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The association between strategic configurations and success for SMMEs supplying fuel in the South African commercial sector

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The association between strategic configurations and success for SMMEs supplying fuel in the South African commercial sector

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

Johannesburg, March 2011

ABSTRACT

This study focuses on the South African commercial fuel industry, specifically the Small, Medium and Micro Enterprise (SMME) oil companies supplying diesel to commercial users. The supply and distribution of diesel is less regulated than that of petrol and price discounting is allowed. This has created a highly competitive environment for the commercial fuel industry. Within this industry there are two distinct sectors, the private and public sectors.

Few SMME's have had success in supplying fuel to the public sector despite the stated intention of organs of state to promote SMME businesses. Are some SMMEs finding success in the private and not the public sector? Is there a winning strategic style or configuration that promotes success in this industry? This study categorises SMME oil companies into one of four Miles and Snow (1978) strategic classifications, (1) Reactors, (2) Defenders, (3) Analysers and (4) Prospectors. Success in both the public and private sectors was measured and associations were then sought with strategic classification. In addition correlations were sought between public and private sector performance.

The population of this study was the 26 SMME respondents to the 2010 tender for supply of fuel to the government transport parastatal, Transnet. Transnet accounted for 64.6% of public sector diesel usage in 2008 and the population was intended to be indicative of SMMEs trying to sell fuel in both the private and public sectors. Data was collected using a three part questionnaire in an interview environment. A total of 14 SMMEs participated in this study, all data collected was usable.

No significant association was found between the SMMEs' strategic classification or configuration, and the private sector performance. The rankings of public and private sector success were compared and a significant correlation was detected.

None of the Miles and Snow strategic classifications work better in the commercial fuel industry. This may only be indicative of the industry as it is now as it has been undergoing much change. A more stable industry may yield different results. SMMEs that does well in the private sector tend to do well in selling fuel to the public sector. This implies an effective fuel supply tender process in Transnet.

DECLARATION

I, Geoff Haw, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Geoffrey Robin Haw

Signed at ……

On the …….. day of …… 2011

DEDICATION

This study is dedicated to all the smaller companies in the commercial fuel industry who's often unnoticed efforts keep this country moving forward no matter the time of day, or day of the week.

ACKNOWLEDGEMENTS

Throughout my MBA studies there have been many individuals, companies and institutions that have given so much in order to make this study possible. These were:-

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- The CEO's of the oil companies interviewed, for making time in their busy schedules to see me.
- The management and staff of my employer, Transnet Fuel Solutions, for their understanding and support throughout my studies.
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CHAPTER 1: INTRODUCTION

1.1 Purpose of the study

The purpose of this study is to determine the factors that promote success amongst small businesses trading within the South African commercial fuel industry.

The research will establish whether or not there is a link between certain common strategic configurations and business success. Relationships between these strategies and modern strategic management theory will be explored.

1.2 The context of this study

Commercial fuel suppliers focus on selling fuel in bulk to commercial users. In the case of small businesses the sale of this fuel is rarely from a traditional road side filling station. Normally the customer buys the fuel in bulk and dispenses it from their privately owned fuel facilities. There are two distinct sectors in this market, the public and private sectors. Both sectors are heavily focused on diesel as this is the fuel of choice from industrial users. The regulation and legislation surrounding the storage and distribution of diesel as opposed to petrol is far less. Diesel can be sold at discounted prices whereas heavily regulated petrol cannot (DME 2010a). This has created a highly competitive environment within the commercial fuel industry.

The main customers for the private sector are transport companies, agricultural users, construction vehicle and industrial uses. The South African public sector is a major consumer of fuel (SAPIA 2008). Uses of fuel within government are varied, from Transnet's locomotives and tugboats to the Eastern Cape's road department's earthmoving machinery. Prior to 1994 supply of fuel to the South African government was restricted to large multinational oil companies. Subsequent deregulation has made it easier to become a supplier and transporter of fuel in this country. South Africa's SMME economy has been actively promoted since 1995 (Al Berry, Ernst van Seventer, Cassim, Kesper and Rajaratnam 2002) and by a number of state institutions, Ntsika Enterprise Promotion

Agency, Khula Enterprise Finance, the Department of Trade and Industry (DTI) and provincial SMME desks.

A few SMMEs have become successful in the government fuel supply niche whilst most have not. SMME fuel suppliers have had varied success in the private sector too.

Public sector fuel usage falls into four categories (SAPIA 2008):

- **Provincial and national government**
  This includes provincial departments and national institutions such as the military
- **Local authorities**
  Local municipalities and utilities
- **Public transport**
  Buses run by local municipalities
- **Transnet**
  Locomotives, industrial equipment, pilot and tug boats.

See Appendix A to view the relative proportions of the fuel demand across government and other sectors.

1.3 Problem statement

1.3.1 *Main problem*

Establish whether certain strategy configurations promote success with SMME fuel suppliers in the commercial sector. Determine if there is a correlation between private and public sector success with SMME fuel suppliers in the commercial sector.

1.3.2 *Sub-problems*

The first sub-problem is:

Research and select a suitable methodology to determine the business strategy configuration of SMME commercial fuel suppliers.

The second sub-problem is:

Determine a suitable business success measurement methodology for SMMEs within the context of this study for both private and public commercial sectors and investigate the correlation, if any between the public and private sector performances.

1.4 Significance of the study

The study fills a gap in that no specific studies could be found that investigate why certain SMMEs have had success in the public and private sectors and if the same SMMEs are successful in both.

Studies have been done that describe the strategies employed by small businesses when competing against larger, well established competitors (Dawar and Frost 1999) but none against the backdrop of South Africa, the fuel industry and black economic empowerment. Black economic empowerment is not a focus of this study but is considered as it is a contributing factor in the awarding of public sector business.

The study provides guidance to SMMEs trying to position itself for entry into the commercial fuel supply industry. They will be better able to formulate a winning strategy in providing the type of service that the public and private sectors will find attractive.

Government institutions tendering for fuel supply business will find value in this study in that it would shed some light onto how to approach the tendering process in order to level the playing ground to allow greater SMME success in an industry still dominated by large oil companies.

1.5 Delimitations of the study

The research is limited to determining the SMMEs' organisational configuration (Miles and Snow 1978). In addition the SMMEs' business success in the private sector will be gauged as well as its success in selling fuel to the government.

The SMMEs that were studied were limited to current respondents to the most recent fuel supply tender for Transnet whether their submission was successful or not.

The measure of the SMMEs' success in selling fuel to the government is limited to the supply of commercial diesel fuel to Transnet only.

The sale of petrol implies the use of a network of retail fuel outlets and favours a few large oil companies whereas the sale of commercial diesel is possible from a much broader base of suppliers (See Table 5 for a list of these suppliers). Transnet accounted for 64.6% of the government's total consumption of diesel in Q3 2008 (SAPIA 2008).

1.6 Definition of terms

Local government

In a South African context this would be the public services of the provincial government.

Transnet

The government owned transport parastatal that owns and operates all national railways, ports and fuel pipelines in South Africa.

SMME

Small, medium and micro enterprises – SMME is defined in the Small Business Act 102 of 1996 as a business entity employing a maximum of 100 employees. In the case of enterprises in the mining, electricity and manufacturing sectors, the threshold is 200 employees (DTI 2010)

1.7 Assumptions

1. It is assumed that the respondents answered the questions truthfully and accurately.

    - Many may want to apply hindsight to their answers rather than to admit to making bad decisions. If this is done it would obscure the link between business strategy with the resulting business success or lack thereof.

- Some may feel that they are giving away information that would compromise their competitive advantage and deliberately conceal or falsify information. This again obscures the causal link between strategy and business success.

2. That the tender process and adjudication in government is mostly fair and just in its application. All government departments have good procurement policies and it is assumed that procurement policies are applied consistently. This would otherwise dilute the effects of the topics being examined and analysed as business will be awarded for reasons other than competitive pricing and superior service delivery.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The literature review that follows seeks to identify a suitable means for classifying the strategic configuration of the SMMEs in this study. This classification must provide a means of understanding and analysing the relationships between strategic configuration and the organisation's performance. These means or methods will be taken from the wide range of knowledge on this subject and a single research route will be compiled and selected for its efficacy, appropriateness and alignment with current practices in use with configuration research.

2.2 Configurations research – common terms and the need for it

This study examines the holistic nature of the typical convergences of organisations seeking optimal efficiency within their business environment. In various studies these convergences can be referred to as archetype, gestalts and strategic orientations, in all cases within this study these will be referred to as configurations.

The distinction between typology and taxonomy needs to be understood in the classification of organisation. They have distinct intrinsic meanings. For typology this refers to *theoretical conceptual classification schemes.* Taxonomy refers to only to *empirically derived classification* schemes (Dess, Newport and Rasheed 1993).

Much effort has been put into understanding how organisational configurations give a holistic perspective of an organisation's interaction with its internal and external environment. Typically organisations display configurational coherence (Greenwood and Hinings 1993) and tend to display typical adaptive behaviour when faced with similar causal direction within a single industry (Miller and Friesen 1980). The importance of being able to classify organisations into particular configurations is that it reflects the organisational

processes and implementation behaviour of an organisation in a particular business environment in order to attain optimal performance (Ginsberg 1984).

Dess et al. (1993) proposed that the value of configurations research is to enable the classification of organisations. By gathering and organising facts and data pertaining to organisations into meaningful sets, propositions and theories may be developed about the common members of the classification. This concept is discussed in detail by
Ulrich and McKelvey (1990) who suggested that classification systems provide a means for defining sets of homogeneous organisations that help explain why some show commonalities with others and why others are relatively unique.

Miller (1986) asserted that only a very limited number of strategies are viable in any type of environment, these few viable strategies and structures will favour the organisation employing them but will have a negative effect on any competing organisation. Failure for a competing organisation to move towards one of the viable strategies will result in its downfall.

2.3 Determination of organisational strategy configurations

Configurations can be determined utilising a variety of methods, however, a common view prevails in that in order to uncover patterns of organisational behaviour, two tasks need to be considered: first definition of the elements of organisational behaviour; and secondly a definition of how to recognise and interpret the patterns of the elements (Greenwood and Hinings 1993).

2.3.1 *Deductive and inductive approaches to configurational analysis*

Performance based configurational studies fall into two different categories: (1) inductive and (2) deductive approaches (Ketchen, Thomas and Snow 1993). The inductive approach utilises empirical procedures to identify the organisational configuration that are often particular to an industry. The deductive approach categorises the organisation's configurations first and then interrogates their performances with theory based predictions.

Inductive methods have been successful in determining empirically distinct configurations however, they have done little to prove a relationship between an inductively determined strategic group and its performance (Ketchen et al. 1993). This casted doubt on this methodology's value in the field of configuration research into performance, and as such were not considered for this study.

The deductive approach applies to a broad spectrum of industries and has been proven to be more successful in linking configurations to performance (Bantel 1998). This study utilised a deductive approach in determining the organisation's configuration and subsequent application of theory in investigating the relationship to actual performance.

2.3.2 *The deductive approach in more detail*

This approach assumes that configurations are produced by organisational and environmental attributes that influence performance regardless of industry type (Ketchen et al. 1993).

Some of the earliest theories in the context of organisational configuration came from the Contingency theorists in the 1960's who believed that there was no single best cause of action for an organisation, the optimal action was dependant on the internal and external situation. In the 1970's this theory was applied to organisational structure and became known as the Structural Contingency theory which quickly became the dominant paradigm of the period (Pennings 1975). This theory is relevant to configuration research as the central theme for the Structural Contingency theory is that the differential success that can be attributed to organisational types is a function of the environmental condition (Ketchen et al. 1993). There was much doubt in this period whether or not there was any real efficacy associated with the theory and subsequent empirical studies carried out cast doubt on this method (Pennings 1975). A new more effective theory of configurations research was sought.

