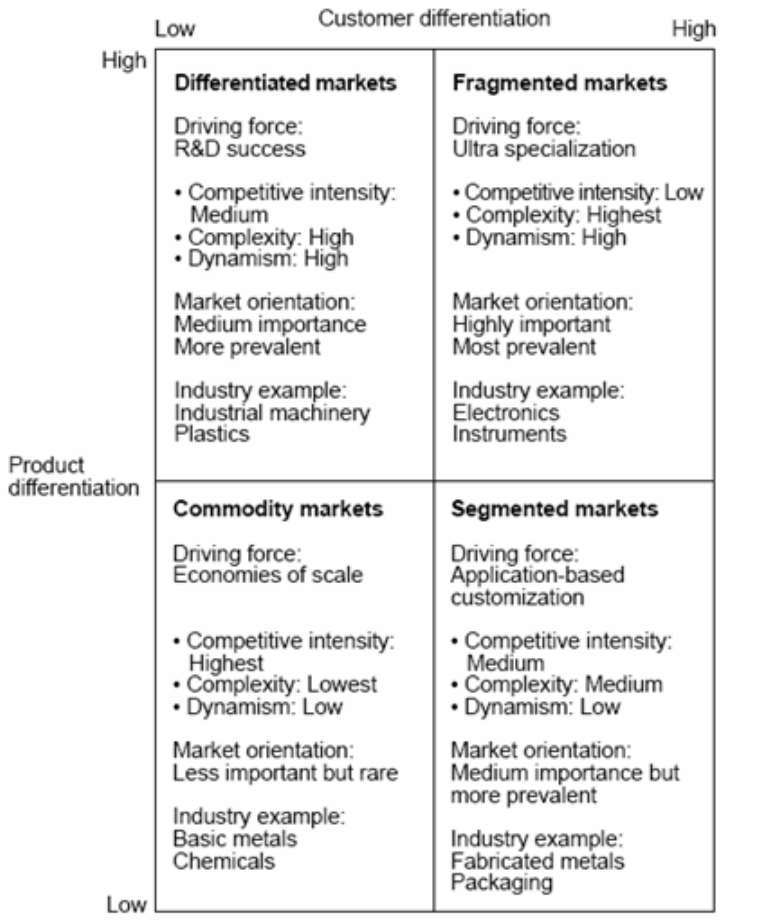
2.5.1 Defining market orientation of commodities

In conducting market research in a specific industry or sector, it is important to determine the level of importance of market orientation for each type of industry.

Groups of customers are considered differentiated if their needs and buying behaviour and motives are different and/or segmented. Products are considered differentiated if customers perceive differences in the features and attributes of the competitive products. A commodity market can therefore be defined as an industry with a relatively low product differentiation and low customer differentiation.

Sheth (1985) provides a useful diagram (See Figure 6) that indicates how different industries relate to product- and customer differentiation and the significance of market orientation.

Figure 6: A model of determinants of industrial competitive structure with expected levels of environment characteristics and market orientation.



Source: (Sheth, 1985)

Also included in this matrix is the level of competitive intensity, complexity and dynamism (change in technology and customer needs) for each type of industry.

In the quadrant named commodity markets, it is expected that a product focus on low cost would be a more significant competitive advantage compared to market orientation. This is based on the notion that a low product and customer differentiation provides for an easier understanding of consumers needs (Sheth, 1985).

However, Day & Wensley (1983) propose that a completely price determined market orientation has its drawbacks, even in a commodity market. Focus on cost reduction may obscure potential product differentiation opportunities and draws attention away from changes in market segmentation and customer requirements.

Besides focussing solely on cost, a company may also look towards building customer relationships and building on customer loyalty. This strategy may be especially relevant to smaller commodity product companies where they have less potential to take advantage of economies of scale and brand differentiation may become a competitive advantage (Day & Wensley, 1983).

Research has found that brand equity does exists in industrial markets in terms of buyers' willingness to pay a premium for a recognised and trusted brand, the recommendation of the brand and the willingness to extend to products with the same name (Hutton, 1997).

Therefore, in a commodity market an effective- and well-managed branding strategy may result in product differentiation in a market that can essentially not be differentiated on price. Branding therefore provides and alternative to commoditisation as it moves the buying decision away from purchasing solely on price (Gupta, 2002).

In the South African fuel retail industry however, the price of fuel is regulated by the government and is fixed for all competitors and therefore the fuel price has no impact on the consumer's buying behaviour.

In addition, according to Sheth's model (Sheth, 1985), by adding a number of value-adding services to the fuel retail station (such as convenience stores) and attempting to differentiate the fuel product by the addition of performance-enhancing additives, the fuel retail industry is moving away from operating in a purely commodity environment towards differentiated markets with an increase in product

differentiation. In such a differentiated market environment, research and development is defined as the driving force.

It can therefore be argued that in the new “diversified” fuel retail industry, market research is crucial in understanding the consumer’s needs and that the market orientation of this industry is becoming more important.

2.5.2 Corporate branding in a commodity environment

Argenti & Druckenmiller (2004:369) defines a corporate brand as a brand that “…spans an entire company (which can also have disparate underlying product brands),” and “conveys expectations of what the company will deliver in terms of products, service and customer experience”.

Organizational buyers who purchase commodity items are primarily concerned with the company’s overall brand identity, rather than with the specific product they want to buy and will value the perceived image of the company over that of product specifications (De Chernatony & McDonald, 1998). Aaker (1996) also confirms that a corporate brand is often used to provide credibility of the service or product being endorsed. This concept may also be applied to the purchase of fuel by private individuals, as the image of the company may be perceived as more important than the fuel specifications.

The second advantage of corporate identity is that it sustains a real point of differentiation in that the point of difference is based on an emotional, rather than a functional discriminator. Buyers normally perceive this differentiation as providing extra value (De Chernatony & McDonald, 1998).

Lastly, a corporate identity that is trusted by the consumer is much harder to copy and technical product developments and/or product diversification (De Chernatony & McDonald, 1998). Strong, corporate brands are therefore important assets to companies, especially where consumers are overwhelmed with choices. As the selling channels of companies broaden, a strong corporate brand can provide cohesiveness and lend credibility to new products and ventures (Argenti & Druckenmiller, 2004).

2.6 MARKET SEGMENTATION FOR COMPETITIVE BRANDS

2.6.1 Principles of segmentation

Kotler (2003:279) defines a market segment as a "…group of customers who share a similar set of wants". Market segments can be identified by examining demographic, psychographic and behavioural differences among buyers (Kotler, 2003).

The concept of market segmentation was developed in economic theory to show how a company selling a homogeneous product in a market characterised by heterogeneous demand could maximise profits (Claycamp & Massy, 1968). This concept is based on the principle that profits could be maximised by consumers' differential responses to price or promotional variables so that the overall profits achieved from the identified segments is maximised.

However, there are a number of problems if marketers wish to practically apply market segmentation: a critical mass of consumers is required to populate a particular market segment as it is rarely possible to pinpoint promotional efforts to specific customers. In addition, marketers still have to rely on broad-based, standard promotional vehicles, such as advertising media with predetermined audience characteristics, even if a specific market segment is targeted (Claycamp & Massy, 1968).

In isolated cases, market segmentation based on price differentiation is not possible due to pricing regulations (for example the fuel retail industry).

2.6.2 Brand segmentation

Brand segmentation relates specifically to how far directly competing brands differ to what population subgroups they appeal to.

There appears to be no published examples where different brands have shown to appeal to different population subgroups (Hammond, 1996) and no striking general instances of brand segmentation have been reported.

Qualitative analysis may indicate that there are a wide variety of individual preferences regarding brands, however, the issue is whether or not these groupings of individuals make up significant and sizeable subgroups who consistently prefer specific brands compared to similar ones (Hammond, 1996). Kassarjian and Sheffet (1991) also claim that if brand correlations do exist with specific 'personality' or demographic variables, they are generally insignificant and therefore meaningless.

To support this argument, research conducted by Hammond (1996) across 23 grocery categories in four different countries has yielded no evidence of strong market segmentation (mainly demographic) between competitive brands.

Proposition 4: There is little or no relationship between fuel brand preference in South Africa and demographic segmentation or personality variables

3. RESEARCH PROPOSITIONS AND HYPOTHESES

Based on the literature review and to be able to provide insight into the research problem and sub-problems, the following propositions and hypothesis are to be tested:

Hypothesis 1: There is a significant difference in the degree of importance the South African private fuel consumer attaches to brand, location, fuel specification, quality of convenience store and level of forecourt service of when rating a fuel retail station preference

Proposition 1: The South African consumer considers fuel quality as insignificant and rates the brand and image of the fuel retail outlet as more important.

Proposition 2: Value-adding services at fuel retail stations (such as convenience stores and improved customer service) are more important than branding in the South African consumer market.

Hypothesis 2: There is a significant difference in the mean part worth utilities attributable to (a) different brands of fuel retail stations, (b) at different locations, (c) with differing levels of fuel quality, (d) with differing quality of convenience stores and (e) with differing levels of service

Proposition 3: Customers who are perceived as brand loyal make up a relatively small portion of the consumer base.

Hypothesis 3: There is a significant difference in the preference of consumers (a) visiting during peak and off-peak times, (b) with differing visitation frequencies, (c) age, (d) sex, (e) race, (f) type of purchase and (g) type of vehicle

Proposition 4: There is little or no relationship between fuel brand preference in South Africa and demographic segmentation or personality variables

Hypothesis 4: Cluster membership is dependent on consumers (a) visiting during peak and off-peak times, (b) visitation frequencies, (c) age, (d) sex, (e) race, (f) type of purchase and (g) type of vehicle

4. RESEARCH METHODOLOGY

The data obtained by means of a questionnaire was analysed by primarily using conjoint analysis measuring the respondent's relative preferences associated with attributes of a fuel retail station.

Adequate demographic information of the respondents was also collected to determine if specific demographic groups consider branding to be more important when compared to other attributes and if certain population "clusters" exists with regards to brand importance. The objective of cluster analysis is to separate respondents into groups so that homogeneity is maximised within the groups and heterogeneity is maximised between the groups (Beane & Ennis, 1984).

4.1 RESEARCH METHOD

4.1.1 Quantitative vs. qualitative approach

At a most basic level, research techniques can be divided into two approaches: qualitative and quantitative.

The qualitative research approach is related to people's meanings and interpretations since the researcher is trying to reconstruct the subject's reality or make certain deductions regarding human phenomena. In this case, the respondent's truthfulness and objectivity is critical to the credibility of the research (Creswell, 1994).

Descriptive quantitative research can be defined as a type of research that involves "…either identifying the characteristics of an observed phenomenon or exploring possible correlations among two or more phenomena" (Leedy & Ormrod, 2003: 191).

Quantitative research is typically applied to explain, predict and answer questions regarding correlations or relationships between measured variables. Such an analysis typically results in the confirmation or rejection of hypotheses that were identified and tested (Leedy & Ormrod, 2003).

Therefore, quantitative research is most often deductive, in other words, it tests a certain pre-defined theory. Qualitative research can be considered inductive as the research often implies or generates theory.

Quantitative analysis was employed as the research methodology for this study.

4.1.2 Conjoint analysis overview

Conjoint analysis is based on a decompositional approach in which respondents respond to various preferences of products, brands, concepts etc. This is achieved by evaluating the object based on a combination of predetermined attributes in a systematic manner (Dillon, Madden & Firtle, 1987). In this analysis approach, the researcher asks the consumer to make certain judgements about a product or service, each with a predefined set of attributes, and then uses mathematical decomposition to determine the consumer's value system behind the preferences made. Conjoint analysis therefore provides a quantitative measure of the relative importance of different attributes against each other (Aaker *et al.*, 2005).

The respondent is typically presented with realistic trade-off scenarios that combine a number of attributes. In this way, the respondent is forced to make difficult tradeoffs so that individual attribute preferences may be inferred from the scenario choices (Dillon *et al.*, 1987).

For each attribute, a number of levels are selected to describe the various attribute options. Each level should be mutually exclusive and have an unambiguous meaning.

Therefore, conjoint analysis aims to attach a weight (i.e. "utility") to the individual attributes to indicate how influential each attribute level (or groupings of attribute levels in one concept) is in the consumer's overall evaluations (Dillon *et al.*, 1987).

Conjoint analysis further incorporates an element of realism as respondents are forced to consider attributes simultaneously, as opposed to two at a time. This can be considered strength of this specific analysis methodology and is important when attributes are compared with each other (Dillon *et al.*, 1987). In addition, conjoint analysis can be applied even with small sample sizes and non-parametric tests can be carried out.

4.1.3 Conjoint analysis design

Two basic approaches can be selected when deciding on the number of scenarios used for the conjoint analysis: a "full factorial" approach or a "fractional" approach.

For a full factorial approach the respondent is asked to rank each combination of levels of attributes; therefore all possible combinations are presented (Aaker *et al.*, 1995). However, this is a very lengthy and tedious approach due to the potentially

large number of possible combinations and it is seldom required to obtain all parameters to model consumer behaviour.

For this research, a fractional factorial approach was applied so that only a limited number of the full factorial scenarios are selected that will permit efficient estimation of the attributes. This fractional factorial, embeddable in a full factorial design, permits one to estimate all main effects.

In addition, the following types of conjoint tasks can be used to determine how the respondent will rank or weigh the specific attributes:

- Pairwise comparison: respondents are asked to compare two hypothetical fuel retail stations and rate their preference according to a set scale. However, for this task, the respondent is required to evaluate double the quantity of information when making a single selection or preference.
- Single concept ranking: respondents are asked to sort the hypothetical fuel retail stations from most to least preferred. This is only practical when a limited number of scenarios have to be evaluated.
- Single concept rating: respondents are provided with one fuel retail station scenario at a time and are asked to rate how likely they would be to visit such a fuel retail station.

For this research, a single concept rating methodology was selected as this would be the simplest and fastest ranking method, when compared to the other conjoint tasks.

4.1.4 Conjoint analysis attributes and levels

The following attributes and levels were selected for this research (See Table 2). The number of levels per attribute was kept relatively equal (either 3 or 4 levels) as to minimise any excessive duplication of levels in the fuel station scenarios presented and ensure that each hypothetical fuel retail station description is sufficiently different from the next one.

It can be assumed that any excessive duplication of levels would be easily identified by the respondent and his/her preference rating may be exclusively based on these repetitive or easily recognisable levels.

The recommended number of conjoint tasks was given as 15 and the absolute minimum number of tasks was given as 12. Due to the typical time constraints at a fuel retail station, it was decided to use 12 single conjoint tasks.

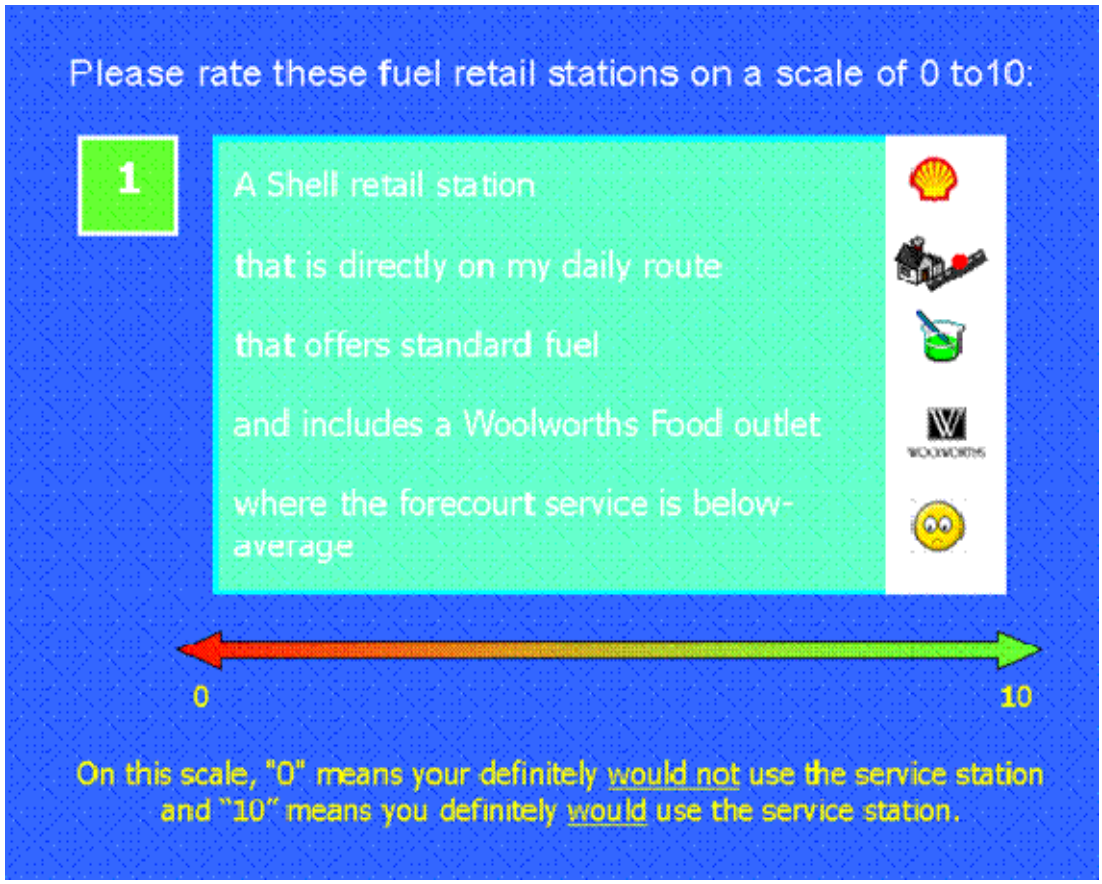
Table 2: Attributes and utilities selected for conjoint analysis

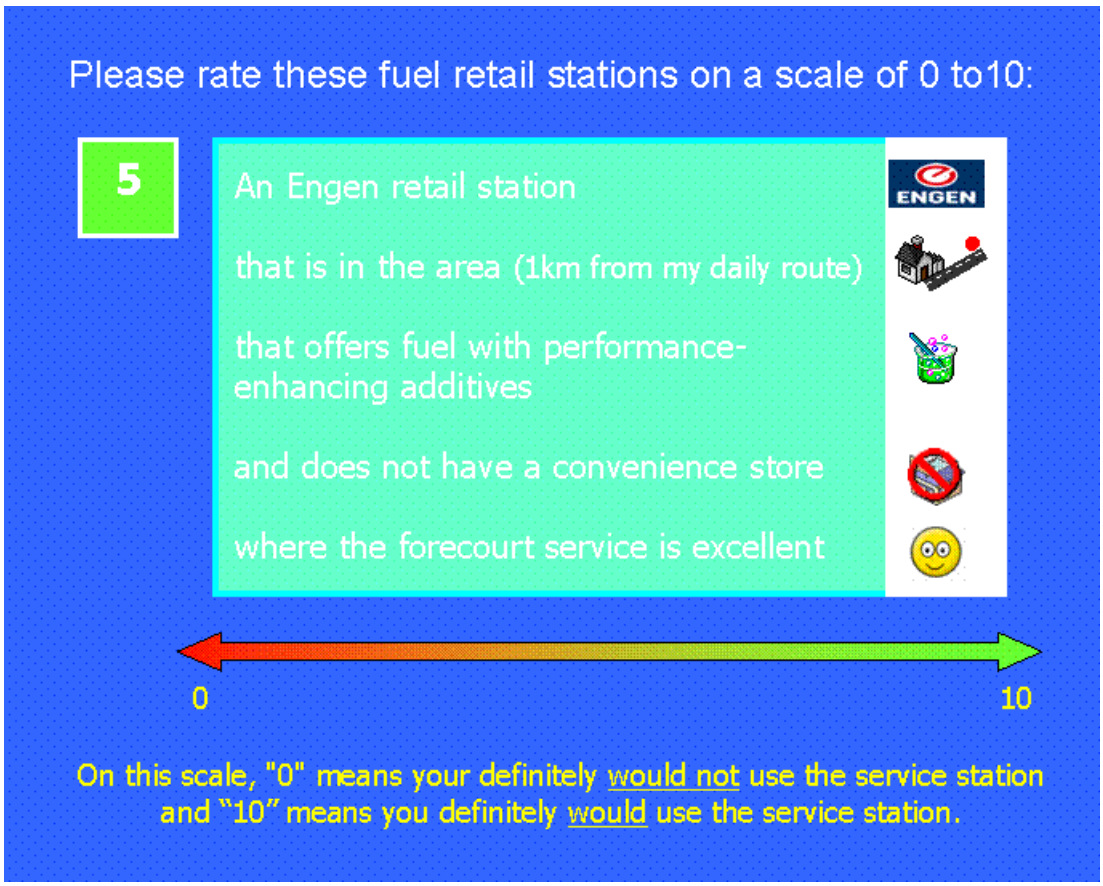
No	Attribute	Levels
1	Brand	*1. BP* *2. Engen* *3. Caltex* *4. Shell*
2	Location	*1. on my route between home and work* *2. in the area (within 1km from my route from home to work)* *3. out of my way (further than 2km away from my route from home to work)*
3	Fuel specifications	*1. fuel with performance-enhancing additives* *2. standard fuel*
4	Convenience store	*1. high quality convenience store (example Woolworths)* *2. basic convenience store (example Shell Select)* *3. not available*
5	Service	*1. excellent service* *2. average service* *3. below-average service*

A 10 point interval level scale was selected to provide the respondent with enough means of differentiation between the hypothetical fuel retail stations.

Due to the fact that the combination of 5 attributes may be overly complex and confusing to the respondent, the hypothetical fuel retail stations were visually displayed with symbols for easy recognition (See Figure 7 for two examples of the 12 hypothetical fuel stations that were presented for inspection and rating).

Figure 7: Examples of respondent's questionnaire





4.1.5 Demographic segmentation

The following demographic groups were identified and captured in the research to determine if any correlations exist between fuel retail station attribute preferences and demographics:

- Age, since younger respondents may have different perceptions regarding the importance of branding
- Sex, since men and woman may, for example, rate the value of a convenience store and forecourt service differently.
- Race, since recent research suggests that the use and perception of brands differ considerably across cultures (Aaker & Schmitt, 1997, cited in Belen del Rio, Vazquez & Iglesias, 2001).
- Type of fuel purchase, since purchasers of petrol may regard fuel specifications as more or less important when compared to diesel purchasers
- Type of vehicle, which may be associated with personal income and differentiate the perceptions of respondents.
- Time of visit, which is divided in peak and off-peak times since respondents travelling at peak traffic hours may be more inclined to visit fuel retail stations that is situated in a convenient location. Off-peak time will be defined as between 9am and 4pm on weekdays.
- Frequency of visits, since respondents that use fuel retail stations frequently may be more or less brand loyal.

The demographic information was also used to identify certain specific consumer clusters with regard to fuel retail station preferences.

4.2 RESEARCH POPULATION AND SAMPLE

4.2.1 Research population

The population comprises all South African consumers who purchase fuel (petrol and diesel) in a private capacity at fuel retail stations.

4.2.2 Sampling methodology

Convenience sampling was used to collect questionnaires. The selection of respondents included private consumers visiting 4 fuel retail stations in the Rivonia and Morningside areas.

Leuthesser *et al*. (1995) recommends that the brands analyzed should be well-known by the consumer and this is certainly the case. For this reason, the following fuel retail brands were selected for the research: Engen, BP, Shell and Caltex. These fuel retail brands represent the top four market share in South Africa, comprising 78.3% of petrol market share during 2002 (See Table 1).

The four fuel retail stations are situated within a distance of 3.9km from each other, on the same road, of which the BP and Engen fuel retail station are directly opposite each other. On the same road, or within 1 block adjacent to Rivonia Road, there are a total of eight fuel retail stations (this includes the four fuel retail stations selected for the research). This scenario was selected to minimise the effect of distance and location convenience on the research.

It is assumed that branding and other attributes (for example level of forecourt service and the quality of convenience stores) may be a significant factor in selecting one of these fuel retail stations compared to typical attributes, such as location. It is therefore assumed that specific location would be a less significant factor in deciding which service station to visit as a number of stations will be available in the same vicinity.

4.2.3 Sample size

A total number of 300 questionnaires were collected (75 questionnaires per fuel retail station). A total of 6 records had to be removed from the sample since the respondents used the same preference rating for all fuel retail station. There were 294 valid responses for the conjoint analysis in total.

4.3 DATA COLLECTION

4.3.1 Method

The data required for this research was collected by means of a physical questionnaire handed to the respondents visiting the fuel retail stations. The questionnaires were completed by customers filling up their fuel tanks. No incentive was provided for completing the questionnaire.

