

An analysis of the retail price elasticity of demand for a leading fuel
company.

By

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ABSTRACT

In this paper the case that the retail petrol elasticity of demand within South Africa is becoming more elastic has been argued, in order to assist fuel companies with future strategic decision-making. The dissertation addresses the market forces that influence elasticity of demand and the determinants for elasticity of demand. Research has been done on the analysis of the retail price elasticity of demand for one of the leading petrol companies in South Africa.

The author has provided a theoretical overview of some of the different market forces as well as a summary of selected prior studies that were done on price elasticity of demand for petrol. Empirical research has been done by means of a survey questionnaire that was designed for the purposes of this study. The main determinants of price elasticity of demand for petrol as well as the impact that these determinants have on petrol elasticity of demand have been investigated as part of the empirical study. The results from the statistical analyses have been used to conclude if the petrol market is elastic within South Africa.

The empirical research shows that consumers are changing their lifestyles related to the usage of petrol in order to reduce money spent on petrol purchase. The main variables that consumers consider when buying petrol, which include, price, location, price and brand are also analysed as part of the results.

The study also concludes that at R10 per liter for petrol, consumers become absolutely price sensitive.

The empirical research of this study has shown that even though it is evident that there are elements of elasticity creeping into the market for petrol demand, the study's outcome is inconclusive to deem the entire South African petrol market elastic.

Further research needs to be conducted to obtain conclusive results of retail price elasticity in South Africa.

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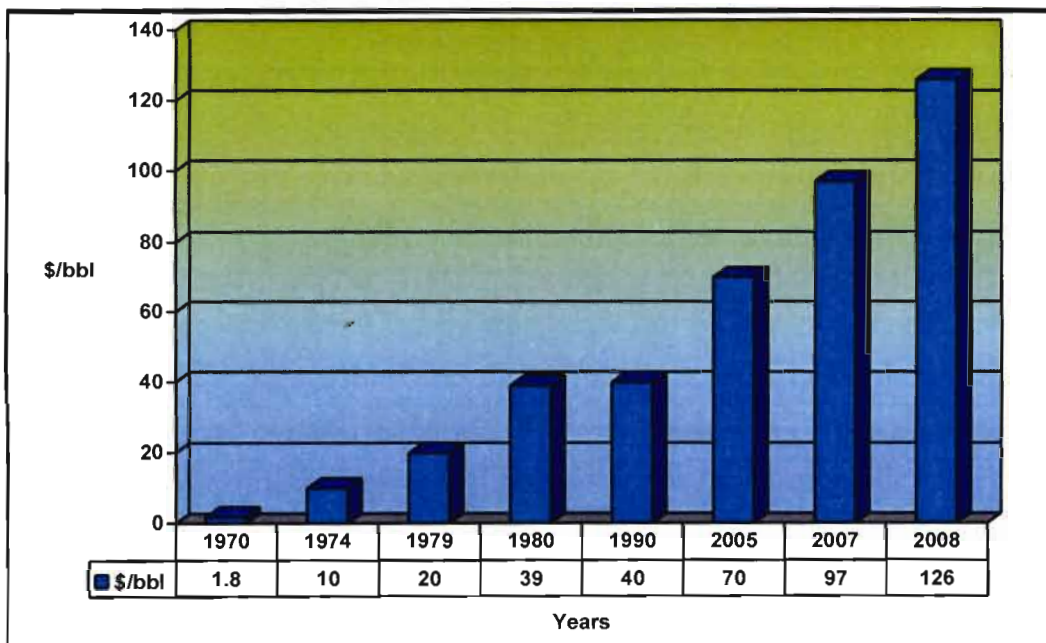
CHAPTER 1: NATURE AND SCOPE OF THE STUDY

1.1 BACKGROUND

World crude oil demand has increased by 3% every two years over the last decade, and supply of this modest commodity has decreased as there are not many new oil fields being discovered DME (2009). This has resulted in an increase of petroleum product prices because the finished product prices are directly linked to crude oil prices DME (2009).

Figure 1.1 illustrates the evolution of crude prices over the last 38 years, and it can be seen that prices have increased drastically during this period. Between 2005 and 2008, prices for crude oil have increased by 80%, and the worldwide demand has continued to increase. The graph below presents the average dollar price per barrel of Brent crude oil over the period 1970 to 2008.

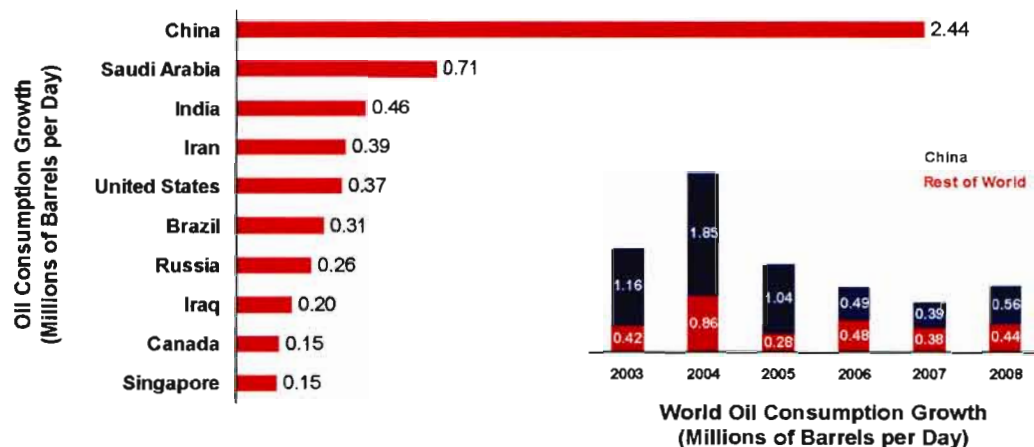
Figure 1.1: Crude Price History



Source: DME: 2009

In June 2008, the Commodity Futures Trading Commission (CFTC) formed an Interagency Task Force on Commodity Markets (ITF). The ITF's objective was to investigate and report back to the CFTC on the reasons behind the increase in the oil price from 2003 until 2008. One of the initial findings was that between 2004 and 2007 oil consumption increased by 3.9 % (Interim report of the ITF, July 2008).

Figure 1.2: World Oil Consumption Growth (ITF: 2009)



Source: Energy Information Administration

Apart from strong economic growth, there were other factors that have led to the steady increase in crude oil prices.

- The slow-down in oil supplies growth. In the July 17 2008 edition of the Energy Bulletin (2008), the fact that global oil production will decline at some point is discussed. They conclude that it will lead to lower supply and that it is the main long-term fundamental cause of increasing prices.
- Increased levels of political unrest, particularly in the Middle East (the continued war in Iraq and political instability in Iran) and Nigeria have had impacts on global oil supplies. Possible unrest in the Middle East is made worse by the allocation of resources in this geographical area—research indicates that the Middle East has the world’s best-known oil reserves (61%) BP Statistical Review of World Energy (2008).
- Due to the 2003 war in Iraq, the oil fields and production facilities in the country were crippled. A significant amount of capital investment was required to get the oil fields and related production facilities up and running, resulting in a temporary decrease in crude oil supply from this region. The same can be said of Nigeria, with rising militant or rebel violence, labour disruptions and the lack of appropriate government interventions and control continuing to impact on oil supply. The

supply issues in the Middle East and Nigeria have led to a decrease in the supply of crude to the global market and a subsequent increase in the price of crude.

- A decrease in production supply by OPEC in February 2007 of “a further 0.5 million barrels per day due an apparent overhang in supply” (Moving commodity and equity markets, 19 December 2008) had the effect of increasing oil prices.
- KPMG International’s research (2008) raises the interesting fact that oil consumption is increasing in the oil-exporting countries due to high economic growth. This has led to less oil being exported to the non-oil-producing countries.
- Low levels of surplus oil capacity .The Interagency Task Force (2008) reports that the global surplus oil capacity is below 2% of consumption (of which the majority sits in Saudi Arabia). This compares poorly to the 1996 to 2002 average of 3.9 millions barrels per day.
- The ITF points out that, without significant surplus, “market participants can no longer rely on increased production from key members of OPEC to offset supply disruptions and restore balance without the need for significant price changes”. The combination of these factors “means that prices react strongly to actual or perceived supply disruption”.
- Natural disasters have had temporary influences on the supply of crude in the market. Hurricane Katrina and Hurricane Rita struck the Gulf of Mexico within a month of each other, and “destroyed 109 oil platforms” McCaskill (2006). Robin-McCaskill (2006) reported in June 2006 that Hurricane Katrina accounted for a “25% supply deficit to the USA in the year 2005”. This had the effect of disrupting the supply of crude and helped to push up prices.

The above-mentioned supply some of the main reasons for the crude price changes; however, this study will analyse the retail price elasticity of demand for a leading fuel company in South Africa.

The South Africa petroleum market is different to other markets because South Africa is seen as a price taker (the South African market is considered a price taker because the market is not influential enough to affect the price of petrol and

therefore the fuel companies are usually forced to go with the market price if they want to sell their goods). The oil trade business is too small to influence either global or regional crude product prices and the government regulates the price of petrol and paraffin at retail value and diesel at the wholesale value.

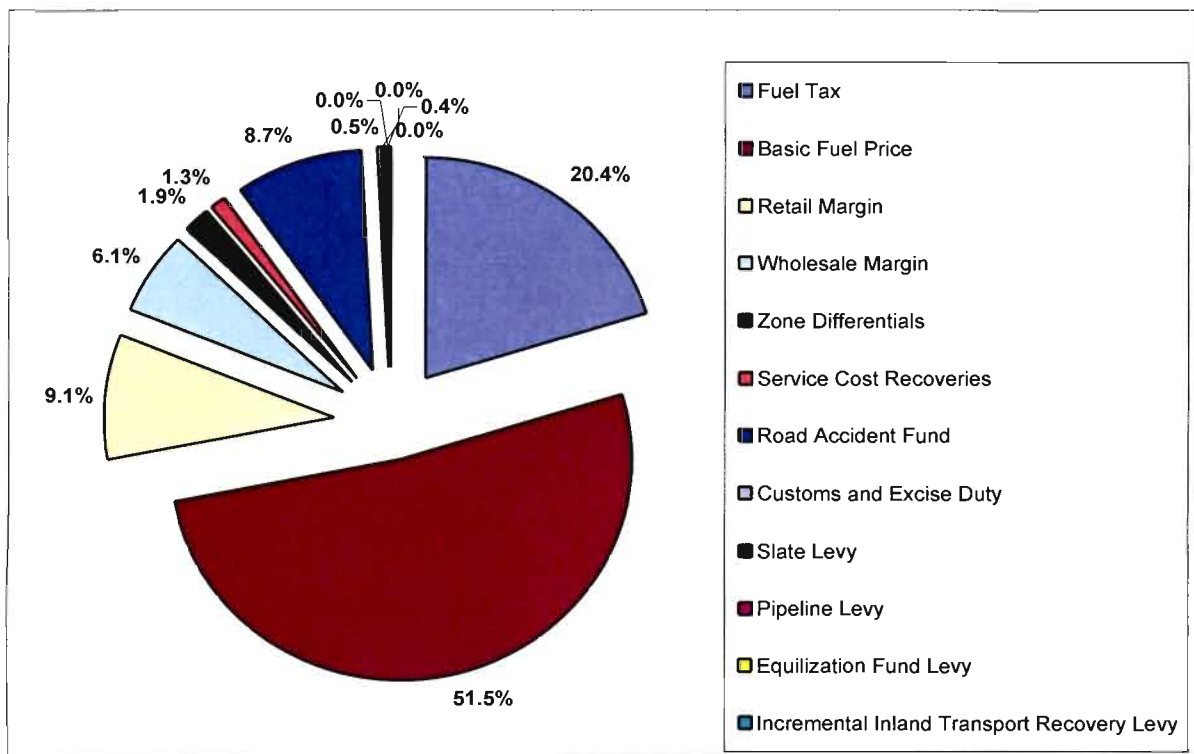
The South African demand for fuel increased by 3% annually since 2002 DME (2009). Even though the South African market is considered too small to influence global trends, the petroleum industry plays a critical role within the local economy SAPIA (2009). Some of the main attributes of the petroleum market to the South African economy are that it:

- contributes 2% to the overall GDP of South Africa;
- supplies 18% of South Africa's primary industry with energy products;
- employs over 100,000 people within the country;
- operates six refineries and 135 storage facilities all over South Africa;
- has collected ZAR200 billion in fuel taxes for government between 1994 and 2006; and
- has invested approximately ZAR19 billion between 1994 and 2006 in infrastructure and ZAR10 billion on cleaner fuel initiatives.

The South African basic fuel price (hereafter referred to as BFP) is calculated using market-related costs of importing a substantial portion of the South African fuel requirements DME (2009). The pricing formula, which was introduced in April 2003, is essentially an import parity pricing formula (import parity implies oil companies sell products locally at the price that consumers would pay if they were to import the same products from another country) and relies on spot prices, which is the present delivery price of petrol being traded on the cash market. It is also called the cash price ANON (2008): for petrol 50% Mediterranean and 50% Singapore price quotations and for diesel and paraffin 50% Mediterranean and 50% Arabian Gulf price quotations SAPIA (2009). This means that when the final petrol price in South African is calculated, the government will make use of the average between Mediterranean and Singapore spot prices during a specific period and, added to these factors, are cost items such as sea freight cost, demurrage, insurance, wharfage, coastal storage and stock financing cost. Figure 1.3 below illustrates all

the variables that make up the final petrol price to consumers, and the percentage that the variable contributes to the final selling price. As can be seen in Figure 1.3, the BFP contributes to the majority of the petrol price build-up with 51.5%, the second biggest variable is fuel taxes paid to the government (20.4%), the retailer received the third biggest contribution (9.1%) and then the fourth biggest variable is that of the wholesale margin (6.1%) that the oil companies receive.

Figure.1.3: South African Petrol Price Build-up (DME: 2009)



Source: DME: 2009

According to the Department of Minerals and Energy's (hereafter referred to as DME) master plan, 2007 was the first time that the country's demand exceeded supply for finished products by 2 billion litres and the forecast shows that the situation will only deteriorate within coming years.

