

THE SUSTAINABILITY OF THE CANDLE MARKET IN SOUTH AFRICA

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ABSTRACT

Electrification is an initiative that has been undertaken by the South African government to improve the quality of life. The investigation into the future of candle industry will highlight the impact of electrification and the use of candles as a light source and strategies for the manufacturers of household candle. The impact of electrification on future demand for candles will be quantified and used to give trends for the future candle demand. This investigation will assist candle manufacturers in drawing up their strategies for the type/s of candles to produce or the market to focus on, to sustain reasonable profits.

Declaration:

I hereby declare that the dissertation submitted is an original piece of work produced by myself.

The information relevant to any mentioned company is confidential.

Signature: _____ **Date: 25 October 2012**

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Definition of terms

1. **Decorative Candle.** - A candle that has been decorated with art and is used as an ornament or in the hospitality industry. The candle can also be scented.
2. **Household.** – A household is a group of persons who live together, and provide themselves jointly with food and/or other essentials for living, or a single person who lives alone.

Acronyms

1. **ASSA.** – Actuarial Society of South Africa.
2. **BC.** – Before Christ
3. **PLC.** – Product Life Cycle.
4. **SA.** – Republic of South Africa.
5. **SAHC.** - South African Household Candle, pack of six white candles each weighing 75 gram or 450 gram in total. The candles are mainly used for light and heat in poor communities.
6. **NERSA.** – National Electricity Regulator of South Africa.
7. **FT.** - Fischer-Tropsch process to produce synthetic fuel.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Before electricity and still in the absence thereof, the candle is the ancient way of making light in households. The Egyptians already used this concept 3000 years BC (National Candle Association, 2005)

Candles are mainly used for light and also as a source of heat in winter by the poor in South Africa. The commercial manufacturing and development of the South African household candle (SAHC) started in 1909 with a candle factory in Cape Town (Price's Candles, 2005). The SAHC is unique in design, weight and burning time, and is regulated by law within South Africa. As a developing country the South African Government targets to electrify the country. The target set in the report NERSA (1996:6) was to connect 450 000 households per year. This is a drive that is essential for the future prosperity of SA.

The candle manufacturers in SA are competing against the electrification effort of government for maintaining market share in supplying energy for lighting. Statistics from Statistics South Africa (1996, 2001 and 2007) shows that after electricity candles are the second largest light source for households. The local market for the South African household candle in South Africa used for light is getting replaced by electricity as a new technology substitute product.

1.2 Problem Statement

This study seeks to assess the impact of electrification as a substitute product of the SAHC market in South Africa. It needs to be established whether a candle is still required, either as a lighting source or any other purpose and to give the south African candle manufacturers

direction if they have to stop producing a household candle and start producing another type of a candle for the other purpose other than light.

1.3 Objectives of the study

- To compile a demand forecast for the SAHC and other types of candles
- To analyse the candle market and the substitutes for it
- Provide guidelines on the consequences for the SA population if production of SAHC is stopped and alternatives or substitutes are used

1.4 Research Questions

- What is the current and future demand for the SAHC?
- What are the substitutes for the SAHC?
- What are the advantages and disadvantages of electrification for the SA population?
- Should candle manufacturers continue to produce a SAHC and should they produce other types of candles?

1.5 Significance of the study

Current research that has been reviewed focus on the electrification process in SA and how to use renewable resources to produce electricity. This research will fill the gap to provide information to highlight the linkage between modern energy and the SAHC as a light source in SA households. The use of candles in SA as a light source will also be established.

According to Statistics South Africa (2005:16) the amount of households in 1996 that were still using candles as a light source were 28% of total households. This represented more than 2.6 million households or 1.8 billion candles per annum. This is evidence that the candle industry in SA is large and a major contributor to the local manufacturing infrastructure. Electricity is an old technology in the world, but new for many in SA, and is seen as a substitute for candles by the poor population as soon as they can afford it.

1.6 Conclusion

The study will allow for the correct assessment of the SAHC and the relative strategy to manage it correctly in a social responsible way. By using statistics on the rate of electrification

and applying quantitative analysis to forecast the future use of the SAHC in SA households, a strategy to phase out the SAHC and phase in other types of candles and other alternatives will be discussed.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discusses research related to the current study and is reviewed together with theories and models of marketing, management economics and quantitative analysis for management and business ethics. The only studies that include the use of the SAHC in SA households are documented in the South African National Census of 1996 and 2001 (Statistics SA, 2001), and the Community survey of 2007 (Statistics SA, 2007).

The literature review highlights the data and theory that addresses the research questions and contributes to reaching the set objectives, stated in chapter one and include the following:

- The marketing principles that underlie a PLC analysis for the candle wax industry.
- Literature related to assessing how many households will use candles as a light source in the future, with a focus on the following variables:
 - population forecasts,
 - statistics on households,
 - the electrification of SA,
 - energy sources for household light sources.
- Literature on supply and demand economics and how to do a quantitative analysis. This data will provide a theoretical framework and forecasting data with the correct validity to compile a future demand curve for the SAHC market.
- Data from Sasol Wax will be reviewed to compile a potential future supply curve.
- Literature on how to do a break-even profitability analysis will be reviewed, and used as the basis to forecast the future break-even point for the manufacturing industry of the SAHC.
- Literature on the social responsibility of companies will be reviewed to have a proper understanding of the potential consequences if Sasol Wax stops manufacturing the SAHC,

which is a consumer product still used by millions of the SA population in the lower income levels.

2.2 Product Life-cycle analysis

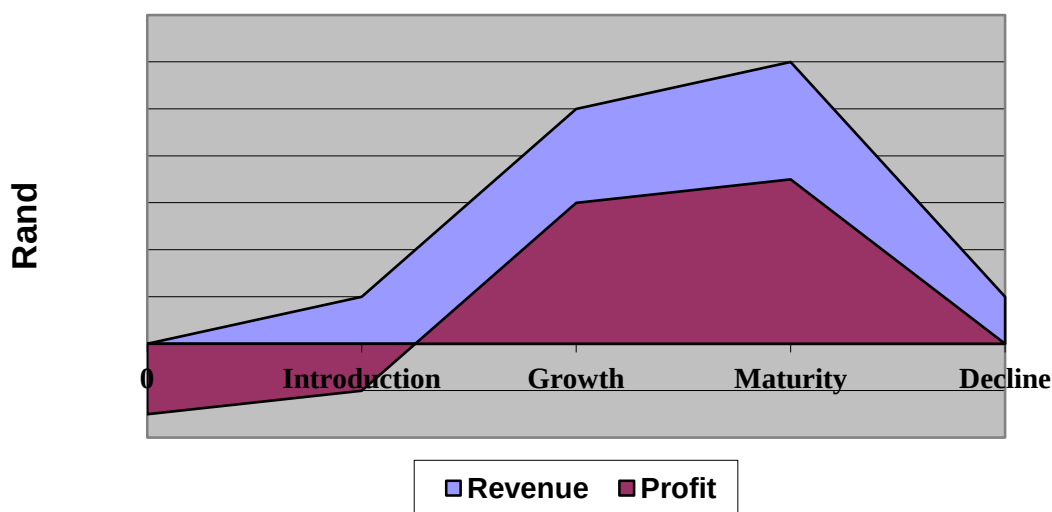
2.2.1 Brief overview of the PLC

Cravens, Hills and Woodruff (2002:266) affirm that products, like people, move through life cycles, and a firm's marketing strategy must be modified in response to changes in the PLC. The PLC indicates the limited time over which a company can enjoy sales growth and profitability with any one product. A PLC can have a direct bearing on a company's survival. Etzel, Walker and Stanton (2004:243) postulate that the concept of product life applies to a generic category of products and not specific brands. In addition, information on the PLC of a product is a key marketing and planning tool because the relative importance of various elements of the marketing mix will shift at different stages in the PLC. The PLC emphasizes the limited time over which a company can enjoy sales growth and profitability with any one product. A PLC consists of the aggregate demand over an extended period of time for all brands comprising a generic product category.

2.2.2 Product Life-cycle definition and characteristics

Marketing strategies that work for one product may not work for another. There are many reasons for the differences, but an important one is that these products are at different stages of their life cycles. The PLC model is useful to help marketers to plan their strategies.

Figure 2.1: The Product Life-Cycle



A PLC is defined as a model of the stages as a function of profit and sales. As shown in Figure 2.1 the four stages in PLC are introduction, growth, maturity and decline. The two curves in the figure show the pattern of sales and profits throughout these stages. Eventually the sales volume for most products begins to fall as we see in Figure 2.1. There are many reasons for sales to decline, as in the case of candles being substituted by electricity, whereby technology has led to a superior alternative. Kotler and Keller (2006:322) states that the PLC concept can be used to analyze a product and they describe the different stages as follows:

- **Introduction** – A period of slow sales growth as the product is introduced in the market. Profits are nonexistent because of the heavy expense of product introduction.
- **Growth** – A period of rapid market acceptance and substantial profit improvement.
- **Maturity** – A slowdown in sales growth because the product has achieved acceptance by most potential buyers.
- **Decline** – Sales show a downward drift and profits erode.

The PLC has implications for the marketing strategy of a product. The SAHC is either in the mature or decline stage. The demand for candles as an energy source for lighting will decline as the SA government build new households with electrical infrastructure. The implications in these stages are as follows:

- **Maturity stage:**
 - Basic objectives:
 - Defend the products share of the market, and

- Seek growth by luring customers from competitors.
- Product:
 - Improve quality, and
 - Distinguish brand from competitors.
- Price:
 - Low, reflecting heavy competition.
- **Decline stage:**
 - Basic objectives:
 - Limit costs, and
 - Seek ways to revive sales.
 - Product:
 - Continue to provide high quality products.
 - Price:
 - Low enough to sell off the remaining inventory.

Perreault and McCarthy (2005:279) state that it is important for a firm to have some form of competitive advantage in the maturity stage. The firm would capitalize on the lower production or marketing costs or is simply better at promoting the product. By contrast, product profits decline in the maturity phase and top managers must understand this and not to put impossible burdens on the marketing department. Product life-cycles keep moving, and a firm should not just sit by as its sales decline. The firm can develop a strategy for its product, perhaps with modifications or target a new market.