The questionnaire included 12 hypothetical fuel retail station descriptions based on the relevant fuel retail station attributes, namely brand, location, quality of the convenience store, fuel specification and quality of forecourt service. The fuel retail station combinations were prepared using Sawtooth Software SMRT (Sawtooth Software, 2002). The respondent was required to rate each scenario presented from 0 to 10 in terms of preference.

In addition, the respondent was asked a question relating to his/her perception of his/her own brand loyalty as well as his/her age.

Two data capturers were utilised to acquire the relevant data: the first data capturer provided the respondent with the descriptions of the hypothetical fuel retail stations and noted down the preferences. The first data capturer also noted the answer to the brand loyalty question and the respondent's age.

The second data capturer was used to note down the relevant demographic information per respondent (note that age was captured by the first data capturer). The demographic details captured by the second data capturer were:

- sex
- race
- type of purchase
- type of car
- time of visit
- frequency of visits

All of the questionnaires were completed on weekdays and included peak as well as off-peak times.

The Questionnaires completed by the two data capturers are included in Appendix A: Questionnaire.

4.3.2 Questionnaire administration

The researcher made use of a private research sourcing and administration company: Research in Action, for the completion of the questionnaires. The data capturers and supervisor for this research was sourced and managed by Research in Action. The names and contact details of the respondents were also captured and

the supervisor performed a back-check of 20% of the completed questionnaires to check for accuracy, consistency and completeness.

The researcher was responsible for transcribing the data on the questionnaires into Microsoft Excel.

4.4 VALIDITY AND RELIABILITY

4.4.1 Internal validity

Leedy and Ormrod (2001:103) define internal validity of a research study as the "extent to which its design and the data that it yields allow the researcher to draw accurate conclusions about the cause-and-effect and other relationships within the data".

Conjoint analysis has been widely accepted in the industry and there are several indications that the model has a substantial level of validity. Therefore conjoint analysis is a valid application in market research (Aaker *et al.*, 1995).

For this research study, the following factors were considered to ensure that a high measure of internal validity was obtained:

- A pilot test was conducted to ensure that the questionnaire was well understood and clear to the respondents;
- Sampling was conducted during peak- and off-peak times during weekdays to ensure that the demographics of the respondents were not skewed.
- The respondents were requested to participate in the research on a voluntary basis and no incentive is offered. It is assumed for the purposes of this study, that there is no significant preference difference between people who agree to fill in the questionnaire and those who decline.
- Only people filling up their tanks with fuel were asked to participate in the survey (and not people visiting convenience stores, ATMS only). Therefore, people who do not regularly use petrol stations to buy fuel (for example passengers buying bread and milk) were excluded from the survey.

4.4.2 External validity

Leedy and Ormrod (2001:105) define external validity of a research study as the "extent to which it's the conclusions drawn can be generalized to other contexts".

It may be argued that the results obtained from a small sample of fuel retail stations in Rivonia, Johannesburg, may not be directly applied to the rest of South Africa's consumers in other regions. However, this research study attempts to indicate typical consumer preferences regarding fuel stations in residential areas where location may not be the primary driver for fuel station selection. Therefore, the research should have a measure of external validity.

Convenient sampling could also lead to some bias, however, the size of the sample (300) and the use of four different fuel retail stations assisted in addressing this potential bias.

4.4.3 Reliability

Leedy and Ormrod (2001:98) define reliability of a measuring instrument as the "extent to which it yields consistent results when the characteristics being measured hasn't changed".

The results of the study may be considered reliable as the respondents were required to complete the survey in an actual and real setting (i.e. at the fuel retail station) and therefore no artificial situation was created.

The reliability of conjoint analysis has been studied on a number of occasions and in general, the reliability of this analysis has been found to be high. However, some research has found that reliability may fall as the number of attributes is increased. (Aaker *et al.*, 1995). For this research, the number and level of attributes were limited to increase reliability.

4.4.4 The pilot test

Leedy and Ormrod (2001) recommend that a pilot test be carried out to test the validity and reliability of the research method. For this reason, a sample of 4 respondents was surveyed as part of a pilot test.

The results of the pilot tests resulted in the following changes to the questionnaire and research method:

- The actual branded convenience store names were included in the questionnaire, for example Shell Select and Engen Quick Shop (as opposed to only referring to "convenience store").
- The attribute description "service" was replaced with "forecourt service" to differentiate forecourt and convenience store service.

- Visual representations of the fuel retail descriptions were created to reduce the complexity of the questionnaire (See Figure 7)
- Additional demographic categories were includes, for example “not sure” and “it varies”, to capture all possible responses.
- Some of the questionnaire wording was simplified and corrected to eliminate any possible ambiguities and to make the questionnaire more “user-friendly”.

In addition to the above information, the pilot test was also used to determine how long it would take to carry out the actual survey (5 minutes).

4.5 DATA ANALYSIS

4.5.1 Fuel retail station attribute preferences

The preferences relating to the fuel retail stations were transcribed into Microsoft Excel and then imported into Sawtooth Software SMRT (Sawtooth Software, 2002) to determine the conjoint importances for the selected attributes and part worth utilities for the selected levels. The importances and part worth utilities were calculated using the method of ordinary least squares. This is an appropriate statistical technique for analysing interval level conjoint data.

The conjoint importances were presented so that the sum of the importances of all attributes would equal 100. This would allow for the possibility to make conclusions regarding the relative importance of each fuel retail station attribute and provide ratio level conjoint importances for further analysis.

The conjoint part worth utilities were calculates using zero-centred differences so that the sum of all part worth utilities would equal 0 and provide interval level part worth utilities.

The conjoint importances and part worth utilities were imported into Number Cruncher Statistical Systems (NCSS) and a number of non-parametric test were carried out on the data due to the non-normality of the distributions. These tests are provided in Table 3.

Due to the exploratory nature of the research, a significance level (α) of 5% was selected for all hypothesis test carried out.

Table 3: Hypothesis test selected for analysing conjoint data

Hypothesis/Proposition	Data	Hypothesis test(s)
Hypothesis 1	Conjoint importances	Friedman's ANOVA by ranks Kruskal-Wallis ANOVA Bonferroni Multiple Comparison test
Proposition 1	Means of conjoint importances	Not applicable
Proposition 2	Means of conjoint importances	Not applicable
Hypothesis 2	Conjoint utilities	Friedman's ANOVA by ranks Pearson's rank correlation coefficient Wilcoxon signed-rank test
Hypothesis 3	Conjoint importances and utilities; demographics	Pearson's rank correlation coefficient Aspin-Welch unequal variance t-test Kruskal-Wallis ANOVA
Proposition 4	Means of conjoint importances; demographics	Not applicable
Hypothesis 4	Cluster membership; demographics	χ^2 test of independence; Kruskal-Wallis ANOVA

4.5.2 Perceived brand loyalty

Descriptive statistics were used to determine the perceived brand loyalty of the sample (Proposition 3).

4.5.3 Demographic information

Descriptive statistics were used to analyse the demographic data captured in the questionnaire.

Chi-square tests were used to determine if there were any significant differences in the demographic profile of the identified clusters.

5. PRESENTATION OF RESULTS

5.1 SUMMARY OF SAMPLE DEMOGRAPHICS

The survey sample comprised of predominantly males (65%), who visit fuel retail stations more than once per week (61%) and drive average vehicles (55%) and luxury vehicles (19%), with the largest proportion of the respondents being white (67%).

A total of 83% of the respondents in the sample purchased petrol at the fuel retail station, with the balance made up of diesel.

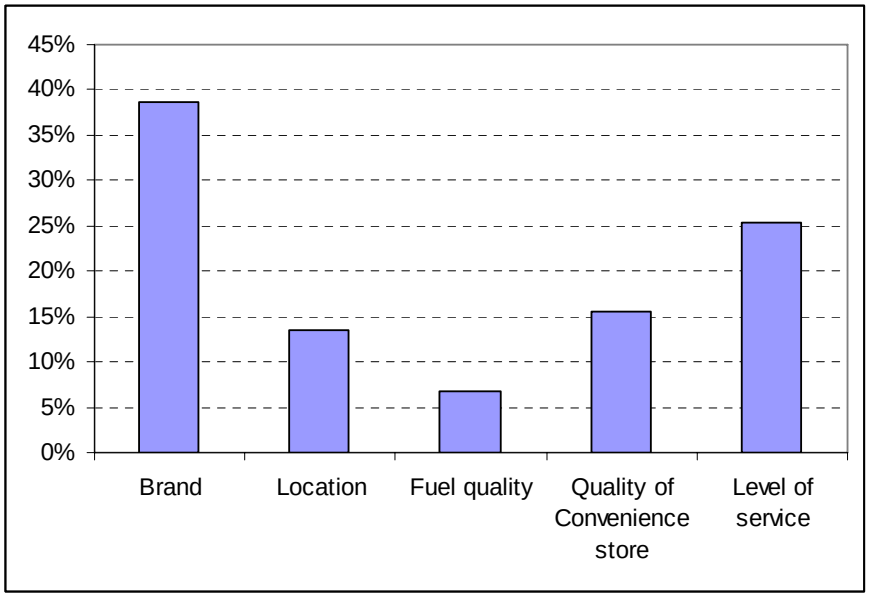
The median age of the respondents was 38. The youngest respondent was 20 and the oldest was 86.

The detailed breakdown of the demographics of the sample is provided in Appendix B: Sample demographics.

5.2 OVERALL IMPORTANCE OF THE FUEL RETAIL STATION ATTRIBUTES

The conjoint importances for the attributes relating to fuel retail station preference are provided in Figure 8.

Figure 8: Overall conjoint importances*



*See Appendix C: Hypothesis tests for Importances for full ANOVA reports

From Figure 8 it is evident that brand by far the most important factor with regards to fuel retail station preference at 38.6%. The level of forecourt service (25.5%) was

also found to be a substantial feature relating to the attractiveness of a specific fuel retail station. The quality of the convenience store (15.6%) and the location of the fuel retail station (13.5%) had a lesser effect, whilst the fuel quality provided at the station (6.7%) was not found to be a substantial deciding factor when rating a fuel retail station.

The results of the various hypothesis tests to determine the significance of the means of the conjoint importances are included in Table 4. The Friedman's test is a nonparametric analysis that may be performed on data from a randomized block experiment. It is used when the assumptions of normality and equal variance are suspect.

Table 4: Hypothesis tests for significant differences in importances*

Statistical test	**Test statistic**	**Degrees of freedom**	**p-value**
Friedman's ANOVA by ranks	Q = 337.31	4	<0.0001
Kruskal-Wallis ANOVA by ranks	H = 390.37	4	<0.0001
Bonferroni Multiple Comparison test	z>1.96, except for Service-Location combination (1.9596)	n/a	

*See Appendix C: Hypothesis tests for Importances for full ANOVA reports

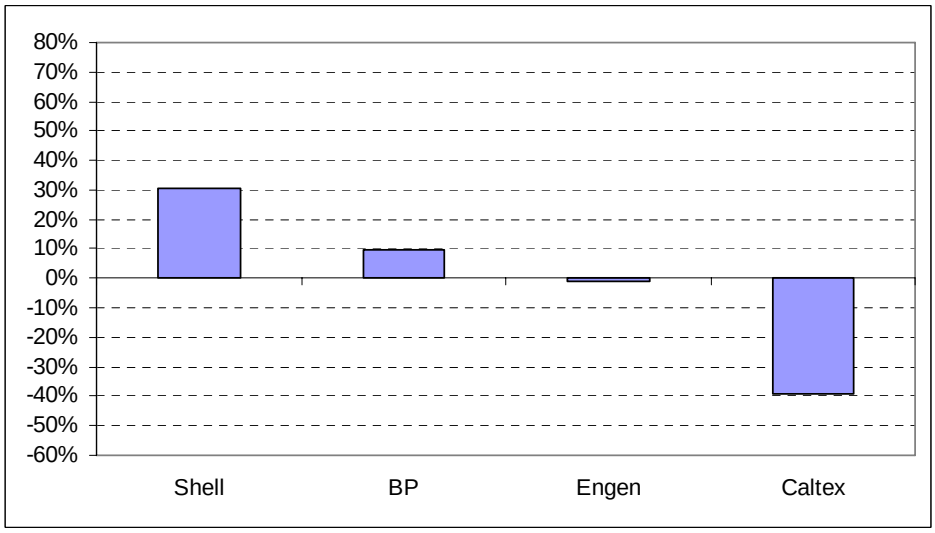
From the hypothesis tests it is concluded that there is a significant difference associated between the importances associated with brand, location, fuel specification, convenience store and service when assessing fuel retail station preferences. However, the Bonferroni Multiple Comparison test between the mean for location and service failed just under the required significance specification of α=5%. This indicates that the importance for location and service could not be adequately differentiated.

5.3 PART WORTH UTILITIES OF THE FUEL RETAIL STATION ATTRIBUTES

In the following figures, the mean is equal to zero and therefore positive part worth utility values indicate that the utility levels are considered above average and negative values indicate that the utility levels are below average.

The conjoint part worth utilities for level of "brand" relating to fuel retail station preference are provided in Figure 9.

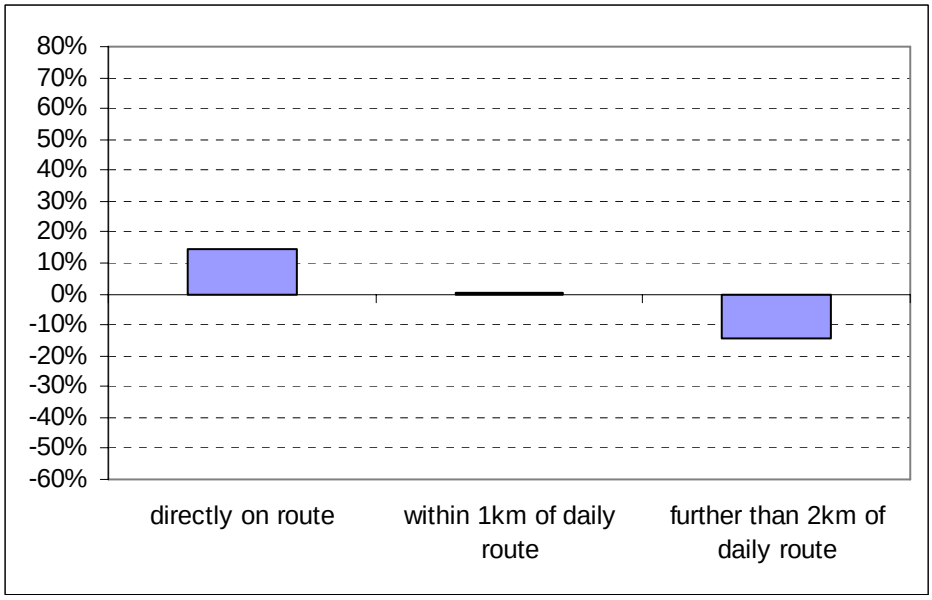
Figure 9: Overall part worth utility for Brand



From Figure 9 it is clear that out of the four fuel retail brands selected for this research, the Shell brand was considered the most preferred. There is a measure of indifference to the BP and Engen brands, but the Caltex brand was considered the least popular of the brands.

The conjoint part worth utilities for level of "location" relating to fuel retail station reference are provided in Figure 10.

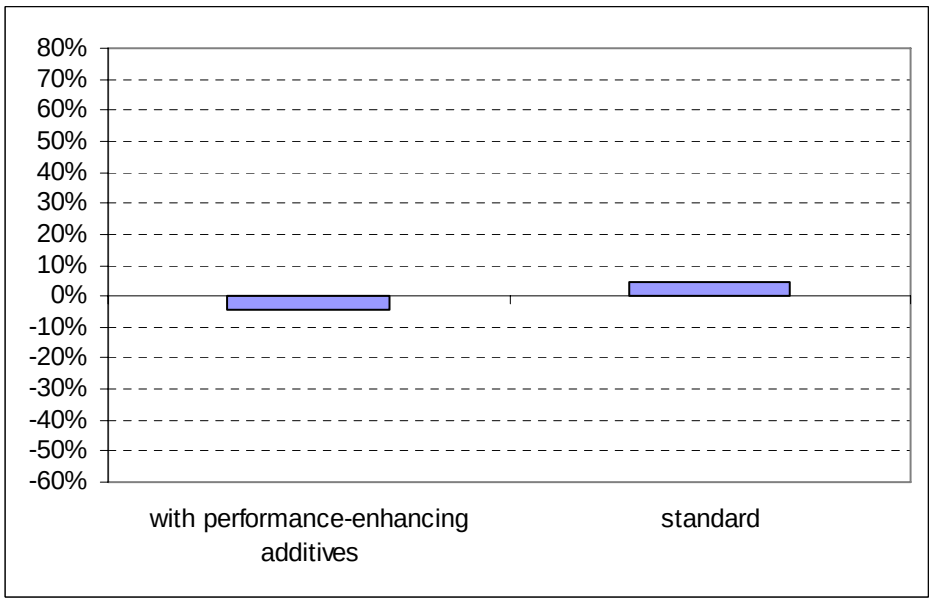
Figure 10: Overall part worth utility for Location



From Figure 10 it is evident that there is a positive association with fuel retail stations that are directly on the respondent's route between home and work. There is a negative association with fuel retail stations that are some way outside of the respondent's normal travelling routes.

The conjoint part worth utilities for level of “fuel specification” relating to fuel retail station reference are provided in Figure 11.

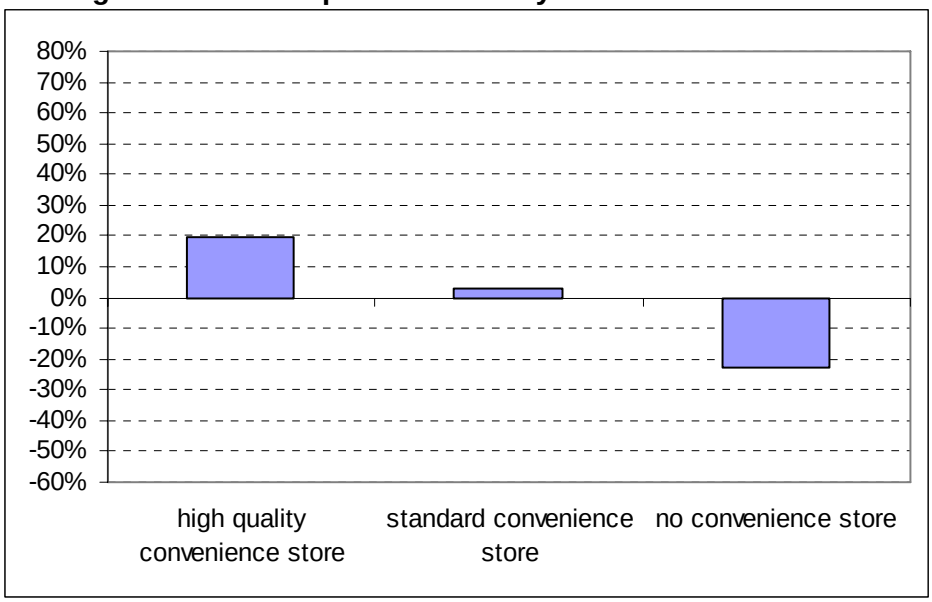
Figure 11: Overall part worth utility for Fuel specification



From Figure 11 it was found that fuel specification did not play a substantial role in determining the overall preference to a fuel retail station.

The conjoint part worth utilities for level of “convenience store” relating to fuel retail station reference are provided in Figure 12.

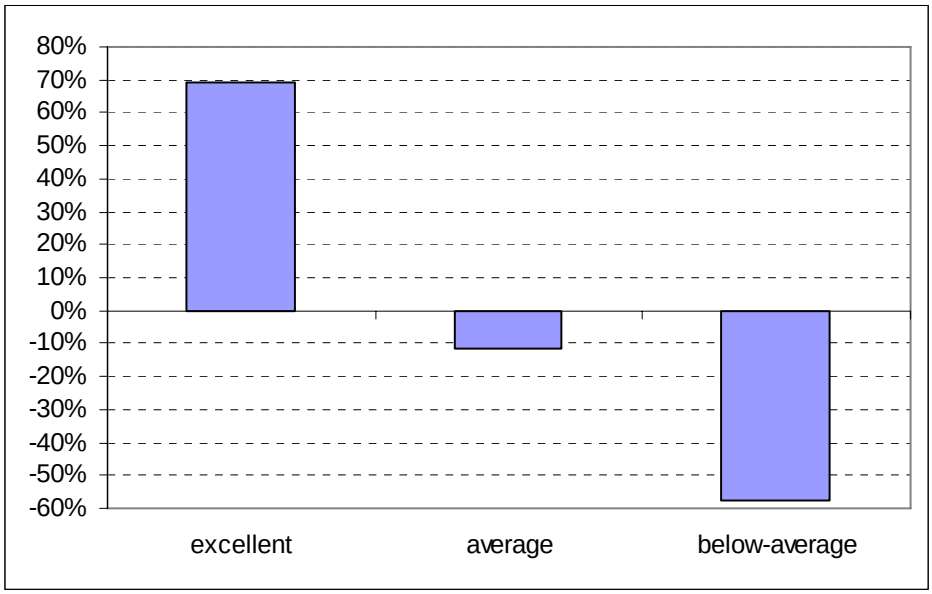
Figure 12: Overall part worth utility for Convenience store



From Figure 12 it is clear that a high quality convenience store is preferred when selecting a fuel retail station. A standard convenience store is considered with some indifference, whilst the lack of a convenience store is rated negatively.

The conjoint part worth utilities for level of “service” relating to fuel retail station reference are provided in Figure 13.

Figure 13: Overall part worth utility for Service



From Figure 13 it was found that excellent forecourt service is considered as a substantial positive determinant of a preferential fuel retail station. Average and especially below-average service was found to be significant deterrents when selecting a fuel retail station.

The results of the various hypothesis tests to determine the significance of the means of the conjoint importances are included in Table 5. From the hypothesis tests it is concluded that there is a significant difference associated between the part worth utilities associated with brand, location, fuel specification, convenience store and service when assessing fuel retail station preferences.

Table 5: Hypothesis tests for significant differences in part worth utilities*

Attribute	Statistical test	Test statistic	Degrees of freedom	p-value
Brand	Friedman's ANOVA by ranks	Q = 48.86	3	<0.0001
Location	Friedman's ANOVA by ranks	Q = 61.52	2	<0.0001
Fuel specification	Wilcoxon signed-rank test	z = 3.6488	n/a	0.0003
Convenience store	Friedman's ANOVA by ranks	Q = 70.89	2	<0.0001
Service	Friedman's ANOVA by ranks	Q = 584.50	2	<0.0001

*See Appendix D: Hypothesis tests for part worth utilities for full ANOVA reports

5.4 SEGMENTING THE MARKET

5.4.1 Differences in conjoint importances between demographic groups

A number of hypothesis tests were used to determine the significance of certain demographic groupings with regards to the conjoint importances obtained for the fuel retail station attributes. The results of hypothesis tests are provided in Table 6.

Table 6: Hypothesis tests of conjoint importances across demographic groups*

	Age Note 1	Sex Note 2	Race Note 3	Type of purchase Note 2	Type of vehicle Note 3	Time of visit Note 2	Freq. of visits Note 3
Brand	0.834	**0.014** males> females	**0.002** Indian>all	**<0.001** Petrol> diesel	**<0.001** Average> all	**<0.001** Offpeak> peak	0.735
Location	0.855	0.363	**0.049** Indian<all	0.219	0.547	0.167	0.271
Fuel specification	0.618	0.197	0.381	0.181	0.160	0.339	0.197
Convenience store	0.532	0.071	**<0.001** Coloured & white>all	0.110	**0.003** Luxury> all	**<0.001** Peak> offpeak	0.604
Service	0.816	**0.001** females> males	**0.002** White> all	**<0.001** Diesel> petrol	**<0.001** Average< all	**0.003** Peak> offpeak	0.970

1. Pearson's correlation coefficient
2. Aspin-Welch unequal variance test
3. Kruskal-Wallis one-way ANOVA

*See Appendix E: Hypothesis tests for conjoint importances per demographic grouping

The appropriate hypothesis tests have been determined by the sample size distribution and equality of variances, as indicated by the corresponding notes. Significant differences (at α = 5%) have been highlighted.

From Table 6 it can be seen that a number of significant differences exists between the demographic groupings with regards to the various conjoint importances. These significant differences are further explored in Table 7, which provide the conjoint mean utilities per demographic grouping.