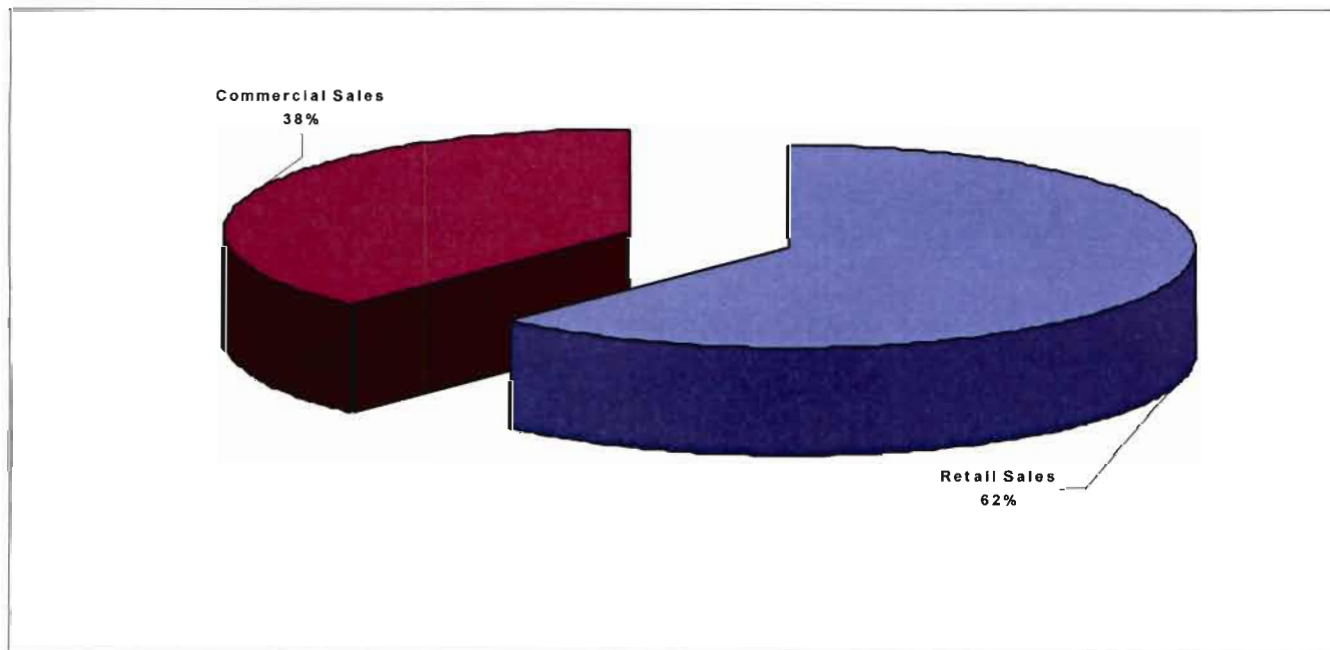
However, during 2008, the prices of finished products increased substantially, mainly due to the reasons given above for the increase in crude prices, which has resulted in a decrease of demand, which is the exact opposite of the DME's master plan and their forecast. This means that the price of petrol influences the South African

market's short-run (short-run refers to a period ranging from 1 to 3 years) elasticity of demand for petrol.

The current fuel market in South Africa is split into retail and commercial sections as illustrated by Figure.1.4 below. The retail market, which is made up of the individual consumers that use petrol as a monthly commodity, and the commercial market, which caters to other businesses in different sectors like mining, agriculture and manufacturing. The retail market is the main contributor to the current demand figures; the market shares illustrated by the retail market contributing 62% and the commercial market 38% out of a total market size of 24 billion liters of fuel SAPIA (2009).

Information below obtained from Company X and the company's name can not be mentioned due to competition law within the country.

Figure 1.4: Market Split (Company X: 2009)



Source: Company X: 2009

During 2008, the world market experienced volatility in the global markets, especially the crude oil market. The price of crude rose by 85% from June 2007 to June 2008, and then decreased by 56% as at the end of November 2008 PLATTS (2008). This

resulted in high petrol prices within the South African market. The price of unleaded petrol increased by 50% from June 2007 to June 2008 DME (2008).

This big increase in the petrol prices led to a decrease of 2% of company X's sales overall when compared to 2007, but the main concern is that the retail sales declined by 3.5%, and no concrete reason can be given by company X's marketing department for the relatively big decline in the sales, considering that six new retail services stations were opened during this period.

Therefore, it would seem that, together with other variables, the petrol price plays a substantial role in the demand for petrol. Thus the problem statement is that company X does not have sufficient knowledge on the elasticity of demand for petrol in order for the company to review their strategy.

1.2 RESEARCH OBJECTIVES

1.2.1 Primary objective

The primary objective of this study is to analyse the petrol price of elasticity of demand for company x in order to assist the company with strategic planning for raw materials, investments and decision-making within their retail network.

One of the main reasons for a lack of work done previously on the South African fuel market has been the constant growth of the economy over the last five years, which meant that the demand for fuel grew constantly and planning was easier within these economic conditions. The economic growth in South Africa has slowed down, and forecasts suggest that it will continue to do so in 2009, like the rest of the world undergoing an economic downturn. This is evident with the negative GDP growth during the last quarter of 2008 and the first quarter of 2009 of -1.8 StatsSA (2009). The challenge with the economy slowing down is to understand the impact it will have on the demand for petrol within the reseller network for company X.

1.2.2 Secondary objective

The secondary objective of this research is to investigate the main determinants that influence the responsiveness of demand for petrol.

1.3 RESEARCH METHODOLOGY

This research, pertaining to the specific objectives, consists of two phases, namely a literature review and an empirical study.

1.3.1 Phase 1: Literature review

The literature review will consist of two sections. The first section will focus on past studies done of petrol elasticity of demand and different theory on price elasticity of demand. The second section will focus on macro- and microeconomics for company X's demand for petrol as well as the variables that influence this demand. The determinants of the responsiveness of demand are also highlight as part of the chapter. During the literature review, previous studies will be reviewed and various concepts will be investigated.

Variables that will be reviewed as part of the literature review include:

- income elasticity's;
- price evolution of petrol;
- demand for petrol within company X's network in the current and past years;
- availability of substitutes for fuel; and
- changes in lifestyle.

The literature review will also help identify the issues, which must be included in the research questionnaire.

1.3.2 Phase 2: Empirical study

The empirical study consists of the research design, measuring instrument and statistical analysis.

Research design

The basis for the research will be a design of a questionnaire and a survey will be conducted to generate responses from petrol users within the Gauteng area.

Statistical analysis

Bless and Higson-Smith (2000:137) defines the data analysis process as the allowing of the researcher to generalise the findings from the sample used in the research to the larger population in which the researcher is interested. The following statistical analyses will be done:

- Descriptive statistics, to determine the change in crude prices, which is the mean price at a given time and to determine price elasticity at a given time, which is the standard deviation.

1.4 LIMITATIONS OF THE STUDY

Problems experienced include:

- Obtaining relevant and up to date data on the petroleum market and the opposition;
- The unwillingness of the service station owner or managers to have the surveys conducted at their premises;
- The response rate on the questionnaire
- Lack of current literature studies conducted on the petrol price elasticity of demand;
- Constant significant fluctuation of the petrol price from an average of R9 per litre, when study started, to currently an average of R7 per litre; and
- The current economic slowdown, or recession, that affects the demand for petrol.
- Due to confidentiality agreement within the industry, the petrol company's name is not mentioned, however the name of the company is available to the author and study leader.

1.5 LAYOUT OF THE STUDY

The chapters in this mini-dissertation are presented as follows:

Chapter 1: Nature and scope of the study.

Chapter 2: The South African market

Chapter 3: Empirical research.

Chapter 4: Conclusions and Recommendations.

References

Annexure

1.6 CHAPTER SUMMARY

This chapter provides an introduction of what the research will be based on and what the objectives are of the study. A brief introduction to the South African petroleum market was also covered in this chapter, as well as the key contributions that have been made to the South African economy by the petroleum sector.

The problem statement of the study was defined, which is to analyse the petrol price elasticity of demand for company x in order to assist the company with strategic planning for raw materials, investments and decision-making, within their retail network.

An overview of the research that will be done in order to help solve the problem statement was provided. Questionnaires will be used to help analyse the market and variables that will influence the demand for petrol.

The forthcoming chapters will focus on the macro- and microeconomics in which company X operates. Some of the main supply and demand theories will also be covered to observe if these theories are applicable to the South African petrol market. Once the research is completed, recommendations will be made to assist company X with the problem statement that is mentioned above.

CHAPTER 2: THE SOUTH AFRICAN MARKET

2.1 INTRODUCTION

The following chapter will look at the market conditions and variables that influence the demand and supply. Chapter two will also focus on literature reviews and theory on demand and supply that has been done before, and to illustrate what these theories mean in terms of the petrol demand for company X.

This section will also present the main market and economic factors that company X's retailers operate within and focuses on the elements that would influence demand as stated in the above section.

This chapter also looks at the main factors that influence the responsiveness of consumer demand to the petrol price changes. The main factors that have been identified according to Mohr et al (2008:164 –166) are:

- availability of substitutes;
- proportion of income required;
- degree of necessity; and
- lifestyle changes.

The impact of one determinant can be neutralised by another determinant, which works in the opposite direction. Sometimes different consumers or groups may respond differently to price changes. Therefore, in deciding whether the demand for particular goods or services will tend to be elastic or inelastic, all the relevant information must be considered, i.e. all the possible determinants have to be taken into account, (Mohr et al; 2008:164).

Company X is one of the six organisations that operate in the South African petroleum sector. Young and Mcauley (1994:143) define this as an oligopoly market, which is characterised by:

- a relatively small number of large sellers, in this case, only six players;
- either a standardised product or the same grade of petrol as it is regulated by government;

- difficult market entry—very high level of capital investment and regulation prevent many entries into the market; and
- complete information about market prices, as the market selling prices are regulated by government where consumers pay the same price at all different outlets and there is no price competition.

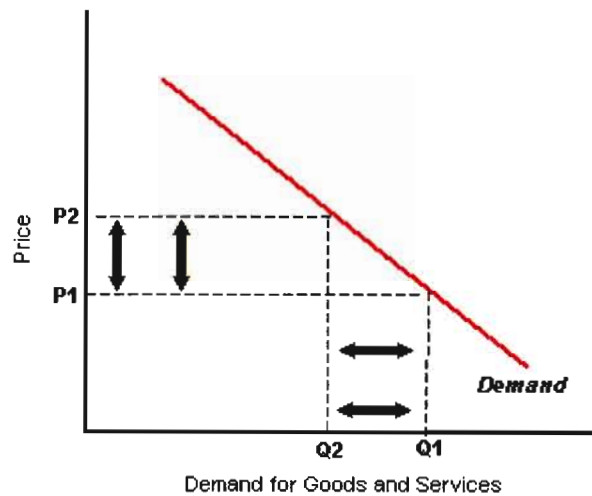
2.2 THE BASIC MARKET FORCES

The law of demand has been researched and documented over a number of years. Research even dates back to studies done by Henderson (1922:18), who defines the law of demand, as when at the price ruling demand exceeds supply, the price tends to rise. Conversely, when supply exceeds demand, the price tends to fall. A rise in price tends, sooner or later, to decrease demand and to increase supply. Conversely, a fall in the price tends, sooner or later, to increase demand and to decrease supply. Henderson (1922:19) also stated that price tends to level at which demand is equal to supply.

Even though the study was done so long ago, these principles still apply today. Stretton (1999:12) simplified it much more by stating that demand means the willingness to buy specific quantities of goods at specific prices. According to the law of demand, the quantity demanded for any good or service and the price are inversely related. This means that the price of any good or service will influence the demand and supply of the commodity. So, even for the petrol price, this law will play a fundamental role in the demand and supply of petrol to consumers.

The relationship between price and quantity demanded can be represented as a downward sloping curve as shown by the figure below:

Figure 2.1: The Demand Curve



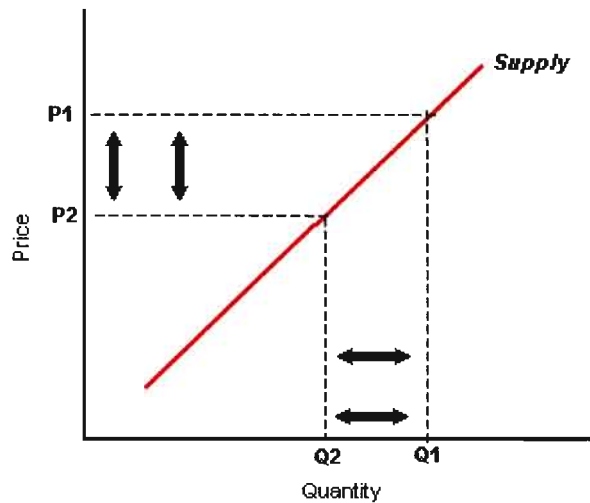
Source: Carbaugh 2007:33

This curve indicates that consumers are willing to buy more of the service or product as the price decreases and less when the price increases; this is if all the other factors except price is kept constant. According to Lipsey et al (1987:59), there are six factors that can influence or move the level of demand up or down and these elements include:

- the commodity's price, in the case of petrol, controlled by government;
- the average household income;
- prices of related products or services, like rail transport, for example;
- taste of the consumers;
- distribution of income amongst households; and
- size of the population, or the number of customers, current and new.

The other side of the model is that of supply. This is the schedule showing the amounts of goods and services that a firm or household is willing and able to sell at each possible price during a specific period Carbaugh (2007:36). In the case of company X, the supply of petrol are the quantities that their refinery can manufacture plus the amount of petrol that company X can purchase at a competitive price, as the selling price is regulated.

Figure 2.2: The Supply Curve



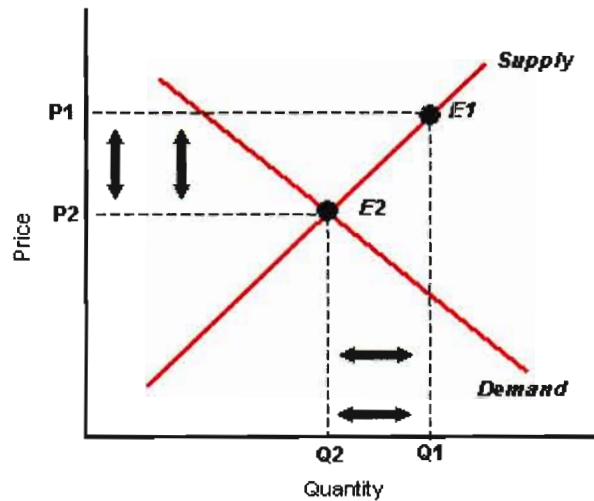
Source: Carbaugh 2007:37

The law of supply is illustrated by the graph above, which shows that as the quantity supplied increases as the price increases and the price decreases when the quantity decreases, this means that the relationship between price and quantity is directly related. Therefore, in the case of company X, when they receive higher prices or margins, the more petrol they can manufacture or purchase in order to meet the demand from the market. According to Lipsey et al (1987:59), there are four factors that can influence or move the level of supply up or down and these elements are:

- The commodity's own price.
- Prices of inputs or raw materials.
- Goals of the firm.
- The state of technology.

Another important law that is highlighted by Mohr et al (2008:117) is that an increase in demand or decrease in supply will tend to raise the price, for a short period at least. Conversely, a decrease in demand, or an increase in supply will tend to lower the price, for a short period at least.

Figure 2.3: Equilibrium Market (Paulsen & Toutkoushian 2006:16)



Source: Paulsen & Toutkoushian 2006:16

Figure 2.3 illustrates the movement from a high price to a lower price as the supply decreases and from a lower to higher price as the demand increases of the required commodity. Where the supply and demand is equal it is known as the equilibrium price. According to Paulsen and Toutkoushian (2006:16), when prices are set above this level, then quantity supplied would exceed quantity demanded and suppliers would have an incentive to reduce the prices. If this had to happen with the petrol prices, company X will only have the benefit for one month as government market use of import parity prices as explained in chapter 1 and will reduce the price in the new month, as these prices are regulated and changed monthly.

On the other hand, if the prices are set below equilibrium, quantity demanded would exceed quantity supplied, then buyers would increase their offers and this would drive up the market prices. This is what has been happening with petrol prices in recent years. As demand increases, it started to push up prices. The importance of changing prices therefore ask that retailer or sellers need to know how much more or less will be demanded of the commodity if prices changes.