More recent attempts to explain the causal links between environment, organisational configuration and organisational performance gave rise to two new schools of thought, **strategic choice** and **organisational ecology**.

2.3.1 *The ecology school of thought*

The ecology school of thought is focused on what organisations within a population need to do to exploit resource opportunities within a niche, and what environmental conditions favour specific exploitation strategies (Zammuto 1988). Singh and Lumsden (1990) described the study of ecology in organisations as investigating the convergence of work patterns and organisational forms that have a common vulnerability to particular environmental circumstances. The work done by Romanelli (1991) showed that structural arrangements converge into organisational 'forms' that display similar vulnerability to environmental conditions.

The success of strategies according to biologists is density dependant. This refers to the viability of strategies to successfully exploit resources within a niche and is a function of the extent to which the niche environment is filled with competing organisms (Zammuto 1988). For example, in the early stages of proliferation an organism with a faster reproductive cycle would have a winning strategy in a low density environment. This is due to the fact that immature organisms will have little competition from other organisms. In a high density environment an organism with rapid reproduction will not be the best choice as its immature offspring will not be able to effectively compete against adult competing organisms. In ecology school these two types of selection pressures are called **r-selection** and **K-selection** (Reznick, Bryant and Bashey 2002). K-selection refers to environmental pressures that favour organisms that compete on the basis of efficiency in their use of resources whereas r-selection refers to environmental pressures that favour organisms that reproduce rapidly (Mehrabian and Lucas 2006).

The two selections propose two opposing types of organisational strategies, **r-strategies** and **K-strategies** (Brittain and Freeman 1980). Pure r-strategists are organisations that are able to move quickly and exploit resources in an under-populated niche before other competing organisations can. By contrast pure K-strategists are those whose gain a

competitive advantage by efficient use of resources and are more successful in a fully or over-populated niche.

This classification was further expanded by Brittain and Freeman (1980) and Hannan and Freeman (1977) splitting the r- and K- extremes into specialist and generalist forms, thus forming a four-fold ecological classification of organisational strategy. These are named **r-specialism**, **r-generalism**, **K-specialism** and **K-generalism**. The r-specialists are those who move quickly to exploit resources in an under-populated niche within a narrow domain of activity, whereas the r-generalist are those who move quickly to exploit new opportunities over a broader range of activities but all within low density populations. By contrast the K-specialists are those that seek efficient operations in an over-populated niche within a narrow domain of activity. The K-generalists are those that engage in a wide scope of activities in dense populations and seek efficient operations in all.

The r- type of organisations are expected to be more prevalent during the formative stage of population growth and the K- type organisations will more prevalent during the mature phase of population growth (Zammuto 1988).

2.3.2 *The strategic choice school of thought*

The school of strategic choice is based on the premise that the managerial decisions on environmental responses determine the organisation's performance (Ketchen et al. 1993). Seen from a broader perspective organisations are not only affected by their environments but the choices they make influence the environment (Miles and Snow 1978).

Typologies like Miles and Snow (1978) and taxonomies such as Miller and Friesen (1978) attempt to predict organisational behaviour by identifying the organisational configuration and making assumptions based on the resulting classification. In the case of Miles and Snow (1978) organisations exist as one of four configurations (See Table 1 for more detail).

Table 1: Organisational configurations (Miles and Snow 1978)

Configuration type	Key attributes
Defenders	• Narrow product-market domains • Top managers are expert in their organisation's limited operations • Do not regularly search outside their domains for new opportunities • Focus on making efficiency improvements and not technology improvements
Prospectors	• Continually searching for new opportunities • Regularly experiment with new products for emerging trends • Creators of change to which competitors must react • Due to having a focus on innovation their operations are often inefficient
Analysers	• In stable domains these organisations operate efficiently • In unstable domains these organisations rapidly adapt to new trends introduced by competitors • Regarded as a compromise between Defenders and Prospectors (Cunningham 2002)
Reactors	• Top managers often detect changes in their environment but are unable to successfully react to them • Lacks a consistent strategy-structure relationship • Does not make any changes until forced to by environmental pressures

This study utilises the typology defined by Miles and Snow (1978) as it is focused on constant organisational change required to adjust to environmental change and uncertainty. This particular typology has been used successfully in a number of industry and strategy studies (Bantel 1998; Carneiro, Da Silva and Da Rocha 2010; Pinto and Curto 2007; Regan, Ghobadian and Gallear 2006) and is still the main typology in use (Conant, Mokwa and Varadarajan 1990; Regan et al. 2006).

2.4 Evidence of a causal link between strategy configuration and business success

Many studies have been conducted that show that organisation performance does display some correlation to organisational configuration whilst many have not.

The study done by Conant et al. (1990) showed that the reactor class showed less marketing success than the prospector, defender and analyser classes. This however may just indicate that any strategic planning is better than none. The ecology school of thought assert that organisational performance is dependent on if the strategic configuration is suited to the current environment (Romanelli 1989; Zammuto 1988). Miller (1987) supported this argument by stating that the environment causes structures and strategies. Organisations not heeding these signals will be punished, thus inducing industry conformity. Romanelli (1989) showed that different strategies were more suitable for companies starting up. Companies that were specialists were more likely to survive their first three years than generalists. Aggressive firms were more likely to survive than those seeking efficiency. Zammuto (1988) suggested that these ecological classifications had correspondence with the Miles and Snow (1978) classification. Using this cross-school linkage it suggests that young companies with an Analyser configuration will do worse than Defenders and Prospectors.

Just as the studies mentioned above suggest at least some correlation between performance and strategic configuration others in specific industries do not. Segev (1987) looked for a correlation between strategic configuration, strategy making and performance of Kibbutz owned industrial enterprises found a correlation between strategic configuration and strategy making but found little correlation between strategic configuration and performance.

The study done by Dess, Lumpkin and Covin (1997) explored the linkages between strategy making, strategy, environment and performance. It was found that approaches that measured the (1) strategy making, (2) strategy and (3) environment were effective in predicting performance. Effectiveness was dramatically reduced when only two of the components were measured. The study recommended use of a classification system in strategic configurational research that utilises a broad base of measurement.

2.5 Measuring business success in SMMEs

Performance of an SME should be measured in 6 dimensions, these dimensions cover financial and operation aspects as seen through the additional dimension of time, quality and flexibility (Hudson, Smart and Bourne 2001). Table 2 shows details for these dimensions.

Table 2: Critical dimensions of SME performance (Hudson et al. 2001)

Quality	**Time**	**Flexibility**	**Finance**	**Customer satisfaction**	**Human resources**
Product Performance	Lead time	Manufacturing effectiveness	Cash flow	Market share	Employee relationship
Delivery Reliability	Delivery reliability	Resource Utilisation	Market share	Service	Employee involvement
Waste	Process throughput time	Volume flexibility	Overhead cost reduction	Image	Workforce
Dependability	Process time	New product introduction	Inventory performance	Integration with customers	Employee skills
Innovation	Productivity	Computer Systems	Cost control	Competitiveness	Learning
	Cycle time	Future growth	Sales	Innovation	Labour efficiency
	Delivery speed	Product Innovation	Profitability	Delivery reliability	Quality of work life
	Labour efficiency		Efficiency		Resource utilisation
	Resource utilisation		Product cost reduction		Productivity

2.6 Conclusion of Literature Review

Organisations seeking success in their industries show a tendency to converge into distinct strategic configurations. When organisations are classified into meaningful sets, propositions and theories may be developed about common members of each classification.

These classifications are commonly determined though a deductive or inductive approach. The inductive approach involves utilising empirical methods that are often industry specific to determine the strategic configurations. The deductive approach assumes that configurations are produced by organisational and environmental attributes that influence performance regardless of industry type. The deductive classifications exist prior to the examination and classification is done by identifying behavioural theory applicable the organisation.

Deductive classification can be applied to either the strategic choice or the ecology school of thought. The ecology school of thought seeks to categorise organisations using a similar method to one used to predict behaviour of biological organisms, these being the r-specialism, r-generalism and K-specialism categories. The strategic choice school of thought believe that managerial decisions on environmental responses determine the organisation's performance. Various typologies and taxonomies exist that classify the organisation in this fashion. The typology selected for this study is the Miles and Snow (1978) approach. This is comprised of four configurations, Defenders, Prospectors, Analysers and Reactors. Its focus is on the organisational change required to adjust to change and uncertainty.

There has been mixed success with studies trying to prove a causal link between strategic configuration and organisational success. Certain industries show a better correlation between strategy configuration and performance than others. Effectiveness of strategic configuration being used as a predictor of performance is improved if the classification system is based on broad base of measurement. There are 6 dimensions of SME performance, Quality, Time, Flexibility, Finance, Customer Satisfaction and Human Resources. Performance measuring instruments need to incorporate all of these.

Proposition 1: A company's performance is a result of its strategic configuration classification.

Proposition 2: SMME oil companies that do well in the private sector will do well in the public sector.

CHAPTER 3: RESEARCH METHODOLOGY

The research will be conducted as a cross-sectional field study and will benefit from being conducted in the live context of the industry being studied (Bahaee 1993).The section below will give the reader a sense of the statistical nature of the research.

3.1. Research methodology / paradigm

The research paradigm used is largely qualitative in that part one of the instrument seeks to gather understanding of organisational strategy configuration as opposed to the precise measurement of a quantitative instrument. Qualitative refers to a non-numerical data collection, whereas quantitative research implies measurement of physical phenomena. Some of the dependent variables captured by the instrument in part two and three are nominal and quantitative by nature. These are the measures of profit and fuel sold to the public sector. Part four is purely qualitative by nature and is comprised of interview questions to gather material for the discussion of the results and the environment.

3.2. Research Design

The data was collected by means of a questionnaire completed in an interview environment. This gave the author of this study the opportunity to correct any misunderstanding of the questionnaire. The instrument was sent to the potential respondents at least two weeks prior to any interview. This gave the respondents the chance to compile some of the financial information contained in part two and three of the instruments.

The questionnaire approach has proven to be successful in similar studies. The maximum possible number of respondents from the intended sample is 26. If the questionnaires are completed in an interview environment the number of spoilt instruments should be less.

The downside of this method was two-fold. Firstly the geographical locations of the respondents were spread throughout the country and it took much time and effort to visit those willing to be involved in this study. Secondly the respondents may have had a

tendency to not be entirely truthful with some of the financial measures believing that a higher figure would be advantageous to them in current and future Transnet tenders. To combat this problem a letter was distributed with the questionnaire stating that data from this study will not be used by Transnet in any form whatsoever.

3.3. Population and sample

3.3.1. Population

There are a total of 142 licensed fuel wholesalers in the country (DME 2010b). Table 3 lists totals for these by province. Once licensed by the Department of Minerals and Energy as a fuel wholesaler they are eligible to procure fuel from producing oil companies, if not one already, and sell it to commercial end users.

The population of this study includes the subset of these companies that are SMMEs and submitted a tender response to the government parastatal Transnet in 2009. Transnet is by far the largest government based consumer of diesel fuel using 64.6% of the public sector total in 2008 (SAPIA 2008).

In total there were 31 respondents to this tender (Transnet Fuel Solutions 2009). Out of the 31 respondents to this tender, five of them are large multi-national oil companies and will not be included in the study. The remaining 26 regard themselves as SMMEs as defined in 1.6 in this study. Table 4 lists this population.