Table 7: Mean conjoint importances across significant demographic groups*

	Sex	**Race**	**Type of purchase**	**Type of vehicle**	**Time of visit**
Brand	Males=41.7	Black=45.7	Petrol=41.4	Average=48.0	Off-peak=42.3
		Coloured=29.0		Luxury=26.3	
	Females=33.0	Indian=59.1	Diesel=25.3	Delivery=27.4	Peak=28.1
		White=34.3		4x4=29.1	
Location		Black=14.5			
		Coloured=17.3			
		Indian=9.5			
		White=13.5			
Fuel specification					
Convenience store		Black=13.4		Average=13.5	Off-peak=14.3
		Coloured=24.0		Luxury=18.9	
		Indian=9.6		Delivery=17.6	Peak=19
		White=16.6		4x4=16.8	
Service	Males=22.5	Black=20.6	Petrol=23.8	Average=19.5	Off-peak=23.4
		Coloured=22.6		Luxury=32.6	
	Females=31.0	Indian=15.6	Diesel=36.1	Delivery=34.3	Peak=31.3
		White=28.4		4x4=33.4	

*See Appendix E: Hypothesis tests for conjoint importances per demographic grouping

From Table 7 the following demographic preferences per fuel retail station attribute can be inferred:

Brand: is more important to males than females, as well as to Indians compared to other races. This attribute also carries more favour with customers that purchase petrol, rather than diesel and who drive average vehicles (as opposed to luxury, or

4x4 vehicles). Respondents who considers brand as an important attribute are also more likely to purchase fuel during off-peak times.

Location: is the least important attribute to Indians.

Convenience store: rated as least important to Indians. Considered as most important by respondents who drive luxury vehicles and who visit fuel retail stations during peak times.

Service: considered most important attribute by females and also by whites. Good service is also important to respondents who purchase diesel, drive luxury and 4x4 vehicles and visit during peak times.

5.5 PREFERENCE BASED CLUSTERS

5.5.1 Cluster analysis

NCSS was used to perform a K-means cluster analysis. The cluster analysis report is provided in Appendix F: Cluster analysis report.

As can be seen from the cluster scree plot in Figure 14, four clusters in the cluster analysis provide a 63.13% explanation of the variation within the data, with 36.87% of the variability in the responds data remaining unexplained. Adding a fifth cluster only increases this explanation by 5.87% and adding a sixth cluster improves the explanation by another 4.63%.

Figure 14: Scree plot of percentage of variation explained by number of clusters*

Iteration No.	No. of Clusters	Percent of Variation	Bar Chart of Percent
1	2	59.59	||||||||||||||||||
4	3	45.01	|||||||||||||
8	4	36.87	|||||||||||
10	5	31.20	|||||||||
14	6	26.57	||||||||
16	7	23.66	||||||||
21	8	21.23	|||||||
23	9	19.70	||||||
25	10	18.36	||||||

*See Appendix F: Cluster analysis report.

It is clear that a trade-off needs to be made between decreasing the number of clusters (and by implication reducing the complexity of the analysis) and increasing the variation explained by these clusters.

It is usually considered best practice to include enough clusters to account for at least 60% of the variance in the data. This would make the minimum required number of cluster equal to four.

After inspection of the data and performing the various hypothesis tests to determine significance of the differences between the clusters, it was decided to select five clusters as this proves to be an optimum point with regards to complexity and variation explained.

5.5.2 Description of the clusters based on importances and part worth utilities

The mean conjoint importances for each fuel retail station attribute are provided for the different clusters in Table 8.

Table 8: Mean conjoint importances per cluster

	Cluster 1	**Cluster 2**	**Cluster 3**	**Cluster 4**	**Cluster 5**
	Brand or bust	*Shop 'till you drop*	*Location, location, location*	*Turbo boost*	*Service with a smile*
Brand	**90.3**	20.9	22.9	**43.5**	17.4
Location	3.1	12.3	**27.6**	14.2	11.5
Fuel specification	1.5	6.2	7.0	**16.3**	4.8
Convenience store	3.2	**30.6**	14.5	14.2	16.0
Service	1.9	30.1	28.0	11.8	**50.4**
Count	61	58	58	49	68

See Appendix H: Cluster Means for Importances and Part Worth Utilities in the Fuel Retail Industry for the mean values presented in this table

From Table 8 it is evident that each clusters can clearly be recognised by one or two attribute that is of significance. For example, the respondents in Cluster 1 base more than 90% of their fuel retail selection on brand only. Other attributes, such as location, the quality of the convenience store and service do not play any role in determining the preference of these respondents in this clusters.

For Cluster 2, the quality of the convenience store is twice as important as for respondents in the other clusters. The respondents in Cluster 3 rate location more

than twice as important compared to the rest of the respondents. Cluster 4 values both brand and fuel specification and the respondents in Cluster 5 base half of their fuel retail selection on the quality of service.

A comparison of the importances for each attribute of the five clusters was carried out to determine if the differences between the clusters could be considered significant. The data is ordinal and non-normal, and therefore the Kruskal-Wallis test was used to test the hypothesis is all the means of the importances are equal for each cluster.

The results of the hypothesis tests are provided in Table 9. From this table it can be concluded that there are significant differences (within α = 5%) that there are differences in the importances across the five clusters.

Table 9: Kruskal-Wallis hypothesis tests for significant differences in importances per cluster*

Cluster	Test statistic	Degrees of freedom	p-value
1	H = 192.00	4	<0.0001
2	H = 190.37	4	<0.0001
3	H = 146.09	4	<0.0001
4	H = 197.80	4	<0.0001
5	H = 216.05	5	<0.0001

*See Appendix G: Hypothesis tests for Importances per cluster for full ANOVA reports

To evaluate the part worth utilities per cluster, the mean importances and part worth utilities are provided in graphical format in Table 10. The number of squares per importance/utility is an indication of the weight attached to the mean value.

Table 10: Mean conjoint importance and part worth utilities per cluster*

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
	Brand or bust	*Shop 'till you drop*	*Location, location, location*	*Turbo boost*	*Service with a smile*
Brand	■■■■■■■ ■■■	■■■	■■■	■■■■■	■■
BP	■■	■	■	■■	■
Engen	■	□	□	■	□
Caltex	□□□□□□ □□□□□	□□□	□□	□□□□□□ □□	■
Shell	■■■■■■■ ■■	■■	■■	■■■■■■	□
Location	■	■■	■■■	■■	■■
directly on route	■	■■	■■■■	■	■■
within 1km of daily route	□	□□	■■	■	□
further than 2km of daily route	□	□	□□□□□	□	□
Fuel specification	■	■	■	■■	■
with performance-enhancing additives	□	□	□	□□	□
Standard	■	■	■	■■	■
Convenience store	■	■■■■	■■	■■	■■
high quality convenience store	□	■■■■■■■	■■	■	■■■
standard convenience store	■	■	□	■	■
no convenience store	■	□□□□□□ □	□	□□	□□□
Service	■	■■■■	■■■	■■	■■■■■■
Excellent	■	■■■■■■■ ■■	■■■■■■■ ■	■■■■	■■■■■■■ ■■■■■■■
Average	■	□□	□□	□	□□□
below-average	□	□□□□□□ □	□□□□□□ □	□□□	□□□□□□ □□□□□□

Key:

■ Positive

□ Negative

*See Appendix G: Hypothesis tests for Importances per cluster for the full ANOVA reports.

Using the information presented in Table 8 and Table 10, certain cluster characteristics can be identified:

Cluster 1 (“brand or bust): 90% of the fuel retail station selection criteria is based on brand. The respondents in this cluster have a very strong preference towards the Shell brand and do not prefer the Caltex brand. Both the BP and Shell do not have a significant preference in this cluster.

Cluster 2 (“shop till you drop”): In this cluster, the quality of the convenience store is the primary basis of fuel retail station preference. In addition, the level of service can also be considered as significant, but secondary to the quality of the convenience store. Specifically, the inclusion of a high-quality convenience store, such as a Woolworths Food outlet is of extreme importance to the respondents in this cluster and it is expected that these respondents will specifically seek out and support fuel retail stations with such outlets.

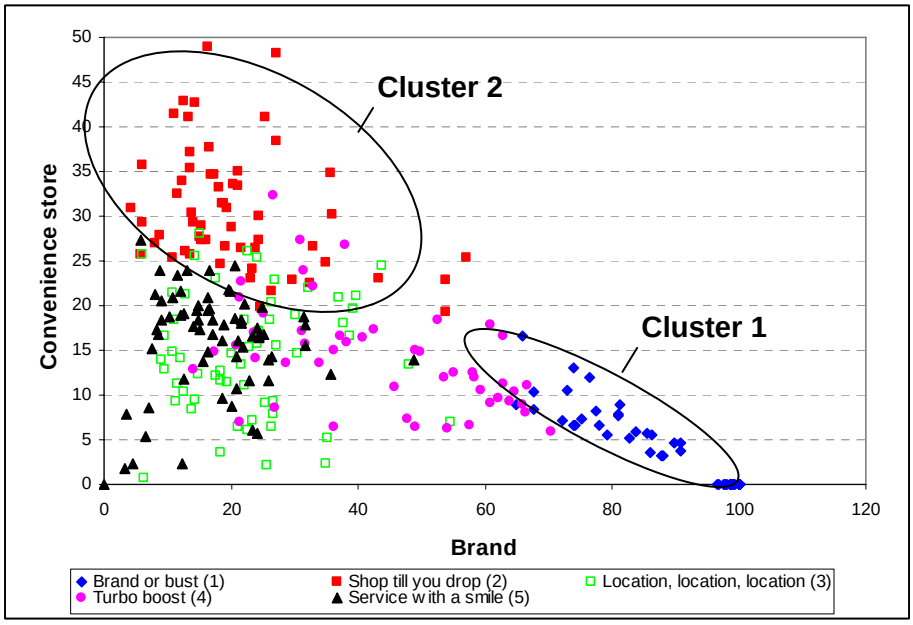
Cluster 3 (“Location, location, location”): For the respondents in this cluster, convenience is the key and location is of prime importance. It can be assumed that these customers will avoid going out of their way to visit a specific fuel retail station. For this reason, attributes such as brand and convenience store is of lesser importance. The quality of the forecourt service also has some significance to this cluster, supporting the fact that these respondents value convenience and speed.

Cluster 4 (“turbo-boosters”): Although it has been found that fuel specification is the attribute least valued by all of the respondents, this cluster places more than double the importance on fuel specification compared to all of the other clusters. In addition, these respondents also value the brand and specifically prefer the Shell brand. It can therefore be assumed that some of the respondents in this cluster specifically visit the Shell-branded fuel retail station because of the fuel quality provided at this outlet.

Cluster 5 (“service with a smile”): These respondents value quality of service and base 50% of their decision on fuel retail station preference and selection on this attribute. This cluster will actively avoid any fuel retail station that provides below-average service.

The cluster characteristics can also be inferred from the following graphs. Figure 15 indicates the different clusters and their preferences towards “brand” and “convenience store”. From this graph it can be seen that Cluster 2 (“shop ‘till you drop”) has a higher preference for a high quality convenience store compared to the other clusters.

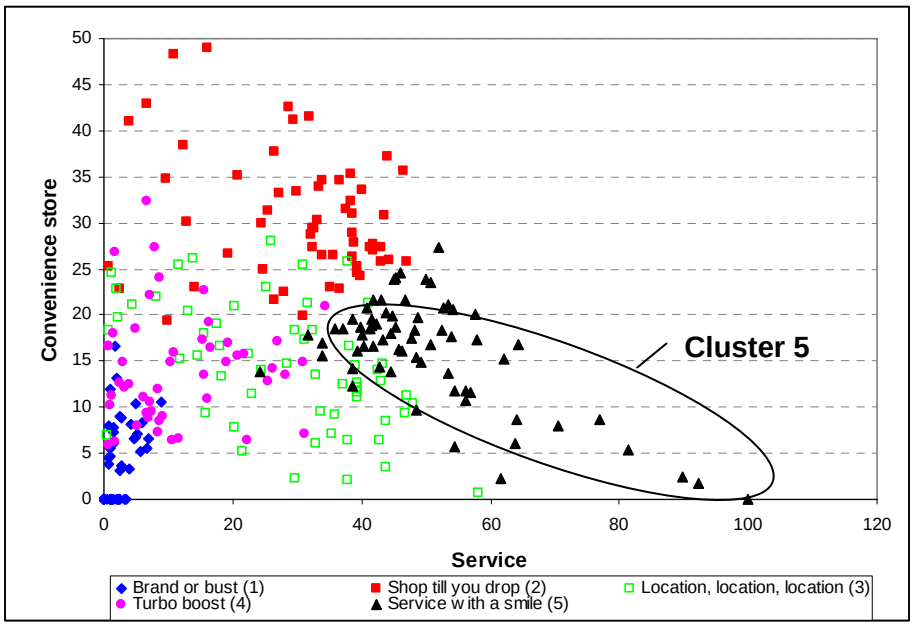
Figure 15: Mean importances for Brand and Convenience store



Cluster 1 ("brand or bust") is also clearly identified as the respondents who value brand above others.

Figure 16 provides the mean importances for the "service" and "convenience store" attributes. From this graph it is evident that Cluster 5 ("service with a smile") attaches a significantly higher importance to service compared to the other clusters. It is also interesting to see how little Cluster 1 ("brand or bust") values either the convenience store or service. For these respondents, their fuel retail station selection is based almost purely on brand.

Figure 16: Mean importances for Service and Convenience Store



The following graph (Figure 17) indicates the preferences for “fuel specification” and “brand”. It can be seen from this graph that Cluster 4 (“turbo boost”) is the only cluster that specifically values fuel specification.

Figure 17: Mean importances for Fuel specification and Brand

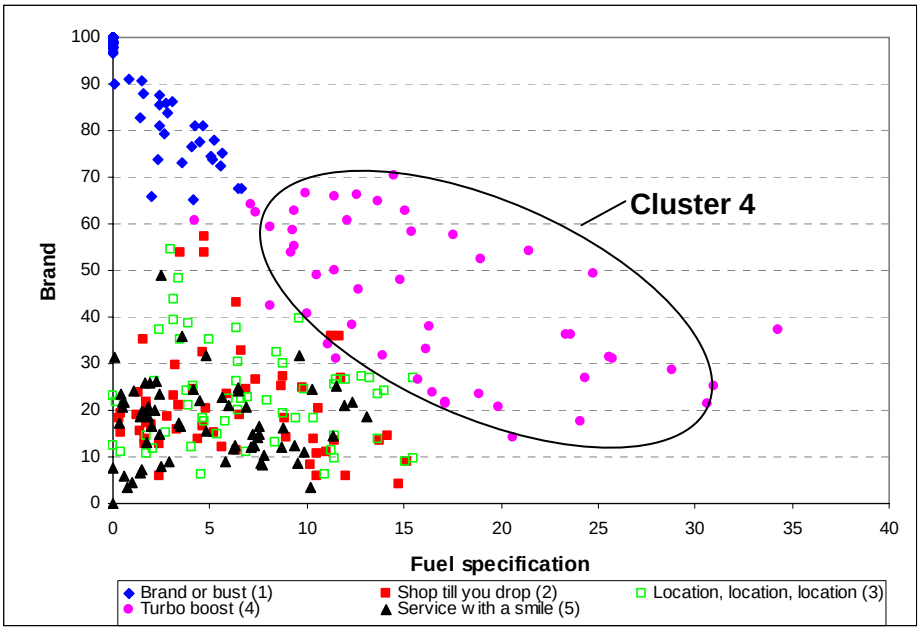
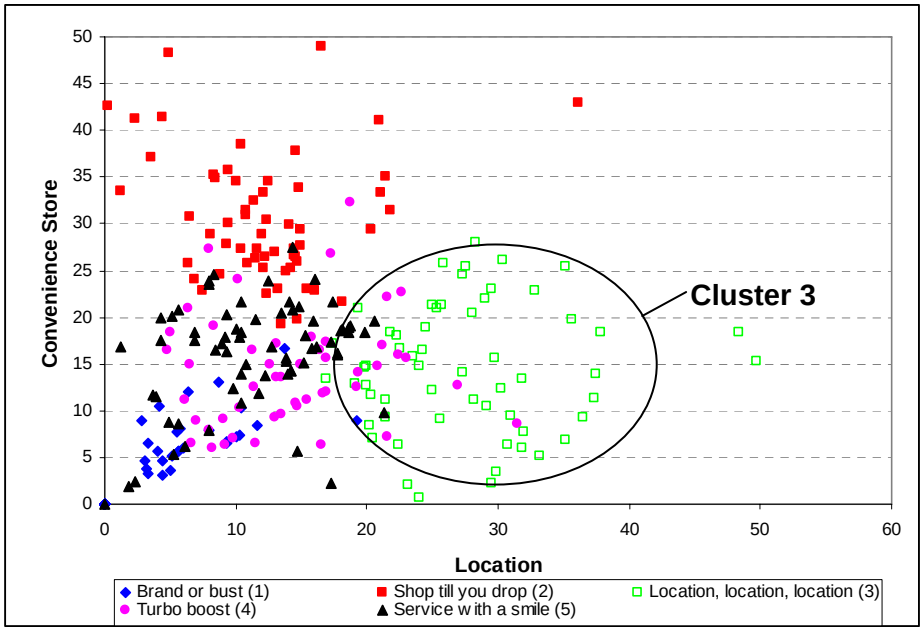


Figure 18 provides the mean importances for the “location” and “convenience store” attributes. Cluster 3 (“location, location, location”) clearly values location above the other clusters.

Figure 18: Mean importances for Location and Convenience store



5.5.3 Demographics of clusters

Chi-square tests were carried out on the various clusters to determine if there were any significant differences between the demographic groupings. To test the significance of age for all of the clusters, a Kruskal-Wallis hypothesis test was performed to test the age means for the clusters. The level of significance selected was 5%. The results of these tests are provided in Table 11. From this table it is evident that there are significant differences in sex, race, type of purchase, type of vehicles and time of visits for these clusters. These significant demographic groupings are highlighted in the table.

Table 11: Hypothesis tests of independence of clusters and demographic groups*

Demographic variable	Statistical test	Test statistic	Degrees of freedom	p-value
Sex	χ^2 independence*	χ^2 = 12.19	d.f .= 4	**0.016**
Race	χ^2 independence*	χ^2 = 32.60	d.f .= 12	**0.001**
Type of purchase	χ^2 independence*	χ^2 = 10.69	d.f .= 4	**0.030**
Type of vehicle	χ^2 independence*	χ^2 = 39.84	d.f .= 12	**<0.001**
Frequency of visits	χ^2 independence*	χ^2 = 3.39	d.f .= 8	0.907
Time of visit	χ^2 independence*	χ^2 = 23.82	d.f .= 4	**<0.001**
Age	Kruskal-Wallis**	H = 2.01	d.f. = 4	0.735

* See Appendix I: Cross-tabulations of Clusters and demographic variables and Appendix J: Hypothesis test of independence of Clusters and age

For these significant demographic groupings, the specific grouping that placed above average importances on the attributes, are highlighted in Table 12.

The result of this analysis shows that Cluster 1 (“brand or bust”) includes a higher-than-average ratio of Indian males. Females are more prominent in Clusters 2 (“shop ‘till you drop”) and 5 (“service with a smile”). It is also evident that more respondents driving luxury and 4x4 vehicles belong to these two clusters. People who visit fuel retail stations during peak times are typically in Clusters 2 and 3 (“location, location, location”) and therefore this demographic group clearly values convenience.

Table 12: Summary of primary demographic identities per cluster*

	Cluster 1 *Brand or bust*	Cluster 2 *Shop 'till you drop*	Cluster 3 *Location, location, location*	Cluster 4 *Turbo boost*	Cluster 5 *Service with a smile*
Sex	males	females	males	males	females
Race	Indian	white			white
Type of purchase	petrol				diesel
Type of vehicle	average	luxury & 4x4			luxury & 4x4
Time of visit	off-peak	peak	peak	off-peak	off-peak

*See Appendix K: Cluster demographics for a detailed breakdown of significant demographic differences per cluster sex, race, type of purchase, type of vehicle

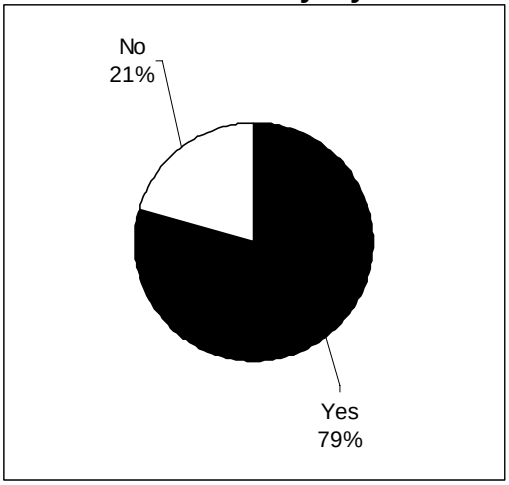
5.6 THE PERCEPTION OF BRAND LOYALTY

The respondents in the research sample were all asked the following question: "Do you always try to visit a Shell/BP/Caltex/Engen* fuel service station?"

*fuel service station selected where the research was conducted.

Of the 300 respondents, a total of 238 responded positively to the question. This means that a total of 79% of the respondents of the research sample considered themselves to be brand loyal (See Figure 19).

Figure 19: Respondents answers to question related to the perception of brand loyalty



6. CONCLUSIONS

In this section, the research findings are evaluated with reference to the hypotheses and propositions formulated in Chapter 3.

6.1 THE LEVEL OF IMPORTANCE OF FUEL RETAIL STATION ATTRIBUTES

Hypothesis 1 will be discussed in this section: There is a significant difference in the degree of importance the South African private fuel consumer attaches to brand, location, fuel specification, quality of convenience store and level of forecourt service of when rating a fuel retail station preference.

From the research conducted it was found that there is a significant difference attached to the above attributes (See Table 3 for the appropriate hypothesis tests selected and Figure 8 for the importances attached to each attributes).

The research found that private consumers questioned during this survey attached the most importance to the branding of the fuel retail station. Next to brand, the level of forecourt service was also found to be important. However, attributes such as the quality of the convenience store, the location of the fuel retail station and the fuel specification provided was considered to a lesser degree when selecting a fuel retail station. The ranking of importance per attribute and the relative degree of importance are provided in Table 13:

Table 13: Ranking of importances for fuel retail station attributes

Rank	Degree of importance
1. Brand	IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
2. Level of service	IIIIIIIIIIIIIIIIIIIIIIIIII
3. Quality of convenience store	IIIIIIIIIIIIIII
4. Location	IIIIIIIIIIIIII
5. Fuel specification	IIIIIII

Therefore, the research found adequate support for **Hypothesis 1.**

Proposition 1 proposed that the South African consumer considers fuel quality as insignificant and rates the brand and image of the fuel retail outlet as more important. From the research conducted, support was found for this proposition (See Table 13).

Proposition 2 proposed that value-adding services at fuel retail stations (such as convenience stores and improved customer service) are more important than branding in the South African consumer market. From the research conducted, support could not be found for this proposition (See Table 13). However, it was found that the South African consumer market can be divided into clusters that each value certain fuel retail station attributes. A number of clusters were found that consider value-adding services such as convenience stores more important than branding (See Table 8).

It is therefore proposed that branding, in general, is more important than value-adding services at fuel retail stations, however, certain clusters of consumers exist in the market that attach more importance to value-adding services.

6.2 THE LEVEL OF IMPORTANCE OF FUEL RETAIL STATION ATTRIBUTES

Hypothesis 2 will be discussed in this section: There is a significant difference in the mean part worth utilities attributable to (a) different brands of fuel retail stations, (b) at different locations, (c) with differing levels of fuel quality, (d) with differing quality of convenience stores and (e) with differing levels of service.

From the research conducted it was found that there is a significant difference in the mean part worth utilities attached to the above attributes (See Table 5 for the appropriate hypothesis tests selected).

The research found that there was a significant positive correlation between the mean part utilities for service (see Figure 13) and the quality of the convenience store (See Figure 12). The correlation for location (Figure 10) was not as significant, and the fuel quality, although still tested as a significant correlation, proved to be much weaker compared to the other attributes (Figure 11).

Interestingly, the respondents reacted very positively to the Shell brand and did not prefer the Caltex brand (Figure 9). The BP and Engen brands were considered with some indifference compared to the previous two brands.