Perreault and McCarthy (2005:279) continuous by saying that in a mature market, a firm may be fighting to keep or increase the market share. If the firm finds new use for the product, it may stimulate the overall demand. Not all strategies have to be growth strategies, if prospects are poor in some product markets, a phase-out strategy may be needed. However, phasing out a product may involve some difficult implementation problems. It is possible to milk a dying product for some time if competitors move out more quickly and there is an ongoing, though declining, demand.

For most products, a decline stage, as described by Etzel et al. (2004:246), is inevitable due to one of the following reasons:

- A better or less expensive product is developed to fill the same need.
- The need for the product disappears, being replaced by a substitute.
- People simply grow tired of the product.

Seeing little opportunity for revitalized sales or profits, most competitors abandon the market during this stage. However, a few firms may be able to develop a small niche and remain moderately successful in the decline stage. Some manufactures of wood-burning stoves have been able to do this. For Strydom, Jooste and Cant (2000:267), the significant indicators that establish if the declining phase is reached are:

- trend in sales,
- trend in prices,
- trend in market share,
- the nature and extent of substitute products,
- product ability to continuously satisfy the consumer need, and
- amount of management time getting taken up by the product.

Not all manufacturers in the declining phase abandon the product simultaneously. The business that decides to continue with the product in spite of declining industry sales can experience an increase in sales in the short term as other manufactures abandon the market. Some businesses might act aggressively and buy out some competition in order to stop their production. It is also important not to start a price war at this stage to extend the declining phase. Most firms will use the same market strategy as before until such time that the product is eventually removed. Management can decide to drastically reduce their marketing effort and to focus only on target markets. An option can be to withdraw the product from all markets and use strategic withdrawal as a defence mechanism. The organization would then withdraw from certain markets and change to a more profitable market.

Etzal et al. (2004:250) list the following alternatives when sales are declining:

- Ensure that marketing and production programs are as efficient as possible.
- Prune unprofitable models. This tactic will decrease sales but increase profits.
- “Run out” the product; that is, cut all costs to the bare minimum to maximize profitability over the limited remaining PLC.

- Improve the product in a functional sense, or revitalize it some manner.

If these alternatives do not work, management will have to consider product abandonment. Either before or after abandoning a declining product, a company may redefine its mission to concentrate on a more promising venture. The PLC is an aid to thinking about marketing decisions, but it needs to be handled with care. Jobber (2004: 314) lists the following limitations of the PLC:

- Fads and classics – not all products follow the S-shaped curve. Products may appear to defy entering the decline stage, only experiencing an intense but brief period of popularity.
- Marketing effects – The PLC is the results of marketing activities, not the cause. Sales of a product may flatten or fall simply because it has not received enough marketing attention.
- Unpredictability – The duration of the PLC is unpredictable. It is not possible to predict when maturity ends and decline starts.
- Misleading objective and strategy prescriptions – An example is the last strategy of the United Kingdom cinema market. Cinemas were in their declining phase and the response was to close cinemas. One company saw the scenario as a marketing opportunity in offering new showcase cinemas with a choice of 12 films in modern purpose build cinemas. The result was an upturn in cinema attendance.

In conclusion, as noted by Thompson, Strickland and Gamble (2005:78), it is important to monitor the strategy of competition in the marketplace. For Sasol Wax electrification is competition and although Sasol Wax supports electrification as a positive development for SA, the organisation also ensures return on the profit to stakeholders by managing the PLC of the SAHC with the correct strategy. As the theory shows, there are many alternatives for Sasol Wax that may include the following:

- Supply the market only according to demand and find alternative markets for candle wax.
- Replace the manufacturing of SAHC's with the production of decorative candles which targets a total different market segment.
- Abandon the manufacturing of the SAHC in total.

2.2.3 The product

The SAHC is specially developed for the poor in SA, and is primarily manufactured as a light source for households that are not electrified. The SAHC must not be confused with decorative candles that is decorated and used in the hospitality industry. Decorative candles can also be scented and are relatively more expensive than the SAHC. The following are characteristics of the SAHC:

- **Description of candle:**

- The candle varies in length and diameter, and weighs 75 gram.
- The external surface of the candle is fluted, sometimes none fluted.
- The candle is white in appearance.

- **Candle composition:**

- Mainly FT- wax, sometimes blended with Paraffin wax.
- Wick.

- **Characteristics:**

- Under test conditions, the candle burns for 9.5 hours.
- The candle must not smoke or drip.

- **Packaging:**

- The six candles are packed in a wrapper.
- Wrappers are packed in cases, with 25 wrappers per case.

- **Laws governing the SAHC:**

- The Department of Weights and Measurement Law, Ministry of Trade and Industry (1973: Act 76), mandated that there must be six candles to a wrapper, each weighing 75 grams or a total of 450 grams per wrap.
- Furthermore, as set out by the South African Bureau of Standards (SABS), standard CKS60 stipulates that a domestic candle is required to burn for 9, 5 hours (SABS, 2003).

2.2.4 The Company

The South African Sasol was founded in 1950 in Sasolburg. The former state-owned company utilised the Fischer-Tropsch process to produce synthetic fuel, diesel, and other liquid fuels through the gasification of coal on an industrial scale. The company rapidly diversified into other chemical sectors and became one of the predominant suppliers of chemical raw materials. The chemical direction and the production of chemical final products were continued with the establishment of Sasol II and III in Secunda. Through privatisation, at the end of the

nineteen-seventies, Sasol became a valued and well-known supplier of specialty products in wax and chemicals. Sasol Wax specialises in the production of Fischer Tropsch (FT) waxes whereby

- A FT- wax is derived from coal and gas sources and is not crude oil based.
- FT- Waxes offer a number of application possibilities through the wide range of low-melting to high-melting grades of waxes available.
- Candles are manufactured from the medium grade waxes.

In 1996, Sasol Wax purchased the Wax plant from Engen Refinery in Durban and today is the major supplier of candle wax to the industry from the Sasolburg and Durban plants and the biggest candle producer at its Price's Candles plant in Johannesburg and smaller manufacturing capacity at the Durban plant.

2.3 Demand and Supply Economics

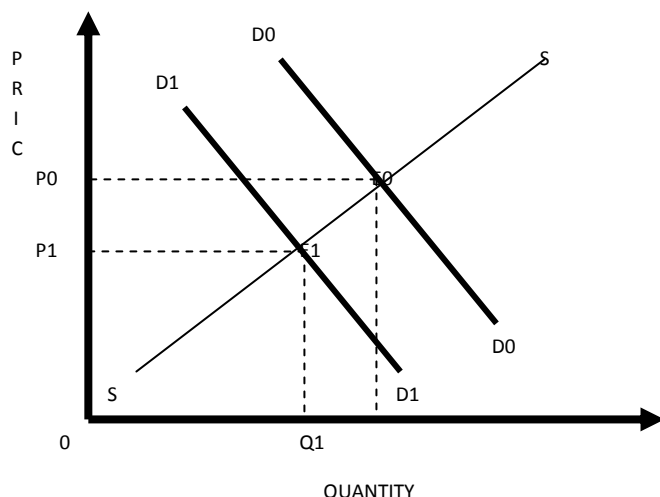
2.3.1 Demand Curve

Pape (2000:94) asserts that when we look at economic demand, we are looking at the market from the point of the buyer, or in economic terms, the consumer. According to the law of demand:

- Consumers will demand more of a good or service at a low price than a higher price, and
- consumers will demand less of a good or service at a high price than a lower price.

The shift in demand can be presented by the demand curve showing the effect on quantity and price.

Figure 2.2: Demand Curve



Source: Mohr and Fourie (2005:156)

In Figure 2.2, the demand D_0 decreases to demand D_1 . The effect is typical of what can happen when the demand for candles decrease. The effect is both a decrease in quantity to Q_1 and price to P_1 . The theory shows that if the variables on demand are known, the information can be used to project behaviour based on the demand curve. The decrease in demand will influence the volume of candles that gets sold and will put pressure on the price to decrease, or at least resist any increase. For the economist, there are two factors behind the law of demand. These are the:

- substitution effect, and
- the income effect.

If the price of a good is too high, it will affect consumer income and consumers will look for substitutes. Mohr and Fourie (2005:155) define a substitute as a good that can be used in place of another good to satisfy a certain want.

Electricity as a substitute for candles as a light source can have the following influence on candle demand:

- Electricity is more expensive than candles and will affect the income of consumers.
- Electricity that is too expensive will increase the demand for candles.

- If candles are too expensive and close to the price of electricity, electricity will substitute candles.
- Electricity as the preferred energy source for light will decrease the demand for candles.
- The unavailability of electricity in geographic areas will increase the demand for candles.

However, with reference to the SAHC, demand also depends on the size of the SA population. The population in the current South African economic situation will have the following influence:

- large population will increase unemployment resulting in more poor consumers and will increase the demand for candles.
- Decline in population growth will decrease unemployment, resulting in higher income for consumers and will decrease the demand for candles.

2.3.2 Demand Forecasting

Expressed by Mithani (2003:57), knowledge about demand is vital for the business manager in creating price, sales and output strategies against dynamic changes in the determinants of demands. Forecasting demand refers to the expectations about the future course of the market demand for the product. Demand forecasting is based on statistical data about past behaviour and empirical relationships of the demand determinants. Trivedi (2000:188) puts demand as forecasting for a company's decisions into three groups:

- Short-run decisions for day- to- day routine.
- Short-run marketing, finance and production decisions.
- Long-run expansion decisions.

Planning for both the short-run and the long-run requires demand forecasting. Long-run decisions are concerned with any one or more of the following:

- expansion of existing capacity.
- diversification of the product mix.
- gains by acquisition: integration or mergers.
- change of location of plant.

- capital issues.
- manpower planning.

Trivedi (2000:190) states that the choice of method to conduct a demand forecasting depends on the objective and the availability of data. Statistical and economic techniques require past data on sales for reasonably long periods. It is also possible to use data of substitute products for statistical analysis. In the current research, data on electrification as a substitute product will be used in the statistical analysis.