Table 3: Totals of licensed fuel wholesalers by province (DME 2010b)

Province	Wholesalers
Eastern Cape	10
Free State	7
Gauteng	64
KwaZulu-Natal	12
Limpopo	12
Mpumalanga	16

Northern Cape	5
North West Province	6
Western Cape	10
Total	**142**

3.3.2. Sample and sampling method

The sample from the abovementioned population was as many of the members that were willing to partake in this study.

The author of this study is employed by the division of Transnet that is responsible for the procurement and distribution of all fuel used internally by the parastatal and had the permission of the divisional CEO to engage with the tender respondents for the purpose of gathering data. See Appendix C for evidence of this.

Table 4: List of potential respondents

Company Name	**Head office location**
1. Advantage Facilities Management	Gauteng
2. Afric Oil	Gauteng
3. Borutho Gas	Gauteng
4. Brent Oil	Gauteng
5. Chevron (***Major oil company #1***)	Gauteng
6. DCM Mining and Mineral Holdings	Gauteng
7. Domilupa Projects	Gauteng
8. Engen (***Major oil company #2***)	Western Cape
9. EPIC	Gauteng
10. Gas-2-Liquids	Gauteng
11. Khuselani lubricants	KwaZulu-Natal
12. Koena Commercial Enterprises	Gauteng
13. Kulani Africa Gas	Gauteng

14. Kwande Petroleum	Gauteng
15. KZN Oils	KwaZulu-Natal
16. Lesego Fuel	Mpumalanga
17. Masana Petroleum	Gauteng
18. Morning Tide Investments	Western Cape
19. Motse Interiors	Gauteng
20. Musiwa Trading	Gauteng
21. PetroSA (***Major oil company #3***)	Western Cape
22. Sasol (***Major oil company #4***)	Gauteng
23. Shaninga Trading	Gauteng
24. Shell (***Major oil company #5***)	Western Cape
25. Siphumelolo Commercial Enterprise	Gauteng
26. TCS	Gauteng
27. Tensure Investment Holdings	Gauteng
28. Tunica Traders	Western Cape
29. Vukani Gazz	Western Cape
30. WOA Oils	KwaZulu-Natal
31. Wozani Berg Gasoline	KwaZulu-Natal

3.4. The research instrument

The research instrument is a four part questionnaire that gathers data that will be analysed to provide a measurement of the company's strategic configuration, business performance and success in selling fuel to the government. The parts of this instrument are described in detail below.

3.4.1. Part 1 – Strategic configuration

See Appendix B – Strategic configuration measurement, for the actual questionnaire used.

The instrument used has been adapted from Conant et al. (1990) and is in the form of an 11-part multi-item scale questionnaire. The meaning of the questions was preserved, only certain terms were changed to make it more appropriate for the South African oil industry context.

This instrument was selected because of its popularity and strong focus on accurately measuring the Miles and Snow (1978) typology. In addition the generic nature of the questions made it easy to adapt to a particular industry. Each of the 11 questions have been designed by Conant et al. (1990) to determine the strategic orientation of an organisation in respect to a dimension of each of the Miles and Snow (1978) adaptive cycle components. For a detailed view of the three adaptive cycle components and their 11 dimensions see Appendix E. One of the original methods for measuring the Miles and Snow (1978) strategy typology was self-typing without using a specific instrument, relying only on written descriptions of the strategy types (Snow and Hambrick 1980). The author felt that the 11 question format of Conant et al. (1990) was comprised of simpler and easier to understand components that would be easier to implement in an interview scenario. A better explanation of the context and meaning of the 11 questions can be gained by using the table in Appendix E in that it illustrates the intention behind the 11 questions and their four possible answers.

Success with the Conant et al. (1990) instrument has been established in a number of other studies (Gimenez 2004; Lukas 1999; Parnell and Wright 1993).

Other instruments were examined for their suitability for this research but were rejected for various reasons. The instrument used by Bantel (1998) that drew upon the work done by Zammuto (1988) that combines the Miles and Snow (1978) typology with a four-fold ecological classification was considered but rejected on the grounds that the author of this research could find little evidence that this was a popular implementation of the typology. The instrument was also very specific to technology based companies carrying out research and development.

An alternative instrument for measuring the Miles and Snow (1978) typology was developed by Snow and Hrebiniak (1980) that is a single part scale that asked respondents to best match their perception of their strategy configuration with a description of each of the four

Miles and Snow (1978) strategy types. This instrument has be criticised as being overly simplified and measures only two of the three adaptive cycle dimension constructs (Conant et al. 1990). This instrument can be seen in seen in Appendix F.

The taxonomy methodology and instrument form by Miller and Friesen (1978) was considered but no recent support and usage could be found.

For each question on the selected instrument there are four possible answers. Each answer adds one to an accumulating score for one of the four Miles and Snow (1978) strategic configurations. The configuration that receives the score is indicated at the end of the four possible answers on the instrument in Appendix B.

The strategic configuration is then determined from the accumulated scores using the following rules as developed by Conant et al. (1990).

Configuration selection rule 1: The configuration with the most score is selected for the company.

Configuration selection rule 2: A tie between defender, prospector and analyser configurations will result in an analyser selection for the company.

Configuration selection rule 3: Any tie that includes the reactor type will result in a reactor selection for the company.

Each of the 11 questions is aligned with one of the 11 adaptive cycle dimensions from Miles and Snow (1978) (See Appendix E for additional detail).

3.4.2. Part 2 – Business success

This was measured using a reduced list of the dimensions identified by Hudson et al. (2001). The dimensions of performance and their measures to be used are listed below. Care has been taken to only include measures that are relatively easy to supply otherwise there is a risk that the respondents may choose to guess the measures rather than to calculate them.

1. Quality and customer satisfaction – Delivery reliability will be measured as a percentage of deliveries out of the total deliveries that failed to arrive on the promised day.

2. Time – Process time will be measured. This will be the average number of days from order placement to delivery despatch.

3. Flexibility – Delivery volume flexibility will be measured. This will be based on the minimum delivery volume.

4. Finance – Operating profit margin will be used to measure financial success.

5. Human resources – Percentage of staff turnover in 2009.

The instrument was part of the questionnaire distributed to the sample beforehand to give the researched companies adequate time to compile the information.

Each dimension was measured against a scale of 0 to 4. The quality and customer satisfaction dimensions have been combined into one. This left five questions to be answered. The accumulated total for the five questions was the measure of business success, with 0 being the worst possible score and 20 being the best possible score. This instrument with the abovementioned scales can be seen in Appendix D.

The appropriateness of the operating profit margin scale was checked by examining the operating profit margin of the local oil company Engen.

Financial year 2009	Operating profit margin 3.2%
Financial year 2008	Operating profit margin 4.1%
Financial year 2007	Operating profit margin 5.6%
Financial year 2006	Operating profit margin 4.8%
Financial year 2005	Operating profit margin12.5% (Engen 2009)

This range fits comfortably in the fourth question's (financial success) measurement scale in the instrument.

The average staff turnover in South Africa for the last decade was 12-14% as stated by the HSRC (2010). This is close to the middle of the scale in the fifth question of the instrument.

3.4.3. Part 3 – Success in selling fuel to the government

Success in selling fuel to the government was measured as the 2009/2010 financial year's gross profit from selling diesel to Transnet.

Also included in this part of the instrument were requests for the SMME's BBEEE status, age and number of employees. This information was used in a later discussion of the research findings.

3.4.4. Part 4 – Interview questions

The questions in this section will be used in a semi-structured interview. The questions or topics in part four will be used as a check list to ensure that all topics have been covered in the discussion. Information captured from this part of the interview will be used in the discussion of the result to either critique or corroborate the data from other parts of the instrument. They also aim to capture information about the environment the SMME companies operate in, and how this environment has changed recently and where it is headed.

This information will also be used to understand and reinforce the conclusions from the other parts of the instrument.

3.5. Procedure for data collection

The CEO of the company was contacted by email to initiate communication and introduced to the study. Data collection was conducted in an interview environment. The research instrument was distributed prior to the interview to allow the respondent opportunity to gather the performance related data and to identify any questions that may need clarification.

Below are reasons why the author believed that he would be able to overcome the geographical and other challenges of the data collection phase.

- The author of this study frequently travels to the vicinity of the potential respondents and will have ample opportunity to interview them in the time allocated to this phase of research.
- All the potential respondents have submitted a tender response in the current Transnet fuel tender and are expected to be highly responsive to requests for an interview from an employee from the division of Transnet that distributed the tender documents.
- The author has access to industry leaders who would be willing to use their influence to help persuade potential respondents to agree to an interview.

3.6. Data analysis and interpretation

3.6.1. Preparation of the data prior to analysis (Data screening)

Missing data – Only completed questionnaires were accepted. The interview method of data collection effectively eliminated this problem. Part four of the instrument was not able to be used in every interview due to time constraints. Any incomplete responses for part four will not be used.

Data validity – This was applied during the interview. Any values submitted that appeared to be outside industry norms were rejected and the question re-explained with additional detail. Invariably these were due to a misinterpretation of the question.

Normality and outliers – It is assumed that the scores determined by questionnaire two are distributed normally. A number of normality tests from NCSS were applied. A normal probability plot was used to view normality levels and to detect any outliers. In addition a histogram was produced but due to the small sample size it is of little value in terms of normality measurement.

Proportional testing of the sample against the population – A large proportion of the population was sampled, 14 out of a population of 26. The common factor that would have

been used for proportionality is the total per province but given the small sample size of 14 this would not have been feasible. Given these facts no proportional testing was done. If the sample was substantially larger it would have been feasible to conduct a CHI-squared test to compare the provincial distribution of the population against that of the sample to determine 'goodness of fit'.

3.6.2. Data analysis for Proposition 1

Proposition 1: A company's performance is a result of its strategic configuration classification.

The validity of this proposition was examined using a Kruskal-Wallis one-way ANOVA. This compares the performance means of each of the configurations to determine if at least one group mean is different to the others.

A Kruskal-Wallis one-way ANOVA is better suited to this study than a standard one-way ANOVA as there is no guarantee that the data for each group is normally distributed around the mean.

All statistical analysis was processed using NCSS 2007/GESS 2006 software. Data was presented in a grouping and a response variable. The grouping was the company's abbreviated Miles and Snow (1978) strategic configuration, D-Defender, P-Prospector, A-Analyser and R-Reactor. The response variable was the same company's performance as measured by the research instrument. Table 5 shows an example of the data presentation.

Table 5: Example data presentation for Kruskal-Wallis one-way ANOVA

Row #	Grouping	Response
1	P	11
2	P	7
3	R	14
4	A	12
5	R	5

The test determines if the mean value of the performance scores differs significantly across the four strategic configuration classifications. A relatively high α of 0.10 was used to determine significance.

3.6.3. Data analysis for Proposition 2

Proposition 2: SMME oil companies that do well in the private sector will do well in the public sector.

The validity of this proposition was examined by ranking each company in terms of its business success and selling fuel to the public sector. Spearman's rank correlation coefficient (denoted as ρ or r_s) was then calculated to measure the level of association between the two ranks.

To test for significance the resulting Spearman's coefficient was then converted to a normally distributed z-score. This is done using a 'Fisher transformation' and is best visualised as a two step process.

$$F(r) = \frac{1}{2}\log\frac{1+r}{1-r} = \operatorname{arctanh}(r).$$

F(*r*) is the Fisher Transformation of *r.* To convert this to a z-score the following applies.

$$z = \sqrt{\frac{n-3}{1.06}}F(r)$$

Alternatively a t-value can be calculated with the following formula.