It was expected that the brand preference should at least correlate with the market share of the brands. Since Shell and Caltex have an almost equal market share in South Africa (see Table 1), the difference in brand perception found did not validate

with this expectation. The following possible explanations for the difference in brand perception between these two brands are proposed:

- Localised/regional marketing and branding campaigns may have had a more positive effect on the Shell brand compared to other brands. However, most oil companies normally focus their advertising campaigns on a broader-based, if not national and even international, scale.
- The Shell brand is indeed preferred over the Caltex brand, but market share is equal because Caltex may focus on other fuel retail station attributes such as prime location etc. to attract consumers.
- According to Bamert & Wehrli (2005), the consumer considers the various value-adding services offered (such as convenience store and high level of service) simply as a precursor of brand equity. Therefore, the specific Shell fuel retail station surveyed may have had the optimum mix and quality of services available that are important to the customer, thereby strengthening the overall brand equity of the specific fuel retail station

Therefore, the research found adequate support for **Hypothesis 2.**

6.3 ATTRIBUTE PREFERENCES RELATING TO DEMOGRAPHIC GROUPINGS

Hypothesis 3 will be discussed in this section: There is a significant difference in the preference of consumers (a) visiting during peak and off-peak times, (b) with differing visitation frequencies, (c) age, (d) sex, (e) race, (f) type of purchase and (g) type of vehicle.

The research found support that there were significant differences (see Table 6) in preferences for consumers a) who visit during peak and off-peak times, d) with differing sex, e) with differing race, f) with differing type of purchase and g) with differing type of vehicle.

No support could be found for significant differences in preferences for consumers a) who visit fuel retail stations at differing frequencies and of c) differing age.

No support could also be found between fuel specification preference and any of the demographic groups.

Therefore, the research found limited support for **Hypothesis 3**.

Proposition 4 proposed that there is little or no relationship between fuel brand preference in South Africa and demographic segmentation or personality variables.

The research did not support this proposition and it is therefore proposed that there is a significant relationship between fuel brand preference and demographic segmentation, specifically with regards to race, personal income and customers who visit during peak and off-peak times.

6.4 CLUSTERS LINKED TO ATTRIBUTE PREFERENCES

Hypothesis 4 will be discussed in this section: Cluster membership is dependent on consumers (a) visiting during peak and off-peak times, (b) visitation frequencies, (c) age, (d) sex, (e) race, (f) type of purchase and (g) type of vehicle

The research conducted found strong support that the broad private fuel retail consumer base could be clustered on the basis of their preferences. Approximately 70% of the variation of responses could be attributable to the five identified clusters.

The respondents could be grouped into the following five clusters:

- “brand or bust”
- “shop ‘till you drop”
- “location, location, location”
- “turbo boost”
- “service with a smile”

Support was found that cluster membership is dependent on consumers (a) visiting during peak and off-peak times (d) of different sex, (e) of different race, (f) who purchase different types of fuel and (g) who drive different types of vehicles.

No support could be found that cluster membership is dependent on consumers’ (b) visitation frequencies and (c) age.

Therefore, the research found limited support for **Hypothesis 4**.

Based on the demographic groupings and preferences for each cluster, the characteristics of each cluster are described in Table 14.

Table 14: Cluster characteristics

Cluster 1	*Brand or bust*	• almost exclusively base fuel retail station selection on brand • extremely brand loyal and proud to be associated with the brand • will go out of their way to visit their specific branded fuel retail station • above-average number of Indian customers belong to this cluster • above-average number of male customers belong to this cluster • average level of income
Cluster 2	*Shop 'till you drop*	• considers the convenience store as and important value-adding service at a fuel retail station • makes significant use of the convenience store • above-average number of female customers belong to this cluster • above-average income, price is not an issue but convenience and ease of shopping is. Willing to pay a premium for the convenience. • will prefer to visit fuel retail outlets that include a Woolworths Food outlet or have a basic convenience store that stock a comprehensive range of items
Cluster 3	*Location, location, location*	• above-average number of male customers belong to this cluster • busy professionals on their way to work, or on their way home from work, in a hurry and impatient • want fast, efficient, no-nonsense service, the faster the better, they do not want to waste time • above-average income • values convenience as most important

Cluster 4	*Turbo boost*	• attach some importance to the type of fuel they use and may be related to the specific brand • they value their vehicles and want to maximise their vehicle's performance, proud vehicle owners (they probably also keep their vehicles very clean and ensure that it is serviced on a regular basis) • may have some basic technical knowledge or background relating to vehicle maintenance • above-average number of male customers belong to this cluster • responsive to marketing and advertising campaigns
Cluster 5	Service with a smile	• will support a fuel retail station that offers service that is friendly, efficient and familiar and will provide a range of services • above-average number of female customers belong to this cluster • above-average income, are used to receiving good service and considers the level of service as part of the purchase price of the fuel.

The assumption was initially made that the sampling distribution between peak and off-peak times will not have a significant effect on the overall research conclusions. However, it was found that only 26% of the respondents were sampled during peak-times, although it is commonly known that the majority of fuel retail station customers visit these stations during peak hours. This may impact the conclusions regarding the overall population that may be inferred from the sample results. This means that the relative size of those clusters that relate to peak time fuel retail customers (Clusters 2 & 3) may be larger than the clusters related to off-peak customers (Clusters 1,4 & 5). This may increase the overall importance of location and the convenience store for the actual population relative to the sample.

6.5 THE PERCEPTION OF BRAND LOYALTY

Proposition 3 will be discussed in this section: Customers who are perceived as brand loyal make up a relatively small portion of the consumer base.

The research could not support this proposition, since it was found that approximately 79% of the respondents considered themselves to be brand loyal when asked if they attempt to always visit a specifically branded fuel retail station.

This question was not aimed at determining true brand loyalty, since the research did not attempt to link the intention of the respondent with actual behaviour, but can give some indication of the perception of the respondents' brand loyalty.

It is therefore proposed that customers who are perceived as brand loyal do make up a significant portion of the consumer base.

6.6 LIMITATIONS

The following possible limitations were identified:

- The questionnaire was a newly designed measure and used for the first time during this research.
- Only 4 fuel retail brands were included in the questionnaire and surveyed.
- Only 5 attributes were included in the hypothetical fuel retail station descriptions. Attributes such as the availability of an ATM, car-wash facility, restaurant and size of the fuel retail station were not considered during this research.
- Only fuel retail stations on Rivonia Road in Rivonia, Johannesburg were sampled.
- Only 26% of the respondents were sampled during peak-times, although it is commonly known that the majority of fuel retail station customers visit these stations during peak hours.
- Non-random convenience sampling was used.

7. IMPLICATIONS AND RECOMMENDATIONS

7.1 MANAGERIAL IMPLICATIONS

The research conducted presents the franchisee (fuel retail station owner) with the following managerial implications:

- From the respondents surveyed, brand played the most important role in determining fuel retail station preference. A franchisee is typically dependent on the level of national, or even regional, marketing of the brand and has very little influence over this attribute.
- Next to brand, the level of service is the attribute that most consumers consider when selecting a fuel retail station. This is certainly an attribute that the franchisee has direct control and influence over. Improving the level and speed of service would certainly attract more and more loyal customers. However, it is difficult to differentiate such services since the service provided at a fuel retail station is limited in scope. At the end of the day, the speed of service delivery is limited by the rate of the fuel pumps and the transaction process. There is also limited contact with the customer; therefore the interface with the customer is too brief to build up any significant customer relationship.
- Other attributes that affect fuel retail preference is location and quality of the convenience store. Again, these two attributes are normally specified by the franchisor. As a minimum, the franchisee should keep the convenience store clean and provide adequate parking for the customers. Again, this is usually the case for most fuel retail stations and a difficult attribute to use as a basis of differentiation
- Probably the most valuable and practical implication obtained from this research is for the franchisee to the understanding of the different fuel retail station consumer clusters. The franchisee can attempt to address the needs of specific clusters. Some examples of such steps that can be taken to attract and retain these customers are included in Table 15.

Table 15: Examples of steps to attract and retain cluster-specific customers

Brand or bust	☑ maximise brand visibility from the road and within the fuel retail station
Shop 'till you drop	☑ include promotions of specific items on a weekly or monthly basis ☑ provide adequate parking space for the convenience store ☑ stock and promote more products that will appeal to women and children, for example flowers, pre-packed fresh sandwiches for school lunches and baby nappies ☑ the convenience store itself should make use of bright lighting, have clean floors, visually appealing surfaces and air conditioning
Location, location, location	☑ provide for an "express" service option, so that the attendant can focus on providing as fast as possible service ☑ install garage card payment stations per fuel pump to minimise transaction time ☑ introduce vendors to sell newspapers at the forecourt, if the customer is limited by time to enter the convenience store ☑ provide a self-service facility that can process payments electronically
Turbo boost	☑ provide free car wash vouchers as reward to loyal customers ☑ provide advertising material if requested
Service with a smile	☑ provide consistent staff training and customer awareness programmes ☑ award a fuel station attendant of the month ☑ provide performance-linked bonuses to attendants to improve servie

7.2 SUGGESTIONS FOR FUTURE RESEARCH

- The replication of this study with other fuel retail brands and in other geographical locations in order to generalize the above conclusions, or to make specific conclusions regarding regional preferences. It is also recommended to extend the study to include a larger number of consumers that visit fuel retail stations during peak hours to obtain a truly representative sample.
- The testing of new and different combinations of attributes that affect fuel retail station preferences, for example the availability of an ATM, carwash facility, restaurant or fast food outlet and size of the fuel retail station.
- Specifically investigate the importance of branding across the different cultures and races in South Africa, since recent research suggests that the use and perception of brands differ considerably across cultures (Aaker & Schmitt, 1997, cited in Belen del Rio *et al.*, 2001).
- Study the link between brand preference and brand loyalty against actual buying behaviour.

REFERENCES

Aaker, D.A. (1991): *Managing Brand Equity: Capitalizing on the Value of a Brand Name*, first edition, New York: The Free Press

Aaker, D.A. (1996): *Building Strong Brands*, first edition, New York: The Free Press

Aaker, D.A., Kumar, V. & Day, G.S. (1995): *Marketing Research*, fifth edition, New York: John Wiley & Sons Inc

Argenti, P.A. & Druckenmiller, B. (2004): Reputation and the Corporate Brand, *Corporate Reputation Review,* 6(4), 368-374

Bamert, P. & Wehrli, H.P. (2005): Service quality as an important dimension of brand equity in Swiss service industries, *Managing Service Quality*, 15(2), 132-141

Beane, T.P. & Ennis, D.M. (1984): Market Segmentation: A Review, *European Journal of Marketing*, 21(5), 20-42

Belen del Rio, A., Vasquez, R. & Iglesias, V. (2001): The role of the brand name in obtaining differential advantages, *Journal of Product & Brand Management*, 10(7), 452-465

Betts, P. (1994): Brand Development: Commodity Markets and Manufacturer-Retailer Relationships, *Marketing Intelligence & Planning*, 12(9), 18-23

Claycamp, H.J. & Massy, W.F. (1968): A Theory of Market Segmentation, *Journal of Marketing Research*, 5, November 1968, 388-394

Cresswell, J.W. (1994): *Research Design, Qualitative and Quantitative Approaches*, Thousand Oaks, California: Sage Publications

Day, G.S. & Wensley, R. (1983): Marketing theory with a strategic orientation, *Journal of Marketing*, 47(Fall), 79-89

De Chernatony, L. & McDonald, M. (1998): *Creating Powerful Brands in Consumer, Service and Industrial Markets*, second edition, Oxford: Butterworth Heinemann

Dillon, W.R., Madden, T.J. & Firtle, N.H. (1987): *Marketing Research in a Marketing Environment*, first edition, St. Louis Toronto Santa Clara: Times Mirror/Mosby College Publishing

Dolan, R.J. (1990): Conjoint Analysis: A Manager's Guide, Paper, Boston: Harvard Business School, 1-14

Doyle, P. (1987): “Branding”, *The Marketing Book*, first edition, Oxford, London: Butterworth Heinemann

Feldwick, P. (1996): Do we really need “brand equity”?, *The Journal of Brand Management,* 4(1), 9-28

Gupta, S. (2002): Branding Commodities: Hidden Issues and Perspectives, *[http://www.brandchannel.com/papers_review.asp?sp_id=371],* (Accessed 24 January 2005)

Hadland, A. (2002): *In Terror and In Silence, An investigation into safety levels and standards at petrol stations. Petrol Station 5 Safety Project*, December 2002

Hammond, K. (1996): Market segmentation for competitive brands, *European Journal of Marketing*, 30(12), 39-49

Hutton, J.G. (1997): A study of brand equity in an organizational-buying context, *Journal of Product and Brand Management,* 6(6), 428-439

Jacks, M. (2005): Move to let market price fuel, *Financial Mail*, 1 April 2005, 36

Kassarjian, H.H. & Robertson, T.S. (1991): Personality and consumer behaviour: an update, in Kassarjian, H.H. & Sheffet, M.J., *Perspectives in Consumer Behaviour*, first edition, Engelwood Cliffs, New Jersey: Prentice-Hall

Kotler, P. (2003): *Marketing Management*, eleventh edition, Upper Saddle River: Prentice-Hall

Leach, D.F. & Reekie, D. (1996): A natural experiment of the effect of advertising on sales: the SASOL case, *Applied Economics*, 28, 1081-1091

Leedy, P.D. & Ormrod, J.E. (2001): *Practical Research: Planning and Design,* seventh edition, Upper Saddle River, New Jersey: Merrill Prentice Hall

Leuthesser, L., Kohli, C.H. & Harich, K. (1995): Brand equity: The halo effect measure, *Journal of Marketing*, 29(November), 57-66

Murphy, J., (1990): *Brand Strategy*, Cambridge: Director Books

Myers, C.A. (2003): Managing brand equity: a look at the impact of attributes, Journal of Product & Brand Management, 12(1), 39-51

Neumeier, M. (2003): *The Brand Gap*, first edition, Indiana: New Riders Publishing

Sapia (South African Petroleum Industry Association), (2003): *Sapia Annual Report 2003*

Sawtooth Software, Inc. (2002): Conjoint Value Analysis (CVA) System, *Sawtooth Software Market Research Tools (SMRT)*, Washington State: Sequim

SBAB (Small Business Advisory Bureau) (2001): *Investigation into the Methodology for the Determination of the Retail Margin for Petrol Resellers*, Potchefstroom: University of Potchefstroom

Selnes, F. (1993): An Examination of the Effect of Product performance on Brand Reputation, Satisfaction and Loyalty, *European Journal of Marketing*, 27(9), 19-35

Sheth, J.N. (1985): “New determinants of competitive structure in industrial markets”, in Speckman, R.E. & Wilson, D.T., A Strategic Approach to Business Marketing, first edition, Chigaco, IL: American Marketing Association

Wood, L. (2000): Brands and brand equity: definition and management, *Management Decision,* 38(9), 662-669

Wright, M., Sharp, A. & Sharp, B. (1998): Are Australian brands different?, *Journal of Product & Brand Management*, 7(6), 465-480

APPENDIX A: QUESTIONNAIRE

QUESTIONNAIRE NO 1

"Good day, would you mind completing a short survey regarding fuel service stations? It will take about 5 minutes to complete."

Station: SHELL ☐ BP ☐ CALTEX ☐ ENGEN ☐

Name: _____ Contact no: _____

NUMBER: _____ Time: _____h_____

1. How often do you visit a fuel service station?

2-3 times per week	
once per week	
once every 2 weeks	
once or twice per month	
less than once per month	
It varies	
not sure	

2. Do you always try to visit a SHELL / BP / CALTEX / ENGEN* fuel service station? (* select the station where you are doing the survey)

YES	
NO	

"I am now going to present you with descriptions of 12 fuel retail stations.

Please rate these fuel stations on a scale from 1 to 10 where 10 means that you <u>definitely would</u> visit such a fuel retail station and

1 means that you <u>definitely would not</u> visit such a fuel retail station.

You can also provide any rating in between."

3. Fuel station preference:

No:	Fuel Station Description	Rating (out of 10)
1	A Shell retail station // that is directly on my daily route // that offers standard fuel // and includes a Woolworths Food outlet// where the forecourt service is below-average	
2	An Engen retail station // that is out of my way (further than 2km away from daily route) // that offers standard fuel // and includes a Woolworths Food outlet// where the forecourt service is average	
3	A BP fuel retail station // that is directly on my daily route // that offers fuel with performance-enhancing additives // and includes a Woolworths Food outlet// where the forecourt service is excellent	
4	A Caltex retail station // that is directly on my daily route // that offers standard fuel // and does not have a convenience store // where the forecourt service is average	
5	An Engen retail station // that is in the area (within 1km from my daily route) // that offers fuel with performance-enhancing additives // and does not have a convenience store // where the forecourt service is excellent	
6	An Engen retail station // that is directly on my daily route // that offers fuel with performance-enhancing additives // and includes an Engen Quick Shop // where the forecourt service is below-average	
7	A BP fuel retail station // that is out of my way (further than 2km away from daily route) // that offers standard fuel // and does not have a convenience store // where the forecourt service is below-average	
8	A BP fuel retail station // that is in the area (within 1km from my daily route) // that offers fuel with performance-enhancing additives // and includes a BP Express Shop // where the forecourt service is average	
9	A Shell retail station // that is out of my way (further than 2km away from daily route) // that offers fuel with performance-enhancing additives // and does not have a convenience store // where the forecourt service is average	
10	A Caltex retail station // that is out of my way (further than 2km away from daily route) // that offers fuel with performance-enhancing additives // and includes a Caltex Star Shop // where the forecourt service is excellent	
11	A Caltex retail station // that is in the area (within 1km from my daily route) // that offers fuel with performance-enhancing additives // and includes a Woolworths Food outlet// where the forecourt service is below-average	
12	A Shell retail station // that is in the area (within 1km from my daily route) // that offers standard fuel // and includes a Shell Select Shop // where the forecourt service is excellent	

4 Please can you tell us the year that you were born?

19	

QUESTIONNAIRE NO 2

Station: SHELL ☐ BP ☐ CALTEX ☐ ENGEN ☐

1. Sex:

Male	
Female	

2. Race:

Black	
Indian	
White	
Coloured	
Not sure	

3. Type of Purchase:

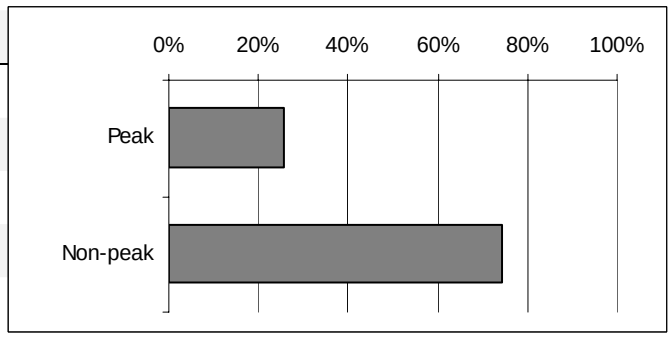
Petrol	
Diesel	
Shop	
Other:	

4. Type of Vehicle:

Average sedan (Golf, Clio etc)	
Luxury sedan (Mercedes,BMW etc)	
Minibus taxi	
Light delivery vehicle (“bakkie”)	
4x4 (Landrover etc)	
Motorcycle	
Other:	

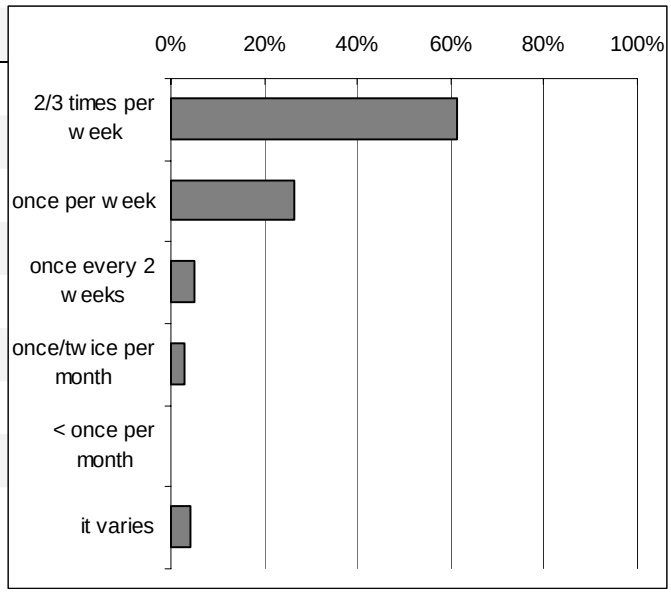
APPENDIX B: SAMPLE DEMOGRAPHICS

Time of visit	Count	Proportion
Peak*	77	25.7%
Non-peak	223	74.3%
Total	*300*	*100%*

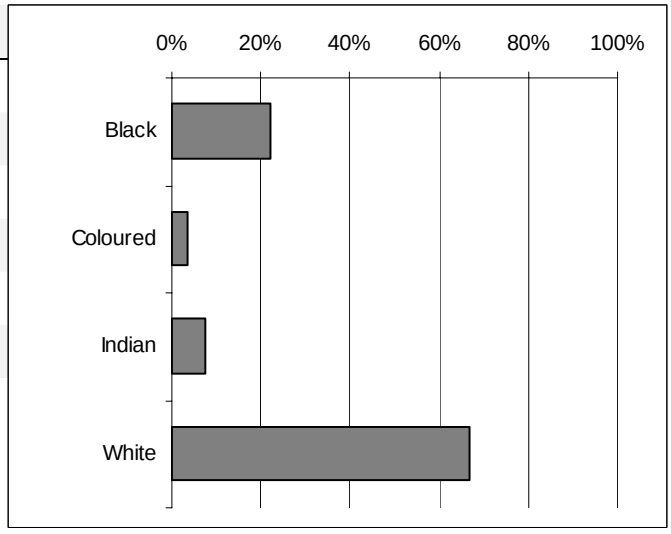


* Peak hours defined as before 09h00 and after 16h00

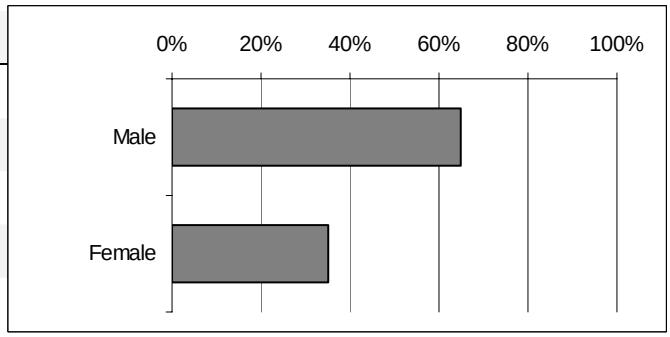
Frequency of visits	Count	Proportion
2/3 times per week	184	61.3%
once per week	79	26.3%
once every 2 weeks	15	5.0%
once/twice per month	9	3.0%
< once per month	1	0.3%
it varies	12	4.0%
Total	*300*	*100%*



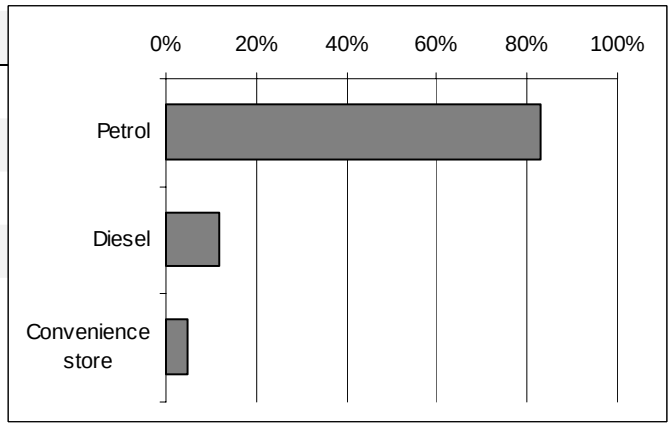
Race	*Count*	*Proportion*
Black	67	22.3%
Coloured	10	3.3%
Indian	22	7.3%
White	201	67.0%
Total	*300*	*100%*



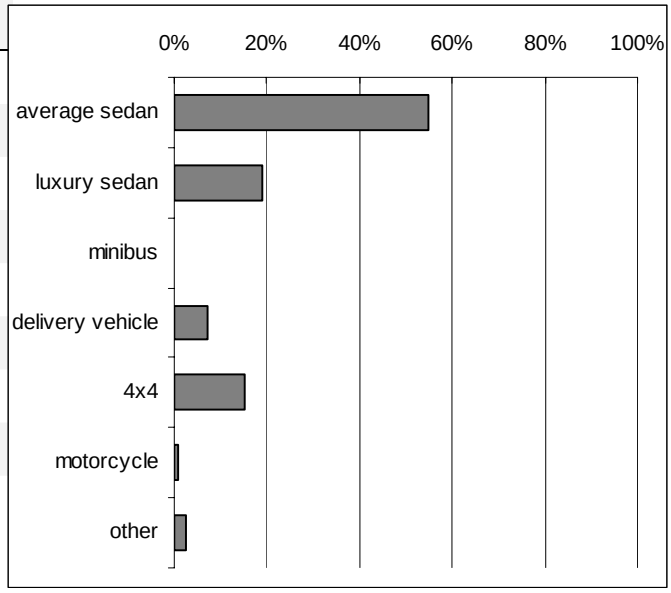
Sex	**Count**	**Proportion**
Male	195	65.0%
Female	105	35.0%
Total	*300*	*100%*