Conclusion, the SAHC is facing both factors, income and substitution, that influence demand. Electricity is providing a substitute for candles and the country's economic conditions are already affecting the poor who use candles for light. A decrease in demand will result in an over-supply in the market and the prices to local retailers will fall. The extent of the decrease of demand and possible price implications is important information for Sasol Wax Management with regards to decision making. Decision making is more important over the long-run for Sasol Wax and includes the following issues:

- Future plans to expand production facilities in Sasolburg.
- Deciding when to diversify into:
 - decorative candle market, and
 - non- candle wax alternative markets.
- Should manufacturing take place closer to feedstock supplies to reduce cost i.e. at Sasolburg and Durban and not Newtown in Johannesburg?

Good demand forecasting will aid Sasol Wax to make long-run decisions based on proper research. The data will form the foundation when making decisions that will involve capital expenditure and strategy objectives for the future.

The current study uses demand forecasting to establish how many households in the future will still be dependant on candles as a light source. Literature on secondary data was examined in order obtain all the variables that will either increase or decrease the use of candles. The following include the independent variables:

- population growth studies,
- household statistics for SA,
- electrification status of households, and
- statistics on household energy sources for lighting.

2.3.2.1 Population growth in SA

Population growth in SA will influence the demand for candles in the following ways:

- High population growth will have the following influence:
 - increase in number of households,
 - increase in unemployment resulting in larger poor communities,
 - more pressure on Government to increase the rate of electrification, and
 - the demand for candles will increase.
- A decrease in population growth will have the following influence:
 - decrease in unemployment,
 - government will catch-up in building new households,
 - current electrification efforts will decrease households without electricity, and
 - the demand for candles will decrease.

2.3.2.2 Household Statistics for South Africa

The primary use of candles is as a light source in households during night time and households with no natural light or windows. Candles are used by households as a light source in the following circumstances:

- no access to electricity,
- electricity is too expensive, and
- if candles is the cheapest alternative.

The number of households in the South African context will have an influence on the market and usage of candles as light source. The following factors will influence the usage of candles:

- A continuous increase in households will not allow the Government to catch-up on electrical connections and the demand for candles will increase.

- A stabilization or decrease in number of households will increase the electrification status of households and the demand for candles will decrease.

From Figure 2.5 the following are observed:

- There is an increase in formal dwellings from 8,1-million in 2002, to 10,4-million households in 2009.
- Traditional dwellings is currently 1.4 million, In 2002, no whites lived in traditional housing, but in 2009 there were 0,2%.
- Informal dwellings increased from 13% in 2002 to 13,4% 2009.
- The proportion of households renting residential dwellings increased from 18,4% in 2002 to 20,2% in 2009.

The use of candles in dwellings can be classified as follows:

- Small percentage in formal dwellings where the income is too low to afford electricity.
- High in traditional dwellings as the electricity connections in rural areas is progressing slowly.
- Very high in informal dwellings as these dwellings are occupied by the poorest of the poor.

Given the above synopsis, the demand for candles will only decrease once the formal dwellings start to replace the informal dwellings. Government programs to build formal dwellings are a high priority and will continue to increase on an annual basis. It can be concluded that the informal dwellings will decrease as the population growth slows down and the number of new formal dwellings built on an annual basis is larger than the population growth requirement for dwellings.

To summarise the synopsis above two cases exist that will influence the study:

- **Case one:**
 - informal dwellings increase,
 - formal dwellings increase, and
 - demand for candles will decrease.
- **Case two:**
 - population decrease, while
 - formal and informal dwellings increase, and

- demand for candles will decrease.

In both cases the decrease in population growth and increase in formal dwelling decrease the demand for candles. As candles are used as lighting only by the poor it is evident that good economic growth in South Africa will eventually influence the market for candles negatively. A prerequisite for this scenario must be that Government can supply affordable electricity to all type of dwellings in future.

2.3.2.3 Electrification status of households

One of the determinants of the future demand for the SAHC is the electrification of households, which is provides new technology to poor communities. Kotler and Keller (2006:92) assess that one of the most dramatic forces shaping people's lives is technology. A large part of the South African population is only now receiving access to electricity and the advantages and technology related to electricity supply. Electrification in South Africa as a substitute product for the SAHC as a light source, is gaining a market share on an annual basis. Electrification will influence the demand for candles as follows:

- Progress in annual electrical connections will decrease the demand for candles;
- Affordable electricity for the poor will decrease the demand for candles;
- Expensive electricity will increase the demand for candles in poor communities.

Electrification is a high priority for the SA Government. The National Electricity Regulator of South Africa (NERSA) as stated in NERSA (1996:3) was set up as a statutory body in 1995, with the principle task to regulate and increase the number of electricity connections in South Africa as follows:

- A target for electrification was set at 450 000 household connections per annum.
- However, the Chief Executive Officer, Dr. X.H. Mkwana of NERSA, reported that the targets per se, however, are not an end in itself. He said "to the millions who gained access to the benefits of electricity and to the millions who are still awaiting the wonders of electricity in their homes, it is all about quality of life, in saving hours of hard labour each day to collect wood, walking kilometres to buy candles, paraffin, gas or coal" (NERSA, 1998:2).
- According to Statssa general household survey (2011), 82.7 percent of households are connected to the mains electricity supply in 2011, compared to 76.8 percent in 2002.

- In 2003 a new development from NERSA, the Department of Minerals and Energy (DME) intends playing a more direct role in the strategic management of electrification in the future. NERSA will only act as an advising body while ESKOM, the national electricity supplier, will co-ordinate the measurement of the number of households electrified per year is a direct measurement of the electrification success and supply (NERSA, 2003:4).

2.3.2.4 Statistics on household energy sources for lighting

The most accurate recent studies on the use of the SAHC as a light source are the SA census of 1996, 2001 and the 2007 Community survey, which is representative of the total population (Statistics SA, 2007). The study revealed the following:

- The highest energy source used for lighting is electricity, followed by candles, paraffin and gas in order of magnitude.
- In 1996, 28.8 percent of total households used candles as a light source.
- The percentage in 2001 decreased to 22.7%.
- The percentage in 2007 decreased to 13.8%.
- The use of electricity as a light source increased from 58.2% in 1996 to 80.0% in 2007.

2.3.3 Supply Curve

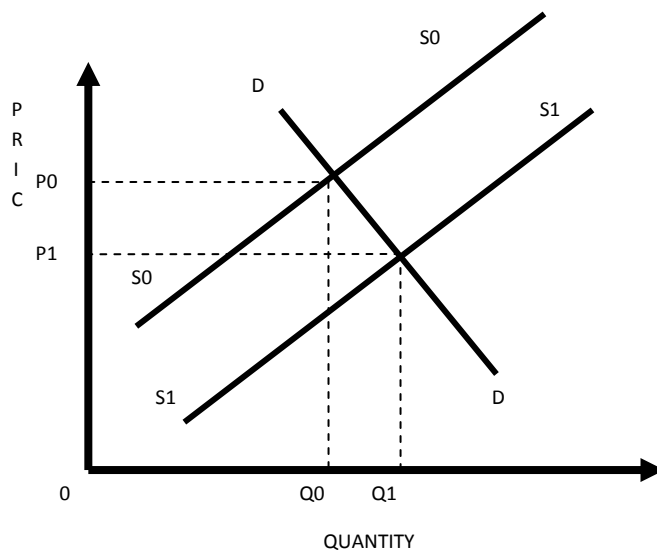
It has been established that there is a demand for candles as a light source in South Africa. It is necessary to understand the candle supply industry in South Africa and how the demand will influence the supply of candles. Bradley and Schiller (2006:47) define “supply” as the willingness to sell or produce specific quantities of a good at alternative prices in a given time period. The determinants of market supply include the following:

- technology,
- factor costs,
- other goods,
- taxes and subsidies,
- expectations,

- number of sellers.

A market supply curve indicates the sales intentions of a company. Any change in supply will result in shifting the supply curve.

Figure: 2.8 Supply Curve



Source: Mohr and Fourie (2005:156)

In Figure 2.8, the supply increases from S_1 to S_0 and the quantity to Q_0 and price to P_0 . The effect of the increase in production or quantity will decrease the price. Mohr and Fourie (2005:156) states that it is possible that a natural monopoly, like Sasol Wax, where one industry achieves economies of scale over the entire range of market supply, can use market power to alter the price of a specific product. They can use this power to enrich themselves rather than moving the economy to an optimal mix of output. The only way to control this is to regulate such a monopoly by antitrust and competition laws

2.3.3.1 Supply economics

2.3.3.1.1 Competition Law

Mohr and Fourie (2005:277) assert that the performance of a market depends on the conduct of the participants and the way the organisation market their products to gain a competitive advantage over their rivals, or to limit competition among them themselves.

Where monopolistic or oligopolistic conditions prevail, governments sometimes intervene in an attempt to reduce supernormal profits. A “monopoly” is a situation that arises where it is most cost efficient for a single firm to produce all the output in an industry. Under “oligopoly”, a few large firms dominate the market. To achieve a more efficient allocation of resources and prevent the abuse of market power, various types of interventions by government can included the following:

- Government can levy taxes on firms to reduce their profits.
- A second alternative is government ownership.
- A third alternative is regulation.
- A fourth alternative is competition policy, which has three basic aims. Firstly, to prevent existing monopolies and other powerful firms abusing their power. Secondly, to regulate the growth of market power through mergers and acquisitions and thirdly, to prevent the application of restrictive practices, particularly by oligopolistic firms.

In SA, the first comprehensive legislation specifically aimed at dealing with the following matters was:

- The Regulation of Monopolistic Conditions Act 24 of 1955.
- In July 1979, a new act, the Maintenance and Promotion of Competition Act 96 of 1979, was promulgated in response to a growing concern over economic concentration and obstacles to competition in SA.
- In 1994, the competition policy received a further boost when the African National Congress, which had been propagating a vigorous anti-monopoly policy, came into power. The economic power of the large conglomerates that were dominating the South African economy had to be curtailed in order to revitalise the economy and address the inequalities of income and wealth.
- All this led to vigorous analysis, debate and negotiations between government, business and labour, culminating in the promulgation of the Competition Act 89 of 1998. The Act provided for the establishment of a Competition Commission and a Competition Tribunal responsible for the Investigation of complaints against firms engaging in restrictive

business practices and to evaluate and approve mergers and acquisitions. The following were included in their duties:

- All mergers and acquisitions had to be notified to the Competition Commission.
- Large and intermediate mergers had to be approved by the Commission.
- The Commission had to consider competitions concerns on a particular industrial section or region, employment, the ability of historically disadvantaged firms to become competitive, and the ability of South African firms to compete internationally.
- Recommendations of the Commission are forwarded to the Competition Tribunal that may accept or reject such recommendations.
- Disputes may be referred to the Competition appeal Court.