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

All statistical analysis processing was performed using NCSS 2007/GESS 2006 software, this analysis is part of the multivariate analysis function.

An α of 0.05 will be used to determine significance.

3.7. Limitations of the study

3.7.1. Limitations of the data analysis methods

- The Proposition 2 analysis can be distorted by too many ties in the performance measures. Alternative coefficients exist should this be the case e.g. Pearson's coefficient.

3.7.2. Limitations of the sampling method

- The sample is not necessarily random.
- Due to the small population size the sample size is small as well. This restricts the effectiveness of the data analysis techniques.

3.7.3. Limitations of the data gathering method

- The geographical location of the respondents will make it difficult to interview every one.
- The respondent's perception that raw data for this study will be used against them in current and future Transnet tenders could result in an exaggerated performance measure.
- CEOs of oil companies are busy people. Appointments are difficult to get.

3.8. Validity and reliability (as applied to quantitative data)

3.8.1. External validity

Internal validity has to do with the accuracy of the results. Results could be inaccurate if samples are not selected randomly. External validity has to do with the generalisability of the findings to the population. The sample size in this study is 53.8% of the total population and it covers one industry only, this promotes external validity or generalisability of the study (Bahaee 1993).

3.8.2. Internal validity

Internal validity measures the congruence of one's findings with reality (Merriam 1995). In the context of this study it would be if the dependent variable is indeed a result of the independent variable. Only once all rival hypotheses have been ruled out can the study be regarded as having internal validity. To improve the internal validity of this study the results will be compared and discussed in the context of similar studies with SMME companies.

3.8.3. Reliability

Reliability in quantitative research is concerned with a measurement method's ability to repeatedly produce the same result (Stenbacka 2001).

A means of measuring reliability is with the Alpha Coefficient (Nunnally 1978). For continuous, non-dichotomous test items this is commonly referred to as Cronbach's alpha. For dichotomous items a variation called the Kuder-Richardson Formula 20 is used, this is also referred to in its abbreviated form as KR-20.

The instrument in this study is non-dichotomous and as such the reliability has been measured using Cronbach's alpha. Nunnally (1978) described the formula for calculating this as follows.

$$\propto = \frac{K}{K-1}\left(1 - \frac{\sum_{i=1}^{K} \sigma_{Y_i}^2}{\sigma_x^2}\right)$$

K = the number of test items

σ_x^2= the variance of the observed total test scores

$\sigma_{Y_i}^2$= the variance of component i for the current sample

The reliability of the instrument developed by Conant et al. (1990) was tested by the authors by the test and retest procedure using a week between the test and retest. Using Cronbach's alpha an initial mean reliability of 0.63 was recorded. This was within the recommended mean reliability of 0.60 to 0.70 recommended by Nunnally (1978) for research instruments in development but was well below the 0.70 standard required for basic research instruments. Reliability was improved using variations of the 11 questions in the instrument until a mean reliability of 0.74 was achieved.

The reliability measures for each of the 11 questions are listed below in Table 6.

Table 6: Instrument reliability (Conant et al. 1990)

Test-retest reliability of the instrument items 1-11 and overall instrument											
1	2	3	4	5	6	7	8	9	10	11	Overall
.64	.73	.72	.62	.82	.75	.67	.70	.66	.73	.56	.74

3.9. Validity and reliability (as applied to qualitative data)

Many of the concepts used for the evaluation of quantitative research are not suitable for qualitative applications. Qualitative studies aim to generate understanding. The use of inappropriate quality concepts will create unnecessary limitations that could lead to false

conclusions (Stenbacka 2001). Alternative concepts have been developed that are more effective with qualitative data. The concept that this study will utilise is discussed below using four common attributes of quality, these being validity, reliability, generalisability and carefulness. The content draws heavily on the work done by Stenbacka (2001).

3.9.1. Qualitative validity

The basic quantitative definition of validity is whether or not the intended object to be measured is in fact being measured. If this is so then the concept has little use in qualitative research as the purpose in qualitative research is not to measure anything but to seek understanding and truth surrounding its chosen entity. To apply validity in qualitative research is to ensure that the informant/respondent is immersed in the topic being examined and is given the opportunity to speak freely and draw upon their own experience.

The semi-structured interview that is part four of the instrument was conducted with the CEO of the SMME oil company. It is unlikely that there is a more valid informant. The flow and direction of the interview was largely determined by the informant.

3.9.2. Qualitative reliability

Reliability can be expressed as the extent to which an inquiry's findings would be found again if the inquiry was repeated (Merriam 1995). People's understanding of the world around them is not static nor is their behaviour. Qualitative researchers seek to understand the world from the perspective of people within it, this creates reliability problems given that people's understanding and perception of the world is not always consistent.

This concept was addressed in the interview by allowing the informant to revisit a previous discussion from a different viewpoint and to compare the response with the previous response. If there was consistency then the information was regarded as reliable.

3.9.3. Qualitative generalisability

This quantitative generalisability concept as a quality issue is concerned with whether or not the sample is representative of the total population. This can be termed statistical

generalisability and is regarded by many as being irrelevant in qualitative research (Stenbacka 2001). A concept called Analytical Generalisation is relevant in qualitative research and is applied by strategically selecting informants relevant to the study and not from statically determined samples.

The informants in this study were all leaders of their organisations and were responsible for the bulk of the strategic decisions made. An effort was made to include informants that gave the impression of business success and those who clearly showed signs of financial distress. Also selected were informants who were focusing on risky expansion of their organisation as well as those reducing risk by seeking only improved efficiency within their existing market.

3.9.4. Qualitative carefulness

The concept of carefulness has an application in both quantitative and qualitative research. Carefulness as a quality attribute research that can be best described as the adoption of best practice or a systematic method to doing the research, in other words, the systematic application of a method to ensure quality. The focus must be on allowing understanding to emerge from the study rather than forcing it.

The forcing mentioned above is a result of research prejudice or beginning the analysis with a level of pre-understanding. From the onset the researcher in this study was mindful of the need for quality in both the quantitative and qualitative part of the instrument and a systematic process was applied from the start to promote quality. The problem of prejudice was not a simple one. It was evident from the start of the interviews that the informants were vastly more knowledgeable of their own environment than the author was and this subsequently lessened his own pre-understanding with each interview. No full analysis of the data was attempted until all the interviews were completed, however, an amount of reflection on the collected material was permitted.

CHAPTER 4: PRESENTATION OF RESULTS

4.1. Introduction

Tabulation and recording of data was done in Microsoft Excel 2007, thereafter all data analysis and presentation was done with NCSS 2007.

This chapter focuses on displaying all the data collected and calculated to the reader. In addition some content is devoted to the actual capture and screening of data. In-depth analysis and comment will follow in chapters 5 and 6.

4.2. Demographic profile of respondents

The data collection proved to be far more difficult than planned. The previous financial year (2009/2010) had been a difficult one for most, if not all of the potential respondents. This coupled with inland fuel supply difficulties in Q4 2010 made it difficult for CEOs of oil companies to make time to be interviewed for MBA research purposes. All potential respondents were sent an explanatory email with the questionnaires and a request for an interview. Not a single response was received. Only three CEOs gave an interview with little persuasion, the rest required several phone calls over several weeks before an interview was successfully completed.

Initially 26 potential respondents were identified and initially the author was confident of seeing them all. Nine of these turned out not to be oil companies at all. These were companies or individuals gambling on winning a valuable fuel supply contract without ever having sold fuel before and as such could not be used in this study. Two of them had only recently started selling fuel and were not confident in answering the full questionnaire. Out of the remaining 15, one simply refused to allow any contact at all. The remaining 14 were successfully interviewed and completed the first 3 parts of the questionnaire in full. In some cases the qualitative part 4 of the questionnaire proved to be too time consuming and only seven were completed. In all cases the CEO or Managing Directors supplied the data. Table 7 below lists this information.

Table 7: Data collection success groups

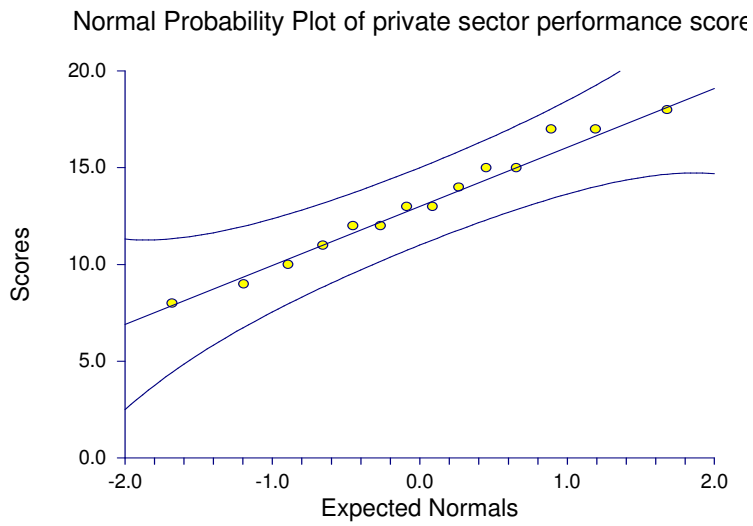
Number of respondents	Description of group
26	Total number of potential respondents
Less 9	Not oil companies
Less 2	Recent entrants, not enough history to answer questionnaires
Less 1	Refused all efforts to make contact
14	**Successfully interviewed and all data captured**

Table 8: Total respondents by province

Province	Respondents
Gauteng	8
KwaZulu-Natal	3
Western Cape	1
Eastern Cape	1
Northern Cape	0
Mpumalanga	1
Limpopo	0
North West Province	0
Free State	0
	14

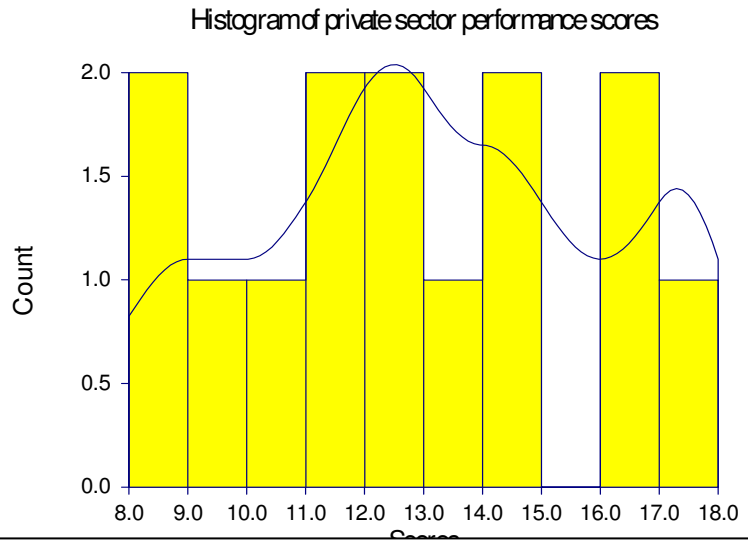
4.3. Data screening for Questionnaire 2 data (business performance measurement)

Questionnaire 2 measured business success with five questions and a score of 0 to 4 awarded to each. A score of 0 to 20 was possible. A normal distribution around the median was expected. 14 companies completed the questionnaire, there were no spoilt responses. The data was checked for normality, the results of which are displayed in Figures 1, 2 and 3 below.



- An upper and lower confidence level of 95% was used. The boundaries of these levels are indicated by the curved blue lines.
- The straight black line indicates where perfectly normal values would lie.
- The yellow circles are the actual scores from the respondents.
- All data was found to be acceptable, no outliers are evident.