Type of purchase	***Count***	***Proportion***
Petrol	249	83.0%
Diesel	36	12.0%
Convenience store	15	5.0%
Total	*300*	*100%*



Type of vehicle	***Count***	***Proportion***
average sedan	164	54.7%
luxury sedan	57	19.0%
minibus	1	0.3%
delivery vehicle	22	7.3%
4x4	46	15.3%
motorcycle	3	1.0%
other	7	2.3%
Total	*300*	*100%*



APPENDIX C: HYPOTHESIS TESTS FOR IMPORTANCES

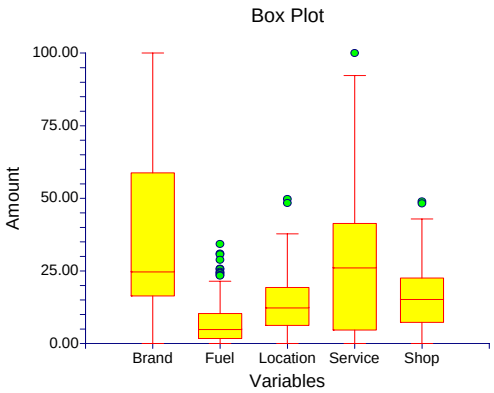
Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	320.789796	4	0.000000	0.272780
Correction	337.311159	4	0.000000	0.286829
Multiplicity	1728			

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	14.6604	0.000000	Reject
Kurtosis Normality of Residuals	9.1861	0.000000	Reject
Omnibus Normality of Residuals	299.3129	0.000000	Reject
Modified-Levene Equal-Variance Test	106.9404	0.000000	Reject

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	4	390.1173	0.000000	Reject Ho
Corrected for Ties	4	390.3701	0.000000	Reject Ho
Number Sets of Ties	167			
Multiplicity Factor	2057052			

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Brand	294	309945.50	1054.24	14.3941	24.925
Fuel	294	116897.50	397.61	-15.2591	5.12
Location	294	190691.00	648.61	-3.9240	12.52
Service	294	252795.00	859.85	5.6155	26.285
Shop	294	210856.00	717.20	-0.8266	15.475

Bonferroni (All-Pairwise) Multiple Comparison Test

Response: Brand,Fuel,Location,Service,Shop
Alpha=0.050 Error Term=S(A) DF=1465 MSE=316.1123 Critical Value=2.8070

Group	Count	Mean	Different From Groups
Fuel	294	6.730612	Location, Shop, Service, Brand
Location	294	13.5331	Fuel, Service, Brand
Shop	294	15.63048	Fuel, Service, Brand
Service	294	25.45789	Fuel, Location, Shop, Brand
Brand	294	38.64806	Fuel, Location, Shop, Service

Kruskal-Wallis Multiple-Comparison Z-Value Test

Variable	Brand	Fuel	Location	Service	Shop
Brand	0.0000	18.7604	11.5892	5.5539	9.6295
Fuel	18.7604	0.0000	7.1713	13.2065	9.1309
Location	11.5892	7.1713	0.0000	6.0353	1.9596
Service	5.5539	13.2065	6.0353	0.0000	4.0756
Shop	9.6295	9.1309	1.9596	4.0756	0.0000

Regular Test: Medians significantly different if z-value > 1.9600
Bonferroni Test: Medians significantly different if z-value > 2.8070

APPENDIX D: HYPOTHESIS TESTS FOR PART WORTH UTILITIES

a) Brand

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	48.407143	3	0.000000	0.054883
Correction	48.855819	3	0.000000	0.055392

Multiplicity 162

b) Location

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	60.678571	2	0.000000	0.103195
Correction	61.515517	2	0.000000	0.104618

Multiplicity 96

c) Fuel specification

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality	-1.0060	0.314394	Cannot reject normality
Kurtosis Normality	3.2293	0.001241	Reject normality
Omnibus Normality	11.4404	0.003279	Reject normality
Correlation Coefficient			

Wilcoxon Signed-Rank Test for Difference in Medians

W	Mean	Std Dev	Number	Number Sets	Multiplicity
Sum Ranks	of W	of W	of Zeros	of Ties	Factor
16307	21630	1458.826	14	3	3486

	Exact Probability		Approximation Without Continuity Correction			Approximation With Continuity Correction		
Alternative Hypothesis	Prob Level	Decision (5%)	Z-Value	Prob Level	Decision (5%)	Z-Value	Prob Level	Decision (5%)
Median<>0			3.6488	0.000263	Reject Ho	3.6485	0.000264	Reject Ho
Median<0			-3.6488	0.000132	Reject Ho	-3.6485	0.000132	Reject Ho
Median>0			-3.6488	0.999868	Accept Ho	-3.6492	0.999868	Accept Ho

d) Convenience store

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	69.807823	2	0.000000	0.118721
Correction	70.892919	2	0.000000	0.120566

Multiplicity 108

e) Service

Friedman Test Section

Ties	Friedman (Q)	DF	Prob Level	Concordance (W)
Ignored	581.022109	2	0.000000	0.988133
Correction	584.501283	2	0.000000	0.994050

Multiplicity 42

APPENDIX E: HYPOTHESIS TESTS FOR CONJOINT IMPORTANCES PER DEMOGRAPHIC GROUPING

a) Age

Pearson Correlations Section (Row-Wise Deletion)

	Age
Brand	0.013022
	0.833840
	262.000000
Location	0.011340
	0.855050
	262.000000
Fuel	-0.030958
	0.617908
	262.000000
Shop	-0.038767
	0.532144
	262.000000
Service	-0.014465
	0.815742

Cronbachs Alpha =- 9.990745 Standardized Cronbachs Alpha =- 0.913898

b) Sex

i) Brand

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Brand___Males	192	41.66964	31.19171	2.251068	37.22949	46.10978
Brand___Females	102	32.96039	27.35131	2.708184	27.58808	38.3327

Note: T-alpha (Brand___Males) = 1.9725, T-alpha (Brand___Females) = 1.9837

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	292	8.709243	29.91917	3.665832	1.524345	15.89414
Unequal	230.57	8.709243	41.48515	3.521586	1.807062	15.61142

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 1.9600

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	2.3758	0.018157	Reject Ho	0.658373	0.415457
Difference < 0	2.3758	0.990922	Accept Ho	0.000030	0.000001
Difference > 0	2.3758	0.009078	Reject Ho	0.767505	0.520418

Difference: (Brand___Males)-(Brand___Females)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	2.4731	0.014117	Reject Ho	0.692462	0.452039
Difference < 0	2.4731	0.992942	Accept Ho	0.000020	0.000001
Difference > 0	2.4731	0.007058	Reject Ho	0.796055	0.558994

Difference: (Brand___Males)-(Brand___Females)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Brand___Males)	4.1934	0.000027	Reject normality
Kurtosis Normality (Brand___Males)	-3.8570	0.000115	Reject normality
Omnibus Normality (Brand___Males)	32.4614	0.000000	Reject normality
Skewness Normality (Brand___Females)	4.6033	0.000004	Reject normality
Kurtosis Normality (Brand___Females)	1.2653	0.205756	Cannot reject normality
Omnibus Normality (Brand___Females)	22.7916	0.000011	Reject normality
Variance-Ratio Equal-Variance Test	1.3005	0.142170	Cannot reject equal variances
Modified-Levene Equal-Variance Test	3.7704	0.053128	Cannot reject equal variances

ii) Location

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Location___Males	192	13.89812	10.10485	0.7292545	12.4597	15.33655
Location___Females	102	12.84598	9.03656	0.8947528	11.07103	14.62093

Note: T-alpha (Location___Males) = 1.9725, T-alpha (Location___Females) = 1.9837

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	292	1.052145	9.74859	1.194441	-1.288917	3.393206
Unequal	226.83	1.052145	13.55608	1.154294	-1.21023	3.314519

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 1.9600

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	0.8809	0.379114	Accept Ho	0.141899	0.044848
Difference < 0	0.8809	0.810443	Accept Ho	0.005893	0.000710
Difference > 0	0.8809	0.189557	Accept Ho	0.223383	0.075379

Difference: (Location___Males)-(Location___Females)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	0.9115	0.362997	Accept Ho	0.148396	0.047614
Difference < 0	0.9115	0.818501	Accept Ho	0.005433	0.000649
Difference > 0	0.9115	0.181499	Accept Ho	0.232889	0.080167

Difference: (Location___Males)-(Location___Females)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Location___Males)	3.7548	0.000173	Reject normality
Kurtosis Normality (Location___Males)	1.4407	0.149679	Cannot reject normality
Omnibus Normality (Location___Males)	16.1741	0.000308	Reject normality
Skewness Normality (Location___Females)	2.7817	0.005408	Reject normality
Kurtosis Normality (Location___Females)	0.2799	0.779555	Cannot reject normality
Omnibus Normality (Location___Females)	7.8162	0.020079	Reject normality
Variance-Ratio Equal-Variance Test	1.2504	0.211847	Cannot reject equal variances
Modified-Levene Equal-Variance Test	1.4606	0.227805	Cannot reject equal variances

iii) Fuel specification

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Fuel___Males	192	7.082396	6.414188	0.4629042	6.169335	7.995457
Fuel___Females	102	6.068431	6.380739	0.6317873	4.815135	7.321727

Note: T-alpha (Fuel___Males) = 1.9725, T-alpha (Fuel___Females) = 1.9837

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	292	1.013964	6.402638	0.7844801	-0.5235883	2.551517
Unequal	207.00	1.013964	9.047411	0.7832212	-0.5211209	2.54905

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 1.9600

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)

Difference <> 0	1.2925	0.197195	Accept Ho	0.251473	0.098473
Difference < 0	1.2925	0.901402	Accept Ho	0.001699	0.000159
Difference > 0	1.2925	0.098598	Accept Ho	0.363130	0.152191

Difference: (Fuel___Males)-(Fuel___Females)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	1.2946	0.196898	Accept Ho	0.251576	0.098310
Difference < 0	1.2946	0.901551	Accept Ho	0.001706	0.000162
Difference > 0	1.2946	0.098449	Accept Ho	0.364249	0.153324

Difference: (Fuel___Males)-(Fuel___Females)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Fuel___Males)	5.5080	0.000000	Reject normality
Kurtosis Normality (Fuel___Males)	2.6871	0.007208	Reject normality
Omnibus Normality (Fuel___Males)	37.5581	0.000000	Reject normality
Skewness Normality (Fuel___Females)	5.9938	0.000000	Reject normality
Kurtosis Normality (Fuel___Females)	4.3213	0.000016	Reject normality
Omnibus Normality (Fuel___Females)	54.5992	0.000000	Reject normality
Variance-Ratio Equal-Variance Test	1.0105	0.966447	Cannot reject equal variances
Modified-Levene Equal-Variance Test	1.0470	0.307041	Cannot reject equal variances

iv) Convenience store

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Shop___Males	192	14.8124	10.46739	0.755419	13.32236	16.30243
Shop___Females	102	17.17039	10.66179	1.055675	15.07622	19.26457

Note: T-alpha (Shop___Males) = 1.9725, T-alpha (Shop___Females) = 1.9837

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	292	-2.357996	10.53504	1.2908	-4.887918	0.171926
Unequal	202.80	-2.357996	14.94122	1.298117	-4.902258	0.1862654

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 1.9600

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-1.8268	0.068755	Accept Ho	0.444723	0.223805
Difference < 0	-1.8268	0.034378	Reject Ho	0.572563	0.310196
Difference > 0	-1.8268	0.965622	Accept Ho	0.000268	0.000018

Difference: (Shop___Males)-(Shop___Females)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-1.8165	0.070774	Accept Ho	0.439639	0.219417
Difference < 0	-1.8165	0.035387	Reject Ho	0.568704	0.307253
Difference > 0	-1.8165	0.964613	Accept Ho	0.000282	0.000020

Difference: (Shop___Males)-(Shop___Females)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Shop___Males)	3.1960	0.001394	Reject normality
Kurtosis Normality (Shop___Males)	1.0420	0.297405	Cannot reject normality
Omnibus Normality (Shop___Males)	11.3002	0.003517	Reject normality
Skewness Normality (Shop___Females)	0.9552	0.339478	Cannot reject normality
Kurtosis Normality (Shop___Females)	-1.9478	0.051444	Cannot reject normality
Omnibus Normality (Shop___Females)	4.7062	0.095075	Cannot reject normality
Variance-Ratio Equal-Variance Test	1.0375	0.818534	Cannot reject equal variances
Modified-Levene Equal-Variance Test	0.2291	0.632569	Cannot reject equal variances

v) Service

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Service___Males	192	22.53766	19.26439	1.390287	19.79537	25.27995
Service___Females	102	30.9548	21.89585	2.168013	26.65405	35.25556

Note: T-alpha (Service___Males) = 1.9725, T-alpha (Service___Females) = 1.9837

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	292	-8.417148	20.21338	2.476634	-13.27126	-3.563034
Unequal	184.64	-8.417148	29.1641	2.575496	-13.49833	-3.335964

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 1.9729

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-3.3986	0.000771	Reject Ho	0.923276	0.789148
Difference < 0	-3.3986	0.000386	Reject Ho	0.960038	0.857539
Difference > 0	-3.3986	0.999614	Accept Ho	0.000000	0.000000

Difference: (Service___Males)-(Service___Females)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-3.2682	0.001291	Reject Ho	0.901675	0.746314
Difference < 0	-3.2682	0.000645	Reject Ho	0.946443	0.820644
Difference > 0	-3.2682	0.999355	Accept Ho	0.000000	0.000000

Difference: (Service___Males)-(Service___Females)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Service___Males)	2.2050	0.027453	Reject normality
Kurtosis Normality (Service___Males)	-7.2229	0.000000	Reject normality
Omnibus Normality (Service___Males)	57.0327	0.000000	Reject normality
Skewness Normality (Service___Females)	2.1552	0.031145	Reject normality
Kurtosis Normality (Service___Females)	1.2487	0.211765	Cannot reject normality
Omnibus Normality (Service___Females)	6.2042	0.044954	Reject normality
Variance-Ratio Equal-Variance Test	1.2919	0.132398	Cannot reject equal variances
Modified-Levene Equal-Variance Test	0.0333	0.855351	Cannot reject equal variances

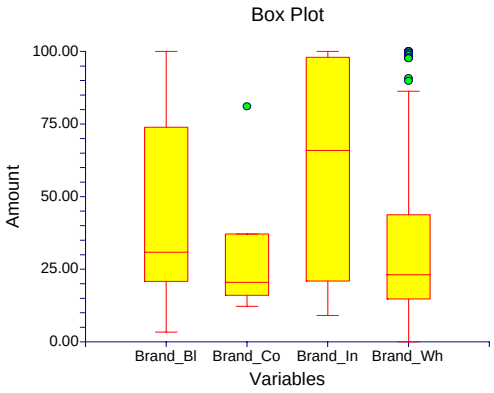
c) Race

i) Brand

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	5.6269	0.000000	Reject
Kurtosis Normality of Residuals	-0.9493	0.342481	Accept
Omnibus Normality of Residuals	32.5629	0.000000	Reject
Modified-Levene Equal-Variance Test	3.6583	0.012913	Reject

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	3	14.77749	0.002017	Reject Ho
Corrected for Ties	3	14.78094	0.002014	Reject Ho

Number Sets of Ties	13
Multiplicity Factor	5922

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Brand_Black	67	11260.50	168.07	2.2536	31.14
Brand_Coloured	10	1298.00	129.80	-0.6699	20.755
Brand_Indian	22	4288.50	194.93	2.7207	66.175
Brand_White	195	26518.00	135.99	-3.2581	23.37

Means and Effects Section

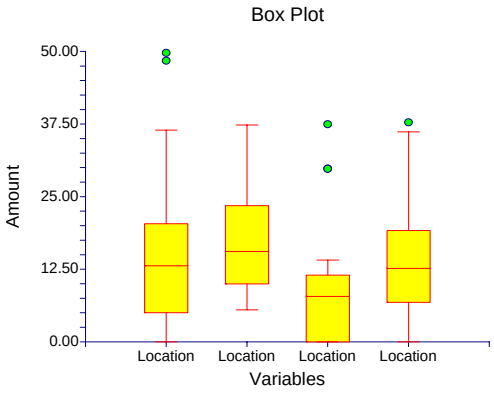
Term	Count	Mean	Standard Error	Effect
All	294	38.64806		42.03534
A:				
Brand_Black	67	45.69866	3.583491	3.66332
Brand_Coloured	10	28.957	9.275635	-13.07834
Brand_Indian	22	59.06682	6.253632	17.03148
Brand_White	195	34.41887	2.100518	-7.616465

ii) Location

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	4.6949	0.000003	Reject
Kurtosis Normality of Residuals	1.5698	0.116450	Accept
Omnibus Normality of Residuals	24.5062	0.000005	Reject
Modified-Levene Equal-Variance Test	1.3710	0.251795	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	3	7.831153	0.049633	Reject Ho
Corrected for Ties	3	7.844394	0.049339	Reject Ho

Number Sets of Ties	10
Multiplicity Factor	42894

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Location_Black	67	10083.00	150.49	0.3279	13.22
Location_Coloured	10	1811.00	181.10	1.2716	15.695
Location_Indian	22	2264.50	102.93	-2.5564	7.95
Location_White	195	29206.50	149.78	0.6445	12.77

Means and Effects Section

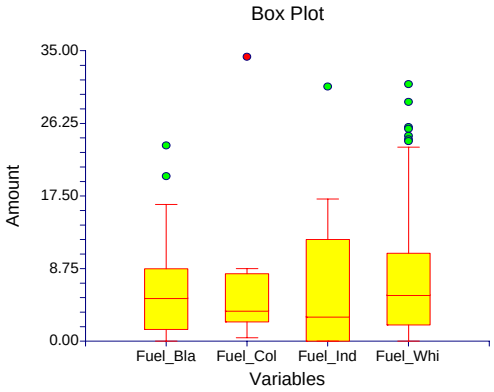
Term	Count	Mean	Standard Error	Effect
All	294	13.5331		13.69239
A:				
Location_Black	67	14.47269	1.184557	0.7802987
Location_Coloured	10	17.321	3.066149	3.628612
Location_Indian	22	9.505455	2.067197	-4.186934
Location_White	195	13.47041	0.694346	-0.2219776

iii) Fuel specification

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	7.7105	0.000000	Reject
Kurtosis Normality of Residuals	4.4484	0.000009	Reject
Omnibus Normality of Residuals	79.2402	0.000000	Reject
Modified-Levene Equal-Variance Test	0.7916	0.499374	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	3	3.065755	0.381598	Accept Ho
Corrected for Ties	3	3.072407	0.380596	Accept Ho

Number Sets of Ties	25
Multiplicity Factor	55014

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Fuel_Black	67	9231.00	137.78	-1.0655	5.23
Fuel_Coloured	10	1409.00	140.90	-0.2498	3.715
Fuel_Indian	22	2810.50	127.75	-1.1329	2.995
Fuel_White	195	29914.50	153.41	1.6722	5.61

Means and Effects Section

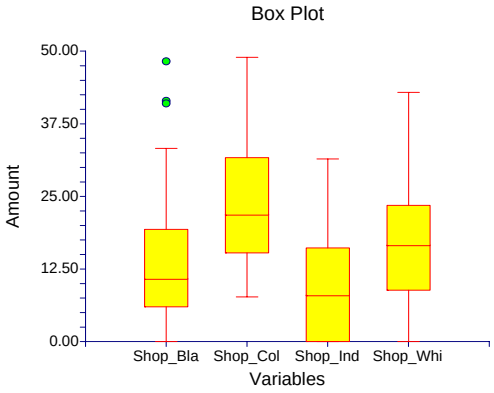
Term	Count	Mean	Standard Error	Effect
All	294	6.730612		6.565424
A:				
Fuel_Black	67	5.814627	0.7842502	-0.7507973
Fuel_Coloured	10	7.159	2.029981	0.5935758
Fuel_Indian	22	6.205454	1.368613	-0.3599696
Fuel_White	195	7.082615	0.4597002	0.5171912

iv) Convenience store

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	3.1889	0.001428	Reject
Kurtosis Normality of Residuals	0.1974	0.843514	Accept
Omnibus Normality of Residuals	10.2083	0.006072	Reject
Modified-Levene Equal-Variance Test	0.2122	0.887943	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	3	18.91523	0.000285	Reject Ho
Corrected for Ties	3	18.94723	0.000280	Reject Ho

Number Sets of Ties	10
Multiplicity Factor	42912

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Shop_Black	67	8482.50	126.60	-2.2896	10.87
Shop_Coloured	10	2064.50	206.45	2.2310	21.9
Shop_Indian	22	2153.50	97.89	-2.8458	8.045
Shop_White	195	30664.50	157.25	2.7609	16.66

Means and Effects Section

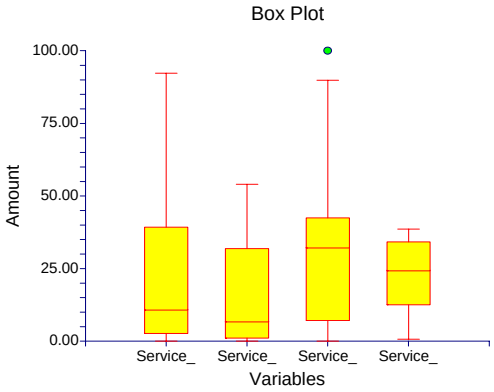
Term	Count	Mean	Standard Error	Effect
All	294	15.63048		15.90161
A:				
Shop_Black	67	13.41463	1.258073	-2.486983
Shop_Coloured	10	23.955	3.256442	8.05339
Shop_Indian	22	9.590454	2.195493	-6.311155
Shop_White	195	16.64636	0.7374389	0.7447489

v) Service

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	3.6491	0.000263	Reject
Kurtosis Normality of Residuals	0.7227	0.469856	Accept
Omnibus Normality of Residuals	13.8380	0.000989	Reject
Modified-Levene Equal-Variance Test	1.0469	0.372146	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	3	14.41264	0.002394	Reject Ho
Corrected for Ties	3	14.416	0.002390	Reject Ho

Number Sets of Ties	10
Multiplicity Factor	5922

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Service_Black	67	8457.00	126.22	-2.3313	10.96
Service_Indian	22	2312.50	105.11	-2.4313	6.9
Service_White	195	31267.00	160.34	3.6355	32.37
Service__Coloured	10	1328.50	132.85	-0.5544	24.505

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	294	25.45789		21.80552
A:				
Service_Black	67	20.59955	2.470322	-1.205966
Service_Indian	22	15.63273	4.311016	-6.172791
Service_White	195	28.38179	1.448017	6.576276
Service__Coloured	10	22.608	6.39427	0.8024814

d) Type of purchase

i) Brand

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Brand_Petrol	243	41.38934	31.11812	1.996228	37.47681	45.30188
Brand_Diesel	36	25.29222	22.50347	3.750578	17.67814	32.9063

Note: T-alpha (Brand_Petrol) = 1.9600, T-alpha (Brand_Diesel) = 2.0301

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	277	16.09712	30.16572	5.387179	5.538443	26.6558
Unequal	56.98	16.09712	38.40239	4.248736	7.589098	24.60514

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 2.0025

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	2.9880	0.003059	Reject Ho	0.845591	0.653324
Difference < 0	2.9880	0.998470	Accept Ho	0.000002	0.000000
Difference > 0	2.9880	0.001530	Reject Ho	0.910105	0.745560

Difference: (Brand_Petrol)-(Brand_Diesel)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	3.7887	0.000367	Reject Ho	0.961144	0.864711
Difference < 0	3.7887	0.999816	Accept Ho	0.000000	0.000000
Difference > 0	3.7887	0.000184	Reject Ho	0.982060	0.914893

Difference: (Brand_Petrol)-(Brand_Diesel)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Brand_Petrol)	4.6275	0.000004	Reject normality
Kurtosis Normality (Brand_Petrol)	-4.3694	0.000012	Reject normality
Omnibus Normality (Brand_Petrol)	40.5057	0.000000	Reject normality
Skewness Normality (Brand_Diesel)	4.4475	0.000009	Reject normality
Kurtosis Normality (Brand_Diesel)	3.2568	0.001127	Reject normality
Omnibus Normality (Brand_Diesel)	30.3874	0.000000	Reject normality
Variance-Ratio Equal-Variance Test	1.9122	0.023319	Reject equal variances
Modified-Levene Equal-Variance Test	7.3478	0.007134	Reject equal variances

ii) Location

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Location_Petrol	243	13.14008	9.946757	0.6380848	11.88946	14.39071
Location_Diesel	36	15.17417	9.028121	1.504687	12.11949	18.22884