The Competition Commission and The Competition Tribunal have been involved in cases investigating the supply of candle wax in South Africa. Sasol Wax as the major producer and supplier of candle wax in South Africa were investigated in 2001. Up to 2001, Price's Candles accrued a high debt with Sasol Wax and a merger was proposed between Sasol Wax and Price's Candles. According to the Competition Tribunal (2001: case 23/LM/May01), the Competition Tribunal prohibited the merger between Sasol Wax and Price's Candles. The Tribunal concluded that the impact on public interest outweighs the anti-competitive consequences of the transaction. They argued that it should be borne in mind that it is the poorest who consume candles and therefore the public interest loss would have to be considerable to justify approving an anti-competitive merger.

Sasol Wax went to the Competition Appeal Court of South Africa (2001: Case 10/CAC/Aug01) who found that the Tribunal's justification for concluding that the merger was likely to substantially prevent or lessen competition in either of the identified markets, lacked sufficient justification. They found it was not necessary to impose the kind of conditions recommended by the Commission. It was ordered that the decision of the Competition Tribunal must be set aside and that the merger be approved.

2.3.3.1.2 Candle wax suppliers

Based on the records of the Competition Tribunal Case No: 23/LM/May01 (2001:3), the largest supplier of bulk liquid wax to the major candle manufacturers is Sasol Wax, a division of Sasol

Chemicals Industry (Pty)Ltd. Sasol Wax has wax production plants in Sasolburg and Durban, and have to blend wax from different components as a national blend and is supplied to manufacturers in liquid bulk.

According to Mohr and Fourie (2005:277) Sasol Wax can be classified as a monopoly in the supply of wax for the SAHC. Being a monopoly, Sasol Wax can fix the price at which it wants to sell the wax, as long as it falls within guidelines of the SA Competition Board. In setting the price Sasol Wax can choose the point on the demand curve at which it wants to operate. Sales purely will depend on market demand but it is also possible to control supply to the market to stimulate demand.

Table 2.3: Candle wax suppliers in SA

CANDLE WAX SUPPLIERS IN SA	MARKET SHARE
Sasol Wax	75%
Masterrank	8%
G. Zabel	6%
Reach Industrial	6%
BP	5%
Shell	2%

Source: (Competition Tribunal, 2001)

Table 2.3 indicates that Sasol Wax is the only major player in the Market. From the candle wax suppliers, only Sasol, BP and Shell produce wax locally. The other firms import wax. It is however only Sasol Wax that refines the wax to candle wax as feedstock for the SAHC. Being a monopoly, Sasol Wax needs to determine a strategy to limit the supply to the SAHC Manufacturers in line with electrification, or allow the manufactures to find alternative strategies to keep the demand equal to the available supply.

2.3.3.1.3 Candle manufacturers

The SAHC manufacturers can be classified as an oligopoly. An oligopoly is defined by Mohr and Fourie (2005:289,291) as a scenario when only a few large firms dominate the market. The product is homogeneous as all the above mentioned manufacturers manufacture the same SAHC regulated by law in South Africa. There is no general theory for an oligopoly but they act as follows:

- interdependent and are rivalries,
- they need to act strategically since their profit not only depends on their own actions, but also on the actions of the other SAHC manufacturers,
- if the electrification of South African households increase and the demand for candles decrease the manufacturers will need to act strategically to defend their market share and profits. Schiller (2006:538) confirms that in an oligopoly only a few firms have a great deal of power in the market. He also states that the increase in market share of one oligopoly will reduce the share of the remaining oligopolies.
- in light of future electrification, the strategic moves from the different manufactures of the SAHC in the South African market will influence each other until one or more totally leaves the market.

All the SAHC manufactures are part of large corporations or established family owned businesses. Price's candles are the only manufacturer that only produces candles. The rest of the manufactures produce candles part of their product mix. The supply of candles usually goes with industries supplying cooking oil, margarine and soap.

Table 2.4: Candle manufactures in SA

CANDLE WAX SUPPLIERS IN SA	MARKET SHARE 2001	MARKET SHARE 2006
Prices Candles	42%	47.2%
Willowton and Cake Mills	13%	21.9%
Morlite Industries	11%	6%
Boardman Brothers	9%	3.5%
Sealake Industries	7%	10.8%
Golden Glo	n/a	3.9%
Costa's	n/a	6.9%

Source for market share in 2001: (Competition Tribunal, 2001)

Source for market share in 2006: (Jansen van Rensburg, 2006)

Table 2.4, lists the estimated 2001 market shares of the five largest participants in the market for the manufacture and distribution of household candles. The data for 2006 shows that:

- The market share of Price's Candles increase by 5.2 percent.
- The market share of Willowton and Cake Mills increased by 8.9 percent.
- The market is dominated by Price's Candles and Willowton, representing about 70 percent of the market.
- New entrants did achieve market share, although this was small.

2.3.3.2 Future supply volumes of candle wax

Another influence on the supply of candle wax was an announcement made by Sasol Wax in its monthly Investor Insight letter which stated that wax production in its Sasolburg operation will be doubled in the next few years. "Sasol Wax is substantially expanding production in South Africa to take advantage of growth in international wax markets," says the MD of Sasol Wax, Johan du Preez. In addition the project will be implemented in phases in line with the projected growth in key markets. The first phase will come into operation in 2010, with the second phase is expected to be completed in 2013. The project will cover the full range of products from medium-melt candle waxes to ultra-hard waxes for specialty applications (Sasol Wax Investor Insight, 2007).

Table 2.5: Current and future supply of candle wax

YEAR	METRIC TONS
2007	40 757
2008	41 210
2009	45 754
2010	45 754
2011	54 454
2012	58 954
2013	64 275
2014	64 275
2015	67 565

Source: (Padayachee, 2006)

Table 2.5 shows the potential supply of candle wax to SAHC manufacturers. The projections are extracted from the forecasting model developed for the Sasol Wax expansion project. The following can be interpreted from the data:

- In 2009 and 2010, the supply increased slightly.
- In 2011, the supply increased drastically with implementation of phase one.
- In 2013, phase two will increase the supply to a maximum.

It is evident that the potential supply of candle wax to the SAHC manufacturers will increase on an annual basis. It is important for Sasol Wax to know if the SAHC industry will be able to balance a higher supply with their future demand for candles.

2.3.4 Supply and Demand

Bradley and Schiller (2006: 58) state that the forces of supply and demand will set and change market prices. By plotting the demand and supply curves, an equilibrium price and quantity can be established. Mohr and Fourie (2005:157) however states that if demand and supply change simultaneously, the precise outcome cannot be predicted. To apply the method of comparative statistics, only one variable will be allowed to change at a time And, in order to

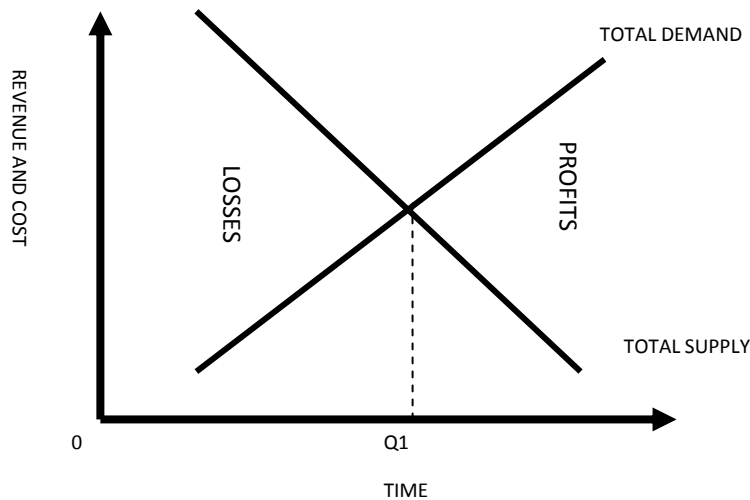
explain equilibrium, the concepts of revenue and cost must be introduced. “equilibrium” is reached under conditions where the firm maximizes its economic profit, which is the difference between its revenue and cost. If the information is known the firm needs to take two decisions:

- The firm must first decide whether or not the product is worth producing at all. Under certain conditions it would not be in the firm’s interest to produce but rather to shutdown operations.
- If it is worth producing, the firm must determine the level of production at which the profit is maximized.

The SAHC producers should only produce candles in the long run if the total revenue from sales is greater or equal than all the variable costs. On the short run, the fixed cost cannot be escaped from and production, even under an economic loss, must continue in order to retain employees and clients. It can be assumed that the SAHC manufactures can run with economic losses in the short run, but in the long run, it must be profitable.

If the demand for candles decreases in South Africa, as a result of electrification, the demand for candle wax will decrease to produce the SAHC. If Sasol Wax is going to increase the supply of candle wax in future it will negatively influence the demand and supply equilibrium. It is therefore of high importance for any business to have good intelligence on future supply of raw materials and future market dynamics.

Figure 2.10: Demand and supply equilibrium



Source: Mohr and Fourie (2005:148)

Figure 2.10 illustrates that point Q1 that will be the point at which a SAHC manufacturer will need to shutdown production in the long run. If the actual projected demand and supply data are plotted, it can provide information to Sasol Wax to:

- balance its supply and demand,
- find alternative markets for candle wax excess volumes,
- make long term strategy decisions, and
- stay socially responsible.

It can provide information to SAHC manufactures to:

- balance manufacturing capacity with local demand,
- provide information on size of export markets to be developed,
- make decisions about future economics of manufacturing, and
- make long term marketing strategy decisions.