According to Carbaugh (2007:56), price elasticity of demand measures how responsive, or sensitive, buyers are to a change in price.

- The price elasticity of demand looks at the percentage change in quantity demanded relative to the percentage change in the price.

- Products or services can either be defined as elastic, which means that the percentage change in the quantity demanded exceeds the percentage change in the price or inelastic, which means that the percentage change in quantity demanded is less than the percentage change of the price Carbaugh (2007:57).

Numerous empirical studies have been done on fuel price elasticity in the past, mostly on first world markets. Most of these studies conclude that the short-run petrol demand is inelastic: Dahl and Sterner (1991) determine a short-run fuel demand elasticity of 0.26, and then Espey (1998) calculated a median short-run elasticity of 0.23 for the U.S.A and other developed countries. Then, more recently, Hughes et al (2006) calculated the fuel demand elasticity to be between 0.41 and 0.43 in the U.S.A. According to Mohr et al (2008:155), demand is elastic when the demand coefficient is greater than 1, and demand is inelastic when the demand coefficient is less than 1. Therefore, the conclusion has been that the fuel market in South Africa is as inelastic as the rest of the world, and constant growth has been forecasted. The short-run of demand represents the period during which only some factors or variables can be changed because there is not enough time to change the other variable and the long-run demand will be done with all variables that can impact on demand ANON (2009).

The next part of the study will highlight some of the key macroeconomic variables for the South African market. As stated above, there are six factors that can influence or move the level of demand up or down and some of them are related to macroeconomics.

2.3 ECONMOMIC ENVIRONMENT

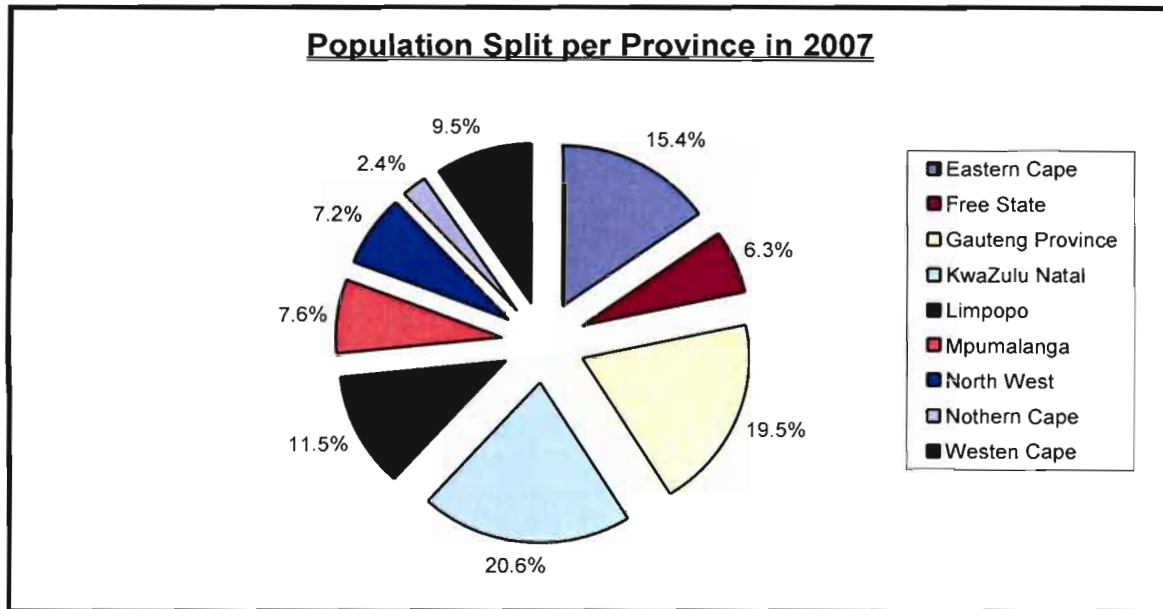
2.3.1 Selected demographic indicators

According to the 2008 South African Development Report, Netshitenzhe (2008:82), over the past 10 years, the South African population increased from 44.5 million to 48.5 million, while at the same time the number of households increased from 9 million to 12.5 million. The increase in the number of new households that were formed far outpaced the increase in the population, and it is clear that South African

society went through a period where a large number of citizens chose to form new, smaller households.

When looking at the population split per province, the following can be illustrated:

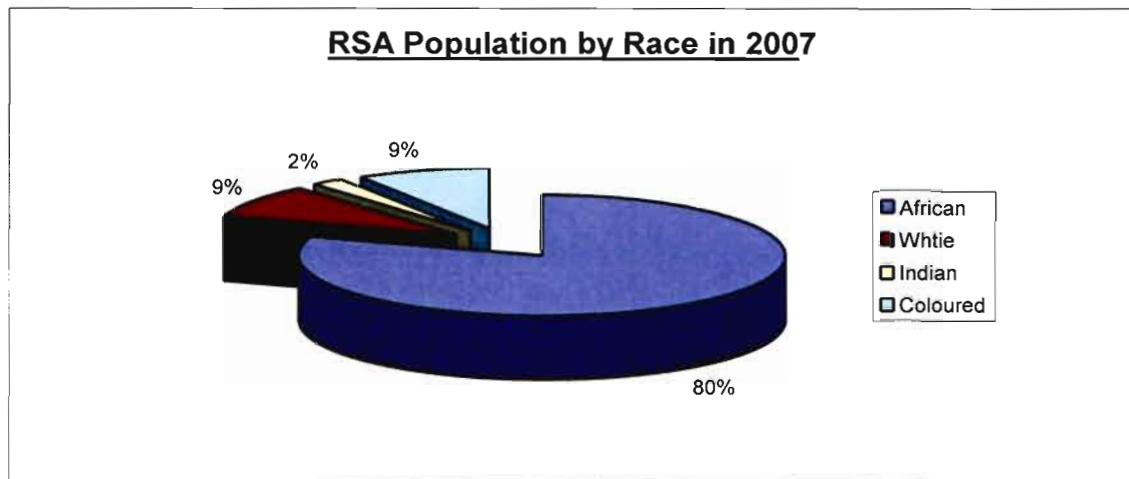
Figure 2.4: The Population Split per Province



Source: South African Survey 2007/2008:17

The figure shows that Kwazulu-Natal province has the highest population number with 20.6%, followed by the Gauteng province with 19.5%, the Free State province with 6.3% and the least populated province is the Northern Cape province with 2.4%. As stated in the above section, the size of the population will influence the demand for commodities; in this instance, the size of the population per province will influence the demand of petrol per province also. Population size is not the only macroeconomic variable that would influence demand, but also other economic indicators, which will be covered in the sections to follow.

Figure 2.5: The Population Split by Race



Source: South African Survey 2007/2008:6

According to the same survey as above, 80% of the population is African, 9% is White, another 9% is Coloured and 2% is Indian.

The South African population is almost split evenly between male and female, with 50.76% of the population being female and 49.24% being male. However, 57% of males are economically active and only 43% of females are economically active Netshitenzhe (2008:82).

2.3.2 Selected economic indicators

According to Netshitenzhe (2008:5), the real GDP has grown since 1999, accelerating towards the end of 2006, as can be seen from table 2.1. The economy grew by 5.1% in 2007, slightly lower than the 5.4% recorded in 2006. The average for the five years up to 2008 is likely to be above the Accelerated and Shared Growth Initiative for South Africa (AsgiSA) target of 6%, and more than 50% higher than the 3% achieved from 1993 to 2003. The forecast for growth going forward is negatively affected by some global and domestic uncertainties, including the credit crunch, electricity supply constraints and high global energy and food prices.

Table 2.1: The real GDP of South Africa

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
%	3.2	3.1	4.3	2.6	0.5	2.4	4.2	2.7	3.7	3.1	4.9	5.0	5.4	5.1

Source: South African Development Report Survey 2008:5

Real per capita income (average income per person) has been rising at around 4% annually since 2004. This can also be seen as the difference between real GDP growth and population growth and population growth has been estimated at about 1.1% per annum in the recent period. At the same time, however, income inequality has grown as shown by an increase in the Gini Coefficient from 0.64 in 1995 to 0.69 in 2005, according to Statistics South Africa's Income and Expenditure Survey. The Gini Coefficient measures income disparity of a specific country or region. Should everyone receive the same income, the Gini Coefficient would be zero DEAT (2009). This means wealth is not equally distributed PCAS (2008:5) and even though the growth has been evident, the new potential petrol users do not earn enough to buy cars in order for them to buy petrol, and therefore the demand for petrol is growing at a slower than what it can.

Table 2.2: The South African Interest Rate Overview

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Real interest	6.6	9.1	12.0	11.5	14.7	13.0	9.2	8.1	6.4	9.3	9.9	7.2	6.5	6.0
Nominal interest	15.5	17.8	19.3	20.1	21.6	18.2	14.6	13.8	15.6	15.2	11.3	10.6	11.1	13.1

Source: South African Development Report Survey 2008:11

Interest rates have been the South African Reserve Bank's main policy instrument in pursuing its mandate of price stability. Inflationary pressures started to come to the fore in 2006 as the low interest rate environment resulted in a massive uptake of credit, boosting consumer demand to record levels. From Table 2.2, 2006 saw the first interest rate increase of the current monetary policy tightening phase, which in 2007 resulted in a 4% increase in the repo rate. In spite of this, with inflation trending upwards, the real interest rate has been steadily decreasing, and was 6.0% in 2007 PCAS (2008:11). This variable is important, because it affects consumer spending. When the interest rate is high, consumer spending decreases and when it is low, as stated above, consumer demand increases. The interest rate also affects the price of petrol and is one of the variables that the government uses to calculate the final selling price to consumers. In order for the consumer demand to increase, consumers have to have a source of income Table 2.3 shows the unemployment rates in South Africa since 2001. Real interest is the prime overdraft rate less the consumer price index (CPI) and nominal interest is the equal to the overdraft rate, economist intelligence unit (2009).

Table 2.3: The South African Unemployment Rates

Year	2001	2002	2003	2004	2005	2006	2007
Narrow (official)	29.4	30.4	28.0	26.2	26.7	25.5	23.0
Broad (unofficial)	40.0	41.6	41.0	39.7	37.9	36.2	34.3

Source: South African Development Report Survey 2008:21

The sustained expansion in overall economic activity has had a positive impact on employment. Since 2004, the rate of job creation per annum has increased. The key sectors that contributed to new job creation include the retail and wholesale sectors, construction, financial and business services sub sectors and manufacturing sectors. These sectors also reported the highest rates of growth, confirming a strong link between faster growth and labour absorption. It should be noted that between September 2006 and September 2007, employment in agriculture and mining increased, which might indicate that job shedding in these sectors has come to an end PCAS (2008:21). This means that more people are employed, and will have income to spend on private cars and ultimately on petrol. However, during 2008 and 2009, the global financial crisis has resulted in jobs being shed and this will result in less disposable income to be spent on petrol if consumers do not have jobs.

The income per consumer is a key issue and determinates the percent of income being spent on petrol versus other consumables. Table 2.4 illustrates the per capita income since 1997 in South Africa.

Table 2.4: Per Capita Real Income (2007 constant rand prices) - AMPS Data

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Poorest 10 %	822	847	849	847	761	830	921	1,004	924	980	1,032
Poorest 20 %	1,142	1,172	1,191	1,185	1,088	1,183	1,305	1,379	1,324	1,404	1,478
Richest 10%	69,728	75,374	75,349	74,401	74,479	71,811	83,197	81,153	87,836	93,717	98,639
Richest 20%	46,700	50,104	50,124	49,466	49,574	48,030	54,080	53,205	57,246	60,844	64,039

Source: South African Development Report Survey 2008:23

The mean per capita analysis, based on both the AMPS datasets, show an improvement in the incomes of the poorest rising from R783 per month to an income of R1 032 per month in 2007. At the same time, however, the income of the richest 10% of the population increased at a faster rate. When the percentage incomes of the richest and poorest quintiles are compared, the deep structural nature of poverty

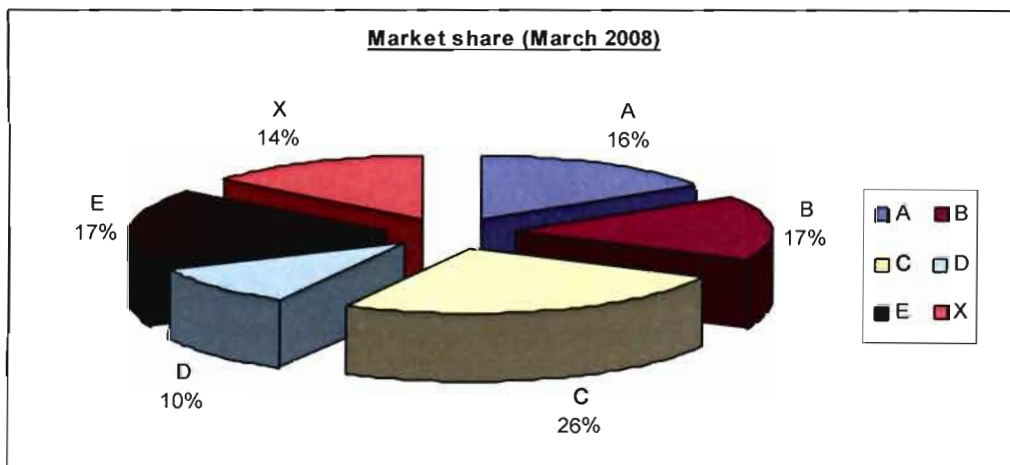
in South Africa is clear. The structural nature of poverty has a racial underpinning, meaning that the black communities make up the bulk of the poorest quintiles and white households make up the bulk of the richest quintiles PCAS (2008:23). However government has implemented policies such as affirmative action, and employment equity to reduce this gap.

South Africa has a high rate of car ownership. For every 1000 people, there are about 130 cars owned. This is high compared to 15 per 1000 in Lagos and 50 per 1000 in Nairobi Satawu (2006). The high car ownership means that 32% of commuters travel by private cars (Satawu, 2006). It can be deduced that 32% of the economic active population are current users of petroleum products, and the other 68% are potential customers, should the macro environment prove to be conducive to these potential consumers to own motor vehicles.

2.3.3 Selected microeconomic indicators

The following are the last published market share for the petrol markets within South Africa; due to the competition commissions investigating the petroleum markets, no market shares are published anymore.

Figure 2.6: Market Share



Source: SAPIA 2009

Company X has 14% of the market share, and company C is the market leader with 26% share. The figure above shows that, other than company C, the other companies' market shares are evenly spread.

Company X has been operating in South Africa for five decades SAPIA (2009), and is involved in the entire value chain of supplying product to the end customer. The organisation is responsible for purchasing its own crude oil, which it then refines to manufacture finished products at its refinery and then distributes, to the reseller network or end consumers via its own depot network. The organization operates 28 depots and 512 reseller outlets across the country at which four main products are actively marketed, namely, petrol, diesel, illuminating paraffin and lubricants. The organisation also markets specialty products such as bitumen that is used to tar roads, jet fuel and liquid petroleum gas, which is also used as an energy product for heating.

However, the study will only focus on analysing the price elasticity of demand of petrol of company X's retail network, because petrol contributes an estimated 60% to the total demand of company X and the entire petroleum market. The reference to petrol includes all grades, namely: (1) unleaded; (2) lead replacement; and (3) high octane petrol that are currently marketed within South Africa.