Note: T-alpha (Location_Petrol) = 1.9600, T-alpha (Location_Diesel) = 2.0301

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	277	-2.034084	9.835421	1.75647	-5.476702	1.408533
Unequal	48.49	-2.034084	13.43298	1.634391	-5.319385	1.251216

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 2.0101

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-1.1581	0.247840	Accept Ho	0.211066	0.077220
Difference < 0	-1.1581	0.123920	Accept Ho	0.314145	0.122913
Difference > 0	-1.1581	0.876080	Accept Ho	0.002598	0.000265

Difference: (Location_Petrol)-(Location_Diesel)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-1.2446	0.219278	Accept Ho	0.230392	0.084908
Difference < 0	-1.2446	0.109639	Accept Ho	0.338095	0.132164
Difference > 0	-1.2446	0.890361	Accept Ho	0.002038	0.000202

Difference: (Location_Petrol)-(Location_Diesel)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Location_Petrol)	4.4368	0.000009	Reject normality
Kurtosis Normality (Location_Petrol)	1.5854	0.112880	Cannot reject normality
Omnibus Normality (Location_Petrol)	22.1988	0.000015	Reject normality
Skewness Normality (Location_Diesel)	2.0294	0.042417	Reject normality
Kurtosis Normality (Location_Diesel)	0.5036	0.614508	Cannot reject normality
Omnibus Normality (Location_Diesel)	4.3721	0.112357	Cannot reject normality
Variance-Ratio Equal-Variance Test	1.2139	0.500433	Cannot reject equal variances
Modified-Levene Equal-Variance Test	1.8881	0.170526	Cannot reject equal variances

iii) Fuel specification

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Fuel_Petrol	243	6.688848	6.500754	0.4170236	5.871497	7.506199
Fuel_Diesel	36	5.764722	4.600056	0.766676	4.208287	7.321157

Note: T-alpha (Fuel_Petrol) = 1.9600, T-alpha (Fuel_Diesel) = 2.0301

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	277	0.9241255	6.292363	1.123729	-1.278342	3.126593
Unequal	58.04	0.9241255	7.963687	0.8727547	-0.8228574	2.671108

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 2.0017

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	0.8224	0.411571	Accept Ho	0.129774	0.039688
Difference < 0	0.8224	0.794214	Accept Ho	0.006951	0.000870
Difference > 0	0.8224	0.205786	Accept Ho	0.206393	0.067508

Difference: (Fuel_Petrol)-(Fuel_Diesel)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	1.0589	0.294050	Accept Ho	0.180506	0.061104
Difference < 0	1.0589	0.852975	Accept Ho	0.003557	0.000388
Difference > 0	1.0589	0.147025	Accept Ho	0.274811	0.098185

Difference: (Fuel_Petrol)-(Fuel_Diesel)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Fuel_Petrol)	7.1394	0.000000	Reject normality
Kurtosis Normality (Fuel_Petrol)	4.0817	0.000045	Reject normality
Omnibus Normality (Fuel_Petrol)	67.6311	0.000000	Reject normality
Skewness Normality (Fuel_Diesel)	0.9135	0.360997	Cannot reject normality
Kurtosis Normality (Fuel_Diesel)	-2.9739	0.002940	Reject normality
Omnibus Normality (Fuel_Diesel)	9.6785	0.007913	Reject normality
Variance-Ratio Equal-Variance Test	1.9971	0.015898	Reject equal variances
Modified-Levene Equal-Variance Test	1.1255	0.289656	Cannot reject equal variances

iv) Convenience store

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Shop_Petrol	243	15.00128	10.80077	0.6928695	13.64328	16.35928
Shop_Diesel	36	17.71305	9.10496	1.517493	14.63238	20.79373

Note: T-alpha (Shop_Petrol) = 1.9600, T-alpha (Shop_Diesel) = 2.0301

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	277	-2.71178	10.60148	1.893277	-6.422534	0.9989744
Unequal	50.79	-2.71178	14.12646	1.668189	-6.061137	0.6375775

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 2.0078

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-1.4323	0.153179	Accept Ho	0.297506	0.124678
Difference < 0	-1.4323	0.076590	Accept Ho	0.416626	0.187376
Difference > 0	-1.4323	0.923410	Accept Ho	0.001077	0.000093

Difference: (Shop_Petrol)-(Shop_Diesel)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-1.6256	0.110228	Accept Ho	0.357710	0.157985
Difference < 0	-1.6256	0.055114	Accept Ho	0.483661	0.228489
Difference > 0	-1.6256	0.944886	Accept Ho	0.000579	0.000046

Difference: (Shop_Petrol)-(Shop_Diesel)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Shop_Petrol)	3.4256	0.000613	Reject normality
Kurtosis Normality (Shop_Petrol)	0.1541	0.877564	Cannot reject normality
Omnibus Normality (Shop_Petrol)	11.7587	0.002797	Reject normality
Skewness Normality (Shop_Diesel)	0.5443	0.586221	Cannot reject normality
Kurtosis Normality (Shop_Diesel)	0.3044	0.760818	Cannot reject normality
Omnibus Normality (Shop_Diesel)	0.3889	0.823267	Cannot reject normality
Variance-Ratio Equal-Variance Test	1.4072	0.225284	Cannot reject equal variances
Modified-Levene Equal-Variance Test	2.4050	0.122089	Cannot reject equal variances

v) Service

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Service_Petrol	243	23.78078	21.10066	1.353608	21.12776	26.43381
Service_Diesel	36	36.05416	15.2668	2.544467	30.88862	41.21971

Note: T-alpha (Service_Petrol) = 1.9600, T-alpha (Service_Diesel) = 2.0301

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	277	-12.27339	20.45557	3.653081	-19.43329	-5.113478
Unequal	56.95	-12.27339	26.04445	2.882112	-18.04482	-6.501954

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 2.0025

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-3.3597	0.000890	Reject Ho	0.917447	0.777497
Difference < 0	-3.3597	0.000445	Reject Ho	0.956569	0.848605
Difference > 0	-3.3597	0.999555	Accept Ho	0.000000	0.000000

Difference: (Service_Petrol)-(Service_Diesel)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-4.2585	0.000078	Reject Ho	0.986982	0.940296
Difference < 0	-4.2585	0.000039	Reject Ho	0.994801	0.966351
Difference > 0	-4.2585	0.999961	Accept Ho	0.000000	0.000000

Difference: (Service_Petrol)-(Service_Diesel)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Service_Petrol)	4.3069	0.000017	Reject normality
Kurtosis Normality (Service_Petrol)	0.6379	0.523527	Cannot reject normality
Omnibus Normality (Service_Petrol)	18.9561	0.000077	Reject normality
Skewness Normality (Service_Diesel)	-2.6403	0.008284	Reject normality
Kurtosis Normality (Service_Diesel)	1.0138	0.310682	Cannot reject normality
Omnibus Normality (Service_Diesel)	7.9988	0.018326	Reject normality
Variance-Ratio Equal-Variance Test	1.9103	0.023520	Reject equal variances
Modified-Levene Equal-Variance Test	12.9000	0.000389	Reject equal variances

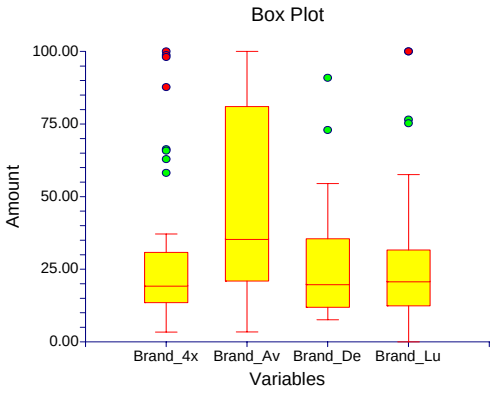
e) Type of vehicle

i) Brand

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	4.9303	0.000001	Reject
Kurtosis Normality of Residuals	-1.9422	0.052113	Accept
Omnibus Normality of Residuals	28.0803	0.000001	Reject
Modified-Levene Equal-Variance Test	10.0760	0.000003	Reject

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	3	32.85741	0.000000	Reject Ho
Corrected for Ties	3	32.86599	0.000000	Reject Ho

Number Sets of Ties	12
Multiplicity Factor	5916

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Brand_4x4	46	5195.50	112.95	-2.6312	19.455
Brand_Average	158	26349.50	166.77	5.7242	35.555
Brand_Delivery	22	2344.50	106.57	-2.1145	19.905
Brand_Luxury	57	6296.50	110.46	-3.2554	20.94

Means and Effects Section

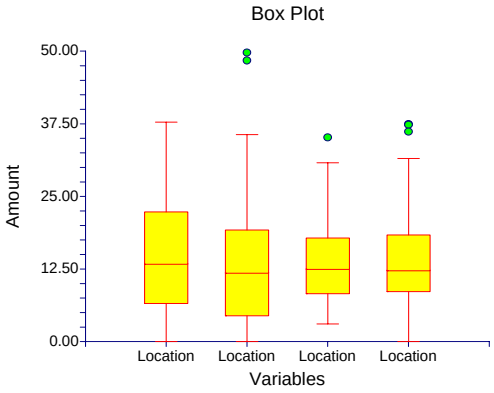
Term	Count	Mean	Standard Error	Effect
All	283	38.94795		32.6972
A:				
Brand_4x4	46	29.11348	4.25815	-3.583728
Brand_Average	158	47.98569	2.297584	15.28849
Brand_Delivery	22	27.4	6.157275	-5.297206
Brand_Luxury	57	26.28965	3.825273	-6.407557

ii) Location

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	4.7789	0.000002	Reject
Kurtosis Normality of Residuals	1.5852	0.112914	Accept
Omnibus Normality of Residuals	25.3508	0.000003	Reject
Modified-Levene Equal-Variance Test	1.5919	0.191542	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	3	2.122054	0.547464	Accept Ho
Corrected for Ties	3	2.126077	0.546655	Accept Ho

Number Sets of Ties	10
Multiplicity Factor	42894

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Location_4x4	46	7016.00	152.52	0.9528	13.46
Location_Average	158	21461.00	135.83	-1.4261	11.905
Location_Delivery	22	3232.00	146.91	0.2930	12.565
Location_Luxury	57	8477.00	148.72	0.6936	12.33

Means and Effects Section

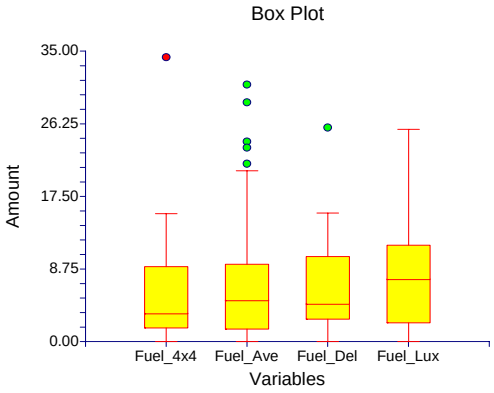
Term	Count	Mean	Standard Error	Effect
All	283	13.48647		13.90614
A:				
Location_4x4	46	14.84087	1.451083	0.9347252
Location_Average	158	12.78405	0.7829653	-1.122094
Location_Delivery	22	13.76773	2.098262	-0.1384171
Location_Luxury	57	14.23193	1.303568	0.3257855

iii) Fuel specification

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	7.6443	0.000000	Reject
Kurtosis Normality of Residuals	4.6510	0.000003	Reject
Omnibus Normality of Residuals	80.0679	0.000000	Reject
Modified-Levene Equal-Variance Test	0.6065	0.611259	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	3	5.152638	0.160955	Accept Ho
Corrected for Ties	3	5.165173	0.160094	Accept Ho

Number Sets of Ties	23
Multiplicity Factor	55002

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Fuel_4x4	46	6118.00	133.00	-0.8150	3.45
Fuel_Average	158	21508.50	136.13	-1.3566	5.025
Fuel_Delivery	22	3296.00	149.82	0.4666	4.6
Fuel_Luxury	57	9263.50	162.52	2.1181	7.57

Means and Effects Section

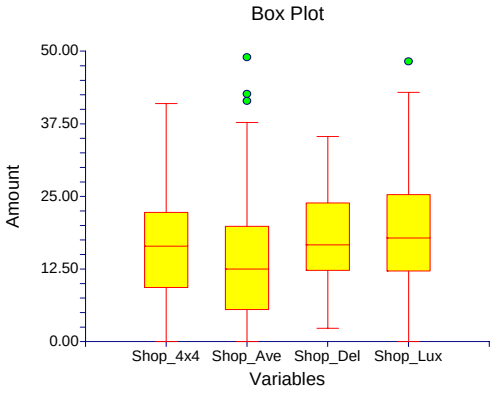
Term	Count	Mean	Standard Error	Effect
All	283	6.560212		6.732865
A:				
Fuel_4x4	46	5.812609	0.9212565	-0.9202561
Fuel_Average	158	6.203165	0.4970853	-0.5297002
Fuel_Delivery	22	6.889545	1.332135	0.1566807
Fuel_Luxury	57	8.02614	0.827603	1.293276

iv) Convenience store

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	3.4270	0.000610	Reject
Kurtosis Normality of Residuals	0.3844	0.700705	Accept
Omnibus Normality of Residuals	11.8922	0.002616	Reject
Modified-Levene Equal-Variance Test	0.6831	0.563003	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	3	14.11415	0.002754	Reject Ho
Corrected for Ties	3	14.14092	0.002719	Reject Ho

Number Sets of Ties	10
Multiplicity Factor	42912

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Shop_4x4	46	7043.00	153.11	1.0060	16.555
Shop_Average	158	19954.50	126.29	-3.6296	12.62
Shop_Delivery	22	3565.00	162.05	1.1963	16.79
Shop_Luxury	57	9623.50	168.83	2.7701	17.96

Means and Effects Section

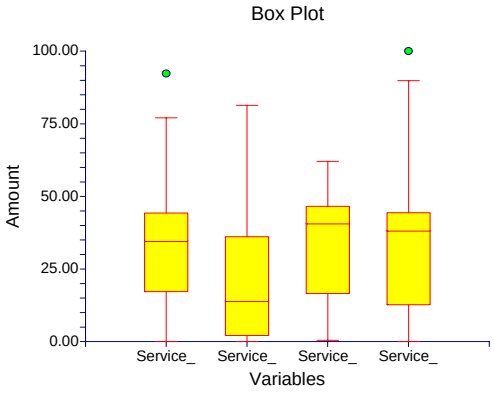
Term	Count	Mean	Standard Error	Effect
All	283	15.4365		16.70384
A:				
Shop_4x4	46	16.84022	1.518366	0.1363745
Shop_Average	158	13.48165	0.8192695	-3.222197
Shop_Delivery	22	17.61	2.195554	0.9061571
Shop_Luxury	57	18.88351	1.364011	2.179666

v) Service

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	3.4616	0.000537	Reject
Kurtosis Normality of Residuals	0.6443	0.519380	Accept
Omnibus Normality of Residuals	12.3977	0.002032	Reject
Modified-Levene Equal-Variance Test	0.2011	0.895557	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	3	32.16571	0.000000	Reject Ho
Corrected for Ties	3	32.17411	0.000000	Reject Ho

Number Sets of Ties	10
Multiplicity Factor	5922

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Service_4x4	46	7858.00	170.83	2.6105	34.77
Service_Average	158	18579.50	117.59	-5.6408	14.095
Service_Delivery	22	4008.00	182.18	2.3980	40.82
Service_Luxury	57	9740.50	170.89	2.9820	38.3

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	283	25.56901		29.96021
A:				
Service_4x4	46	33.3937	2.908587	3.43348
Service_Average	158	19.54532	1.569396	-10.4149
Service_Delivery	22	34.33273	4.205811	4.372512
Service_Luxury	57	32.56912	2.612905	2.608907

f) Time of visit

i) Brand

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Brand_offpeak	218	42.3267	31.46426	2.131029	38.14996	46.50344
Brand_peak	76	28.09618	23.15064	2.655561	22.80604	33.38633

Note: T-alpha (Brand_offpeak) = 1.9600, T-alpha (Brand_peak) = 1.9921

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	292	14.23051	29.55297	3.936767	6.514591	21.94644
Unequal	177.29	14.23051	39.06343	3.404891	7.51118	20.94985

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 1.9734

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	3.6148	0.000354	Reject Ho	0.949797	0.845751
Difference < 0	3.6148	0.999823	Accept Ho	0.000000	0.000000
Difference > 0	3.6148	0.000177	Reject Ho	0.975395	0.900513

Difference: (Brand_offpeak)-(Brand_peak)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	4.1794	0.000046	Reject Ho	0.985980	0.941133
Difference < 0	4.1794	0.999977	Accept Ho	0.000000	0.000000
Difference > 0	4.1794	0.000023	Reject Ho	0.994108	0.965701

Difference: (Brand_offpeak)-(Brand_peak)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Brand_offpeak)	4.2771	0.000019	Reject normality
Kurtosis Normality (Brand_offpeak)	-4.8132	0.000001	Reject normality
Omnibus Normality (Brand_offpeak)	41.4604	0.000000	Reject normality
Skewness Normality (Brand_peak)	4.7793	0.000002	Reject normality
Kurtosis Normality (Brand_peak)	2.5625	0.010392	Reject normality
Omnibus Normality (Brand_peak)	29.4087	0.000000	Reject normality
Variance-Ratio Equal-Variance Test	1.8472	0.002416	Reject equal variances
Modified-Levene Equal-Variance Test	9.9787	0.001750	Reject equal variances

ii)_Location

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Location_offpeak	218	13.05408	9.577749	0.6486871	11.78268	14.32549
Location_peak	76	14.90711	10.14845	1.164108	12.58808	17.22613

Note: T-alpha (Location_offpeak) = 1.9600, T-alpha (Location_peak) = 1.9921

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	292	-1.853023	9.72753	1.29581	-4.392763	0.6867177
Unequal	124.65	-1.853023	13.95437	1.332644	-4.490563	0.7845175

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 1.9792

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-1.4300	0.153783	Accept Ho	0.296800	0.124297
Difference < 0	-1.4300	0.076891	Accept Ho	0.415687	0.186671
Difference > 0	-1.4300	0.923109	Accept Ho	0.001083	0.000093

Difference: (Location_offpeak)-(Location_peak)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-1.3905	0.166859	Accept Ho	0.281315	0.114380
Difference < 0	-1.3905	0.083430	Accept Ho	0.396693	0.170824
Difference > 0	-1.3905	0.916570	Accept Ho	0.001232	0.000107

Difference: (Location_offpeak)-(Location_peak)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Location_offpeak)	3.6444	0.000268	Reject normality
Kurtosis Normality (Location_offpeak)	1.0384	0.299075	Cannot reject normality
Omnibus Normality (Location_offpeak)	14.3599	0.000762	Reject normality
Skewness Normality (Location_peak)	3.0527	0.002268	Reject normality
Kurtosis Normality (Location_peak)	1.1950	0.232079	Cannot reject normality
Omnibus Normality (Location_peak)	10.7472	0.004637	Reject normality
Variance-Ratio Equal-Variance Test	1.1227	0.518098	Cannot reject equal variances
Modified-Levene Equal-Variance Test	0.0968	0.755979	Cannot reject equal variances

iii) Fuel specification

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Fuel_offpeak	218	6.908716	6.893012	0.4668536	5.993699	7.823732
Fuel_peak	76	6.219737	4.763002	0.5463538	5.131344	7.308129

Note: T-alpha (Fuel_offpeak) = 1.9600, T-alpha (Fuel_peak) = 1.9921

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	292	0.6889787	6.41379	0.8543845	-0.9855841	2.363542
Unequal	189.58	0.6889787	8.378532	0.718648	-0.7285949	2.106552

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 1.9726

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	0.8064	0.420666	Accept Ho	0.126655	0.038398
Difference < 0	0.8064	0.789667	Accept Ho	0.007258	0.000915
Difference > 0	0.8064	0.210333	Accept Ho	0.201828	0.065396

Difference: (Fuel_offpeak)-(Fuel_peak)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	0.9587	0.338923	Accept Ho	0.158969	0.052242
Difference < 0	0.9587	0.830538	Accept Ho	0.004659	0.000522
Difference > 0	0.9587	0.169462	Accept Ho	0.245236	0.084650

Difference: (Fuel_offpeak)-(Fuel_peak)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Fuel_offpeak)	6.7879	0.000000	Reject normality
Kurtosis Normality (Fuel_offpeak)	3.7481	0.000178	Reject normality
Omnibus Normality (Fuel_offpeak)	60.1231	0.000000	Reject normality
Skewness Normality (Fuel_peak)	2.3523	0.018657	Reject normality
Kurtosis Normality (Fuel_peak)	-0.2297	0.818293	Cannot reject normality
Omnibus Normality (Fuel_peak)	5.5861	0.061233	Cannot reject normality
Variance-Ratio Equal-Variance Test	2.0944	0.000297	Reject equal variances
Modified-Levene Equal-Variance Test	5.1412	0.024095	Reject equal variances

iv) Convenience store

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Shop_offpeak	218	14.2956	9.902305	0.6706687	12.98111	15.61008
Shop_peak	76	19.45947	11.54574	1.324387	16.82116	22.09779

Note: T-alpha (Shop_offpeak) = 1.9600, T-alpha (Shop_peak) = 1.9921

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	292	-5.163877	10.34936	1.378644	-7.865969	-2.461786
Unequal	115.77	-5.163877	15.21052	1.484519	-8.104218	-2.223537

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 1.9807

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-3.7456	0.000217	Reject Ho	0.961911	0.874615
Difference < 0	-3.7456	0.000108	Reject Ho	0.982017	0.921425
Difference > 0	-3.7456	0.999892	Accept Ho	0.000000	0.000000

Difference: (Shop_offpeak)-(Shop_peak)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-3.4785	0.000711	Reject Ho	0.931825	0.803079
Difference < 0	-3.4785	0.000356	Reject Ho	0.965099	0.866786
Difference > 0	-3.4785	0.999644	Accept Ho	0.000000	0.000000

Difference: (Shop_offpeak)-(Shop_peak)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Shop_offpeak)	2.3840	0.017126	Reject normality
Kurtosis Normality (Shop_offpeak)	-0.1887	0.850333	Cannot reject normality
Omnibus Normality (Shop_offpeak)	5.7190	0.057297	Cannot reject normality
Skewness Normality (Shop_peak)	1.2920	0.196354	Cannot reject normality
Kurtosis Normality (Shop_peak)	-0.9563	0.338920	Cannot reject normality
Omnibus Normality (Shop_peak)	2.5838	0.274748	Cannot reject normality
Variance-Ratio Equal-Variance Test	1.3595	0.091529	Cannot reject equal variances
Modified-Levene Equal-Variance Test	2.6416	0.105176	Cannot reject equal variances

v) Service

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Service_offpeak	218	23.41482	20.6103	1.395905	20.67889	26.15074
Service_peak	76	31.31829	19.43419	2.229255	26.87739	35.75919

Note: T-alpha (Service_offpeak) = 1.9600, T-alpha (Service_peak) = 1.9921

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Equal	292	-7.903473	20.31471	2.706134	-13.2074	-2.599547
Unequal	138.01	-7.903473	28.32794	2.630234	-13.10424	-2.702707

Note: T-alpha (Equal) = 1.9600, T-alpha (Unequal) = 1.9773

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-2.9206	0.003766	Reject Ho	0.829197	0.628601
Difference < 0	-2.9206	0.001883	Reject Ho	0.898701	0.723571
Difference > 0	-2.9206	0.998117	Accept Ho	0.000003	0.000000

Difference: (Service_offpeak)-(Service_peak)

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Decision (5%)	Power (Alpha=.05)	Power (Alpha=.01)
Difference <> 0	-3.0049	0.003157	Reject Ho	0.847064	0.652795
Difference < 0	-3.0049	0.001578	Reject Ho	0.910723	0.741828
Difference > 0	-3.0049	0.998422	Accept Ho	0.000002	0.000000

Difference: (Service_offpeak)-(Service_peak)