2.4 Social responsibility

Thompson et al. (2005:302) put forward a moral case for why businesses should actively promote the betterment of society and act in a manner that benefits all of the company's stakeholders, not just the interest of shareholders. It boils down to "It's the right thing to do." Ordinary decency, civic-mindedness, and the concern for the well-being of society should be expected of any business. In today's social and political climate most business leaders can be expected to acknowledge that socially responsible actions are important and that businesses, owners and managers have a duty to be good corporate citizens. There is also a complementary school of thought that businesses operate on the basis of an implied social contract with the members of society. Society grants businesses the right to do business in the pursuit of profit but in doing so must promote the general welfare of society.

Sasol is a well respected company in South Africa and is serious in projecting an image of being socially responsible in a pro-active way. Examples listed under the Sasol value of Customer Focus (Sasol Internet, 2007):

- puts customer first,
- goes the extra mile to achieve delighted customers,
- sustaining relationships,
- aligns Sasol and customer priorities, and
- listen to customers.

Rossouw (2002:42) describes pro-active morality as the highest form of moral development for a company. Instead of simply reacting to the demands of society, businesses now takes the moral initiative. Businesses see themselves as an integral part of the community and makes an explicit choice to act in such a way that it will contribute to the creation of a better society.

The SAHC is giving light to the poor at low cost and provide the consumer the choice to buy a pack of six candles at a time, or as in poor communities shops offer to sell candles one at a time. To leave this market prematurely, Sasol Wax will not contribute to the social well-being of society. A decrease in supply will increase up to point where it not beneficial for the poor to consider candles as a light source. To act morally, the phasing out of the SAHC must be executed in balance with the electrification of South Africa.

As described in Modh (2005:84), Utilitarianism, founded by Jeremy Bentham in 1870, where his framework asserts that the decision maker should always act as to produce the greatest ratio of good for everyone. The consequences of any decision must be considered to assess the impact on all those concerned with the decision. This framework flounders on the basic concept of goodness in society.

Sasol Wax management must seriously consider all moral and ethical consequences in all business decisions related to the SAHC. They must be able to justify all decisions as aligning with the social responsibility of Sasol with needs to the poor society of South Africa.

2.5 Conclusion

It is evident that the SAHC will still provide light to the poor in SA beyond 2015. The literature shows good evidence that the marketing theory on PLC and economic theory on supply and demand can be applied to the SAHC market dynamics. Literature on electrification shows good progress despite a growing population and large back-logs.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The study aims at assessing the current and future demand for the SAHC in a South African market. The methodology on how the study was conducted is discussed in this chapter.

3.2 Rationale for the study

This research will provide information to highlight the link between modern energy and the SAHC as a light source in SA households. This is of paramount importance as it enables Sasol Wax Management to make and implement important strategic decisions regarding:

- The marketing of the SAHC to the local market.
- To analyse the candle market and the substitutes for it.
- Provide guidelines on the consequences for the SA population if production of SAHC is discontinued and alternatives are used.

It is therefore of importance for the management to strike a balance between supply and demand and this will enable short and long term decisions to be made. In line with this data generated from this research will be used in decision making processes for both short and long term.

3.3 Research design

3.3.1 Research approach

Research approach for this study relies mainly on deductive reasoning. (Saunders et al, 2003:86) list several important characteristics of the deductive approach:

- All facts are quantitatively measured.
- The casual relationships between variables are explained.
- The results of the population can be extrapolated by ensuring that sample of the sufficient size is selected.

3.3.2 Sampling Techniques

Sampling is the process of selecting people from a population of interest so that by studying the sample we may fairly generalize the results back to the population from which they were chosen (Trochim, 2006). While population on the other hand is defined as the group from which the sample is drawn and it include all the people whose opinions, behaviour, preferences and attitudes will yield information for answering the research questionnaire (Tustin et al, 2005:96).

There are two sampling techniques available as described by (Saunders et al, 2003:152):

- Probability sampling, or
- Non – probability sampling.

With the non – probability sampling it is impossible to come up with the statistical conclusions about a population and for this reason probability sampling was used in this study. With probability sampling it is possible to estimate statistically the characteristics of the population from the sample.

Five main techniques are used for probability sampling:

- Simple random
- Systematic
- Stratifies random
- Cluster, and
- Multi – stage

The sampling technique that is going to be employed in this research is stratified random sampling and in this sampling the population is separated into different subgroups (strata) and then random samples are selected from each subgroup (Tustin et al, 2006:353).

For the purpose of sample collection, the following criterion is going to be employed:

- The research will focus on the end users of the candles for lighting purposes.
- The end users of the candles must be located in Gauteng province and the target population must be staying in the informal settlements of Johannesburg.

- In this study four informal settlements from North (Diepsloot), East (Phola park) , West (Durbanville) and South (Elias Motswaledi) parts of Johannesburg will be under study.

According to (Castillo, 2009) the use of the stratified sampling is useful to highlight a specific subgroup within the population as it ensures the presence of the key subgroup within the sample.

3.3.3 Research instrument and design

Research instrument to be employed in gathering the required information is a questionnaire survey, and a questionnaire survey is a structured sequence of questions designed to draw out facts and opinions and which provides a vehicle for recording the data (Hague & Jackson 1996:107). The sampling method to be used in the research will compose of structured questionnaires. The questionnaires will be phrased in very basic English as the level of literacy is low among the targeted participants. Participants will be requested to complete a questionnaire. Permission will be obtained from the respondents to indicate their willingness to participate in the study. The respondents will be assured that the information received will be treated as confidential and that the results will be used for research purposes only.

The questionnaire is going to be made of two sections namely sections A, B and C:

Section A will be gathering demographic information from respondents regarding their profiles and characteristics. Questions on personal information such as age group, marital status, highest academic qualification are included in this section. Respondents have to indicate the applicable option with a cross (x).

Section B will be measuring the financial status of the participants. Source of income, income earned, payment frequency, number of dependants and purchasing preferences of the respondents will be examined. Respondents have to indicate the applicable option with a cross (x).

Section C will be looking at lighting sources used by people in the informal settlements and their past as well as future preferences of lighting sources. Respondents have to indicate the applicable option with a cross (x).

The sampling method to be used in the research will compose of structured questionnaires. The questionnaires will be phrased in basic English as it is believed that the level of literacy is low, among the chosen sample.

3.3.4 Data collection

Well structured questionnaires will be distributed to relevant respondents i.e. the end users of candles as a light source in the informal settlements of Diepsloot, Phola park , Durbanville and Elias Motswaledi. Questionnaires in the form of hard copies were delivered to relevant informal settlements.

3.4 Data Analysis

3.4.1 Introduction

If the researcher intends to quantitatively analyse a given set of data, one should consider:

- Type of data
- Data format
- Error checking method

By so doing the researcher will arrive at a statement of analysis of data (Saunders et al, 2003:328). Descriptive statistical method will be used for data analysis and interpretation. All calculations in this study were performed by computer based analysis software, Microsoft Excel. All data were quantifiable and were prepared in a format for the specific input into specific Excel applications.

3.4.2 Demand forecasting

The demand forecast indicates the amount of candles that the South African households will use in future. It involves analysing variables in a chronological way. The following variables are going to be analysed for the demand forecasting to be arrived at:

- Total population in South Africa that live in electrified households and
- The total households that uses candles as the source of lighting.

The demand forecasting is expressed as follows:

- Liquid candle wax in metric tons
- Number of cases
- Number of candles

Further the following variables are also going to be analysed for a demand forecasting to be arrived at:

- Population figures for South Africa up to 2014
- Total households up to 2014
- Household electrification up to 2014
- Households using candles

The following therefore marks the basis for the demand forecasting:

3.4.2.1 Total number of households forecast

The population forecast is used as the independent variable for the forecast of the total number of households of South Africa up to 2014 to be arrived at. The number of households can be calculated from two sets of dependent variables:

The number of households based on average persons per household and the number of households based on the growth ratio between population and total number of households from 1996 to 2006.

The average number of persons per household is 4.6 persons and 3.9 persons as per the 1996 and 2001 census respectively. From the 2007 community survey the average number of persons per household remained at 3.9. This indicates that the average of persons per household are stabilising and the average persons household of 3.9 will be used in the study as the average up to 2014.

3.4.2.2 Total number of households not electrified

For the number of households not electrified to be ascertained, forecasting of the cumulative electrical connections from 2007 to 2014 is necessary. The regression time-series data analysis tool was used to forecast electrical connections from 2007 onwards. The forecast from the regression analysis was subtracted from the total number of households to quantify the number of households that were not electrified.

3.4.2.3 Households using candles

For the number of households using candles to be calculated, it is important to quantify the percentage of households using candles from the number of households not electrified. According to the census and community survey statistics, the percentage of candles used by households not electrified in 2007 is 69%. Multiplying the number of households not electrified by 69% will result in the number of households using candles.

The number of households using candles is converted to number of candles per households. As provided for by the law one candle can burn for 9.5 hours and this in turn implies that one person can be provided on average four evenings of light. Informal dwellings are normally one or two room dwellings. The average of persons per household is multiplied by the number of candles used per person to arrive at the estimate that a household on average will use in the 350 candles per year. The number of candles per household per year is multiplied with number of households using candles and will result in the total number of candles used per year. The number of candles per year is divided by 150 to obtain the total number of cases per year and by 13 333 to calculated the total metric tons per year which represent the final demand forecast for the South African market.

3.4.3 Conclusion

From the data analysis, a demand forecasting was arrived at using the following:

- Total household forecasting
- Electrical connections forecast
- Houses using candles forecast
- Demand trend expressed in candles, cases and metric tons

3.4 Limitations of the study

The study provides forecasts for 2007 to 2014, predicting future events is not possible for such a long period. The study only applies to South Africa and is not cognisant of the fact that the neighbouring countries are not as developed as South Africa, thus can take longer to electrify households.

3.5 Conclusion

The research methodology allows the compilation of data into quantifiable outputs that produce the required trends as an analytical tool. The following chapter will show the analysis of data and statements will be made on the findings.

CHAPTER 4

RESEARCH RESULTS ASSESSMENT AND ANALYSIS

4.1 Introduction

In this chapter the research results are quantitatively analyzed with the purpose of answering the questions which forms the basis of this research. The following information is going to be analyzed in order to provide the candle demand forecast:

- Population forecasting
- Total household forecasting
- Electrical connections forecast
- Houses using candles forecast
- Demand trend expressed in candles, cases and metric tons

The detail and trend required for this research is going to be provided by the tables and graphs, which are going to be used to state the results.