Figure 1: Normal probability plot of private sector performance scores



- Due to the small sample size a histogram is of little use when checking for normality and was not considered for this purpose.

Summary Section of private sector performance scores

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
14	13.14286	3.059843	0.8177773	8	18	10

Normality Test Section of private sector performance scores

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9698276	0.8743393			Can't reject normality
Anderson-Darling	0.1809803	0.9145373			Can't reject normality
Martinez-Iglewicz	0.9605272		1.305415	1.57245	Can't reject normality
Kolmogorov-Smirnov	9.004752E-02		0.208	0.226	Can't reject normality
D'Agostino Skewness	-4.540807E-02	0.9637821	1.645	1.960	Can't reject normality
D'Agostino Kurtosis	-0.7529	0.451485	1.645	1.960	Can't reject normality
D'Agostino Omnibus	0.5690	0.752397	4.605	5.991	Can't reject normality

- Selected output from NCSS 2007's descriptive stats report. This indicates an acceptable level of normality.

Figure 3: Summary and normality test output

The minimum of 8 and maximum of 18 fitted well within the range of possible scores. The mean of 13.14 is close to the centre of the range of observed values and an acceptable degree of normality was detected in the data.

4.4. Results pertaining to Proposition 1

Proposition 1: A company's performance is a result of its strategic configuration classification.

Figure 4 shows the results of the Kruskal One-Way ANOVA. The results show that there is no significant difference (with $\alpha=0.1$) between the medians of the performance scores of each of the four Miles and Snow (1978) strategic configurations. This result does not support Proposition 1 and the conclusion that particular strategic configurations **do not** promote business success for SMME oil companies is accepted.

Kruskal-Wallis One-Way ANOVA on Ranks

Hypotheses

H0: All medians are equal.
Ha: At least two medians are different.

Test Results

Method	DF	Chi-Square (H)	Prob Level	Decision (0.10)
Not Corrected for Ties	3	1.318571	0.724728	Accept H0
Corrected for Ties	3	1.330266	0.721959	Accept H0

Number Sets of Ties	4
Multiplicity Factor	24

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
A	6	48.00	8.00	0.3873	13.5
D	1	4.00	4.00	-0.8682	11
P	5	41.50	8.30	0.5333	13
R	2	11.50	5.75	-0.6390	11.5

Figure 4: Output from Kruskal-Wallis One-Way ANOVA

4.5. Results pertaining to Proposition 2

Proposition 2: SMME oil companies that do well in the private sector will do well in the public sector.

Questionnaire 3 recorded data pertaining to current public sector performance and public sector potential performance. Only four SMME oil companies supplied fuel to Transnet during the 2009/2010 financial year. The other data from questionnaire 3 was used to provide additional ranking criteria to prevent excessive ties in the ranking.

Table 9: Sector ranking by performance

Private sector ranking	Private sector score	Public sector ranking	Public sector score	Public sector – BBEEE score	Public sector – Age of company
6	18	**3**	12,476,464	5	7
2	17	**1**	5,819,100	1	13
8	17	**5**	4,400,000	3	5
1	15	**2**	2,800	1	3
10	15	**12**	0	1	2
12	14	**11**	0	3	7
14	13	**14**	0	3	2
7	13	**9**	0	3	1
9	12	**6**	0	4	14
13	12	**8**	0	4	9
3	11	**7**	0	4	7
11	10	**10**	0	4	2
4	9	**4**	0	5	15
5	8	**13**	0	5	12

Only four SMME companies supplied fuel to Transnet in the 2009/10 financial year. All of these were in the sample data. The remaining questionnaire 3 data was used as a public sector tie-breaker for the remaining companies. In particular this was the BBEEE score with the lower value being better and the age of the company with a bigger age being better.

Table 10: Calculated correlations

Value name	Value
Spearman's correlation (r_s)	0.683516
Fisher transformation of r_s	0.8357
z score (using formula in 3.6.3.)	2.6921
t value (using formula in 3.6.3.)	3.2438
Confidence level using z score	99.64%
Confidence level using t value (n-2 degrees of freedom, or 12)	>99%

A significant (with α=0.05) correlation between the public sector ranking and private sector ranking was observed. The confidence level in Table 10 above indicates that there is greater than a 99% probability that the observed correlation was not due to chance.

4.6. Summary of the results

Table 11: Totals by strategy configuration type

Configuration type	Quantity	Proportion
Analysers	6	43%
Prospectors	5	36%
Defenders	1	7%
Reactors	2	14%
Total	**14**	**100%**

Questionnaire 1 aims to categorise the companies being examined into the four Miles and Snow (1978) strategy configurations. In total 14 companies were examined and the resulting classifications are shown in Table 11 above.

Table 12: Totals by strategy configuration type

Row	Group	Response
1	A	15
2	P	17
3	D	11
4	P	9
5	R	8
6	P	18
7	P	13
8	A	17
9	A	12
10	R	15

Group is the Miles and Snow (1978) strategic classification.

Response is the score for the private sector business success.

11	A	10
12	A	14
13	P	12
14	A	13

Proposition 1 was examined using a private sector business success score captured with Questionnaire 2. Table 12 shows the data used in this analysis. The analysis allowed this study to look for an association between strategy configuration and performance. **None was found.**

Proposition 2 was examined using a public sector business success score captured with part three of the questionnaire. A ranking of companies was created using this data, Table 9 shows this ranking under the column '*Public sector ranking*'. This ranking was compared with the private sector ranking in Table 9 under the column '*Private sector ranking*'. **A significant correlation** (with α=0.05) **was found**, this supports Proposition 2.

4.7. Summary of the qualitative material

Below is a summary of the responses from the semi-structured interview portion (part four) of the instrument. Additional details for the responses are in Appendix J. The summary below shows the common themes that were observed, these with the additional detail are then used to explain and support findings in the discussion of the results and conclusions.

1.	**Their change of strategy before and during the recent economic slow-down, plus where they are now. In particular, the rationale for these choices and the environmental forces that created the need to change.**
Four of the respondents had moved to a more aggressive strategy as a result of the recent economic slow-down in order to find additional revenue streams. One of these showed signs of being a Reactor/Defender in the past but the instrument shows them	

as an Analyser now. This has enabled them to offer additional services to their clients.

Another SMME began in 2008 as an Analyser but was now moving towards a Prospector stance in order to rapidly build their client base and service offering. However, they did mention that they would abandon their Prospector stance if a large enough client came their way and become more of a Defender.

An SMME that had large reliable clients in the mining sector was a Reactor/ Defender in the past. The recent slow-down reduced demand for fuel from these clients. Their response was to increase their service offering to these clients, in effect getting them to outsource the fuel management function to them. They are now an Analyser.

The last SMME that adopted a more aggressive stance recently was a large well-funded company that showed signs of being an Analyser in their past. They had been growing every year in small controlled increments. They have low debt levels and are able to invest in infrastructure that used to belong to oil industry majors. This new capacity has enabled it to expand in recent years (only one of two respondents has been able to expand in recent years). This study showed that this company is currently a Prospector.

Two of the respondents moved to a less aggressive strategic stance as a result of the slow-down and were waiting for signs of improvement before deciding on a future strategy. One of these appeared to be a Prospector in the past but was now an Analyser in an effort to reduce operational costs. The other used to be a Prospector but now was very much a Reactor with little to no strategic direction, claims to be waiting for economic times but does have some intent to sell the business.

One of the respondents began business during the slow-down and had maintained an aggressive stance throughout.. It showed signs of being a Prospector in the past, rapidly trying to find any source of revenue in the industry and has maintained that stance ever since and has grown whilst most others have shrunk or stagnated. This may be due to their willingness to offer services to the industry that competitors do not.

Typical Prospector behaviour.	
2.	**The future role of major oil companies in the retail and commercial fuel supply industries.**
Foreign major oil companies intend to start focusing solely on the manufacture of petroleum products and will start selling local commercial distribution infrastructure. It is likely that this will be sold to their favoured SMME oil companies in which they often have a vested interest. Major oil companies will still be able to exert considerable influence on the market through their favoured SMME oil companies but with less financial risk that they are currently exposed to. By removing themselves from the distribution of fuel the majors have less exposure to environmental contamination liability, industrial action, bad debt, crime, legislation eroding diesel retail margins and increases in the cost of electricity. Certain foreign oil majors (Chevron and BP) are in the process of reducing their commercial and retail infrastructure ownership by selling off some of these assets to local operators. The oil company branding of the assets will remain for the time being. In the case of Chevron (uses the Caltex brand) this branding will remain in place for 15 years, thereafter the new owner can rebrand the asset (Merafe, Heuvel and& Timol 2010). This process began in 2010 in South Africa but has been ongoing for years in the rest of Africa. This has created capacity increasing opportunities for local SMME oil companies with access to sufficient capital. .	
3.	**How the commercial fuel industry is currently structured and how it is envisaged to change in the near future and how this will affect them.**
See Appendix L for additional detail on the structure of the South African commercial	

oil industry.

Three distinct tiers with major oil companies on top, followed by large SMME's and with small SMMEs on the bottom. Each tier supplies the one below.

Smaller SMMEs are finding it difficult to survive because larger SMMEs are moving into their market places, normally these are clients that are too small for large SMMEs to bother with. This may be a temporary situation that may change once the larger SMMEs' traditional clients regain their previous demand for fuel.

Large SMMEs must affiliate themselves with a major oil company in order to prosper in the future. This is because the affiliated SMMEs will get better pricing from the producers and have a competitive advantage over other non-affiliated SMMEs. Large SMMEs will do well in the vacuum created by major oil company's exiting if they have sufficient capital to buy infrastructure and increase their capacity to store and distribute fuel. This will also give them the ability to create a strategic store of fuel. This has a downside of tying up working capital but is seen by larger clients as a contingency against risks to supply. Examples of these risks are refinery shutdowns, electricity shortages and industrial action. This will give them access to larger clients such as Transnet and Eskom. The increased volume of fuel that a client like this brings allows the SMME to negotiate preferential fuel prices from the major oil companies. This will increase their profit margin with all their clients.

4.	**Their perception of the effectiveness of Transnet's tender process.**

Three respondents thought it was fair, one was undecided and three thought it was unfair. The risk with having a large proportion of SMMEs thinking that Transnet's tender process is unfair is that many SMMEs will not bother responding. This may result in deserving and capable companies not reaping the benefits from having a piece of the country's largest fuel supply tender. Transnet also risks not having access to the company's possibly superior service delivery.

5.	**What Transnet should be doing to promote SMME oil company development.**

Transnet should encourage large SMMEs with whom they have a contract with to nurture a small SMME. This would take the form of giving the small SMME a portion of their volume supplied to Transnet and transferring some of their skills. The small SMME should also be given some access to the large SMME's infrastructure.

Transnet should not give as much business to SMMEs that is part owned by major oil companies. Preference should be give to SMMEs without a vested interest from a major oil company.

Transnet should focus on an SMME's potential when adjudicating a tender rather than just current business success.

CHAPTER 5: DISCUSSION OF THE RESULTS

5.1 Introduction

This chapter will attempt to explain the outcomes of the data analysis in terms of current theory, in particular the concepts covered in the literature review. The topics covered will be the stated propositions of this study and in addition it will cover some of the key propositions from the Miles and Snow (1978) work but within the context of this study.