Tests of Assumptions Section

Assumption	Value	Probability	Decision(5%)
Skewness Normality (Service_offpeak)	3.6465	0.000266	Reject normality
Kurtosis Normality (Service_offpeak)	0.0303	0.975826	Cannot reject normality
Omnibus Normality (Service_offpeak)	13.2978	0.001295	Reject normality
Skewness Normality (Service_peak)	0.8160	0.414509	Cannot reject normality
Kurtosis Normality (Service_peak)	0.5610	0.574764	Cannot reject normality
Omnibus Normality (Service_peak)	0.9806	0.612441	Cannot reject normality
Variance-Ratio Equal-Variance Test	1.1247	0.560271	Cannot reject equal variances
Modified-Levene Equal-Variance Test	3.3291	0.069084	Cannot reject equal variances

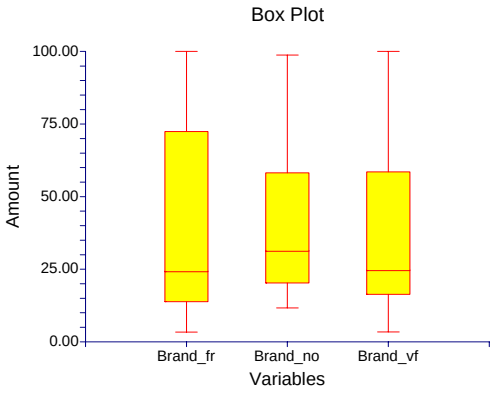
g) Frequency of visits

i) Brand

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	5.5110	0.000000	Reject
Kurtosis Normality of Residuals	-2.8554	0.004298	Reject
Omnibus Normality of Residuals	38.5244	0.000000	Reject
Modified-Levene Equal-Variance Test	1.6244	0.198895	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	2	0.614546	0.735450	Accept Ho
Corrected for Ties	2	0.6147083	0.735390	Accept Ho

Number Sets of Ties	13
Multiplicity Factor	5922

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Brand_frequent	76	10451.50	137.52	-0.4978	24.38
Brand_notfrequent	23	3511.50	152.67	0.6857	31.44
Brand_vfrequent	183	25940.00	141.75	0.0696	24.78

Means and Effects Section

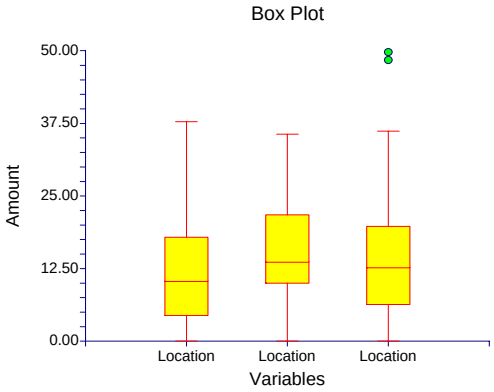
Term	Count	Mean	Standard Error	Effect
All	282	39.33387		39.06437
A:				
Brand_frequent	76	40.79868	3.507213	1.734313
Brand_notfrequent	23	37.42957	6.375364	-1.634806
Brand_vfrequent	183	38.96486	2.260182	-9.950755E-02

ii) Location

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	4.6269	0.000004	Reject
Kurtosis Normality of Residuals	1.6849	0.092014	Accept
Omnibus Normality of Residuals	24.2465	0.000005	Reject
Modified-Levene Equal-Variance Test	0.4026	0.668975	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	2	2.603329	0.272079	Accept Ho
Corrected for Ties	2	2.607901	0.271457	Accept Ho

Number Sets of Ties	9
Multiplicity Factor	39318

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Location_frequent	76	9887.50	130.10	-1.4260	10.42
Location_notfrequent	23	3629.50	157.80	1.0005	13.74
Location_vfrequent	183	26386.00	144.19	0.7519	12.77

Means and Effects Section

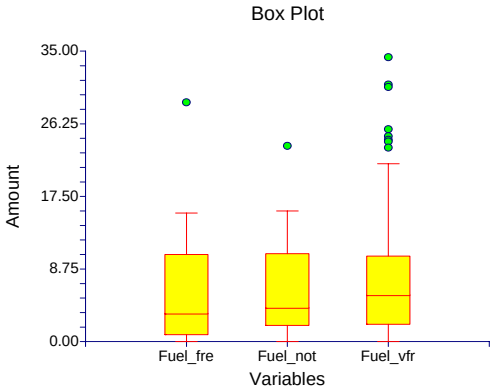
Term	Count	Mean	Standard Error	Effect
All	282	13.36415		13.55696
A:				
Location_frequent	76	12.05684	1.102607	-1.50012
Location_notfrequent	23	14.9	2.004305	1.343038
Location_vfrequent	183	13.71404	0.7105622	0.1570818

iii) Fuel specification

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	7.5014	0.000000	Reject
Kurtosis Normality of Residuals	4.3193	0.000016	Reject
Omnibus Normality of Residuals	74.9270	0.000000	Reject
Modified-Levene Equal-Variance Test	0.3887	0.678321	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	2	3.244562	0.197448	Accept Ho
Corrected for Ties	2	3.251926	0.196722	Accept Ho

Number Sets of Ties	23
Multiplicity Factor	50784

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Fuel_frequent	76	9691.00	127.51	-1.7494	3.43
Fuel_notfrequent	23	3215.00	139.78	-0.1054	4.12
Fuel_vfrequent	183	26997.00	147.52	1.6867	5.65

Means and Effects Section

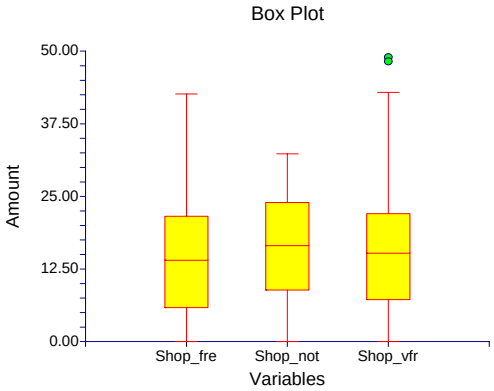
Term	Count	Mean	Standard Error	Effect
All	282	6.695107		6.395464
A:				
Fuel_frequent	76	5.567763	0.7328462	-0.8277009
Fuel_notfrequent	23	6.420869	1.332158	2.540547E-02
Fuel_vfrequent	183	7.19776	0.4722741	0.8022954

iv) Convenience store

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	3.2668	0.001088	Reject
Kurtosis Normality of Residuals	-0.0654	0.947861	Accept
Omnibus Normality of Residuals	10.6761	0.004805	Reject
Modified-Levene Equal-Variance Test	0.5102	0.600916	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	2	1.008188	0.604052	Accept Ho
Corrected for Ties	2	1.009959	0.603518	Accept Ho

Number Sets of Ties	10
Multiplicity Factor	39324

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Shop_frequent	76	10388.00	136.68	-0.6023	14.155
Shop_notfrequent	23	3591.50	156.15	0.8991	16.66
Shop_vfrequent	183	25923.50	141.66	0.0444	15.36

Means and Effects Section

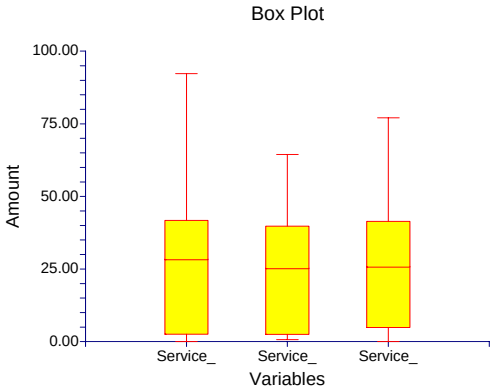
Term	Count	Mean	Standard Error	Effect
All	282	15.56479		15.82791
A:				
Shop_frequent	76	14.90263	1.221892	-0.9252758
Shop_notfrequent	23	16.91043	2.221138	1.082527
Shop_vfrequent	183	15.67066	0.7874335	-0.1572516

v) Service

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	2.3755	0.017524	Reject
Kurtosis Normality of Residuals	-3.3144	0.000918	Reject
Omnibus Normality of Residuals	16.6283	0.000245	Reject
Modified-Levene Equal-Variance Test	0.3621	0.696529	Accept

Box Plot Section



Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	2	0.0617406	0.969601	Accept Ho
Corrected for Ties	2	6.175691E-02	0.969593	Accept Ho

Number Sets of Ties	10
Multiplicity Factor	5922

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Service_frequent	76	10897.50	143.39	0.2362	28.46
Service_notfrequent	23	3210.00	139.57	-0.1187	25.38
Service_vfrequent	183	25795.50	140.96	-0.1515	25.92

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	282	25.0422		25.15609
A:				
Service_frequent	76	26.6746	2.308685	1.518519
Service_notfrequent	23	24.3413	4.196697	-0.8147821
Service_vfrequent	183	24.45235	1.487805	-0.7037367

APPENDIX F: CLUSTER ANALYSIS REPORT

Minimum Iteration Section

Iteration No.	No. of Clusters	Percent of Variation	Bar Chart of Percent
1	2	59.59	|||||||||||||||||
4	3	45.01	|||||||||||||
9	4	36.87	|||||||||||
10	5	31.20	|||||||||
14	6	26.57	||||||||
16	7	23.66	||||||||
20	8	21.53	|||||||
22	9	20.09	|||||||
25	10	18.36	||||||

Iteration Section

Iteration No.	No. of Clusters	Percent of Variation	Bar Chart of Percent
1	2	59.59	|||||||||||||||||
2	2	59.59	|||||||||||||||||
3	2	59.59	|||||||||||||||||
4	3	45.01	|||||||||||||
5	3	45.01	|||||||||||||
6	3	45.01	|||||||||||||
7	4	38.07	|||||||||||
8	4	38.07	|||||||||||
9	4	36.87	|||||||||||
10	5	31.20	|||||||||
11	5	32.96	|||||||||
12	5	33.75	||||||||||
13	6	28.25	||||||||
14	6	26.57	||||||||
15	6	26.70	||||||||
16	7	23.66	||||||||
17	7	23.67	||||||||
18	7	25.61	||||||||
19	8	24.42	||||||||
20	8	21.53	|||||||
21	8	21.72	|||||||
22	9	20.09	|||||||
23	9	21.01	|||||||
24	9	20.33	|||||||
25	10	18.36	||||||
26	10	18.85	||||||
27	10	18.80	||||||

Cluster Means

Variables	Cluster1	Cluster2	Cluster3	Cluster4
Brand	90.29197	20.90724	22.87586	43.49755
Location	3.082951	12.26034	27.61535	14.24082
Fuel	1.524918	6.150345	7.005862	16.27388
Shop	3.242295	30.59241	14.51397	14.2049
Service	1.858033	30.08965	27.99017	11.78367
Count	61	58	58	49

Cluster Means

Variables	Cluster5
Brand	17.41059
Location	11.47176
Fuel	4.783823
Shop	15.96132
Service	50.37132
Count	68

Cluster Standard Deviations

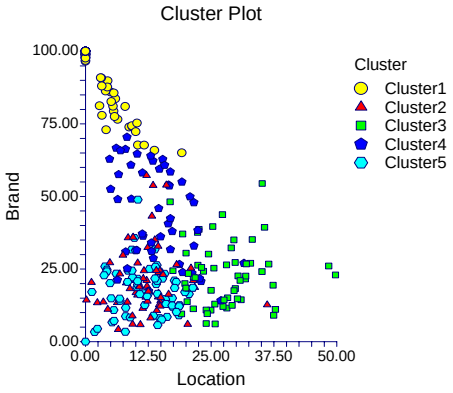
Variables	Cluster1	Cluster2	Cluster3	Cluster4
Brand	11.32251	11.47371	10.69617	16.26675
Location	4.308446	5.758294	6.811553	6.048622
Fuel	2.071313	4.205362	4.348367	7.0501
Shop	4.217721	6.743172	6.753742	5.955996
Service	2.085361	12.12271	14.15441	9.331061
Count	61	58	58	49

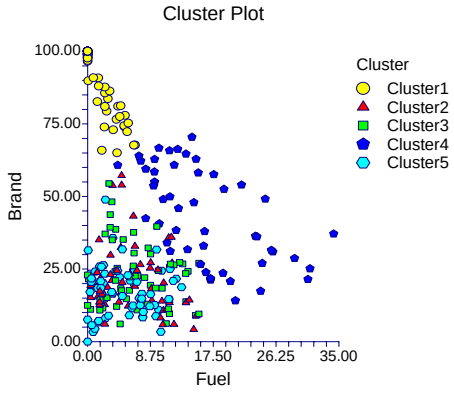
Variables	Cluster5
Brand	8.483698
Location	5.252567
Fuel	3.690084
Shop	5.848929
Service	13.83776
Count	68

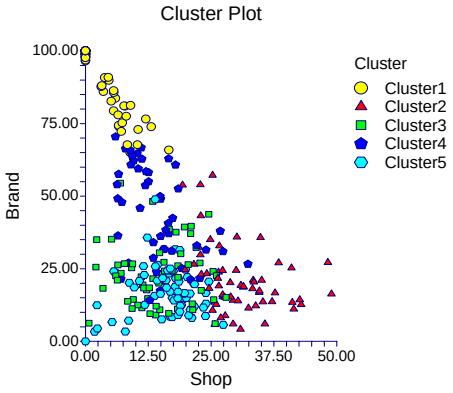
F-Ratio Section

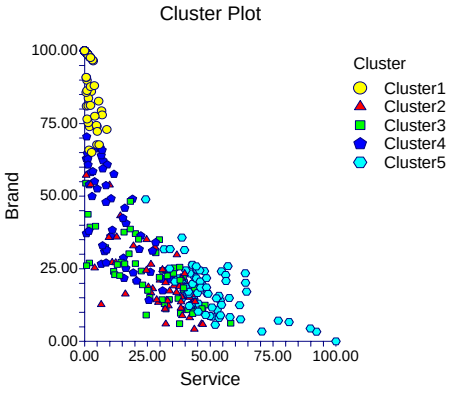
Variables	DF1	DF2	Between Mean Square	Within Mean Square	F-Ratio	Prob Level
Brand	4	289	56799.51	135.7799	418.32	0.000000
Location	4	289	4642.734	32.01738	145.01	0.000000
Fuel	4	289	1599.33	19.52024	81.93	0.000000
Shop	4	289	5631.168	35.48069	158.71	0.000000
Service	4	289	21739.69	128.2565	169.50	0.000000

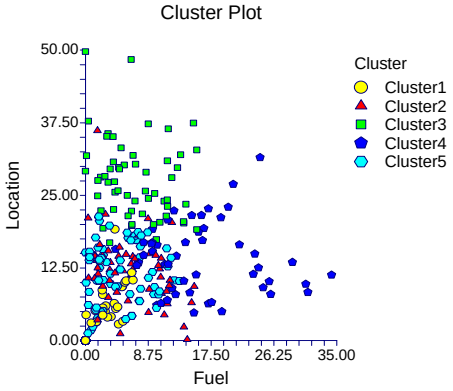
Plots

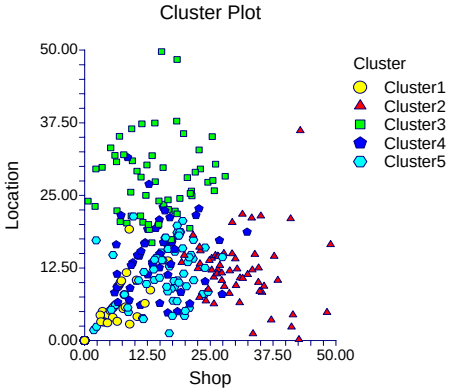


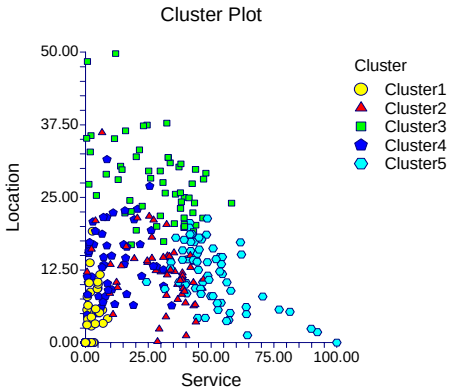


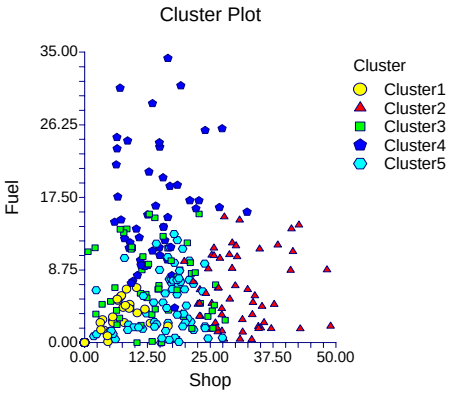

Cluster Plot
Brand
Shop
Cluster
Cluster1
Cluster2
Cluster3
Cluster4
Cluster5
100.00
75.00
50.00
25.00
0.00
0.00
12.50
25.00
37.50
50.00

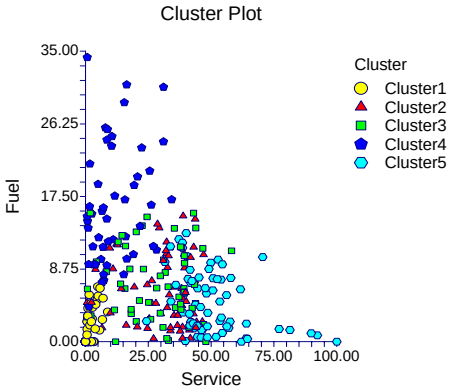

Cluster Plot
Brand
Service
Cluster
Cluster1
Cluster2
Cluster3
Cluster4
Cluster5
100.00
75.00
50.00
25.00
0.00
0.00
25.00
50.00
75.00
100.00

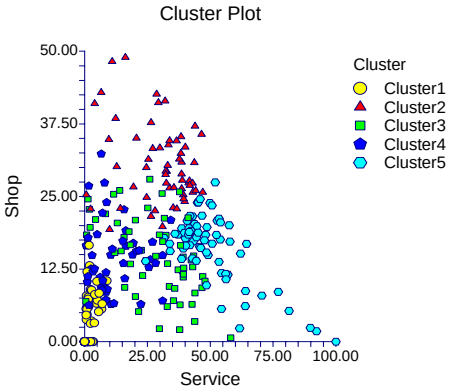

Cluster Plot
Location
Fuel
Cluster
Cluster1
Cluster2
Cluster3
Cluster4
Cluster5
50.00
37.50
25.00
12.50
0.00
0.00
8.75
17.50
26.25
35.00


Cluster Plot
Location
Shop
Cluster
Cluster1
Cluster2
Cluster3
Cluster4
Cluster5
50.00
37.50
25.00
12.50
0.00
0.00
12.50
25.00
37.50
50.00


Cluster Plot
Location
Service
Cluster
Cluster1
Cluster2
Cluster3
Cluster4
Cluster5
50.00
37.50
25.00
12.50
0.00
0.00
25.00
50.00
75.00
100.00


Cluster Plot
Fuel
Shop
Cluster
Cluster1
Cluster2
Cluster3
Cluster4
Cluster5
35.00
26.25
17.50
8.75
0.00
0.00
12.50
25.00
37.50
50.00


Cluster Plot
Fuel
Service
Cluster
Cluster1
Cluster2
Cluster3
Cluster4
Cluster5
35.00
26.25
17.50
8.75
0.00
0.00
25.00
50.00
75.00
100.00


Cluster Plot
Shop
Service
Cluster
Cluster1
Cluster2
Cluster3
Cluster4
Cluster5
50.00
37.50
25.00
12.50
0.00
0.00
25.00
50.00
75.00
100.00

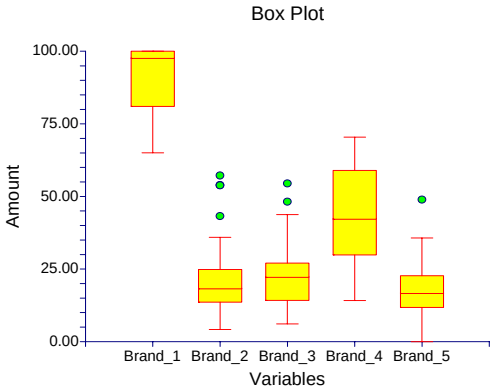
APPENDIX G: HYPOTHESIS TESTS FOR IMPORTANCES PER CLUSTER

a) Brand

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	1.8669	0.061916	Accept
Kurtosis Normality of Residuals	0.6191	0.535867	Accept
Omnibus Normality of Residuals	3.8685	0.144529	Accept
Modified-Levene Equal-Variance Test	8.1789	0.000003	Reject

Box Plot Section



Expected Mean Squares Section

Source Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A (...)	4	Yes	S(A)	S+sA
S(A)	289	No		S(A)

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A (...)	4	227198	56799.51	418.32	0.000000*	1.000000
S(A)	289	39240.39	135.7799			
Total (Adjusted)	293	266438.4				
Total	294					

* Term significant at alpha = 0.05

Kruskal-Wallis One-Way ANOVA on Ranks

Hypotheses

Ho: All medians are equal.

Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	4	191.959	0.000000	Reject Ho
Corrected for Ties	4	192.0038	0.000000	Reject Ho

Number Sets of Ties	13
Multiplicity Factor	5922

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Brand_1	61	16095.00	263.85	12.0072	97.78
Brand_2	58	5757.50	99.27	-4.8226	18.475
Brand_3	58	6636.00	114.41	-3.3081	22.41
Brand_4	49	9224.00	188.24	3.6751	42.43
Brand_5	68	5652.50	83.13	-7.1219	16.865

Means and Effects Section

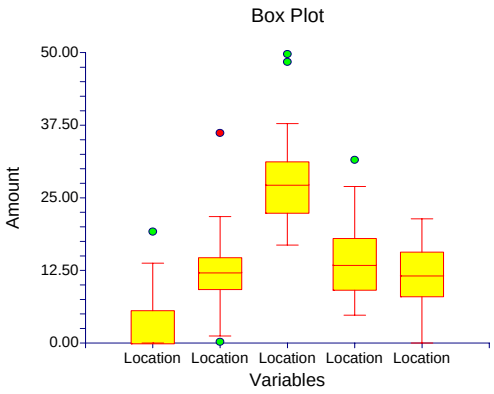
Term	Count	Mean	Standard Error	Effect
All	294	38.64806		38.99664
A:				
Brand_1	61	90.29197	1.491945	51.29533
Brand_2	58	20.90724	1.530043	-18.0894
Brand_3	58	22.87586	1.530043	-16.12078
Brand_4	49	43.49755	1.664638	4.500909
Brand_5	68	17.41059	1.413069	-21.58605

b) Location

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	4.9158	0.000001	Reject
Kurtosis Normality of Residuals	3.6961	0.000219	Reject
Omnibus Normality of Residuals	37.8267	0.000000	Reject
Modified-Levene Equal-Variance Test	2.8298	0.025021	Reject

Box Plot Section



Expected Mean Squares Section

Source Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A (...)	4	Yes	S(A)	S+sA
S(A)	289	No		S(A)

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A (...)	4	18570.94	4642.734	145.01	0.000000*	1.000000
S(A)	289	9253.022	32.01738			
Total (Adjusted)	293	27823.96				
Total	294					

* Term significant at alpha = 0.05

Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	4	190.0487	0.000000	Reject Ho
Corrected for Ties	4	190.37	0.000000	Reject Ho

Number Sets of Ties	10
Multiplicity Factor	42894

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Location_1	61	2849.50	46.71	-10.4009	0
Location_2	58	8261.50	142.44	-0.5060	12.205
Location_3	58	15074.50	259.91	11.2389	27.3
Location_4	49	7941.50	162.07	1.3143	13.5
Location_5	68	9238.00	135.85	-1.2885	11.665

Means and Effects Section

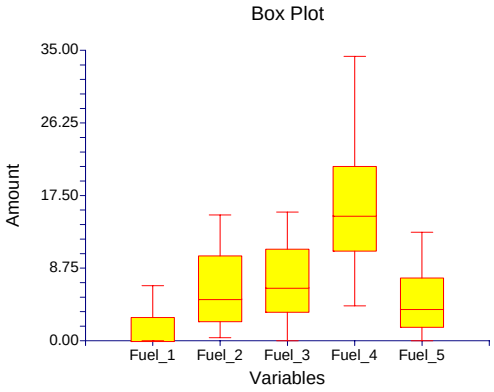
Term	Count	Mean	Standard Error	Effect
All	294	13.5331		13.73424
A:				
Location_1	61	3.082951	0.7244827	-10.65129
Location_2	58	12.26034	0.742983	-1.473899
Location_3	58	27.61535	0.742983	13.8811
Location_4	49	14.24082	0.8083414	0.506572
Location_5	68	11.47176	0.6861806	-2.26248

c) Fuel specification

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	4.4155	0.000010	Reject
Kurtosis Normality of Residuals	2.4847	0.012965	Reject
Omnibus Normality of Residuals	25.6702	0.000003	Reject
Modified-Levene Equal-Variance Test	15.2912	0.000000	Reject

Box Plot Section



Expected Mean Squares Section

Source Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A (...)	4	Yes	S(A)	S+sA
S(A)	289	No		S(A)

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A (...)	4	6397.318	1599.33	81.93	0.000000*	1.000000
S(A)	289	5641.35	19.52024			
Total (Adjusted)	293	12038.67				
Total	294					

* Term significant at alpha = 0.05

Kruskal-Wallis One-Way ANOVA on Ranks

Hypotheses

Ho: All medians are equal.

Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	4	145.7769	0.000000	Reject Ho
Corrected for Ties	4	146.0932	0.000000	Reject Ho

Number Sets of Ties	25
Multiplicity Factor	55014

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Fuel_1	61	3676.50	60.27	-9.0018	0
Fuel_2	58	8830.50	152.25	0.4749	5.045
Fuel_3	58	9624.50	165.94	1.8437	6.41
Fuel_4	49	12405.50	253.17	9.5315	15.1
Fuel_5	68	8828.00	129.82	-1.9556	3.845

Means and Effects Section

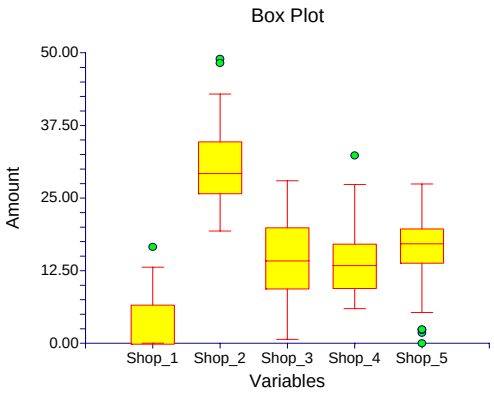
Term	Count	Mean	Standard Error	Effect
All	294	6.730612		7.147765
A:				
Fuel_1	61	1.524918	0.5656889	-5.622847
Fuel_2	58	6.150345	0.5801344	-0.9974204
Fuel_3	58	7.005862	0.5801344	-0.1419031
Fuel_4	49	16.27388	0.6311674	9.126112
Fuel_5	68	4.783823	0.535782	-2.363942

d) Convenience store

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	1.7469	0.080661	Accept
Kurtosis Normality of Residuals	1.0865	0.277266	Accept
Omnibus Normality of Residuals	4.2320	0.120514	Accept
Modified-Levene Equal-Variance Test	2.9346	0.021069	Reject

Box Plot Section



Expected Mean Squares Section

Source Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A (...)	4	Yes	S(A)	S+sA
S(A)	289	No		S(A)

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A (...)	4	22524.67	5631.168	158.71	0.000000*	1.000000
S(A)	289	10253.92	35.48069			
Total (Adjusted)	293	32778.59				
Total	294					

* Term significant at alpha = 0.05

Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	4	197.4701	0.000000	Reject Ho
Corrected for Ties	4	197.8041	0.000000	Reject Ho

Number Sets of Ties	10
Multiplicity Factor	42912

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Shop_1	61	2579.50	42.29	-10.8577	0
Shop_2	58	15093.50	260.23	11.2717	29.36
Shop_3	58	8249.00	142.22	-0.5275	14.32
Shop_4	49	6698.00	136.69	-0.9747	13.51
Shop_5	68	10745.00	158.01	1.1633	17.26

Means and Effects Section

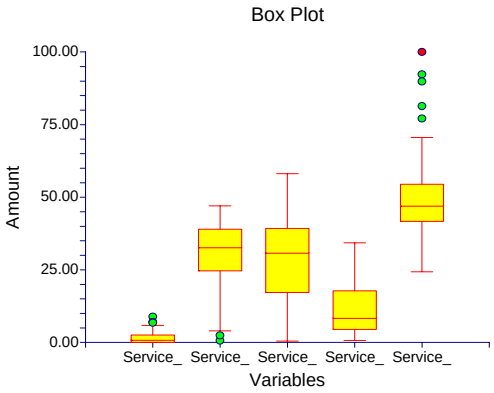
Term	Count	Mean	Standard Error	Effect
All	294	15.63048		15.70298
A:				
Shop_1	61	3.242295	0.7626602	-12.46068
Shop_2	58	30.59241	0.7821355	14.88943
Shop_3	58	14.51397	0.7821355	-1.189014
Shop_4	49	14.2049	0.8509381	-1.498081
Shop_5	68	15.96132	0.7223398	0.2583444

e) Service

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	2.6671	0.007651	Reject
Kurtosis Normality of Residuals	4.1911	0.000028	Reject
Omnibus Normality of Residuals	24.6787	0.000004	Reject
Modified-Levene Equal-Variance Test	15.0881	0.000000	Reject

Box Plot Section



Expected Mean Squares Section

Source Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A (...)	4	Yes	S(A)	S+sA
S(A)	289	No		S(A)

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A (...)	4	86958.77	21739.69	169.50	0.000000*	1.000000
S(A)	289	37066.14	128.2565			
Total (Adjusted)	293	124024.9				
Total	294					

* Term significant at alpha = 0.05

Kruskal-Wallis One-Way ANOVA on Ranks

Hypotheses

Ho: All medians are equal.

Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	4	215.9995	0.000000	Reject Ho
Corrected for Ties	4	216.0499	0.000000	Reject Ho

Number Sets of Ties	10
Multiplicity Factor	5922

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Service_1	61	2458.50	40.30	-11.0624	1.04
Service_2	58	9842.50	169.70	2.2195	32.835
Service_3	58	9350.50	161.22	1.3714	30.975
Service_4	49	4788.00	97.71	-4.4905	8.56
Service_5	68	16925.50	248.90	11.2185	47.18

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	294	25.45789		24.41857
A:				
Service_1	61	1.858033	1.450023	-22.56054
Service_2	58	30.08965	1.487051	5.671084
Service_3	58	27.99017	1.487051	3.571601
Service_4	49	11.78367	1.617863	-12.6349
Service_5	68	50.37132	1.373363	25.95275

APPENDIX H: CLUSTER MEANS FOR IMPORTANCES AND PART WORTH UTILITIES IN THE FUEL RETAIL INDUSTRY

	Cluster 1	**Cluster 2**	**Cluster 3**	**Cluster 4**	**Cluster 5**
	Brand or bust	*Shop 'till you drop*	*Location, location, location*	*Turbo boost*	*Service with a smile*
Brand	**90.3**	**20.9**	**22.9**	**43.5**	**17.4**
BP	17.9	5.1	5.3	12.9	8.8
Engen	5.2	-4.0	-3.8	8.2	-9.1
Caltex	-105.1	-21.3	-14.7	-72.9	7.2
Shell	82.0	20.1	13.2	51.9	-6.9
Location	**3.1**	**12.3**	**27.6**	**14.2**	**11.5**
directly on route	1.8	17.4	30.3	4.5	15.7
within 1km of daily route	-1.1	-11.9	17.6	3.8	-6.2
further than 2km of daily route	-0.7	-5.5	-47.9	-8.3	-9.5
Fuel	**1.5**	**6.2**	**7.0**	**16.3**	**4.8**
with performance-enhancing additives	-1.9	-9.1	-0.3	-11.5	-2.1
standard	1.9	9.1	0.3	11.5	2.1
Shop	**3.2**	**30.6**	**14.5**	**14.2**	**16.0**
high quality convenience store	-2.5	61.6	10.9	3.8	22.1
standard convenience store	1.1	3.7	-2.3	8.8	4.2
no convenience store	1.5	-65.3	-8.6	-12.6	-26.3
Service	**1.9**	**30.1**	**28.0**	**11.8**	**50.4**
excellent	4.4	80.9	76.3	32.5	138.6
average	0.6	-11.4	-12.6	-6.2	-25.4
below-average	-4.9	-69.5	-63.7	-26.4	-113.2

APPENDIX I: CROSS-TABULATIONS OF CLUSTERS AND DEMOGRAPHIC VARIABLES

	Cluster 1 *Brand or bust*	**Cluster 2** *Shop 'till you drop*	**Cluster 3** *Location, location, location*	**Cluster 4** *Turbo boost*	**Cluster 5** *Service with a smile*
Sex					
Females	15	29	17	13	28
χ^2 contribution	1.79	3.92	0.48	0.94	0.82
Males	46	29	41	36	40
χ^2 contribution	0.95	2.08	0.26	0.50	0.44
Total	61	58	58	49	68
χ^2 contribution	2.75	6.00	0.74	1.44	1.26
χ^2	**12.19**				
Degrees of Freedom	4				
Probability level	0.016				
Reject H_0?	Yes, there are significant differences between two or more segments				
Race					
Black	20	10	13	10	14
χ^2 contribution	2.68	0.78	0.00	0.12	0.14
Coloured	1	4	4	1	0
χ^2 contribution	0.56	2.08	2.08	0.27	2.31
Indian	11	2	3	4	2
χ^2 contribution	9.07	2.87	2.09	0.39	2.46
White	29	42	38	34	52
χ^2 contribution	3.25	0.32	0.01	0.07	1.05
Total	61	58	58	49	68
χ^2 contribution	15.55	6.06	4.18	0.85	5.97
χ^2	**32.60**				
Degrees of Freedom	12				
Probability level	0.001				
Reject H_0?	Yes, there are significant differences between two or more segments				

	Cluster 1 *Brand or bust*	Cluster 2 *Shop 'till you drop*	Cluster 3 *Location, location, location*	Cluster 4 *Turbo boost*	Cluster 5 *Service with a smile*
Type of purchase					
Petrol	59	45	47	42	50
χ^2 contribution	0.65	0.03	0.02	0.09	0.59
Diesel	2	8	8	4	14
χ^2 contribution	4.38	0.20	0.11	0.63	3.99
Total	61	53	55	46	64
χ^2 contribution	5.03	0.23	0.13	0.72	4.58
χ^2	**10.69**				
Degrees of Freedom	4				
Probability level	0.030				
Reject H_0?	Yes, there are significant differences between two or more segments				
Type of vehicle					
Average	51	24	30	30	23
χ^2 contribution	8.43	1.25	0.10	0.95	5.20
Luxury	4	16	12	7	18
χ^2 contribution	5.59	2.41	0.02	0.47	1.67
Delivery	2	5	3	2	10
χ^2 contribution	1.59	0.15	0.46	0.64	4.62
4x4	4	9	12	6	15
χ^2 contribution	3.53	0.01	0.81	0.24	1.70
Total	61	54	57	45	66
χ^2 contribution	19.13	3.83	1.40	2.29	13.19
χ^2	**39.84**				
Degrees of Freedom	12				
Probability level	0.0001				
Reject H_0?	Yes, there are significant differences between two or more segments				

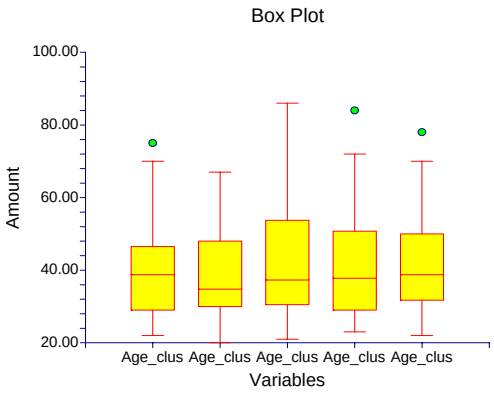
	Cluster 1 *Brand or bust*	Cluster 2 *Shop 'till you drop*	Cluster 3 *Location, location, location*	Cluster 4 *Turbo boost*	Cluster 5 *Service with a smile*
Frequency of visits					
Very frequent	38	38	34	34	39
χ^2 contribution	0.06	0.15	0.00	0.26	0.24
Frequent	19	12	14	10	21
χ^2 contribution	0.40	0.54	0.01	0.67	0.69
Not frequent	4	5	5	4	5
χ^2 contribution	0.19	0.06	0.11	0.00	0.02
Total	61	55	53	48	65
χ^2 contribution	0.65	0.75	0.12	0.93	0.95
χ^2	**3.39**				
Degrees of Freedom	8				
Probability level	0.907				
Reject H_0?	No				
Time of visit					
Off-peak	54	31	39	41	53
χ^2 contribution	1.70	3.35	0.37	0.60	0.13
Peak	7	27	19	8	15
χ^2 contribution	4.88	9.62	1.07	1.72	0.38
Total	61	58	58	49	68
χ^2 contribution	6.58	12.97	1.44	2.32	0.51
χ^2	**23.82**				
Degrees of Freedom	4				
Probability level	0.0001				
Reject H_0?	Yes, there are significant differences between two or more segments				

APPENDIX J: HYPOTHESIS TEST OF INDEPENDENCE OF CLUSTERS AND AGE

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision (0.05)
Skewness Normality of Residuals	4.4551	0.000008	Reject
Kurtosis Normality of Residuals	-0.4804	0.630913	Accept
Omnibus Normality of Residuals	20.0784	0.000044	Reject
Modified-Levene Equal-Variance Test	0.2228	0.925556	Accept

Box Plot Section



Analysis of Variance Report

Kruskal-Wallis One-Way ANOVA on Ranks
Hypotheses
Ho: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	4	2.004902	0.734857	Accept Ho
Corrected for Ties	4	2.006668	0.734532	Accept Ho
Number Sets of Ties	47			
Multiplicity Factor	15834			

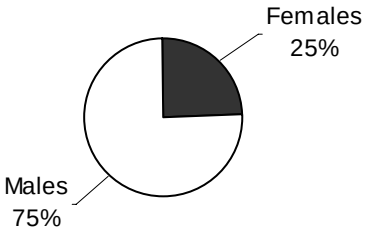
Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	262	41.16794		41.12405
A:				
Age_cluster1	57	40.98246	1.863288	-0.1415974
Age_cluster2	47	38.80851	2.051958	-2.315543
Age_cluster3	48	42.1875	2.030471	1.063446
Age_cluster4	48	41.77083	2.030471	0.6467798
Age_cluster5	62	41.87097	1.786576	0.7469141

APPENDIX K: CLUSTER DEMOGRAPHICS

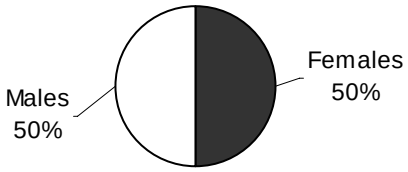
a) Age

Cluster 1
"brand or bust"



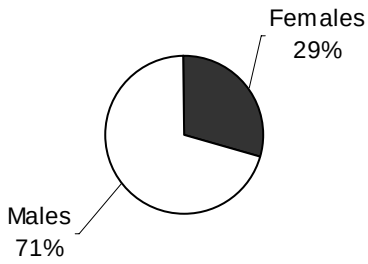
Total = 61

Cluster 2
"Shop 'till you drop"



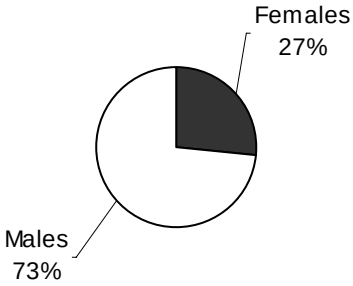
Total = 58

Cluster 3
"Location, location, location"



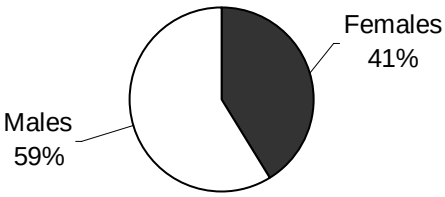
Total = 58

Cluster 4
"Turbo-boost"



Total = 49

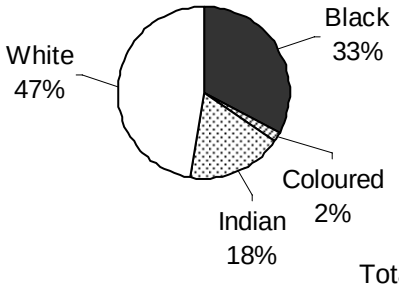
Cluster 5
"Service with a smile"



Total = 68

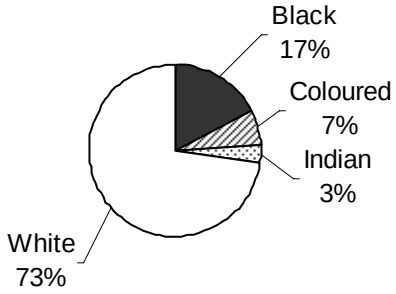
b) Race

Cluster 1
"brand or bust"



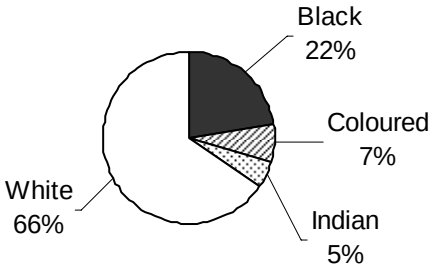
Total = 61

Cluster 2
"Shop 'till you drop"



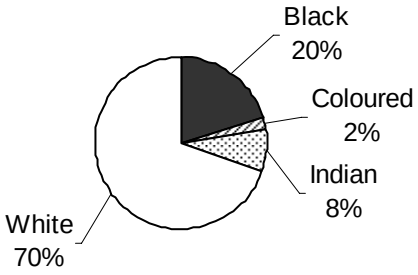
Total = 58

Cluster 3
"Location, location, location"



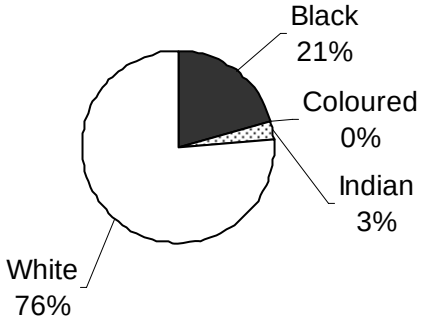
Total = 58

Cluster 4
"Turbo-boost"



Total = 49

Cluster 5
"Service with a smile"



Total = 68

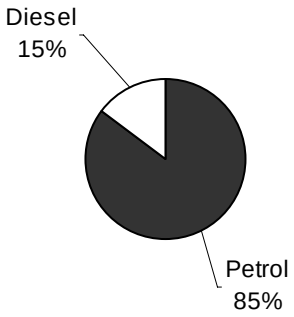
c) Type of purchase

Cluster 1
"brand or bust"



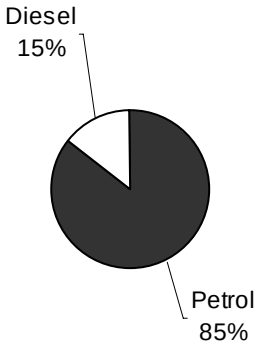
Total = 61

Cluster 2
"Shop 'till you drop"



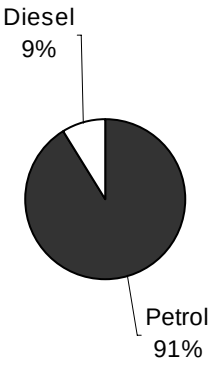
Total = 53

Cluster 3
"Location, location, location"



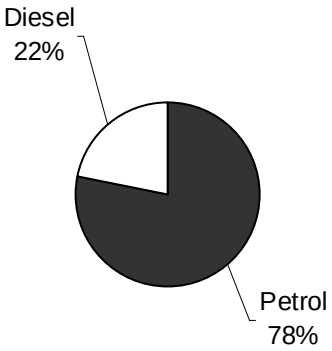
Total = 55

Cluster 4
"Turbo-boost"



Total = 46

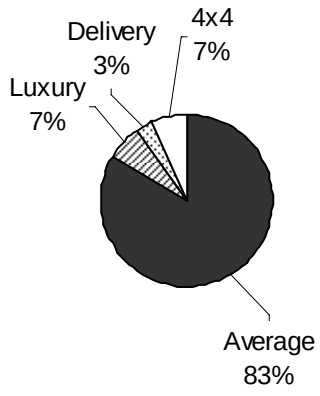
Cluster 5
"Service with a smile"



Total = 64

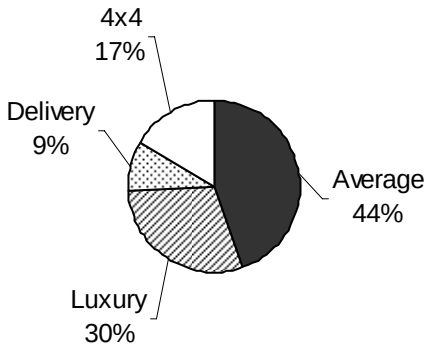
d) Type of vehicle

Cluster 1
"brand or bust"



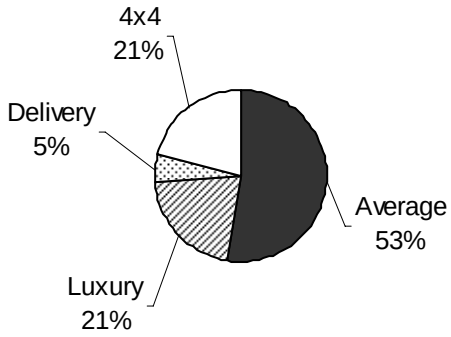
Total = 61

Cluster 2
"Shop 'till you drop"



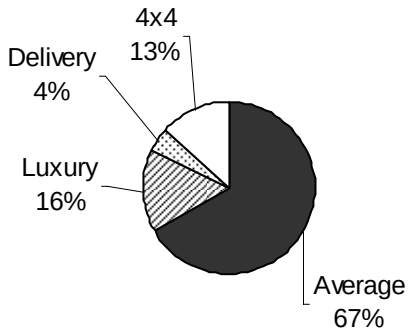
Total = 54

Cluster 3
"Location, location, location"



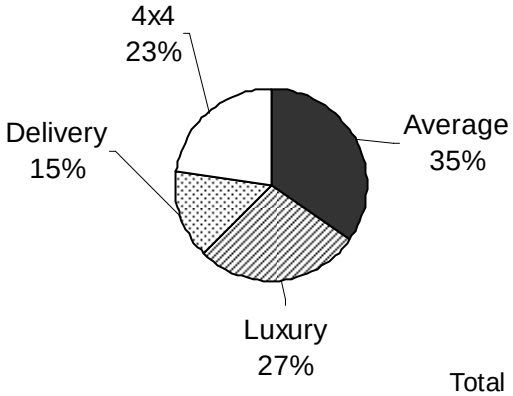
Total = 57

Cluster 4
"Turbo-boost"



Total = 45

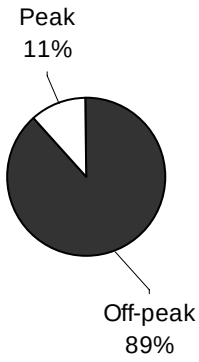
Cluster 5
"Service with a smile"



Total = 66

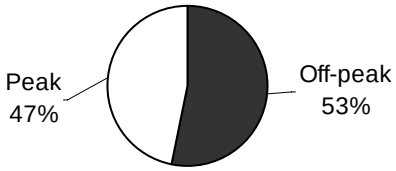
e) Time of visit

Cluster 1
"brand or bust"



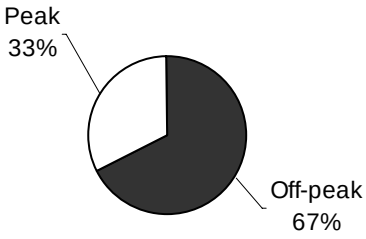
Total = 61

Cluster 2
"Shop 'till you drop"



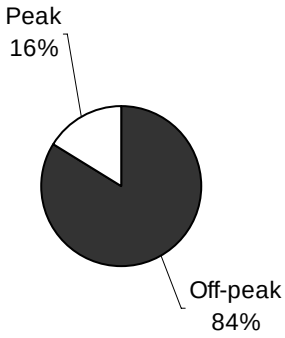
Total = 58

Cluster 3
"Location, location, location"



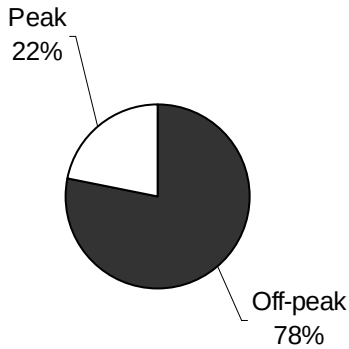
Total = 58

Cluster 4
"Turbo-boost"



Total = 49

Cluster 5
"Service with a smile"



Total = 68