4.2 Demand Forecasting

4.2.1 Population forecasting

The natural population growth in SA is influenced by HIV and AIDS and any forecast for population growth in future need to include the impact of AIDS deaths. For the present investigation, two studies have been examined in order to project the future population growth for SA from 2007 to 2015:

- The Actuarial Society of South Africa (ASSA) developed a model, Dorrington, Bradshaw, Johnson and Budlender (2004: Figure 11), that projects the population growth from 1990 to 2015. The impact of the AIDS pandemic is built into the projections. The model proposes that the total population continues to increase over the period 1990 to 2015. However this rate decreases over time, with a growth rate of 1.3 percent in 1990, and a growth rate of 0.3 percent in 2015. From 2011, the expected annual rate of AIDS deaths increases at 0.4 percent per annum. The number of people infected with HIV peaks in 2013, after which it starts to decrease slowly.
- Another study conducted by the Chief Economist from ING Barings South Africa, Kristina Quattek, focused on the economic impact of Aids on SA. Quattek (2000:30) used the ASSA

model as a base but proposes new assumptions on infection rates, propagation, fertility and mortality. The model proposes that HIV positive infection rates are forecast to peak in 2006 and taper off thereafter.

The assumptions used by Kristina Quattek yields a higher population growth than the base case from ASSA. Therefore it can be concluded that ASSA represents the lower case and the Kristina Quattek the higher end. To add validity to the forecasts of ASSA and Quattek population's figures from the National census and community surveys from Statistics South Africa were used and found to be in the parameters of the ASSA and Quattek forecasts. The population figures were as follows:

- SA National Census (Statistics SA, 2001):
 - Population in 2001 - 44 819 779
- SA Cities Report (Cities report, 2006):
 - Population in 2006 - 46 888 000
- Community survey (Statistics SA, 2007):
 - Population in 2007 - 48 502 063

The ASSA and Kristina Quattek population growth forecasts are represented in Table 4.1:

Table 4.1: ASSA (2004) and Kristina Quattek (2000) population forecast

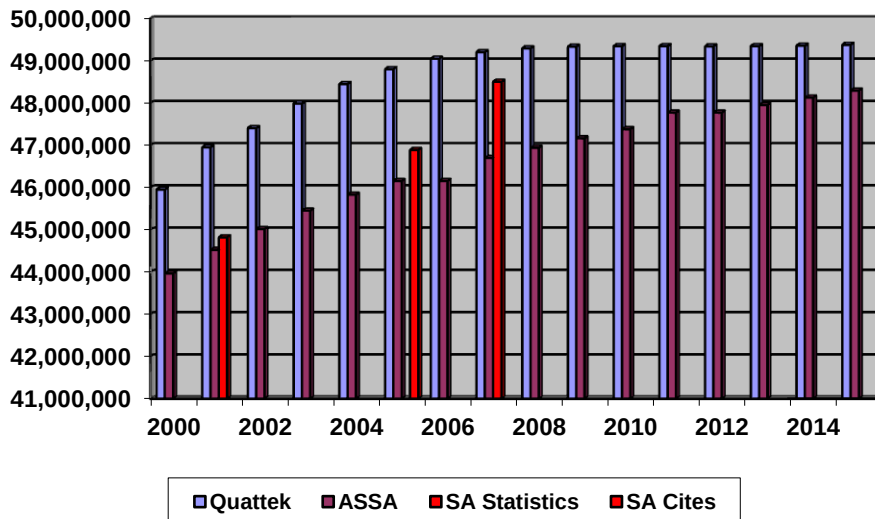
Year	ASSA			Kristina Quattek	
	Total Population	Annual growth rate	Cumulative AIDS deaths	Total Population	Annual growth rate
2001	44 524 453	1.3%	473 326	46 725 267	1.7%
2002	45 106 927	1.1%	673 232	47 407 203	1.5%
2003	45 452 388	1%	919 883	47 984 178	1.2%
2004	45 830 002	0.8%	1 212 117	48 448 708	1%
2005	46 156 343	0.7%	1 542 169	48 800 591	0.7%
2006	46 443 101	0.6%	1 897 965	49 047 777	0.5%
2007	46 700 411	0.6%	2 269 574	49 205 482	0.3%
2008	46 938 003	0.5%	2 648 012	49 293 678	0.2%
2009	47 164 179	0.5%	3 026 181	49 333 750	0.08%
2010	47 380 126	0.5%	3 404 415	49 345 370	0.02%
2011	47 582 605	0.4%	3 787 573	49 344 408	0%
2012	47 772 800	0.4%	4 175 979	49 342 079	0%
2013	47 953 297	0.4%	4 568 340	49 345 084	0.01%
2014	48 126 588	0.4%	4 962 998	49 356 321	0.02%
2015	48 294 565	0.3%	5 358 501	49 375 762	0.04%

Source: Dorrington et al. (2004: Figure 11)

Source: Quattek (2000: 30)

Figure 2.3 represents a graphical representation of total population from the studies by ASSA, Quattek and population census data from Statistics SA:

Figure 4.1: Population Forecasts



From Figure 4.1 the following can be concluded:

- The Census statistics are in all three cases between the ASSA and Quattek forecasts.
- In the current study, the mean of the ASSA and Quattek forecast will be used as the population growth forecast.

4.2.2 Total household forecasting

The total number of households in South Africa is known as published by Statistics South Africa. In the current study, the following South African household data have been used:

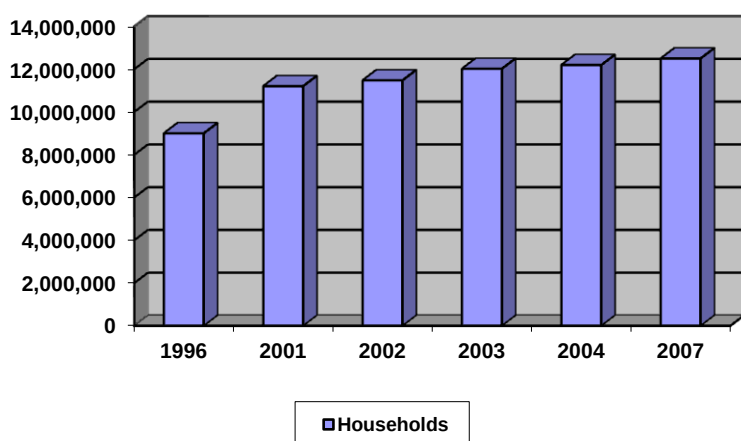
- SA National Census (Statistics SA, Census 2001):
 - Households in 1996 – 9 001 335
 - Households in 2001 – 11 205 705
- Government development data (SA Government information, 2007):
 - Households in 2002 – 11 479 000
 - Households in 2003 – 12 020 221
 - Households in 2004 – 12 194 000
 - Households in 2005 – 12 726 000

- Households in 2006 – 12 980 520
- Community survey (Statistics SA, 2007):
 - Households in 2007 – 12 500 609

The discrepancy between the total numbers of household's obtained from Government development data in 2007 and the Community survey in 2007 can be explained by the fact that the government development data were based on estimates while the Community survey was based on an actual survey. The total number of households for 2007 is thus taken as per the Community survey of 2007. The total number of household's figures for 2005 and 2006 shall be disregarded for the study.

Figure 4.2 illustrate the trend in the increase of households in South Africa:

Figure 4.2: Actual households in SA



From Figure 4.2, the increase in households between 1996 and 2007 is 3.44 million. The increase in annual households implies a there is an increase in the number of electrical connections that need to be made by government in its electrification efforts. It is important for the Government not to only electrify new formal dwellings but also to effect this change in informal dwellings and traditional dwellings that do not have access to electricity. Electrification targets of Government include all type of dwellings, informal (shacks) and traditional dwellings.

By implication all new households getting build under the economic housing projects have electrical infrastructure and lend itself to use electricity as the preferred light source. The exception will only be where household owners are too poor to afford the monthly electrical bill

and use candles as a cheap alternative. Available data from Statistics South Africa shows that formal dwellings are increasing and that traditional and informal dwellings are declining.

Table 4.2 shows the change in type of dwellings since the 2001 census, 2007 census and the Community survey in 2009 (Statistics SA, 2009).

Table 4.2: Percentage change in type of dwellings

YEAR	FORMAL DWELLINGS	TRADITIONAL DWELLINGS	INFORMAL DWELLINGS	OTHER
2001	63.8%	14.8%	16.4%	4.8%
2007	70.5%	11.7%	14.5%	3.3%
2009	75.5%	10.1%	13.4%	3.3%

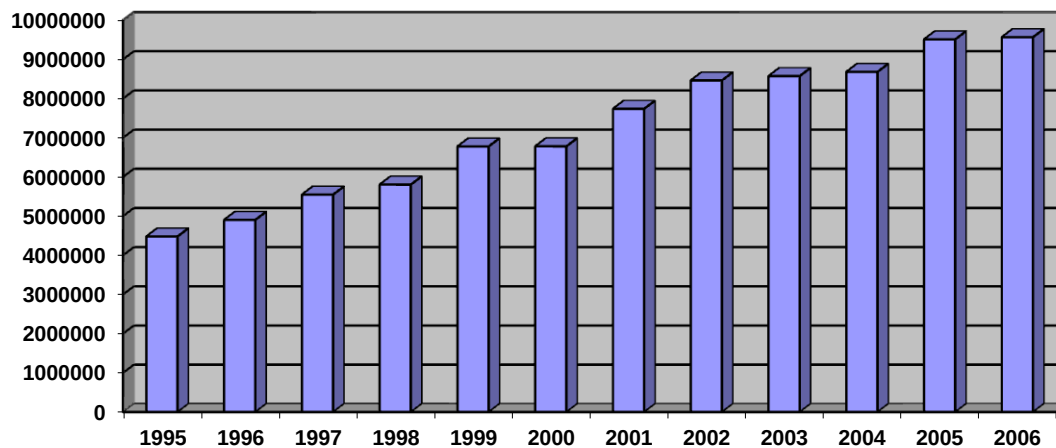
Source: (Statistics SA, 2009)

4.2.3 Electrification connections forecasting

Government supplies statistics on an annual basis in regards of households with access to electricity. These statistics' are detailed to give information per province, divided into business and household electricity consumption. The use of electricity usage is based on the number of households that are connected on not on the actual consumption per households. It cannot be taken for granted that all electrified households are using the electricity. It is well-known that the candle is still used randomly as a cheap alternative.