5.2 Demographic profile of respondents

It was originally hoped that there would be respondents from every South African province as there are several licensed wholesalers in every province (See Table 3 for totals). The data collected did not have a respondent from every province (See Table 8 for details). This was most likely due to the small sample size and restricted population due to the study being limited to the respondents to Transnet's last fuel tender. Many of the respondents were not oil companies at all and it is likely that many of the total licensed wholesalers in Table 3 are not active oil companies. Table 8 shows the provincial breakdown of the respondents. As expected the province with the most was Gauteng, this is likely due to Gauteng having the most economic activity in the country as well as the proximity to the division of Transnet issuing the tender, which is based in Johannesburg.

5.3 Discussion pertaining to Proposition 1

Proposition 1: A company's performance is a result of its strategic configuration classification.

Neither of the four Miles and Snow (1978) strategic configurations displayed any performance advantage over the others in this study. This result does not support

Proposition 1 and the conclusion must be drawn that within the limitations of this study a company's strategic configuration does not affect its performance.

One of the central propositions of the Miles and Snow (1978) study was that the Defender, Analyser and Prospector will outperform the Reactor configuration (Shaker and Pearce II 1990). The Reactor configuration is seen in the Miles and Snow (1978) study as an inferior configuration where the company merely reacts to demands made by the environment without any thought to a broader strategy. This study found no significant difference between the four types, this may have been due to the small sample size that yielded only two Reactors but there is another possibility explained below.

Reactors in rapidly changing environments

Every respondent in the sample is emerging from an economic slowdown that is showing signs of abating. There were only two Reactors detected by this study and more would have been expected. Some studies proposed that a Reactor configuration can be expected whilst a company is weathering rapid environmental change and has not yet adapted to the new environment. This could be viewed as a transitional configuration (Shaker and Pearce II 1990). Indications are that we are emerging from the economic slowdown in 2008/9. Respondents indicated that they have adapted their strategies to make best use of the slowly improving economic climate. This was evident from qualitative material captured using part four of the research instrument. Most had over-extended credit to customers that had entered into liquidation and prospects for recovering their debt were not promising. In simple terms most were fighting for their survival in an environment that suddenly became overcrowded and fiercely competitive over the little growth in the market. This is in contrast to the years leading up to the last recession that were characterised by abundant growth and very liquid customers. The current hard times may have forced many of the respondents out of a Reactor configuration and into one of the other three configurations that are by definition more viable.

Only one Defender was detected by the study. Defenders are characterised by specialising in a narrow domain and focus on improving operational efficiency and spend little effort on technological advances or product development. Often the narrow domain is a premium niche (Miles and Snow 1978). It is possible that the recent economic downturn has forced

Defenders to seek a broader domain and product offering in order to replace reduced revenues from their traditional domains. The qualitative material showed at least one respondent where this was the case and the respondent was positioning themselves for broader market penetration and increased service offering.

This leads to the problems of taking a snapshot of an industry undergoing massive change. Is the snapshot truly indicative of the eventual reality?

An industry in the process of change.

This raises another problem which may have affected the study. The instrument determines a company's strategic configuration at the present. This loses accuracy when applied in an industry that is in transition. If this type of study paid more attention to what a company's configuration was in the recent past and where it was headed it may produce more accurate results, particularly in turbulent times. Various studies have been done extolling the virtues of studies utilising 'longitudinal designs' to better understand the effects of strategic change. According to Shaker and Pearce II (1990) the following needs to be answered when using strategic classification as a driver of performance:

a) What is the origin of the strategic types?
b) What are the antecedents of shifts from one type to another?
c) Are there predictable paths of change (e.g. a Defender becomes an Analyser)?
d) Are certain strategic transitions more conducive than others to company performance?

The low incidence of Defenders and higher incidence of Prospectors and Analysers characterises an industry undergoing growth (Hambrick 1983) and requiring much innovation to satisfy customer demands. It also implies that companies are focusing more on strategies that seek to exploit new revenue sources (Miles and Snow 1978). This is true of the economy of South Africa which has seen moderate growth during 2010.

The qualitative material collected in part four of the research instrument did indicate that almost all of the respondents had changed their strategic stance in recent years in order to weather the effects of the economic slowdown. Many are now changing their stance to take

advantage of future opportunities created by major oil companies changing their own strategies.

Are all the Defender, Analyser and Prospector strategic configurations equally viable?

Another proposition from Miles and Snow (1978) states that if properly implemented the Defender, Analyser and Prospector strategies can all lead to effective performance. As long as there is internal consistency within the three main elements of the adaptive cycle, these being the (1) Entrepreneurial problems and solutions, (2) Engineering problems and solutions, and (3) Administrative problems and solutions. Provided that the same theme is faithfully implemented across each element, efficient performance will be encouraged (Shaker and Pearce II 1990).

This study found similar performance across the Defender, Analyser and Prospector configurations. Median scores were 13.5 for Analysers, 13 for Prospectors and 11 for Defenders (Figure 4 has more detail in this regard). This study seems to agree with the Miles and Snow (1978) proposition but a larger sample size would be required for more certainty.

5.4 Discussion pertaining to Proposition 2

Proposition 2: SMME oil companies that do well in the private sector will do well in the public sector.

This proposition was examined by comparing a private sector success ranking with a public sector raking. This comparison was done using Spearman's technique. This technique was selected because it does not assume that there was equal-interval data. The interval value between the ranks is not necessarily consistent.

The comparison showed a significant correlation between the ranks. This gives support to the proposition that SMME oil companies that do well in the private sector will do well in the

public sector too. Selection criteria used by Transnet in the selection of their fuel suppliers is largely derived from performance measures.

As do other state owned enterprises, Transnet has an obligation to develop new SMMEs. This obligation could be fulfilled by ensuring that when larger SMMEs reach a certain size they in turn develop smaller ones that one day may be big enough to supply Transnet in their own capacity. This support needs to include skills transfer and access to the bigger company's infrastructure in order to empower the smaller companies to the point where they are able to supply fuel to Transnet. This opinion is supported by the qualitative material collected by the research.

5.5 Conclusion

Proposition 1: A company's performance is a result of its strategic configuration classification.

Neither of the four Miles and Snow (1978) strategic configurations displayed any performance advantage over the others in this study. This study cannot support Proposition 1 and within the stated limitations must find that a company's strategic configuration does not affect its performance.

The Defender, Analyser and Prospector configurations failed to show any performance advantage over the Reactor configuration, despite being a central proposition from the Miles and Snow (1978) study. The small sample size, transient and turbulent nature of the industry were identified as being possible causes for this. These were also seen as reasons for there being only one Defender in the results.

It was mentioned that a longitudinal study may be more appropriate for this study given the rapidly changing industry environment that has forced many of the SMMEs being studied to question their strategy and consider others.

The study gives a small amount of support to the Miles and Snow (1978) proposition that Defender, Prospector and Analyser configurations can all be effective. The median of their performance scores only differed by an insignificant amount. This result does not reject this

possibility. For a more conclusive finding a larger sample would be needed with more Defenders and Reactors.

Proposition 2: SMME oil companies that do well in the private sector will do well in the public sector.

A significant correlation was found between the public and private sector performance rankings.

The conclusion of this study is that within the public sector, Transnet at least, has an element of fairness in their procurement of fuel. This element of fairness will be embedded in their stated criteria for selection and in their adjudication of the tender results.

The respondents were sceptical of Transnet's tender process. There is a perception that all tenders linked to the state have an element of unfairness. The qualitative research indicated that three of the respondents thought that the process was at least reasonably fair, one was undecided and the remaining three thought it was unfair. This does not indicate a broad acceptance of Transnet's fuel supply tender and Transnet needs to address this perception.

The actual Transnet fuel tender is adjudicated by a committee and included in this committee are members from an external audit company. The same committee pre-approves all tender documentation including selection criteria and scoring methodology. In addition they will also approve the allocation of business to successful tender respondents. With this type of tendering process, manipulation of results would be difficult at least and limited in their effect (Merafe et al. 2010).

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1. Introduction

The future of SMMEs in the fuel industry promises to be difficult. Most companies built more capacity than they currently need. This has created an industry environment with more supply than demand. Players are looking for any solution to boost efficiencies and market penetration. In this highly competitive post-recession aftermath there has to be casualties. CEO's of SMME oil companies need to be the best they can be to avoid this happening.

This chapter will summarise the findings of this study and make recommendations for the stakeholders of the industry. Finally it will make suggestions for further studies in both the fuel industry and in strategic classification areas.

6.2. Conclusions of the study

The main conclusions resulting from this study are as follows:

- All four of the Miles and Snow strategic configurations were detected amongst the sample of SMME oil companies.

- There are no specific configurations that are superior in the SMME oil industry at the present. This may not be the case if the market was more stable and companies could adopt a consistent long term strategic style. This study did not detect any less performance of the Reactor class. This is in conflict with many studies including the original Miles and Snow (1978) study. This may be due to the transient nature of the strategy formation of many of the SMMEs examined in this study.

- There is at least some correlation between the public sector performance rankings and private sector rankings. This implies that the tendering process used for procurement of fuel in Transnet is effective.

- The Prospector and Analyser configurations dominated the sample of SMME oil companies.

- The Prospector, Analyser and Defender appear to be equally viable strategic configurations for SMME oil companies.

- Most SMME oil companies in the sample had consciously undergone a recent strategic redirection.

- The current slow economic growth following the previous recession has influenced companies to adopt an Analyser or Prospector approach to strategy.

- Most SMME oil companies have had to change their strategy to suit the rapidly changing environment caused by the recent economic slowdown. Most are in the process of or considering changing their future strategy to cater for future environmental change that will be brought about by the changing role of major oil companies in the industry. The expected upswing in economic activity is also a factor that most are considering when formulating their future strategy.

6.3. Recommendations

6.3.1 Recommendations for the public sector

Transnet has an obligation to grow small business. Caution must be taken to select the most deserving companies. Broad-based Black Economic Empowerment, business success and price are the most important criteria for this selection. In addition ownership of these companies needs to examined closely. Any ownership by a major oil company may indicate preferential treatment from the major oil company to the small oil company in terms of priority of supply and pricing. The vested interest in the small company is not a concern but the preferential treatment creates an unfair advantage over other small oil companies. Major oil companies control all production of fuel, smaller oil companies have no choice but to source products from them. Perhaps government regulation is required at this level to ensure equal and fair treatment for all small oil companies by major oil companies. See Appendix L for a view of the supplier hierarchy within the commercial South African oil industry.

There are several SMME oil companies with sufficient infrastructure and capacity to support Transnet regionally. This has been proven in recent years as SMMEs have supplied much of the fuel used by Transnet. Transnet as an organ of state has an obligation to use and promote the use of SMMEs. There is no need to use major oil companies, all fuel should be sourced from SMME oil companies.

Transnet needs to improve the industry's perception of its tender process. This negative perception could prevent high performing and deserving SMMEs from participating in the next tender.

In determining business success, Transnet or any other large buyer of fuel should not make any assumptions with regards to strategic configuration being a contributing factor for performance.

Performance measurement of SMME companies during fuel supply tenders should make use of the Critical Dimensions of SMME Performance in Table 2 to ensure a broad measure of performance. These measures should either be independently audited or captured first hand.

6.3.2 Recommendations for the private sector

Within the context of this study

A company needs to understand what type of strategic configuration it is and ensure that they are faithful to it in order to maximise their efficiency.

For Defenders – This is the most conservative and predictable of the viable configurations (Defenders, Analysers and Prospectors). They strive to dominate a niche in the market utilising a stable set of services and products. Their source of success is their aggressive defence of their prominence within their chosen niche (Miles and Snow 1978). Little effort is spent on environmental scanning. Substantial effort however, is spent on long term forecasting. Very bureaucratic in nature, the defender is highly centralised, specialised and display high levels of vertical differentiation (Cunningham 2002).