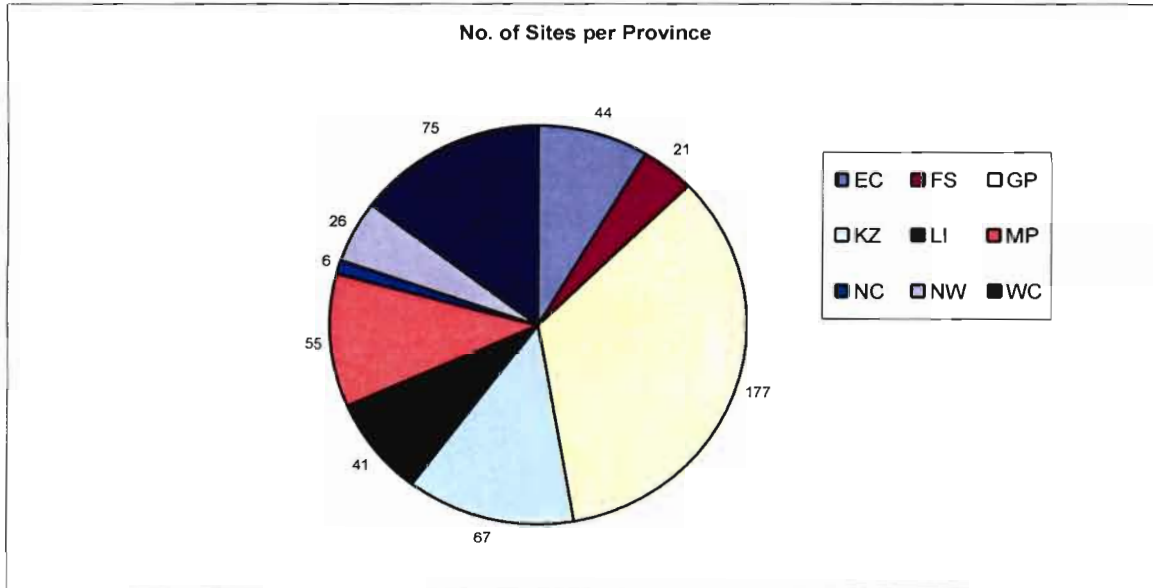
As explained in chapter 1, company X also has to import the finished product from countries in the Arab and Mediterranean regions to supply their demand as the capacity of the refinery is not sufficient to supply the demand.

2.3.4 The demand for petrol of company X

Currently the organisation operates 512 reseller outlets across the country, and is spread across all provinces.

The figure 2.7 below illustrates the number of sites per province.

Figure 2.7: The Number of Sites per Province



Source: Company X 2009

As can be seen from the figure above, the most number of outlets are situated in the Gauteng province with a total of 117 outlets, followed by the Western Cape with 75 outlets, Kwazulu-Natal with 67, Mphumalanga with 55, the Eastern Cape has 44, Limpopo province has 41, the North West province has 26 outlets, the Free State has 21 outlets and the least number of outlets are situated in the Northern Cape with only six outlets in total. This shows that, compared to the population size per province, that company X covers the main populated areas within the country. Based on the information above, 73% of company X's sites (374 sites) will service 57% of the population; that means that there are approximate potential 9 million customers that will require petrol.

The next diagram illustrates the sales volumes of petrol in liters per annum since 2000 for the entire company (please note that the sales recorded within the organisation will be used as proxy for the demand by the consumers, and plotted on the other axis will be the price for petrol over the same period).

Figure 2.8: Petrol Demand for Company X since 2000 and Price per Liter



Source: Company X 2009

The figure above that has been obtained from company X shows that the demand between 2000 and 2005 increased, but from 2006, there has been a decline in the demand for petrol, and the price of petrol also started to show an increase from 2006. Between 2000 and 2005, the average movement in the price between years, was 8%, with the biggest movement between 2004 and 2005 that amounted to 17% for that year. For the same period between 2000 and 2005, the average sales for petrol in company X increased by 4%, with the biggest movement happening between 2002 and 2003 that amounted to 12%. Based on the fundamental market forces of supply and demand stated in the first part of this chapter, the evidence would suggest that the demand for petrol, for the period under consideration was price inelastic based on company X's data. According to Lipsey et al (1987:89) as well as Mohr et al (2008:155) to calculate the price elasticity of demand the percentage change in the quantity demanded and divide it by the percentage change in the price of the product. The quantity demanded is denoted with Q, and the change in quantity is denoted as ΔQ . Price is denoted as P and the change in price as ΔP .

$$\frac{\Delta Q}{\Delta P} \times \frac{P}{Q} \dots$$

Based on the above information and having the volumes and average price for petrol since 2000 the coefficients can be calculated. Below are the sales and price variables and the percentage change from year to year.

Table 2.5: Demand and price change for company X since 2000

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Sales (000'lt)	112,070	119,841	120,306	134,516	137,157	138,884	136,409	131,957	109,955
Avg. Price (ZAR/lt)	3.56	3.73	4.03	3.93	4.43	5.20	6.00	6.71	8.87
% Change in sales		7%	0.4%	12%	2%	1%	-2%	-3%	-17%
% Change in price		5%	8%	-2%	13%	17%	15%	12%	32%
Elasticity coefficient		1.46	0.05	-4.88	0.16	0.07	-0.12	-0.27	-0.52

Source: Company X 2009

Thus, for the period between 2000 and 2005, the elasticity coefficient amounts to 0.52 for company X.

During the same time, the macroeconomics suggest that South Africa had an average GDP growth being 6%, the average unemployment rate decreasing by 2% and the interest rate decreasing by 2% on average. From this, the conclusion is that the macro environment has a seemingly direct impact on the demand for petrol.

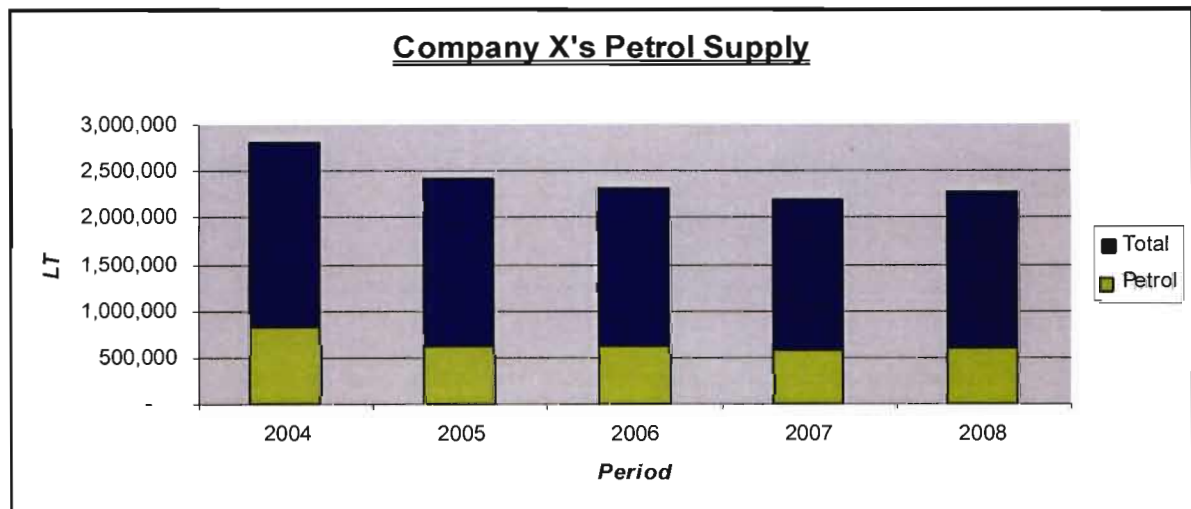
However, from 2006 till end 2008, the petrol price increased by 20% on average, and the sales for company X decreased by 7% on average. This would suggest that the price had an inverse effect on the demand for petrol, and this means that the relationship between petrol demand and price is elastic.

Thus, for the period between 2006 and 2008, the average price elasticity of demand coefficient amounts to 0.32 for company X, and even though this would suggest an inelastic price elasticity of demand, the coefficient is increasing and even reached a coefficient 0.52 from 2007 till 2008. Based on this movement from 2006 till 2008 the trend would suggest that the demand has decreased as the price has increased. During the same period the economy started to slow down with the GDP growing by 6%. The interest rate worsened but the unemployment and income per capita improved for this same period StatsSA (2008).

2.3.5 Company X's supply for petrol

The supply of petrol for company X's reseller outlets was done from their own refinery and additional volume was purchased from overseas. Due to the refinery only being able to produce a certain amount of petrol because of capacity constraints and as well as only being able to produce low levels of unleaded 95 (please note problem for all refineries within the country due to outdated technologies at refineries), some of the petrol is imported from Mediterranean and Singapore to meet the demand. The figure 2.9 below shows the petrol volumes manufactured by company X's refinery in relation to the refineries total production.

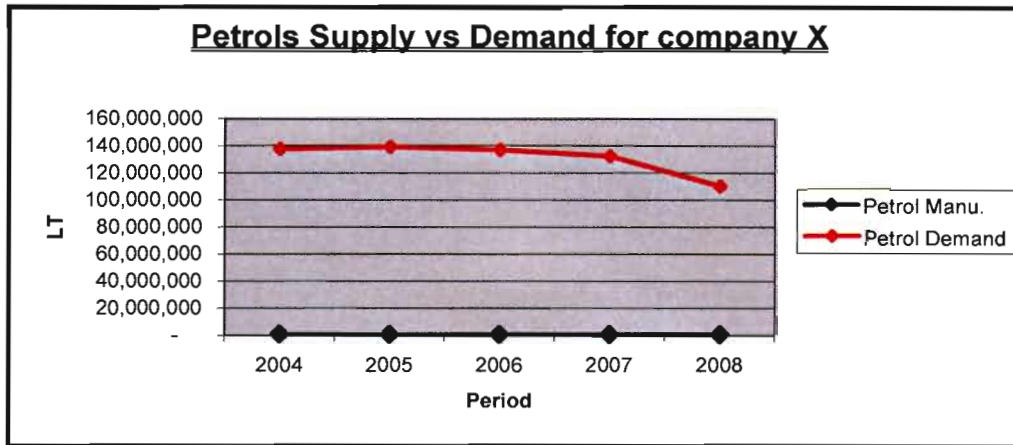
Figure 2.9: Petrol Supply for Company X



Source: Company X 2009

The figure illustrates that, from all the products produced at the refinery, petrol only amounted to an average 37% of the total production, even though it amounts to 67% of sales. From the above figure, the decrease of total supply from 2004 is as a result of the clean fuels that were introduced, the technology of the cars changed requiring cleaner fuel, and government-enforced cleaner fuel manufacturing, which led to a decrease in manufacturing of not only the total production at company X's refinery but also the production of petrol. Figure 2.10 will illustrate the supply of company x versus the demand to show the gap and to show the amount of petrol that needs to be imported on a monthly basis.

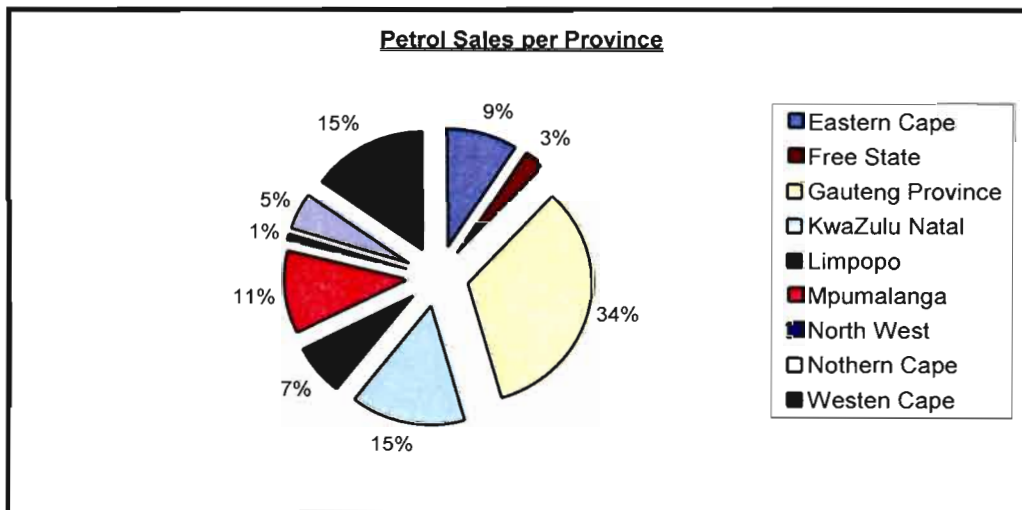
Figure 2.10: The market supply and demand for petrol for company X



Source: Company X 2009

The above figure indicates that the demand for petrol is much higher than company X can manufacture, and therefore company X has to secure the product from imports. The only obstacle is government regulation of the price in RSA. When company X purchases the product, it is at a premium implying higher than what is recovered in the selling price, and this leads to a decrease in the profit margin for company X.

Figure 2.11: Petrol Demand for Company X since 2000 Per Province



Source: Company X 2009

Figure 2.11 illustrates that; the split of petrol per province for company X is in line with the distribution of the population and the number of sites that company X manages. Gauteng province is the biggest contributor to the demand for petrol with 34%, followed by Kwazulu-Natal with 15% and Eastern Cape province with 9%.

According to company X's annual reports, the overall average sales sold per site amounts to 2.2 million liters of petrol per annum. The averages per province per annum are:

- Kwazulu-Natal 2.5 million liters;
- Mphumalanga 2.4 million liters;
- Eastern Cape 2.3 million liters;
- Western Cape 2.3 million liters;
- North West 2.1 million liters;
- Gauteng 2.1 million liters;
- Limpopo 1.9 million liters;
- Northern Cape 1.5 million liters; and
- Free State 1.4 million liters.

These averages indicate that, even though the Gauteng province has the most number of sites and second highest population as seen in figure 2.11, the average demand per site is lower than other provinces. According to the management of company X, the location of the sites are not as prominent as opposition sides. Thus company X should try to increase the average sales per site in Gauteng.

2.4 THE MAIN DETERMINANTS OF PRICE ELASTACITY OF DEMAND FOR PETROL

2.4.1 Availability of substitutes

Biofuel production is expanding rapidly all over the world. In the former US presidential state of the union address, it was proposed a mandatory target that the replacement of about a fifth of oil-based transport fuels by inclusion of 35 billion gallons of biofuels in the fuel is sold by 2017. This is a sharp increase from the current production of 4.2 billion gallons by 97 ethanol refineries Twine et al (2009). The idea of using ethanol from naturally-grown plant matter as an alternative to crude oil for fuel is an appealing one and of equal interest is the idea of producing biodiesel from used and new vegetable oils. These substitutes also carry with them an image of sustainability and environmental friendliness and the promise of allowing a continued use of vehicles without damaging the environment ANON (2009).

Ethanol is alcohol that is produced from corn that is fermented and then distilled to produce pure grain alcohol. The only economical way to make ethanol right now is with corn, meaning using corn that could be used for human consumption Crenson (2009). Motor vehicles will have to be converted to burn any fuel that contains more than 10% ethanol.