Figure 4.3 represents the cumulative number of households with access to electricity (Government Information, 2007):

Figure 4.3: Cumulative number of households electrified



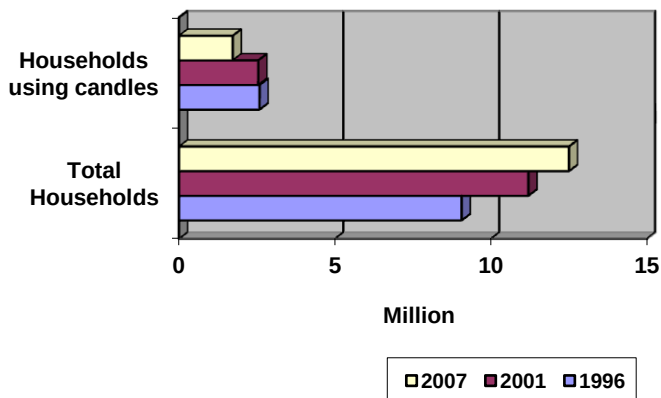
Source: (SA Government Information, 2007)

Figure 4.3 shows an annual increase in the total number of households with access to electricity. Between 1995 to 2006, 4.28 million new electrical connections have been made. The total number of households with access to electricity in 2006 still leaves, as reported in 2007 by the South African Government, a shortfall of 3.4 million households that is not electrified (South African Government, 2007). It is evident that the backlog is high and will take years to catch-up. The households not electrified are mostly traditional dwellings and informal dwellings which require more effort than new formal dwellings to electrify. Candles will stay the preferred energy source for lighting in these dwellings, as long as it stays the cheapest energy source for lighting.

4.2.4 Statistics on household energy sources for lighting

Since electricity is a substitute for candles as a light source, it is expected to gradually decrease the demand for candles. Figure 4.4 represents this notion by illustrating the decrease in households that uses candles from 1996 to 2007:

Figure: 4.4 Households using candles versus total households



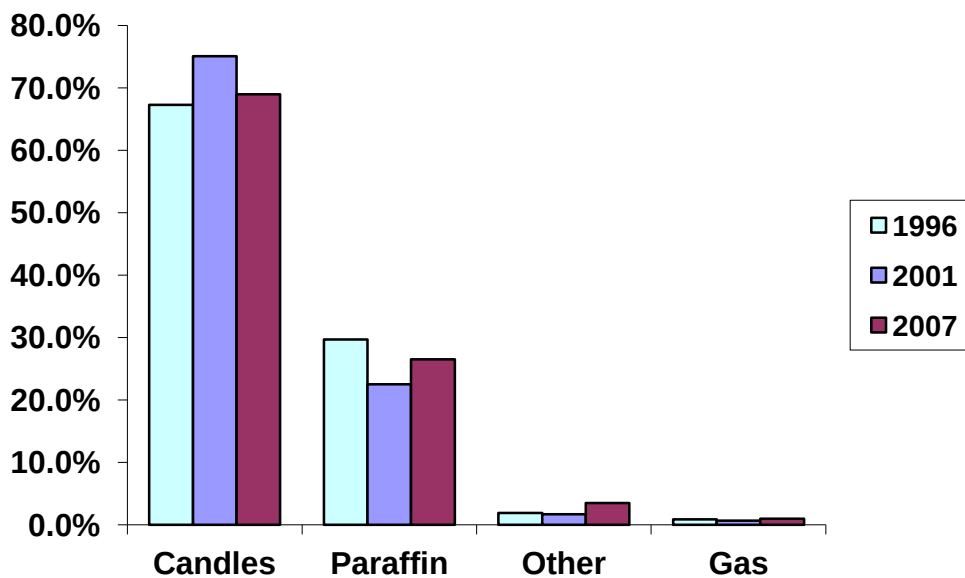
Source: (Statistics SA, 2007)

From Figure 4.4, the total households in South Africa increased from 9.05 million in 1996 to 12.5 million in 2007. In the same time, the households using candles decreased from 2.6 to 1.72 million. The following conclusions can be made from the data:

- The majority of new electricity connections are made in formal dwellings.
- As the population increases, inhabitants of informal and traditional dwellings move into formal dwellings and the new, poor inhabitants occupy the vacant informal or traditional dwellings.
- It is more difficult to electrify informal and traditional dwellings.
- The demand for candles will only decrease if more informal and traditional dwellings are electrified.
- The use of electricity as energy source must be affordable to the poor.

Households that are not using electricity use alternative energy sources as per Figure 4.5:

Figure 4.5: Energy Sources in households not electrified



Source: (Statistics SA, 2001)

From above the following can be concluded:

- Candles are the preferred alternative energy source.
- Candles are the safest and cheapest alternative energy source.
- Paraffin is the alternative after candles, but is more expensive and flammable.
- Gas is very expensive and its usage is limited.
- Other energy sources like sun panels, and wind energy is too expensive to install for the poor.
- Candles can be purchased, one at a time, and can be used in any enclosed environment for light.

The market for candles are thus the total population that reside in dwellings that is not electrified or are too poor to afford electricity. As long as candles are the cheapest alternative energy source, it will stay the preferred light source for the poor with no electricity.

4.3 Conclusion

The findings from this investigation provide the answers to the research questions as follows:

From a sample population size of 106, 73% preferred using electricity for lighting, 37% are currently using candles for lighting mainly because of inability to afford electricity and 6% use gas for light.

When the chosen sample was asked about the lighting source they have been using or used in the past five years 44% used candles and 32% used electricity. When questioned about the next five years the response was 69% think they will using electricity, 25% say they will using candles, the pointed out different reasons for this, unemployment, not positive about getting a formal job in the next five years, price of electricity that keeps climbing. When asked if they feel the candle has a future or it will still be used in the future, many said yes, for religious, cultural and traditional purposes, e.g. during funerals they light candles, traditional healers use candles etc. Though there is a clear picture of the decline in the candle market but it does not seem like it will disappear anytime soon. There will be a decrease in SAHC as people get access to electricity but the decorative range of candles will start picking up and specialty type candles e.g. bugs repellent citronella candles will still be in the market.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The study provided analysis of the current and future demand of SAHC to the people who are currently using candles and mostly dwelling in the informal settlements.

5.2 Findings from the study

The following findings were arrived at during the study:

- From the literature review, the product life-cycle for candle wax in SA is in the decline phase as shown by the declining sales volumes.
- The approach would then to leave the SAHC candle market, however there are some factors to consider. Candles provide the cheapest lighting source for the poor, thus abandoning the SAHC market would result in not upholding the social responsibility on part of Sasol wax.

The population growth in SA, the number of households and the electrification rate in SA has been quantified to provide a model to establish an annual demand for candles as lighting source in SA. The demand forecasting can assist Sasol wax to plan on an annual basis as to how candle wax should be diversified into alternatives markets.

5.3 Recommendations

The following recommendations are made based on the findings and conclusions contained in this chapter.

Candle manufacturers must prepare to service the upper end of the candle market, decorative candles, fashion type colour fragranced candles and specialty type candles e.g. anti-tabacco candles that repel smoke from someone who smokes, bugs repellent candles etc.

5.4 Conclusions

It is evident that the SAHC will still provide light to the poor in SA beyond 2015. The literature shows good evidence that the marketing theory on PLC and economic theory on supply and demand can be applied to the SAHC market dynamics. Literature on electrification shows good progress despite a growing population and large back-logs.

The influence of electrification as a substitute for the SAHC is a fact and demand economies will change over time. The fact that Sasol Wax is a monopoly in the supply of more than 75% of the SA candle wax market lends itself to a strategy where they can control wax supply to the SAHC manufactures to manipulate pricing and demand.

The literature shows evidence that Sasol Wax realize its social responsibility to provide light to the poor in SA and would like to balance the supply with wax for the total demand in SA. The social responsibility should apply to SA markets only and manufactures that produce for export should compete on free market principles.

The quantification of the data from the literature into projection models for the future related to demand and supply will provide Sasol Wax with valuable data to act pro-actively in moving additional volumes of candle wax into alternative markets without under supplying the SA market.

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Appendix A: Questionnaire

All information will be treated as **STRICTLY CONFIDENTIAL** and will only be used for **ACADEMIC PURPOSES**.

GENERAL INSTRUCTIONS

1. Please answer the questions as honestly as possible.
2. Please answer all the questions.

SECTION A: PERSONAL INFORMATION

The following information is needed to help us with the statistical analysis of the data. **All your responses will be treated confidentially.** We appreciate your help in providing this important information.

Mark the applicable block with a cross (X). Complete the applicable information.

A1	Chapter 2 Gender	Male	Female
	Chapter 3		

A2	Age group	Less than 20	21 - 30	31 - 40	41 - 59	More than 60

A3	Race	Black	White	Coloured	Indian	Other

A4	Chapter 4 Marital Status	Single	Married
	Chapter 5		

A5	Qualification	Below Matric	Matric	Diploma / Degree	Postgradua te

A6	Dependants	Less than 2	3 - 6	7 - 10	11 - 14	More than15

A7	Number of Dependants going to school	Less than 2	3 - 6	7 - 10	11 - 14	More than 15

A8	Kind of income	Permanen t Employme nt	Casua l Emplo yment	Maintenan ce / child support	Social Grant	Other

A9	Duration of employment	Unemploye d	0 – 2 yrs	2– 5 yrs	5 – 10 yrs	More than 10 yrs

A10	Kind of income for Spouse	Permanen t Employme nt	Casua l Emplo yment	Maintenan ce / child support	Social Grant	Other

SECTION B: FINANCIAL STATUS AND BUYING PREFERENCES

The following questions are to assess your financial status and the buying preferences. Please answer as honestly as you can.

Mark the applicable block with a cross (X). Complete the applicable information.