For Prospectors – The most dynamic of the configurations. Their success lies in their ability to develop and exploit new markets and products. Prospectors use high levels of environmental scanning to identify opportunities in the market place. A high priority is given to new product and service research and development and can be viewed as the opposite of the Defender type (Miles and Snow 1978). This type of company typically operates in fluid and unpredictable environments. This ability is aided by the type's low levels of formality, specialisation and high levels of employee autonomy. The management structure of this type is the matrix type where projects enforce their own horizontal reporting lines into departments that also have traditional vertical reporting lines (Cunningham 2002).

For Analysers – This type fills up the middle ground between the opposing Defender and Prospector types. They seek to minimise risk whilst maximising opportunities for profit (Miles and Snow 1978). They would rather follow the lead of a less risk adverse company with regards to products, services and markets and there is less emphasis on research and development than Prospectors. Extensive scanning of the marketplace lets them know what industry leaders are doing. Functional divisions are large and highly formalised. Product divisions are smaller and operate with a minimum of standard operating procedures. As a result of their risk adverse nature with regards to products, there is resistance for change in their product line.

For Reactors – This is a permissible type provided it is a temporary transitional phase before one of the other configurations emerges, otherwise it characterises a company that does not match strategy and structure and is typified by its purely reactive nature in its operations. An under-resourced company may behave like a reactor as they are unable to effect internal change required to operate efficiently in the prevailing environment.

In general

The information that follows comes from an interview with key personnel from the Transnet fuel tender adjudication team (Merafe et al. 2010):

- Partner with an oil company major, this promotes confidence with larger clients as they believe that this offers greater security of supply. There is no need for the major oil company to buy equity in the SMME, this may be held against the SMME in future state tenders.

- Own or part ownership in fuel storage facility. This creates the potential for contingency supply of fuel during unplanned refinery shutdowns or industrial action in the transport sector. There is an excess of capacity at the moment and an SMME with available investment capital would do well to purchase infrastructure from outgoing major oil companies which may be available at a discount given the current excess in capacity.

- Exclusive partnerships with technology suppliers. Large buyers of fuel rely on their fuel suppliers to supply technological solutions to improve stock control. Pilferage is rife throughout the fuel value chain and can quickly destroy the small margins found in this industry.

- Consider capital investment in the client's fuel facilities. There may be a viable business case in offering to sponsor improvements in the supplier's fuel facilities, provided ownership of the capital items remains with the supplier of fuel. This will go a long way in ensuring success in future tenders as it creates goodwill and the buyer may not want the added complication of having to either replace the capital items or have the new supplier buy them. Having large amounts of working capital available and low debt will be viewed in a positive light by procurement selectors working for organs of state.

- Create an air of confidence in being able to handle fuel shortages by informing the prospective or current client of supply contingencies you have in place. Your other competitors may be similarly enabled but may not regularly market these capabilities.

- Respond to and fulfil all the requirements of the tender document. Procurement specialists employed by organs of state are duty bound to exclude those that do not fulfil all the stated requirements.. Given the value and ease of converting

fuel to cash, external auditors give more attention to fuel as any other commodity. As such procurement of fuel in the public sector is a very regulated and transparent process. There is little scope for discretion. Many otherwise competent tender responses are immediately disqualified for minor technicalities. Always show a willingness to comply with requirements. In the private sector these may be negotiable however, in the private sector procurement policy is very ridgid and those using these policies are not going to compromise.

- Attempting to bribe officials to win a government fuel tender will not work. Rather focus on giving existing clients good service whilst managing your cash flow. This will contribute to performance measurements that will appeal to government procurement selection committees that consist of a wide cross-section of the business including external auditors from international accounting firms.

6.4. Suggestions for further research

6.4.1. Suggestions for research into strategic configurations

This type of research stands to benefit from a large sample size. This sample size is limited by the amount of time available for research and the willingness of decision makers in the business to give up their time to answer questionnaires. Further research should attempt to increase the sample size. A means of cross-validation of the classification may improve the quality of the data. One possible way of doing this would be to use part one of the instrument in this study on three members of the company's executive and then only use data where there was a majority consensus (two or three common classifications) of strategy type.

Classification of organisations into strategic configurations can be used for more than just looking for a correlation between configuration and performance. Correlations with other aspects of organisational behaviour can be examined, such as staff hiring behaviour or procurement policies.

A changing environment will make organisations question and possibly change their strategic direction. Is there a recommended route for various strategic configurations to follow when undergoing a change into a different configuration in order to be more efficient in a new environment? Events that cause an industry wide dramatic environmental change are rare, previous examples would be the abolishment of apartheid and the recent debt crisis. There may be useful insight to be gained in the study of strategic configurations if a company's starting and ending configurations are determined and starting and ending performance measured. Correlations can then be sought for the migration route and the resulting performance. The study done by Shaker and Pearce II (1990) has additional detail on this matter.

6.4.2.Suggestions for research into procurement effectiveness

Are procurement policies and processes effective in selecting the best supplier? A possible shortcoming of this study was that it relied on the honesty of the person being interviewed. Cross-validation may improve the quality of data. Measures that can be witnessed first-hand would also improve the quality of performance rankings.

An interesting study would be to compare the quality of service given by a company to public sector clients and its private sector clients. Any differences could open up an interesting discussion in client behaviour that either promotes or retards service delivery from suppliers.

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APPENDIX A - CONSISTENCY MATRIX

Table 13: Consistency matrix

Compare the business strategies between successful and unsuccessful SMME suppliers of fuel. Determine the nature of any relationship between these differences and resulting business success in both the private and public sectors.					
Sub-problem	**Literature Review**	**Hypotheses or Propositions or Research questions**	**Source of data**	**Type of data**	**Analysis**
1. Select a suitable methodology to determine the business strategy configuration of SMME fuel suppliers.	(Miller and Friesen 1978) (Bahaee 1993) (Bantel 1998) (Conant, Mokwa and Varadarajan 1990) (Dess, Newport and Rasheed 1993) (Ketchen Thomas, and Snow 1993) (Merriam 1995) (Miles and Snow 1978) (Romanelli 1991) (Zammuto 1988) (Snow and Hrebiniak 1980)	**Hypothesis 1: Performance of a company will not show a correlation to its strategic configuration classification.**	Part 1 of research instrument. Captured in interview environment.	Ordinal	Strategy type determined using total of scales in instrument.

Compare the business strategies between successful and unsuccessful SMME suppliers of fuel. Determine the nature of any relationship between these differences and resulting business success in both the private and public sectors.					
Sub-problem	**Literature Review**	**Hypotheses or Propositions or Research questions**	**Source of data**	**Type of data**	**Analysis**
2. Determine a suitable business success measurement methodology for SMME's within the context of this study.	(Hudson et al. 2001) (Dess et al. 1993)	**Hypothesis 2: There is no association between the performance of SMME oil companies in the private sector against their performance in the public sector.**	Part 2 and 3 of research instrument. Captured in interview environment.	Ordinal and nominal	Business performance determined by totalling score for each question. Relationships examined using Kruskal-Wallis and Spearman's coefficient.

APPENDIX B – FUEL USAGE

Information below has been compiled from two sources namely SAPIA (2008) and Transnet Fuel Solutions (2008).

Table 14: Diesel usage by demand type in South Africa Q3 2008 (SAPIA 2008)

Diesel usage by demand type in South Africa Q3 2008	
Demand type	Volume in litres
Agricultural Co-ops	170,412,197
Construction	66,675,162
Farmers	28,670,316
General Dealers	363,056,596
Provincial and national government	10,474,754
Local Authorities	13,019,608
Local marine fishing	29,946,044
Mining	174,891,746
Public Transport (local authorities)	1,008,508
Public Transport (non local Auth's)	31,818,599
Remainder of General Trade	464,720,387
Retail - garages	845,303,511
Road Haulage	219,613,068
Transnet	44,800,968
Total	**2,464,411,464**

Table 15: Diesel usage by government sector 2008 (SAPIA 2008)

Diesel usage by government sector Q3 2008	
Government sector	Volume in litres
Provincial and national government	10,474,754
Local Authorities	13,019,608
Public Transport (by local authorities)	1,008,508
Transnet	44,800,968
Total	**69,303,838**

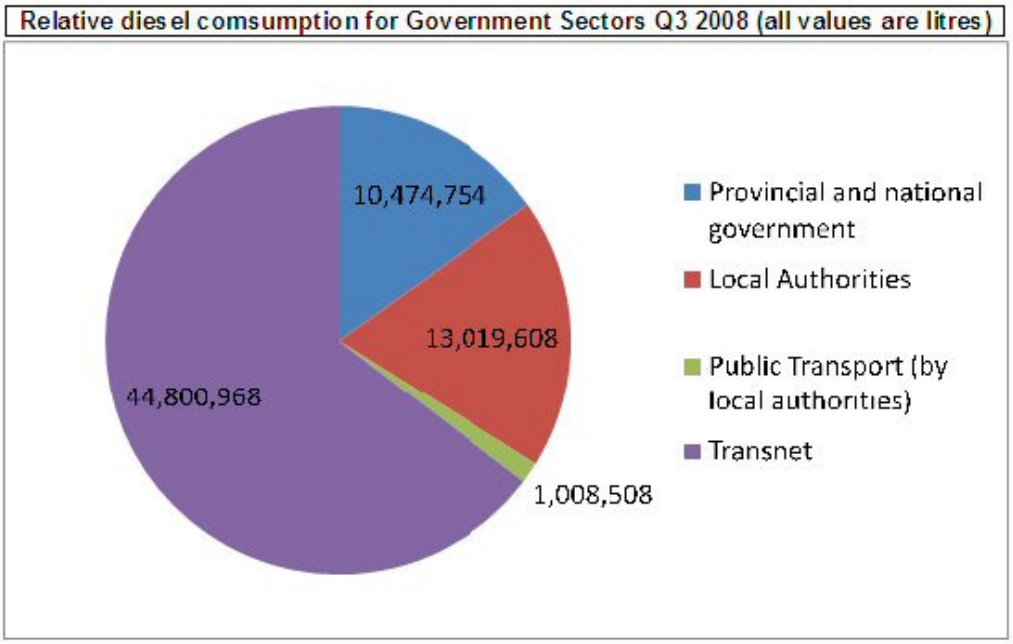


Figure 5: Diesel consumption for government sectors (SAPIA 2008)

APPENDIX C – INSTRUMENT PART 1 - STRATEGIC CONFIGURATION MEASUREMENT

At the end of each question the abbreviated configuration that is answered positively will add one to the score for that particular configuration. These will not be visible to the respondent during the interview.

The configurations that the abbreviations correspond to are as follows.