According to the Renewable Fuels Association (RFA), ethanol production has doubled in the past three years, reaching nearly 5 billion gallons in 2006. With 113 ethanol plants currently operating and 78 more under construction, the ethanol output is expected to double again in less than two years RFA (2009).

Producing ethanol from corn is less efficient than fossil fuel Crenson (2009). Growing corn requires expending energy; ploughing, planting, fertilising and harvesting, all requiring machinery that burns fuel. In addition, there is the cost of transporting the corn to the ethanol plant, more fuel is used to ferment and distill the corn, and the cost of transporting ethanol to the retail outlets via road or rail transport, because the product is more corrosive than gasoline and will be more costly and less reliable Crenson (2009). Another factor would be weather. Should there be a drought, and the corn does not grow, it will have a negative effect on the production of ethanol from corn.

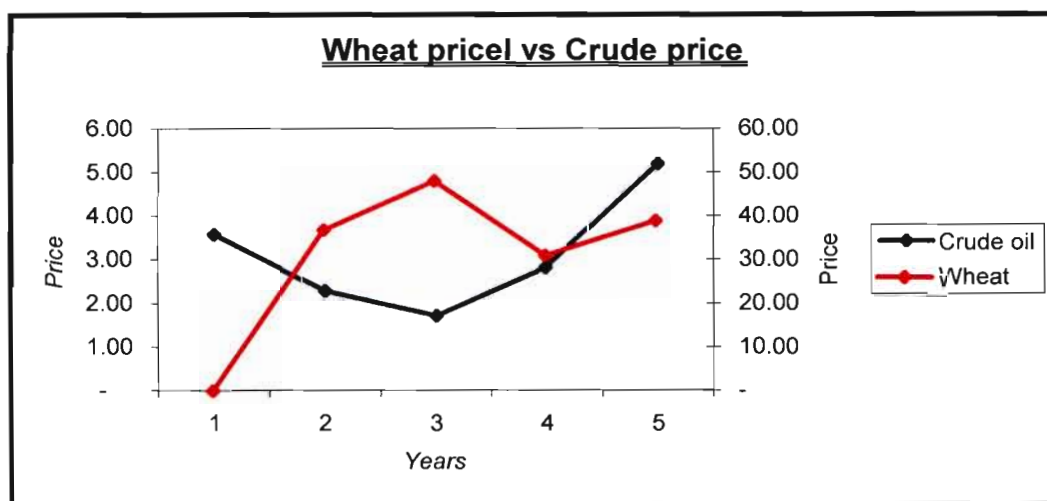
The environmental benefit of making use of ethanol is that the fuel will release less carbon monoxide into the air. The economic benefits include high profitability when corn is cheap and crude oil is costly. However, the cost of corn has doubled since the demand for ethanol has increased in the USA from US\$2 to US\$4 a bushel Crenson (2009).

Within the South African market, biofuels is one of the specific issues taken forward by the DME. In 2007, it announced that the government approved a biofuel industrial strategy. The main goal of the strategy was to replace 4.5% of current fuel demand with biofuels by 2013 DME (2009). A key driver for biofuels in South Africa will be the positive impact on carbon emissions, which will help the country achieve their target for renewable energy in compliance of the Kyoto Protocol on climate change ANON (2009). DME expects that the biofuel will come from a diverse range of product

sources, which include maize and sugarcane, to create ethanol, as well as soya beans and sunflower for biodiesel DME (2009).

The re-balancing of food prices in relation to the price of energy is likely to cause severe social distress.

Figure 2.12: Wheat Price compared to Crude Price for the Last 25 Years



Source: Grainsa 2009

The figure 2.12 above illustrates that the cost of wheat is much lower than that of crude oil so there would be a benefit for consumers in terms of price, should clean fuel targets of the government be met. However, it is also clear that the price of wheat is increasing. In Mexico City, in 2007, tens of thousands of people marched to protest the increase in the price of staple food like tortillas, which is made from wheat, and in South Africa, a report done by the National Agricultural Marketing council stated that some staple foods like maize increased in price by 28% and sugar rose by 12.6%, at the end of 2007 ANON (2009).

The gasoline demand exceeds the possible supply of ethanol fuel, and only if ethanol can be made from a non-food plant source will the demand be met.

According to Fin (2009), other possible substitutes for petrol include butanol, which is a four-carbon alcohol and not a two-carbon alcohol like ethanol, which is six times less evaporative than ethanol and it can be shipped through a pipeline to the retail

outlets because it is not as corrosive as ethanol. Butanol is also produced from the fermentation of corn, grass, leaves and agricultural waste.

In Sweden, sewage waste is being converted into biogas that runs thousands of cars and buses in the country Kanter (2009). This is another avenue to consider as a substitute for petrol in South Africa. This fuel will be cheaper and cleaner than petrol. However, the vehicles that make use of this fuel will be more costly.

It is clear from the discussion above that scientists are looking for substitutes for petrol. However, most of these products are still in a developing phase, and the sustainability is not known. The other concern is that if the increased production is handled badly, the price of staple foods can increase drastically also, and deprive people from reaping the benefits of the land. However, if the government handles the production of biofuel well it can lead to the creation of more jobs but more importantly can help with security of supply for petrol and reduce harmful gasses that have a negative impact on the global weather patterns. For the consumer, there will be a reprieve in the price of fuel because the raw material prices for biofuel are lower than that of current fossil fuel raw materials being used.

2.4.2 Proportion of income

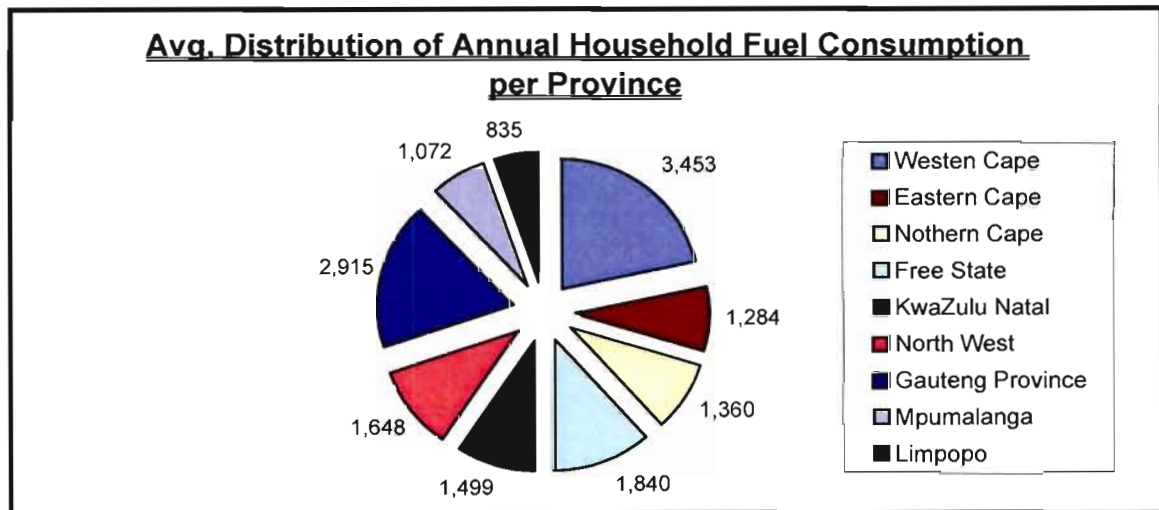
According to Carbaugh (2007:59), the demand for goods on which a large proportion of personal income budgeted is spent tends to be quite relatively elastic, and the demand for goods on which a small fraction of personal income is spent tends to more inelastic because, when consumers spend large amounts of their income on specific goods, it reduces the excess money to spend on other goods.

The average household income amounted to ZAR74 589 and real personal disposable income per head amounted to ZAR15 939. On average, the estimated total annual household consumption expenditure per household in South Africa was ZAR56 152 StatsSA (154:2008).

The four biggest categories of consumer expenditure are food (20%), house and electricity (15%), income tax (12%) and transport (8%) BMR (2009). In a survey

conducted by StatsSA of a sample consisting of over 21 thousand households, only 0.3% of their expenditure was spent on liquid fuel such as petrol.

Figure 2.13: Percentage Distribution of Annual Household Consumption Expenditure on Fuel per Province



Source: StatsSA, 25: 2009

Figure 2.13 illustrates the average income that is spent on liquid fuel per province, and it can be seen that the three provinces that consume the most petrol (as seen in the previous chapter), Kwazulu-Natal, Gauteng and Western Cape, also have the highest average expenditure on fuel. The overall average spent on fuel amounts to ZAR1 939 per household per year. This means that of the average household income of ZAR74 589 StatsSA (154:2008), only 3% is spent on fuel purchases.

Thus the conclusion can be made that the proportion of the average household expenditure on fuel amounts to a small fraction of the total spent of a South African's income, and this means that fuel demand tends to be more inelastic, according to Carbaugh (2007:59), based on these figures.

2.4.3 Degree of necessity

According to Lipsey et al (1987:84), food is a necessity of life, and therefore demand is inelastic over a large price range. However, durable goods tend to be more elastic because most specific manufactured goods have close substitutes available.

According to Olson (2009), fuel has few substitutes, a longer time period for adjustment and for the average household income; it is considered an expensive item. Two of these factors are categorised as elastic, making petrol a luxury product for most consumers. However, travel forms part of a consumer's social and industrial life thus making it a necessity and people are willing to pay a high price for this product; whether the demand for petrol is changing the law of elasticity where a luxury product is becoming inelastic needs to be investigated further.

In conclusion, the nature of petrol can be defined as a luxury product, but does not behave in an elastic way like other luxury products; petrol behaves like an inelastic necessary product.

2.4.4 Lifestyle changes relative to petrol consumption

According to Tony Twine (2009), an econometric economist, the increase in petrol prices will result in consumers drastically changing the way they live; for example, swapping their "petrol guzzlers" for more fuel-efficient vehicles, going out less and curtailing the use of the family car. The reason for this is because the average household income is not increasing at the same rate as petrol prices. The other reason is because a high petrol price impacts on other goods and services prices, like food, which leaves a household with less to spend on luxury products, like petrol, for social driving. He also states that consumers used to take a long time to adjust their spending on fuel, but people are learning quickly to make the adjustment much faster.

SAPIA (2009) advises consumers to do the following in order to reduce petrol consumption:

- Use the right grade of petrol.
- Use a lift club or public transport.
- Ride a bicycle or walk instead of driving alone.
- Take advantage of telecommuting/telecommunications technology.
- Don't drive aggressively and drive at the speed limit.
- Reduce air conditioner use and close windows.
- Eliminate extra wind resistance and weight.

Some of the life style changes that have be visible include, using a car pool for daily commuting; trading in a fuel-inefficient car or swapping cars between family members so that more fuel-efficient cars are used on longer trips; more subtle changes and being more aware of how much fuel is used in commuting to work or doing errands, leading to minor shifts in routine; and decrease in optional or recreational travel ANON (2008).

According to Morgan (2009), service station owners are also feeling the pinch with petrol price increases as their profit margins are decreasing. Fewer people are filling up their cars the way they did in the past; when they do make use of a service station they are only purchasing a few liters at a time. The current economic situation is also causing a reduction in the number of petrol consumers with 7 000 vehicles and 2 500 homes being repossessed in Gauteng alone every month ANON (2008).

In conclusion, South Africa is one of the world's most energy intensive consuming countries per capita in the world, and the world's 11th top polluter per capita ANON (2008) and in order to improve this statistic, consumers will have to make some lifestyle changes. All of the trends discussed above would suggest that change is happening, and all will lead to the reduction of petrol consumption.

2.5 CONCLUSION

Some of the main economic theories on demand and supply were discussed as part of this chapter. The main theories that were highlighted as part of the chapter included;

- The law of demand, which states that the quantity demanded for any goods or services and the price are inversely related, Stretton (1999:12).
- Factors that can influence or move the level of demand up or down and these include factors such as: the commodity's price, the average household income, prices of related products or services, taste of the consumers, distribution of income amongst households, and the size of the population, or the number of customers, current and new. All of these factors will be discussed in more detail later in the study.
- Another major law that was discussed was the law of supply, which states that, as the quantity supplied increases, the price increases and the price decreases

when the quantity decreases which this means that the relationship between price and quantity is directly related Carbaugh (2007:36).

- The law of elasticity was also discussed which states that price elasticity of demand measures how responsive, or sensitive, buyers are to a change in price Carbaugh (2007:56).

The reason for the above mentioned points being discussed was to illustrate previous studies that were done on the subject of price elasticity of demand and to identify the factors that influence demand, supply and elasticity.

All the factors were highlighted, and will be used in the rest of the study to assist with the analysis of the retail price elasticity of demand for company X.

This chapter also covered selected macro- and the microeconomics of the South African market.

The major macro indicators covered include:

- size of population;
- average disposable income; and
- economic trends, which includes the GDP growth, interest rate trends, unemployment.

The amount of the disposable income spent on liquid fuel would suggest the petrol demand in South Africa is inelastic, because it so small.

The selected micro indicators covered include:

- Demand of petrol for company X overall and per province.
- The relationship between petrol demand and petrol price from 2000 until 2008 for company X. Initially, the relationship showed that the price of petrol did not have an effect on the demand, but from 2006 the relationship between these two variables behave inversely, and the demand decreases as the price increases, thus meaning that, in the short term, the price would be elastic.

- The supply of petrol for company X. 37% of the product was manufactured at company X's own refinery, but the rest of the demand is imported, which results in a loss of margin.

Microeconomics of company X would suggest that the demand for petrol is elastic because, as the price has been increasing, the demand for petrol decreased.

The macro- and microeconomics contradict each other and this once again indicates the relevance of the study; in order for company X to be in a position to build strategies, analysis of the retail price elasticity of demand needs to be done.

The factors that influence the responsiveness of consumer demand to the petrol price changes. The unavailability of a pure substitute for petrol would suggest that the petrol demand would remain inelastic. Even though there is a lot of work being done to develop a replacement, it would seem that fossil fuels like petrol would remain the main source of consumption for many years.

From the information obtained about the proportion of income spent on petrol within South Africa, 3%, it would suggest that demand is inelastic as the proportion of the average household income spent on fuel amounts to a small fraction of the total income spent.

The nature of petrol is that of a luxury product, and this means that the demand would be inelastic.

The last element is that of lifestyle changes. Consumers are changing the way they drive or what they drive in a bid to reduce the consumption of petrol as the prices are increasing and this action would suggest that petrol is elastic, because as prices are going up, consumers are consciously trying to reduce the amount of petrol they use. Two out of the four elements suggest that petrol is elastic and the other two suggest that petrol demand is inelastic. However, the weight of a suitable substitute and the proportion of consumer income carry more weight.

CHAPTER 3: EMPIRICAL RESEARCH

3.1 INTRODUCTION

This chapter contains the empirical research part of this study. The research study will focus on petrol consumers within the Gauteng area to identify and analyse the variables on the short-term price elasticity of demand.

This study employs a questionnaire to investigate the petrol consumers' reaction with regard to short-run petrol elasticity of demand for company X through its retail network. The questionnaire is an instrument of set printed questions used to gather data from a potentially large group of people, in this case, all the consumers in Gauteng, Soanes et al. (2006:613). All the sample participants will receive the same set of questions that will have to be completed and returned to researcher. Due to issues of confidentiality, the company names will not form part of the questionnaires submitted with the study.