B1	Income per month	R0 – R500	R501 – R1500	R1501- R5000	More than R5000

B2	Spouse income per month	R0 – R500	R501 – R1500	R1501- R5000	More than R5000

B3	Savings per month	R0 – R500	R501 – R1500	R1501- R5000	More than R5000

B4	How much do you spend on groceries per month	R0 – R500	R501 – R1500	R1501- R5000	More than R5000

B5	How much do you spend on transport per month	R0 – R500	R501 – R1500	R1501- R5000	More than R5000

B6	How much do you spend on clothing per month	R0 – R500	R501 – R1500	R1501- R5000	More than R5000

B7	How much do you spend on lighting per month?	R0 – R500	R501 – R1500	R1501- R5000	More than R5000

SECTION C: LIGHTING SOURCE

The following questions are to assess your lighting source and preferences. Please answer as honestly as you can.

Mark the applicable block with a cross (X). Complete the applicable information.

C1	What do you use for lighting?	Electricity	Gas	Candles	Paraffin

C2	What would you prefer to use for lighting?	Electricity	Gas	Candles	Paraffin

C3	What were you using for lighting in the past 5 years?	Electricity	Gas	Candles	Paraffin

C4	What will you be using for lighting in the next 5 years?	Electricity	Gas	Candles	Paraffin

C5	Which lighting source will be useful in the next 5 years?	Electricity	Gas	Candles	Paraffin

Appendix B: Statistics analysis

Frequency Table					
Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	54	49.5	50.9	50.9
	Female	52	47.7	49.1	100.0
	Total	106	97.2	100.0	
Missing	System	3	2.8		
Total		109	100.0		
Age_Group					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 20 years	3	2.8	2.9	2.9
	21 - 30 years	21	19.3	20.2	23.1
	31 - 40 years	39	35.8	37.5	60.6
	41 - 59 years	31	28.4	29.8	90.4
	60 +	10	9.2	9.6	100.0
	Total	104	95.4	100.0	
Missing	System	5	4.6		
Total		109	100.0		
Race					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Black	105	96.3	96.3	96.3
	Indian	2	1.8	1.8	98.2
	Other	2	1.8	1.8	100.0
	Total	109	100.0	100.0	

Marital_Status					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	61	56.0	57.0	57.0
	Married	46	42.2	43.0	100.0
	Total	107	98.2	100.0	
Missing	System	2	1.8		
Total		109	100.0		
Qualification					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below Matric	59	54.1	54.1	54.1
	Matric	44	40.4	40.4	94.5
	Diploma/Degree	6	5.5	5.5	100.0
	Total	109	100.0	100.0	
Dependants					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 2	44	40.4	41.5	41.5
	3 - 6	51	46.8	48.1	89.6
	7 - 10	10	9.2	9.4	99.1
	11 - 14	1	.9	.9	100.0
	Total	106	97.2	100.0	
Missing	System	3	2.8		
Total		109	100.0		
School_Attending_Dependants					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 2	64	58.7	61.5	61.5
	3 - 6	39	35.8	37.5	99.0
	7 - 10	1	.9	1.0	100.0
	Total	104	95.4	100.0	
Missing	System	5	4.6		
Total		109	100.0		

Type_Of_Income					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Permanent	30	27.5	29.4	29.4
	Casual	28	25.7	27.5	56.9
	Maintenance/Child Support	7	6.4	6.9	63.7
	Social Grant	21	19.3	20.6	84.3
	Other	16	14.7	15.7	100.0
	Total	102	93.6	100.0	
Missing	System	7	6.4		
Total		109	100.0		
Duration_Of_Employment					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unemployed	39	35.8	36.8	36.8
	0 - 2 years	19	17.4	17.9	54.7
	2 - 5 years	30	27.5	28.3	83.0
	5 - 10 years	7	6.4	6.6	89.6
	10 +	11	10.1	10.4	100.0
	Total	106	97.2	100.0	
Missing	System	3	2.8		
Total		109	100.0		
Type_Of_Income_For_Spouse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Permanent	13	11.9	12.7	12.7
	Casual	19	17.4	18.6	31.4
	Maintenance/Child Support	9	8.3	8.8	40.2
	Social Grant	35	32.1	34.3	74.5
	Other	26	23.9	25.5	100.0
	Total	102	93.6	100.0	
Missing	System	7	6.4		
Total		109	100.0		
Monthly_Income					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 500	19	17.4	18.1	18.1
	501 - 1500	42	38.5	40.0	58.1
	1501 - 5000	29	26.6	27.6	85.7
	5000 +	15	13.8	14.3	100.0
	Total	105	96.3	100.0	
Missing	System	4	3.7		
Total		109	100.0		

Spouse_Monthly_Income					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 500	55	50.5	54.5	54.5
	501 - 1500	29	26.6	28.7	83.2
	1051 - 5000	13	11.9	12.9	96.0
	5000 +	4	3.7	4.0	100.0
	Total	101	92.7	100.0	
Missing	System	8	7.3		
Total		109	100.0		
Monthly_Savings					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 500	79	72.5	78.2	78.2
	501 - 1500	19	17.4	18.8	97.0
	1501 - 5000	3	2.8	3.0	100.0
	Total	101	92.7	100.0	
Missing	System	8	7.3		
Total		109	100.0		
Grocery_Monthly_Expense					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 500	50	45.9	47.2	47.2
	501 - 1500	54	49.5	50.9	98.1
	1501 - 5000	2	1.8	1.9	100.0
	Total	106	97.2	100.0	
Missing	System	3	2.8		
Total		109	100.0		
Transport_Monthly_Expense					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 500	86	78.9	86.0	86.0
	501 - 1500	14	12.8	14.0	100.0
	Total	100	91.7	100.0	
Missing	System	9	8.3		

Clothing_Monthly_Expense					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 500	70	64.2	71.4	71.4
	501 - 1500	26	23.9	26.5	98.0
	1501 - 5000	2	1.8	2.0	100.0
	Total	98	89.9	100.0	
Missing	System	11	10.1		
Total		109	100.0		
Lighting_Monthly_Expense					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 500	99	90.8	93.4	93.4
	501 - 1500	7	6.4	6.6	100.0
	Total	106	97.2	100.0	
Missing	System	3	2.8		
Total		109	100.0		
Lighting_Use					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Electricity	30	27.5	38.0	38.0
	Gas	6	5.5	7.6	45.6
	Candles	37	33.9	46.8	92.4
	Paraffin	6	5.5	7.6	100.0
	Total	79	72.5	100.0	
Missing	System	30	27.5		
Total		109	100.0		
Lighting_Preference					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Electricity	73	67.0	75.3	75.3
	Candles	19	17.4	19.6	94.8
	Paraffin	5	4.6	5.2	100.0
	Total	97	89.0	100.0	
Missing	System	12	11.0		
Total		109	100.0		
Lighting_Type_Past_Five_Years					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Electricity	32	29.4	35.6	35.6
	Gas	1	.9	1.1	36.7
	Candles	44	40.4	48.9	85.6
	Paraffin	13	11.9	14.4	100.0
	Total	90	82.6	100.0	
Missing	System	19	17.4		
Total		109	100.0		

Lighting_TypeUsed_next_Five_Years					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Electricity	69	63.3	75.8	75.8
	Gas	1	.9	1.1	76.9
	Candles	17	15.6	18.7	95.6
	Paraffin	4	3.7	4.4	100.0
	Total	91	83.5	100.0	
Missing	System	18	16.5		
Total		109	100.0		
Lighting_Source_Useful_Next_Five_Years					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Electricity	58	53.2	57.4	57.4
	Gas	17	15.6	16.8	74.3
	Candles	25	22.9	24.8	99.0
	Paraffin	1	.9	1.0	100.0
	Total	101	92.7	100.0	
Missing	System	8	7.3		
Total		109	100.0		

Appendix C: Population Forecast

Table 1: Population forecast 2000 to 2015

PERIOD	YEAR	ASSA	QUATTE K	AVERAG E	POPULATIO N DATA	FORECAS T
1	2000	43,966,75 6	45,951,12 3	44,958,94 0		44,819,779
2	2001	44,524,45 3	46,725,26 7	45,624,86 0	44,819,779	44,819,779
3	2002	45,016,92 7	47,407,20 3	46,212,06 5		46,212,065
4	2003	45,452,38 8	47,984,17 8	46,718,28 3		46,718,283
5	2004	45,830,00 2	48,448,70 9	47,139,35 6		46,888,000
6	2005	46,156,34 3	48,800,59 1	47,478,46 7	46,888,000	46,888,000
7	2006	46,443,10 1	49,047,77 7	47,745,43 9		47,745,439
8	2007	46,700,41 1	49,205,48 2	47,952,94 7	48,502,063	48,502,063
9	2008	46,938,00 3	49,293,67 8	48,115,84 1		48,502,063
10	2009	47,164,17 9	49,333,75 0	48,248,96 5		48,502,063
11	2010	47,380,12 6	49,345,37 0	48,362,74 8		48,502,063
12	2011	47,582,60 5	49,342,07 9	48,462,34 2		48,502,063

13	2012	47,772,80 0	49,344,40 8	48,558,60 4		48,558,604
14	2013	47,953,29 7	49,345,08 4	48,649,19 1		48,649,191
15	2014	48,294,56 5	49,356,32 1	48,825,44 3		48,825,443
16	2015	48,294,56 5	49,375,76 2	48,835,16 4		48,835,164

Appendix D: Average households based average persons

PERIOD	YEAR	DATA E	AVERAGE PERSONS PER HOUSEHOLD	HOUSEHOLDS BASED ON AVERAGE PERSONS
1	2,000	44,819,779	3.90	11,492,251
2	2,001	44,819,779	3.90	11,492,251
3	2,002	46,212,065	3.90	11,849,247
4	2,003	46,718,283	3.90	11,979,047
5	2,004	46,888,000	3.90	12,022,564
6	2,005	46,888,000	3.90	12,022,564
7	2,006	47,745,439	3.90	12,242,420
8	2,007	48,502,063	3.90	12,436,426
9	2,008	48,502,063	3.90	12,436,426
10	2,009	48,502,063	3.90	12,436,426
11	2,010	48,502,063	3.90	12,436,426
12	2,011	48,502,063	3.90	12,436,426
13	2,012	48,558,604	3.90	12,450,924
14	2,013	48,649,191	3.90	12,474,151
15	2,014	48,825,443	3.90	12,519,344
16	2,015	48,835,164	3.90	12,521,837