3.2 SAMPLE SELECTION

The statistical sample is selected from petrol consumers in Gauteng province retail network, as it is the biggest province in term of the number of service stations and total contribution of demand. It is opted to select the sample as such to ensure that no sampling bias errors are encountered. The sample participants were requested to complete the questionnaire as honestly as possible, in order to get sufficient data for this study. Anonymous respondents completed 201 questionnaires (a response rate of 40.2%), and the respondents were made up of different age groups, sex, color and social classes, but they were all current petrol consumers.

3.3 SAMPLE QUESTIONNAIRE

One questionnaire (see Annexure 1) was developed by the researcher to analyse the retail price elasticity of demand for a leading fuel company within South Africa. The questionnaire consisted of nine questions for demographic and general information and 17 questions respectively formulated on the factors that influence the price elasticity of demand for petrol, evident in the literature study section 2.4 (of these 17 questions, four questions had subsections that also needed to be

completed). Respondents had a choice of answers and had to indicate their correct answer that they agree with each statement by marking the applicable box with 'X'. The questions were formulated both positively and negatively to counteract the acquiescent response style Welman & Kruger (2001: 137).

The questionnaire made no provision for respondents' names to be entered as the researcher was of the opinion that anonymity would ensure a true reflection of the current situation in the market.

3.4 DATA ANALYSIS AND RESEARCH RESULTS

The next section of the study will interpret the results of the survey that was conducted by the author. The questionnaires were evaluated by assigning scores to participants' responses in order to translate the results.

3.4.1 Research Procedure

The respondents were approached at the time that they were filling up their cars at the petrol station. The questionnaires were handed out and the purpose of the study was explained. The respondents were asked to screen the documents and clarify any statements that were not clear.

The participants were assured of the confidentiality of their submissions and special attention was given to anonymity as indicated by the absence of names on the questionnaires.

3.4.2 Analysis of the demographic results

The demographic results are analysed first. The sample and gender and race results appear to be in line with what the author presented earlier as part of the macroeconomic of South Africa in section 2.3; however, the annual income of consumers and the percentage spent on petrol deviate considerably from what was presented earlier. Even though the income per person is higher than the statistics presented earlier, the percentage of the salary spent on petrol differs by almost a 100% from a survey that was conducted by StatsSA (2008).

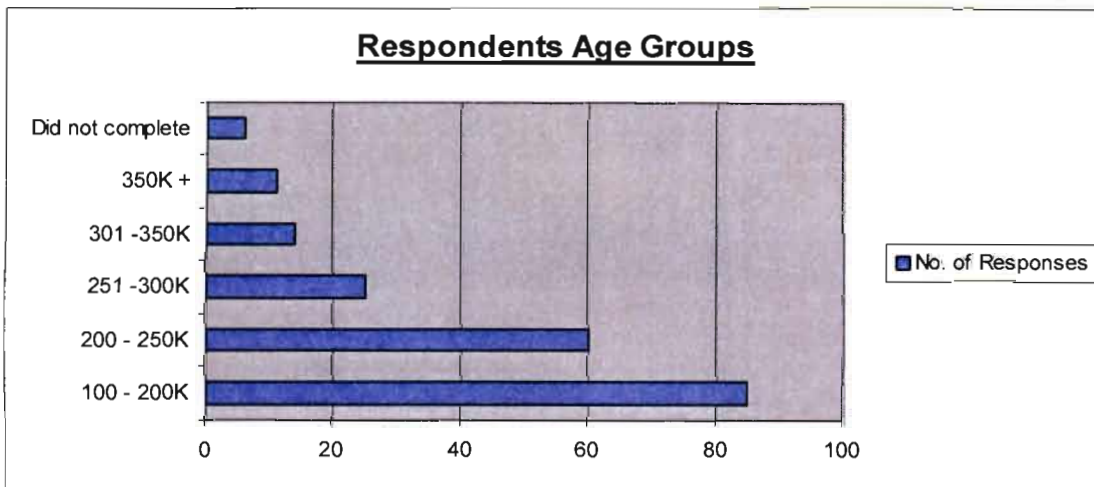
Table 3. 1: Gender of Respondents

		Frequency	Percent
Valid	Male	133	66.2
	Female	67	33.3
	Total	200	99.5
Missing		1	.5
Total		201	100.0

(Source: Own Completion)

Table 3.1 illustrates that of the 201 respondents, 133 were male, 67 were female and one did not indicate their gender; thus majority of the respondents were male, making up 66.2% of the sample size. This is in line with macroeconomics presented earlier that indicated that more males are economically active in South Africa, thus resulting in more disposable income for males to use on petrol purchases. In the next figure the age groups of the respondents will be illustrated.

Figure 3. 1: Respondents' Age Groups



(Source: Own Completion)

The sample provided responses from petrol consumers from different age groups with the majority of 87 (43.3%) responses belonging to the age group ranging from 21 to 29 years of age; and the second biggest group was between the ages of 31 and 39 years of age (29.9%). The age group with the least amount of responses was from respondents younger than 20 years (4%).

The next two figures will illustrate the annual income that respondents from the sample generate and the percentage of that income that they spend on the purchase of petrol generally.

Table 3. 2: Annual income of respondents

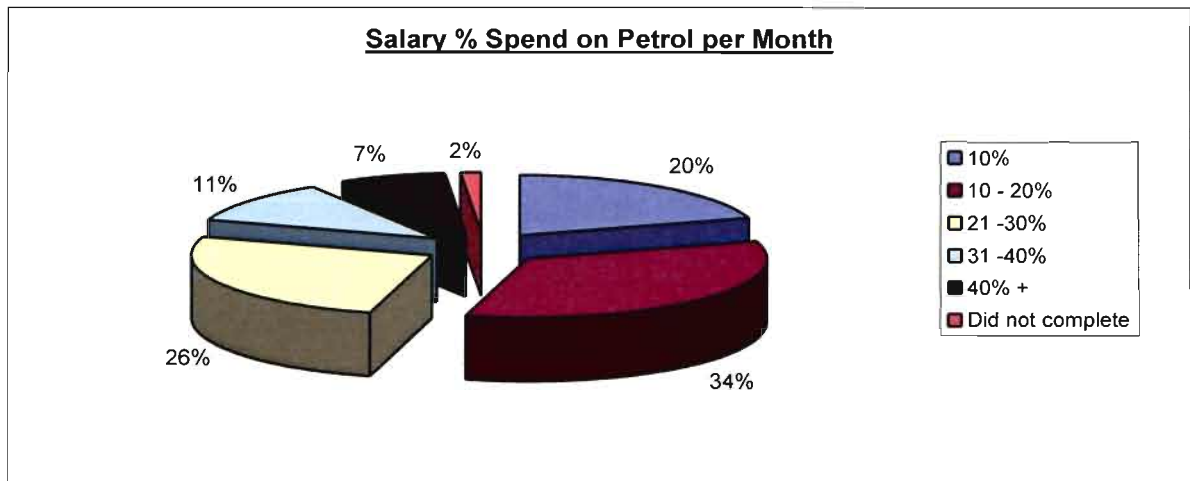
Annual Income Package	No. of Responses	Percentage
100 - 200K	85	42.3
200 - 250K	60	29.9
251 -300K	25	12.4
301 -350K	14	7.0
350K +	11	5.5
Did not complete	6	3.0
Total	201	100.0

(Source: Own Completion)

The majority of the respondents', 72%, annual income was from the two lowest income bracket between R100 000 and R250 000 per year whilst only 12% of the respondents generated income from the two highest income brackets that range from R301 000 to over R350 000 per annum. From this information it can be concluded there is no direct link between annual income and ownership of a petrol vehicle in the Gauteng area, because even though the majority belong to the lower bracket of income, they all own motor vehicles.

In figure 3.2 the monthly income spend on petrol of the respondents is presented.

Figure 3.2: Respondents' monthly percentage of salary spent on petrol



(Source: Own Completion)

The results indicate that majority (34%) of the respondents spend between 21–30 % of their monthly income on petrol purchase. Overall, 80% of the respondents spend between 10 and 30% of their income on petrol. This is very high compared to the survey conducted by StatsSA of a sample consisting of over 21 000 households;

only 0.3% of their expenditure was spent on liquid fuel such as petrol (BMR, 2009). A further 18% of the sample indicated that monthly expenditure on petrol amounted to more than 30% of their respective income.

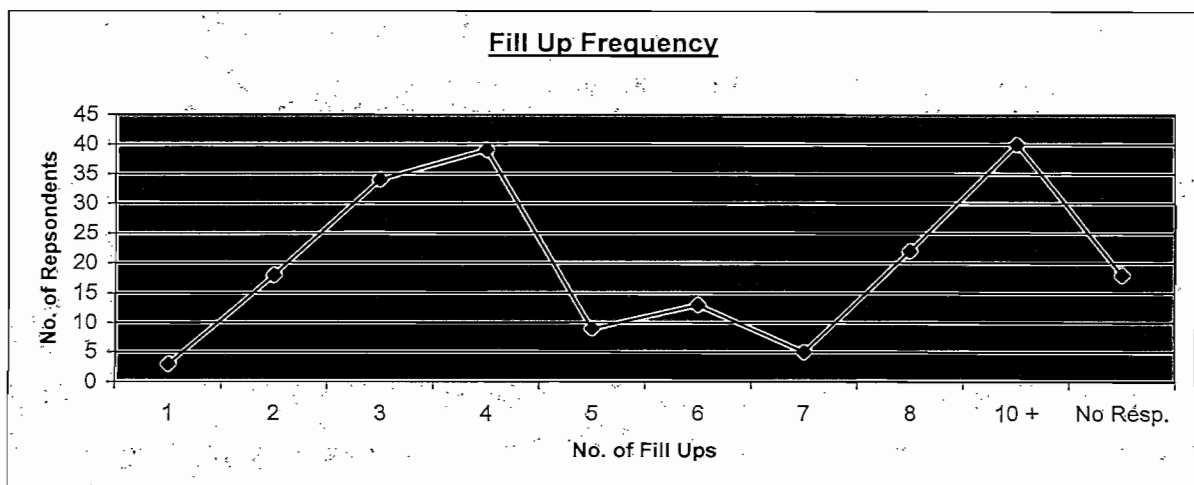
3.4.3 Analysis of petrol price sensitivity

The results of the next category of questions will be analysed. The majority of the questions had either a “yes” or “no” answer.

Of the questionnaires completed, 168 (84%) respondents said that the price of petrol does not affect their monthly expenditure on petrol, even though 148 (74%) respondents said that they perceive the price of petrol as being too high. This means that the petrol is not a luxury purchase, but more a purchase of necessity. As previously indicated according to Lipsey et al (1987:84), the demand for necessities is inelastic and luxuries is elastic.

Below, figure 3.3 indicates the frequency with which respondents fill up with petrol per month. From the results below, it is evident that the number of times respondents fill up per month varies considerably, depending on the amount of petrol that respondents purchase each time.

Figure 3.3: Respondents frequency of fill-up at a garage.



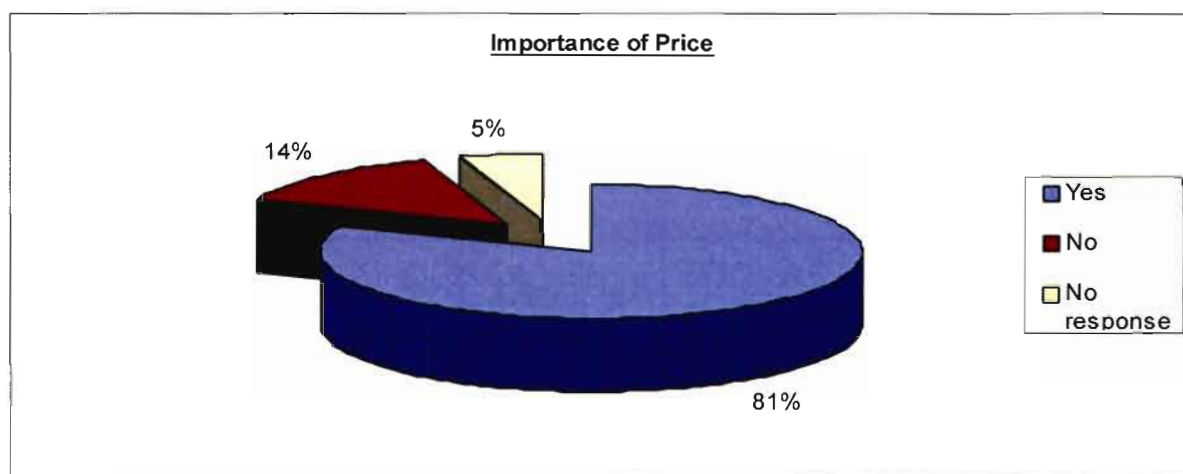
(Source: Own Completion)

With the frequency of the fill-ups being identified, it was also evident that respondents are very knowledgeable regarding the grade of petrol that they make

use of, only 7% indicating that they don't know or that it does not matter what grade they make use of. In another question asked, being whether the respondents ever make use of a lower grade of petrol because it is cheaper, 161 (80.1%) replied in the negative; that they never use a lower grade to save money. This means that respondents do not compromise the quality of the products used for price; they make use of appropriate grades of petrol.

However, results of the variables that respondents considered as important when purchasing petrol are as follows:

Figure 3.4: The importance of price



(Source: Own Completion)

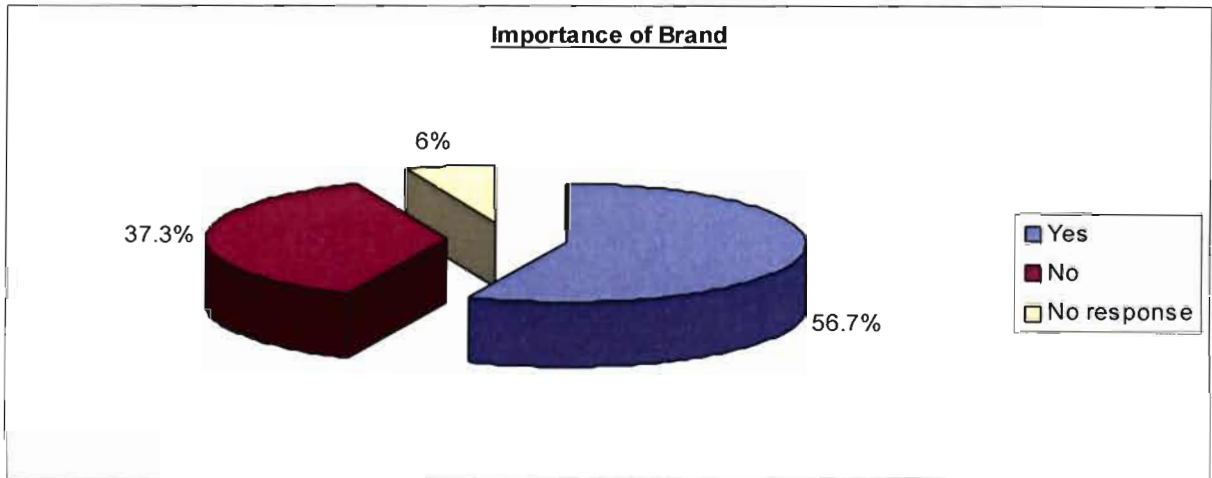
Of the 201 respondents, 81% (163) indicated that the price of petrol is important. Of these respondents, 156 pay cash and only 43 pay for petrol by card. Majority 56.7% (114) indicated that the brand is important when doing a purchase.

Price is illustrated as the main factor that consumers consider when purchasing petrol. This would suggest that they are very sensitive to any changes in the price, and this would suggest that the demand for petrol is elastic.

Even though the respondents indicated the importance of the price, company X cannot influence this variable as company X operates in a regulated market as indicated earlier in chapter 1, meaning that it has no influence or control on price to consumers. According to Carbaugh (2007:56), price elasticity of demand measures how responsive, or sensitive, buyers are to a change in price; thus even with the regulation in South Africa, from the sample it can be seen that price of petrol plays a very important role in elasticity of demand. This means that the South African petrol

market cannot be considered as inelastic as the rest of the world, as previous studies have indicated.

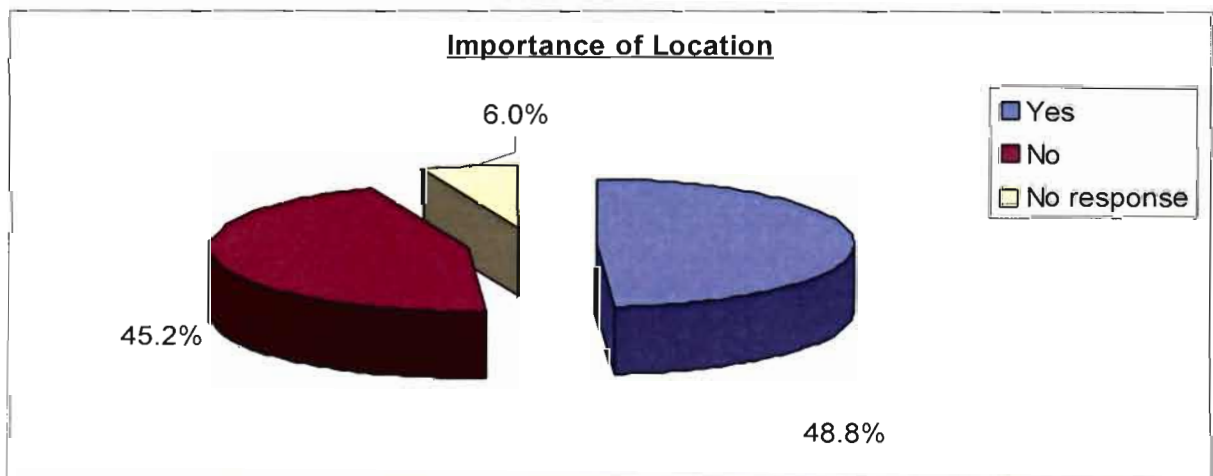
Figure 3.5: The importance of brand



(Source: Own Completion)

The brand image can be improved by creating more awareness through advertising or promotions. A majority of 56.7% of the respondents indicated that the brand that they use when filling up is important. This is a variable that company X can influence and will have re-look at the advertising and marketing strategy.

Figure 3.6: The importance of location



(Source: Own Completion)

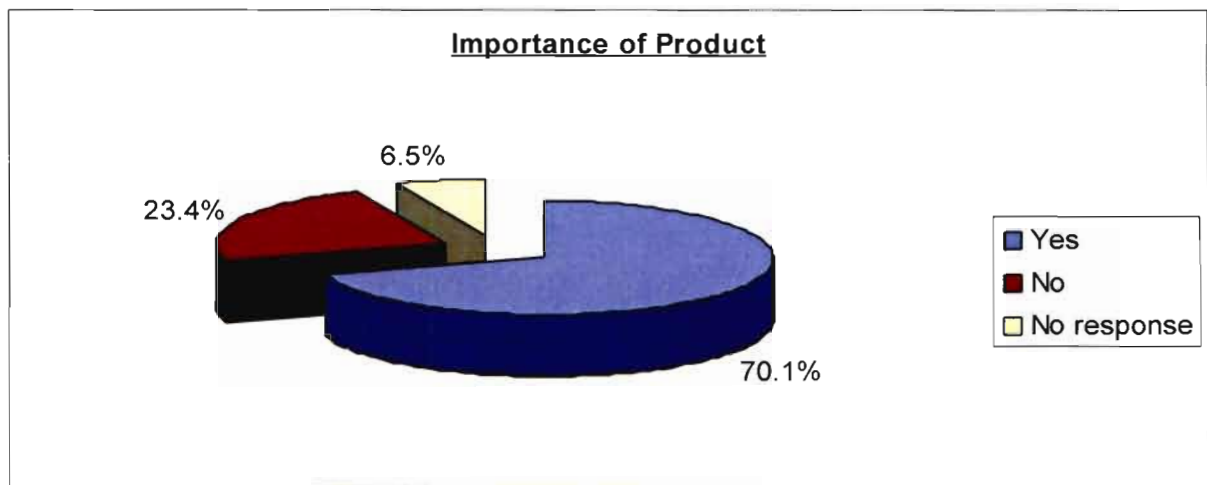
The location has been a very big drive for company X and other opposition companies, as the issuing of retail licences by government are restricted and all of them are competing for the licences in the most convenient location for consumers

are important. A majority of 48.8% of the participants indicated that location is important variable when filling with petrol.

This means that company X will have to identify location of convenience in order to meet the demand of the consumers. This will include locations that cover the main routes to and fro from customer's destinations.

Convenience of complimentary products are would be a strategic drive for the oil company, as it makes it convenient for consumers to get a newspaper or bread from convenient store.

Figure 3.7: The importance of product



(Source: Own Completion)

The above shows that product quality is a key variable and that 70.1% of respondents agree that it is a very important variable. So this means that company X has to make sure that the quality and product availability is of a high standard. The distribution chain has to make sure that the right product is available at the right place and it must be of the right quality.

This information will be communicated to company X in order to assist with their future strategy and they can further the study. The following results will focus on the lifestyle changes that consumers make or consider to be related to petrol price changes.

A majority of 119 (59.2%) respondents said that they would consider using an alternative fuel source and 80 (39.8%) respondents said that they would not consider using alternative fuel and will keep on using fossil fuel.

Below is a table with a summary of the behaviours that consumers would change as a result of a petrol price increase.

Table 3.3: Respondents behaviours influenced by petrol price changes.

Behaviour Influenced	Yes	%	No	%	No Resp.	Total
Using your vehicle less	140	70%	53	26%	8	201
Cutting out on non-essential living expenses	116	58%	76	38%	9	201
Using public transport	54	27%	135	67%	12	201
Driving less during busy periods	116	58%	75	37%	10	201
Making use of a lift club	118	59%	68	34%	15	201
Buying a more fuel-efficient vehicle	106	53%	80	40%	15	201
Trading vehicle in for motorcycle	25	12%	159	79%	17	201
Reducing travel or recreational driving	115	57%	74	37%	12	201

(Source: Own Completion)

The responses show that 70% uses their vehicles less when the price of petrol increases and 26% continue to use their vehicles the same number of times. Only 58% of the respondents said that they would cut down on non-essential living expenses when the petrol price increases. Even though the majority of the respondents, 52.2%, rated the public transport systems within their areas as average, 67% said that they would not make use of the public transport in their area, even if the price of petrol increases.

Of all the respondents, 58% said that they would drive less during busy periods such as peak hour traffic time when the petrol price increases, and 59% would make use of a lift club to work in order to avoid the impact of the increase in petrol price.

Majority of 53% respondents said that they would buy a more fuel-efficient vehicle in order to cushion the effect of the increase of the petrol price; however, at the same time, 79% said that they would not consider buying a motorcycle to reduce expenses on petrol price.

The majority of the respondents, 57%, also said that they would reduce recreational driving in order reduce actual expenditure on petrol. This means that when the petrol price increases, fewer consumers from the sample would actually drive to their holiday destinations.

Overall results from the above table would suggest that respondents from the sample would change their current behaviour relating to petrol price and usage of their vehicles. The average number of respondents that are for change amount to 49%, and the average of those against change amount to 45%.

More importantly, the table below maps the responses of the survey with regard to at what price increase the behaviour of the respondents would change

Table 3.4: The price at which respondents behaviours would change

Behaviour Influenced	R 8.00	%	R 9.00	%	R 10.00	%	R 10.00 +	%
Cutting out on non-essential living expenses	51	25%	50	25%	31	15%	57	28%
Using public transport	32	16%	20	10%	22	11%	111	55%
Driving less during busy periods	49	24%	38	19%	21	10%	78	39%
Making use of a lift club	52	26%	19	9%	28	14%	85	42%
Buying a more fuel-efficient vehicle	56	28%	25	12%	20	10%	89	44%
Trading vehicle in for motorcycle	19	9%	13	6%	17	8%	135	67%
Reducing travel or recreational driving	51	25%	25	12%	43	21%	69	34%

(Source: Own Completion)

Results show that respondents would cut out non-essential living expenses from R8 per litre for petrol; however the majority indicated that if the price had to increase above R10 per litre they would reduce spending on non-essential living.

Reluctance to make use of public transport is very evident, as 55% of the respondents would only make use of public transport if the price of petrol went higher than R10 per litre.

Driving habits of the respondents would change; however, the majority, 39%, indicated that, should the petrol price rise to over R10 per litre, they would drive less during peak periods, and 34% indicated that if the price rose above R10, they would reduce recreational driving.

In terms of vehicle ownership, results show that the majority of respondents, 44%, would trade in their current vehicle for a more fuel-efficient vehicle, and 67% said that they would trade in their current vehicle for a motorcycle.

Overall results from the above table shows that respondents would change their behaviour at different prices per litre for petrol; however R10 per litre seems to be the ultimate turning point at which respondents would change their current behaviour considerably.

Lastly, results indicating behavioural changes over a 3-year period due to incremental petrol price changes are shown below.

Table 3.5: Respondents behavioural changes over last 3 years

3-Year Behavioral Changes	Yes	%	No	%	No. Resp.	%	Total
Less leisure travel, i.e holiday travel	127	63.2%	62	30.8%	12	6%	201
Bought a petrol-efficient car	101	50.2%	83	41.3%	17	8.5%	201
Changed driving style	129	64.2%	59	29.4%	13	6.5%	201
Made use of alternative transport, e.g motorbike	41	20.4%	143	71.1%	17	8.5%	201

(Source: Own Completion)

The results indicate a clear negative correlation to petrol price changes. Results indicate that:

- Less leisure travel, for example on holidays, 63.2% indicated that they have reduced actual spending in this regard.
- Of the respondents, 50.2% have bought a more petrol-efficient car to reduce spending on monthly petrol bill.
- A majority of respondents, 64.2%, indicated that they have changed their driving style to reduce monthly spending on petrol.
- 71.1% of the respondents indicated that they did not make use of alternative transport like buying a motorcycle over the last three years to reduce spending on petrol.

From the above it can be derived that in this sample there is a downward trend in terms of petrol demand due to increase of the petrol price and consumers are consciously making efforts to reduce their demand for petrol through changing their consumer behaviour.

3.5 CONCLUSION

Results from the fieldwork conducted indicate that the majority of drivers are male and also show that monthly average income increased compared to results from StatsSA survey conducted. More importantly, the average expenditure on petrol has

also increased considerably, compared to the same StatsSA survey. This confirms the incremental trend of petrol price over the last few years.

Responses show that the price of petrol does not affect monthly demand, even though respondents said that they perceive the price of petrol as being too high. This means that petrol is not a luxury purchase, but more a purchase of necessity for consumers, and according to Lipsey et al (1987:84), the demand for both products of necessity and luxury products is inelastic.

However, even though the nature of the product would suggest the necessity for it, results imply that:

- 80% of respondents said that price is very important when buying the product.
- 70.1% said that the product itself is important when buying petrol.
- 56.7% said the brand of the petrol is important when purchasing.
- 48.8% said that the location of the service station is important.
-

This shows that price is a key issue and, according to the law of demand, when the price increases, the demand decreases Carbaugh (2007:56); this would imply elasticity.

Price is illustrated as the main factor that consumers consider when purchasing petrol. This would suggest that they are very sensitive to any changes in the price, and this would suggest that the demand for petrol is elastic.

Results interpreting variables related to petrol life style changes indicate that:

- the majority would consider alternative petrol sources;
- the majority would change their driving style;
- the majority would reduce spending on recreational driving; and
- the majority would make use of more petrol efficient vehicles.

However, the majority of the respondents would not make use of alternative services, such as public transport, unless the price per petrol would increase to above R10 per litre.

Results also shows that changes occur at various price changes per litre, but R10 per litre is the ultimate turning point when consumers would change their behaviour significantly to reduce spending on petrol.

Lastly, results show that consumers have been implementing behavioural changes over a longer time frame to reduce demand for petrol.

CHAPTER 4: CONCLUSION AND RECOMMENDATIONS

4.1 INTRODUCTION

Chapter 4 deals with the main conclusions from the empirical study that was done, will also make recommendation to be communicated to company X that they can consider for future studies to be done independently.

The primary objective of the study was to analyse the retail petrol price elasticity of demand for company X and this chapter the other concludes that the findings are inconclusive and suggest further studies to be conducted.

However the secondary objective of the study was to investigate the main determinants that influence the responsiveness of demand for petrol. The author concludes that this objective was met and that results can be communicated to company X as soon as possible.

4.2 CONCLUSION BASED ON EMPIRICAL STUDY

The study has found that crude prices have fluctuated considerably over the last year, as well as the price of petrol within South Africa; the main reasons being that the demand has slowed down for these commodities.

The study reviewed some of the main macro economic indicators that can have an impact on the demand for petrol and the following facts were established:

- The South African population increased from 44.5 million to 48.5 million.
- The number of households increased from 9 million to 12.5 million.
- The real GDP has grown since 1999.
- Real per capita income (average income per person) has been rising at around 4% annually since 2004.
- Inflationary pressures started to come to the fore in 2006 as the low interest rate environment resulted in a massive uptake of credit, boosting consumer demand to record levels.
- South Africa has a high rate of car ownership. For every 1000 people, there are about 130 cars owned.

All the above macroeconomics would suggest a desired environment for growth.

Company x's petrol demand between 2000 and 2005 increased, but from 2006, there has been a decline in the demand for petrol, and the price of petrol also started to show an increase from 2006. Between 2000 and 2005, the average movement in the price between these years, was 8%, with the biggest movement between 2004 and 2005 that amounted to 17% for that year. For the same period between 2000 and 2005, the average sales for petrol in company X increased by 4%, with the biggest movement happening between 2002 and 2003 that amounted to 12%. This would suggest that, for company x, the demand for petrol is elastic Lipsey et al (1987:89).

The main factors that influence the responsiveness of consumer demand to the petrol price changes that have been identified according to Mohr et al (2008:164 – 166) are:

- availability of substitutes;
- proportion of income required;
- degree of necessity; and
- lifestyle changes.

The study reviews all of these factors in more detail and the results would suggest that petrol is more inelastic than elastic. Consequently the author had to investigate further because of the contradicting analysis from company x's study on the demand for petrol that suggests that demand is elastic and the main factors that affect price elasticity, which suggest that demand for petrol is inelastic.

A survey was conducted to analyse the petrol price sensitivity. The sample consisted of 201 users, was conducted at service stations, and the results from the fieldwork conducted indicate:

- 80% of respondents said that price is very important when buying the product.
- Respondents said that they perceive the price of petrol as being too high.
- Results also shows that life style changes occur at various price changes per litre, but R10 per litre is the ultimate turning point when consumers would change behaviour significantly to reduce spending on petrol.

- The majority would make use of an alternative petrol source, if it were made readily available.
- The majority of the respondents also indicated that they have made life or driving style changes over the last three years in order to reduce their spending on petrol.

4.3 RECOMMENDATIONS

The following recommendations are made:

- Conduct a more detailed elasticity of demand study, with a bigger sample and for all petroleum products. This will create awareness and provide information regarding the change in the petroleum market, which will assist company X with long-term strategies.
- Industry surveys need to be conducted to have more up-to-date market information in order to make critical business decisions. This will assist with demand and supply analysis and current and future potential trends.
- Government to be consulted (by industry), to investigate deregulation of the market. This will allow for more price competition, which will result in the benefit going to the end user.
- Company x to invest more in creating brand awareness. Results show that 56.7% said the brand of the petrol is important when purchasing it.
- Bigger investment in alternative fuel supplies. This will also stimulate price competition and will result in the benefit of better prices to the end user.
- Improve trade negotiations with crude-producing countries in order to improve crude import prices that will lead to reduce finished product prices.
- Finally, government to subsidise the price of petrol, which will lead to improved demand. This is being done in countries like Egypt and Nigeria (SAPIA: 2009).

4.4 STUDY EVALUATION

The primary objective of the study was to analyse the retail petrol price elasticity of demand for company X and, even though research was conducted with a sample of 201 participants and majority of the findings suggest that the demand for petrol is

elastic in the Gauteng province, therefore the overall the study indicated that elasticity in the petrol market is creeping in, however not totally conclusive. However results from the study would suggest that there is enough evidence to suggest that the demand for petrol in the retail market is no longer as inelastic as previous studies suggest.

Thus further studies needs to be done on the overall petrol retail market in South Africa.

This can lead to major strategic changes from government and strategic realignment from the major petroleum companies within the country, once conclusive results are presented.

The secondary objective of this research was to investigate the main determinants that influence the responsiveness of demand for petrol.

In this instance the study succeeded in identify the four various namely:

- price
- brand
- location
- and product

The study also highlighted the importance of each variable, which can assist company X with short-term strategy immediately.

Overall the study provided enough evidence that would promote further precise studies to be conducted into elasticity of demand for petrol in South Africa.

5. REFERENCES

ANON, 'What is Biofuel.?'

<http://www.green-planet-solar-energy.com/wat-is-biofuel.html>. Accessed on 15 May 2009.

ANON. 'What is the definition of spot price?'

<http://www.investorwords.com.html>. Accessed on 6 May 2009.

ANON. 'Prospects for Biodiesel in South Africa'

[http:// www.parallaxonline.net/biofuel.html](http://www.parallaxonline.net/biofuel.html). Accessed on 15 May 2009.

ANON. 'Definition of short run of demand.'

[http:// www.businessdictionary.com.html](http://www.businessdictionary.com.html). Accessed on 6 May 2009.

ANON. 'Driving style changes, due to high price of gasoline'.

[http:// www.timespicayune.com](http://www.timespicayune.com). Accessed on 15 May 2009.

AKINBOADE, O.A, E. ZIRAMBA & W. L. KUMO, 2008, 'The demand for gasoline in South Africa: an empirical analysis using co-integration techniques', *Energy Economics*, vol. 30, issue 6, pp. 3222-3229.

BLESS, C. B & HIGSON-Smith, C., 2000, *Fundamentals of social research methods: an African perspective*. Juta Legal and Academic Publishers.

BP Statistical Review of World Energy (2008) BP Statistical Review of World Energy. London: BP Plc.

[http:// www.bp.com.html](http://www.bp.com.html). Accessed on 26 May 2009.

BRONS, M, NIJKAMP, P, PELS, E & RIETVELD, P. 2007, A meta-analysis of the price elasticity of gasoline demand. A SUR approach.

Energy Economics vol 30, 2008, pp. 2105-2122

BROWN, A, & DEATON, A. 1972, Surveys in Applied Economics: Models of consumer behaviour. *The Economic Journal*, vol 82, no. 328, Dec1972, pp1145-1236.

CARBUAGH, R, J. 2007, *An Application Approach to Contemporary Economics*, 4th edition. Thomson South-Western publishers.

COOPER, J, C, B. 2003, Price elasticity of demand for crude oil: estimates for 23 countries. 2003 Organization of Petroleum Exporting Countries Review.

CRENSON, M. 2007, Ethanol: Is it the best solution? Get to know the pros and cons. [http:// www.pennlive.com/naturalliving/2007/03/ethanol.html](http://www.pennlive.com/naturalliving/2007/03/ethanol.html). Accessed on 26 May 2009.

DAHL, C. 1993. 'A survey of energy demand elasticities in support of the development of the NEMS.' October 1993. De-AP01-93Ei23499. [United States Department of Energy]

DAHL, C & STERNER, T. 1991, 'Analyzing gasoline demand elasticities: a survey', *Energy Economics* 3 (13), pp. 203-210.

DEAT, 2009. Department of environmental affairs and tourism. <http://www.deat.gov.za.html>. Accessed on 25 March 2009.

DME, 2009. Department Minerals and Energy official webpage. <http://www.dme.gov.za.html>. Accessed on 25 March 2009.

EIU.2009, Economist Intelligence Unit. <http://www.eiu.com/index.asp?layout.html>. Accessed on 26 May 2009.

ESPEY, M. 1998, 'Gasoline demand revisited: an international meta-analysis of elasticities', *Energy Economics*, vol. 20, pp. 273-295.

FIN, A. 2006, Butanol- Better than Ethanol as a Gasoline Substitute.

<http://www.alfin2300.blogspot.com/2006/06/butanol-etter-than-ethanol-as.html>.

Accessed on 26 May 2009.

GOODWIN, P. B., 1992, 'A review of new demand elasticities with special reference to short and long run effects of price changes', *Journal of Transport Economics and Policy*, vol. 26, issue. 2, pp. 155-69.

GRAHAM, D, J & GLAISTER, S. 2002, The demand for Automobile Fuel: A survey of Elasticities. *Journal of Transport Economics and Policy* , Volume 36, Part 1, January 2002, pp 1-26.

HENDERSON, H, D. 1922, *Supply and Demand*.

Publisher: Harcourt, Brace. Place of publication New York , 1922, p. 18- 30.

HUGHES, J. E., KNITTEL, C. R. & SPERLING, D. 2008, 'Evidence of a shift in the short-run price elasticity of gasoline demand'. *Energy Journal* 2008, vol. 29, issue. 1, pp. 113-34.

HYUNG-GUN, K. 2007, An analysis of income distribution effects of gasoline tax: Evidence from the U.S. micro-level data.

ITF, 2009. Interagency Task Force on Commodity Markets.

<http://www.itf.com.html>. Accessed on 5 May 2009.

KANTER, J. 2008, Sweden turning sewage into gasoline substitute.

<http://www.nytimes.com/2008/05/27/business/worldbusiness.html>. Accessed on 26 May 2009.

KPMG International, 2008, 'Key Issues for Rising National Oil Companies'

<http://www.kpmg.com/html>. Accessed on 3 May 2009.

KRAUSS, C. 2008, "Oil Demand Will Grow, Despite Prices,

<http://www.nytimes.com.html>. Accessed on 15 May 2009.

KREFTLING, L. 1991, Rigor in qualitative research: the assessment of trustworthiness. March 1991. PMID: 2031523 [PubMed - indexed for MEDLINE].

LIPSEY, R, G, STEINER, P, O & PURVIS, D, D. 1987, Economics, 8th edition. Harper & Row publishers' Inc. 10 East 53rd street, New York, NY 10022.

LUCHANSKY, M, S & MONKS, J. 2008, Supply and demand elasticities in the US ethanol fuel market. *Journal Energy Economics* vol 31 pp. 403 –410.

McCASKILL, J. 2006, Natural Disasters and Oil: The Effect of Hurricane Katrina on Oil production in the Gulf of Mexico Submitted to GP200A.

MILES, M. B & HUBERMAN, M. A., 1994, *Data analysis*, 2nd edn, SAGE publications.

MOHR, P. & FOURIE, L. 2008, Economics for South African students, 4th edition. Van Schaik publishers.

NETSHITENZHE, J. 2008, Development Indicators.
[http:// www.pcas.gov.za.html](http://www.pcas.gov.za.html). Accessed 13 June 2009

NKOMO, J.C., 2006, 'Crude oil movements and their impact on South Africa'. *Journal of Energy in South Africa*, vol. 17, no. 4, SAPIA. 2008.

OUM, T, WATERS W, G & JONG-SAY, Y. 1992, Concepts of price elasticities of transport demand and recent empirical estimates. *Journal of transport economics and policy*, 1992.

PAULSEN, M, B & TOUTKOUSHIAN, R, K. 2006, Overview of Economic Concepts, Models and Methods for Institutional Research. *New Directions for Research*, no132, winter 2006. Wiley Periodicals, Inc. Published online in Wiley InterScience.

PLATTS. Official fuel market price indicator.

[http:// www.plattssarus.com.html](http://www.plattssarus.com.html). Accessed 6 May 2009

RFA, 2009. Road Freight Association.

[http:// www.rfa.co.za.html](http://www.rfa.co.za.html). Accessed 13 June 2009

SAPIA. 2009. South Africa Petroleum Industry official webpage.

[http:// www.sapia.co.za.html](http://www.sapia.co.za.html). Accessed on 1 May 2009.

SATAWU, 2006. South African Transport & Allied Worker's Union

[http:// www.satawu.org.za.html](http://www.satawu.org.za.html). Accessed on 1 May 2009.

STATSSA. 2009. The South African Market Indicators.

[http:// www.statssa.co.za.html](http://www.statssa.co.za.html). Accessed on 15 May 2009.

STEVENS, P. 2008, Oil Prices: Crude Awakening. BP Magazine. Issue 3. BP
Publication: London

STRETTON, H. 1999, Economics, a New Introduction. Published: UNSW Press,
Sydney, NSW, 1999.

STROOP, B.J. 2002, 'Aspects of pricing structure for South African fuels'. MEng -
Rand Afrikaans University, 2002.

WELMAN, J.C. & KRUGER, S.J. 2001. Research methodology. 2nd edition.
Oxford, Cape Town.

YOUNG, & MCAULEY, 1994. The portable MBA in Economics.
Published by John Wiley & Sons Inc, Canada.

6. ANNEXURE

This is a copy of the questionnaire that was use to conduct the survey.



Petrol Price Sensitivity Analysis

CONTACT DETAILS:

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Questionnaire: Petrol Price Sensitivity Analysis

PLEASE NOTE:

This questionnaire to be completed by retail customers of Total service stations.

All the information will be treated as STRICTLY CONFIDENTIAL and will only be used for academic purposes.

Instructions for completion:

- 1 Please answer the questions as objectively and honestly as possible.
- 2 Place a cross (X) in the space provided after each question, which reflects your answer most accurately.
- 3 Where asked to comment or to express your opinion, keep answers short and to the point.
- 4 Please answer all the questions, as this will provide more information to the researcher so that an accurate analysis and interpretation of data can be made.

SECTION A: DEMOGRAPHICS

A1	Please indicate gender	Male	Female
		(1)	(2)

A2	Number of vehicles owned by you	
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A3	Vehicle information	
	Make:	
	Model:	
	Engine Size:	
	Year:	

A4	Car ownership	Pool Car	Company car	Personal
		(1)	(2)	(3)

A5	Indicate applicable age group	≤ 20	21-29	30-39	40-49	50+
		(1)	(2)	(3)	(4)	(5)

A6	Ethnic group	Black	White	Coloured	Indian	Asian
		(1)	(2)	(3)	(4)	(5)

A7	How far do you have to drive to reach a filling station?	1 km or Less	2 – 5 km	6 – 10 km	11 km or More
		(1)	(2)	(3)	(4)

“Please note K represents hundred thousands”

A8	Indicate annual Total income group	100- 200K	200-250K	251-300K	301-350K	+350K
		(1)	(2)	(3)	(4)	(5)

A9	Specify % of salary spent on petrol per month	≤ 10%	10-20%	21-30%	31-40%	40 %+
		(1)	(2)	(3)	(4)	(5)

SECTION B: SURVEY

B1	Does the change in petrol price affect your expenditure on petrol?	Yes	No
		(1)	(2)

B2	In general, do you think the petrol price is high?	Yes	No
		(1)	(2)

B3	Why do you think prices are high (if you answered yes in B2)?	
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B4	Please rate the public transport system in your area	Good	Average	Poor	Non-existing
		(1)	(2)	(3)	(4)

B5	Which grade of petrol do you use?	ULP93	LRP93	ULP95	Does not matter	Don't know
		(1)	(2)	(3)	(4)	(5)

B6	Which brand of petrol do you prefer?	
B7	Why is this your favourite brand?	
B8	How many times do you put petrol in your vehicle per month?	
B9	What amount of petrol do you put into your vehicle on average per fill up?	

B10	How do you pay for petrol?	Cash	Card
		(1)	(2)

B11	Indicate which variables are important when buying: Petrol	Yes	No
	Price	(1)	(2)
	Brand	(3)	(4)
	Location	(5)	(6)
	Product	(7)	(8)

B12	Indicate at what price per litre you would change your driving style	R 8.00	R 9.00	R 10.00	R 10.00 +
		(1)	(2)	(3)	(4)

B13	Would you consider an alternative fuel source (e.g. biofuel)?	Yes	No
		(1)	(2)

B14	Do you ever use a lower grade of petrol because it's cheaper?	Yes	No
		(1)	(2)

B15	Indicate which of these variables are influenced by an increase in petrol price:	Yes	No
	Using your vehicle less	(1)	(2)
	Cutting out on non-essential living expenses	(3)	(4)
	Using public transport	(5)	(6)
	Driving less during busy periods	(7)	(8)
	Making use of a lift club	(9)	(10)

	Buying a more fuel-efficient vehicle		(11)		(12)
	Trading vehicle in for motorcycle		(13)		(14)
	Reducing travel or recreational driving		(15)		(16)

B16	At what petrol price per litre will you change the following habits:	R		R		R			
		8.00		9.00		10.00		10.00 +	
	Using your vehicle less		(1)		(2)		(3)		(4)
	Cutting out on non-essential living expenses		(5)		(6)		(7)		(8)
	Using public transport		(9)		(10)		(11)		(12)
	Driving less during busy periods		(13)		(14)		(15)		(16)
	Making use of a lift club (car pool)		(17)		(18)		(19)		(20)
	Buying a more fuel-efficient vehicle		(21)		(22)		(23)		(24)
	Trading vehicle in for motorcycle		(25)		(26)		(27)		(28)
	Reducing travel or recreational driving		(29)		(30)		(31)		(32)

B17	Over the last 3 years, the price of petrol has increased. How have you adapted to this long-run trend of price increases?	Yes		No	
			Less leisure travel, i.e.. holiday travel		(1)
	Bought a petrol efficient car		(3)		(4)
	Changed your driving style		(5)		(6)
	Made use of alternative transport, e.g motorbike		(7)		(8)

THANK YOU FOR YOUR TIME.