(P) - Prospector

(A) - Analyser

(D) - Defender

(R) - Reactor

1. Entrepreneurial-product market domain

In comparison to other oil companies, the services which we provide to our customers are best characterised as:

a) Services which are more innovative, continually changing and broader in nature throughout the organisation and marketplace. (P)
b) Services which are fairly stable with some markets and innovative in others. (A)
c) Services which are well focused, relatively stable and consistently defined throughout the organisation and marketplace. (D)
d) Services which are in a state of transition, and largely based on responding to opportunities or threats from the marketplace or environment. (R)

2. Entrepreneurial-success posture.

In contrast to other oil companies, my organisation has an image in the marketplace as an oil company which:

a) Offers fewer, selective services which are high in quality. (D)
b) Adopts new ideas and innovations, but only after careful analysis. (A)
c) Reacts to opportunities or threats in the marketplace to maintain or enhance our position. (R)
d) Has a reputation for being innovative and creative. (P)

3. Entrepreneurial-surveillance

The amount of time my oil company spends on monitoring changes and trends in the marketplace can best be described as:

a) Lengthy: We are continuously monitoring the marketplace. (P)
b) Minimal: We really don't spend much time monitoring the marketplace. (D)
c) Average: We spend a reasonable amount of time monitoring the marketplace. (A)
d) Sporadic: We sometimes spend a great deal of time and at other times spend little time monitoring the marketplace. (R)

4. Entrepreneurial-growth

In comparison to other oil companies, the increase or losses in demand which we have experienced are due most probably to:

a) Our practice of concentrating on more fully developing those markets which we currently serve. (D)
b) Our practice of responding to the pressures of the marketplace by taking few risks. (R)
c) Our practice of aggressively entering into new markets with new types of service offerings and programs. (P)
d) Our practice of assertively penetrating more deeply into markets we currently serve, while adopting new services only after a very careful review of their potential. (A)

5. Engineering-technological goal.

One of the most important goals in this oil company, in comparison to other oil companies, is our dedication and commitment to:

a) Keep costs under control. (D)
b) Analyse our costs and revenues carefully, to keep costs under control and to selectively generate new services or enter new markets. (A)
c) Insure that the people, resources and equipment required to develop new services and new markets are available and accessible. (P)
d) Make sure that we guard against critical threats by taking whatever action is necessary. (R)

6. Engineering-technological breadth

In contrast to other oil companies, the competencies (skills) which our managerial employees possess can best be characterised as:

a) Analytical: their skills enable them to both identify trends and then develop new service offerings or markets. (A)
b) Specialised: their skills are concentrated into one, or a few, specific areas. (D)
c) Broad and entrepreneurial: their skills are diverse, flexible, and enable change to be created. (P)
d) Fluid: their skills are related to the near-term demands of the market-place. (R)

7. Engineering-technological buffers

The one thing that protects my organisation from other oil companies is that we:

a) Are able to carefully analyse emerging trends and adopt only those which have proven potential. (A)
b) Are able to do a limited number of things exceptionally well. (D)
c) Are able to respond to trends even though they may possess only moderate potential as they arise. (R)
d) Are able to consistently develop new services and new markets. (P)

8. Administrative-dominant coalition

More so than many other oil companies, our management staff tends to concentrate on:

a) Maintaining a secure financial position through cost and quality control measures. (D)
b) Analysing opportunities in the market- place and selecting only those opportunities with proven potential, while protecting a secure financial position. (A)
c) Activities or business functions which most need attention given the opportunities or problems we currently confront. (R)
d) Developing new services and expanding into new markets or market segments. (P)

9. Administrative-planning

In contrast to many other oil companies, my organisation prepares for the future by:

a) Identifying the best possible solutions to those problems or challenges which require immediate attention. (R)

b) Identifying trends and opportunities in the marketplace which can result in the creation of service offerings or programs which are new to the oil company industry or which reach new markets. (P)
c) Identifying those problems which, if solved, will maintain and then improve our current service offerings and market position. (D)
d) Identifying those trends in the industry which other oil companies have proven to possess long-term potential while also solving problems related to our current service offerings and our current customers' needs. (A)

10. Administrative-structure

In comparison to other oil companies, the structure of my organisation is:

a) Functional in nature (i.e. organised by department-marketing, accounting, personnel, etc.). (D)
b) Service or market oriented (i.e. most departments have their own marketing or accounting responsibilities). (P)
c) Primarily functional (departmental) in nature; however, a service or market oriented structure does exist in newer or larger service offering areas. (A)
d) Continually changing to enable us to meet opportunities and solve problems as they arise. (R)

11. Administrative-control

Unlike many other oil companies, the procedures my organisation uses to evaluate our performance are best described as:

a) Decentralised and participatory encouraging many organisational members to be involved. (P)
b) Heavily oriented toward those reporting requirements which demand immediate attention. (R)
c) Highly centralised and primarily the responsibility of senior management. (D)
d) Centralised in more established service areas and more participatory in newer service areas. (A)

APPENDIX D – COVERING LETTER FOR RESPONDENTS





Faculty of Commerce, Law and Management

July 12th, 2010

REQUEST FOR INTERVIEW TO GATHER DATA FOR ACADEMIC RESEARCH

Dear Mr/Mrs .....

I am studying an MBA at the University of the Witwatersrand, Johannesburg (Wits). My MBA thesis is titled *'An SMME perspective on supplying fuel to the South African public and private sectors'* and seeks to identify some of the factors that promote or inhibit success in selling fuel to both the public and private sectors of our economy.

I understand that you are busy person in what is a very competitive industry but would like to schedule an interview with you to complete the attached questionnaire. This should take no longer than one hour. Some of the questions may require some prior preparation and I would appreciate it if you reviewed the content prior to my visit.

I must also declare that I am currently employed by Transnet Fuel Solutions (TFS), to whom you have recently submitted a fuel supply tender to. This research will in no way affect any of the decisions made by Transnet in awarding the current fuel supply tender. Confirmation of this from TFS's CEO Zeyd Timol is attached. None of the data collected will be made available to any member of Transnet or the fuel industry, myself excluded. The final thesis will only contain data in an aggregated form with no named reference to its source.

Yours sincerely,

Geoff Haw
MBA Student and TFS Technology Manager

APPENDIX E – INSTRUMENT PART 2 - BUSINESS SUCCESS MEASUREMENT

Each dimension will be measured against a scale of 0 to 4. The quality and customer satisfaction dimensions have be combined into one. This means that there will be five questions to the answered. The accumulated total for the five questions will be the measure of business success, with 0 being the worst possible score and 20 being the best possible score.

1. **Quality and customer satisfaction (delivery reliability)**

What percentage of deliveries out of your total deliveries failed to arrive at the customer on the promised day?

a) 0% - 2% scores 4
b) 2% - 5% scores 3
c) 5% - 10% scores 2
d) 10% - 20% scores 1
e) > 20% scores 0

2. **Time (order process time)**

What are your average number of days from order placement to delivery despatch.

a) 0 – 1 days scores 4
b) 1 – 2 days scores 3
c) 2 – 3 days scores 2
d) 3 – 4 days scores 1
e) > 4 days scores 0

3. **Flexibility (delivery volume flexibility)**

What is your minimum delivery volume?

a) < 1,000 litres scores 4
b) 1,000 – 2,000 litres scores 3
c) 2,000 – 5,000 litres scores 2
d) 5,000 – 10,000 litres scores 1
e) > 10,000 litres scores 0

4. **Finance (profitability)**

What was your operating profit margin for the 2009 – 2010 financial year?

a) > 10% scores 4
b) 10% – 8% scores 3
c) 8% – 6% scores 2

d) 6% – 4% scores 1
e) < 4% scores 0

5. Human resources (quality of work life)

What was your staff turnover percentage in the 2009 calendar year?

a) 0% - 5% scores 4
b) 5% - 10% scores 3
c) 10% - 15% scores 2
d) 15% - 30% scores 1
e) > 30% scores 0

APPENDIX F – THE ADAPTIVE CYCLE AND ITS DIMENSIONS

The 11 dimensions listed below correspond to the 11 questions and possible responses in the research instrument. Use of the table below can help the person conducting the interview explain the context and meaning of the questions in the instrument.

Table 16: The adaptive cycle and its dimensions (Conant et al. 1990)

Adaptive cycle components	Dimensions	Strategic types			
		Defenders	**Prospectors**	**Analysers**	**Reactors**
Entrepreneurial problems and solutions	**1. Product-market domain**	Narrow, and carefully focused	Broad and continuously expanding	Segmented and carefully adjusted	Unseen and transient
	2. Success posture	Prominence in 'their' product	Active initiation of change	Calculated followers of change	Opportunistic thrusts and coping
	3. Surveillance	Domain dominated and cautious strong organisational monitoring	Market and environmentally oriented aggressive search	Competitive oriented and thorough	Sporadic and issue dominated
	4. Growth	Cautious penetration and advances in productivity	Enacting product market development and diversification	Assertive penetration and careful product market development	Hasty change
Engineering problems and solutions	**5. Technological goal**	Cost-effectiveness	Flexibility and innovation	Technological synergism	Project development and completion
	6. Technological breadth	Focal, core technology/ basic expertise	Multiple technologies / pushing the edge	Interrelated technologies / at the edge	Shifting technological applications / fluidity
	7. Technological buffers	Standardisation, maintenance programs	Technical personnel skills / diversity	Incrementalism and synergism	Ability to experiment and rig solutions
Administrative problems and solutions	**8. Dominant coalition**	Finance and production	Marketing and R&D	Planning staffs	Trouble shooters
	9. Planning	Inside out control dominated	Problem and opportunity finding / campaign (program) perspective	Comprehensive with incremental changes	Crisis oriented and disjointed
	10. Structure	Functional / line authority	Product and / or market centred	Staff dominated / matrix oriented	Tight formal authority / loose operating design
	11. Control	Centralised and formal / financial anchored	Market performance / sales volumes	Multiple methods / careful risk calculations ... sales contributions	Avoid problems / handle problems ... remain solvent

APPENDIX G – THE PARAGRAPH APPROACH OF DETERMINING STRATEGY TYPE

Below is the older paragraph approach of Snow and Hrebiniak (1980) to measure strategy by matching a description of a company's strategy with a top manager's perception of it.

Which one of the following descriptions most closely fits your organisation compared to other firms in the industry? (Please consider your division or company as a whole and note that none of the types listed below is inherently "good" or "bad").

Type 1 - *This type of organisation attempts to locate and maintain a secure niche in a relatively stable product or service area. The organisation tends to offer a more limited range of products or services than its competitors, and it tries to protect its domain by offering higher quality, superior service, lower prices, and so forth. Often this type of organisation is not at the forefront of developments in the industry — it tends to ignore industry changes that have no direct influence on current areas of operation and concentrates instead on doing the best job possible in a limited area.*

Type 2 - *This type of organisation typically operates within a broad product-market domain that undergoes periodic redefinition. The organisation values being "first in" in new product and market areas even if not all of these efforts prove to be highly profitable. The organisation responds rapidly to early signals concerning areas of opportunity, and these responses often lead to a new round of competitive actions. However, this type of organisation may not maintain market strength in all of the areas it enters.*

Type 3 - *This type of organisation attempts to maintain a stable, limited line of products or services, while at the same time moving out quickly to follow a carefully selected set of the more promising new developments in the industry. The organisation is seldom "first in" with new products or services. However, by carefully monitoring the actions of major competitors in areas compatible with its stable product market base, the organisation can frequently be "second in" with a more cost-efficient product or service.*

Type 4 - *This type of organisation does not appear to have a consistent product-market orientation. The organisation is usually not as aggressive in maintaining established products and markets as some of its competitors, nor is it willing to take as many risks as other competitors. Rather, the organisation responds in those areas where it is forced to by environmental pressures.*

The strategic types assigned to each paragraph.

Type 1 – refers to the Defender type
Type 2 – refers to the Prospector type
Type 3 – refers to the Analyser type

Type 4 – refers to the Reactor type

APPENDIX H – INSTRUMENT PART 3 - SUCCESS AT SELLING FUEL TO THE GOVERNMENT

The following questions will be asked during the interview. These questions will be mailed to the prospective respondents prior to the interview to give them a chance to compile the information.

1. What was your gross profit from selling diesel to Transnet in the 2009/2010 financial year?
2. What was your BBEEE status during the 2009/2010 financial year?
3. What is the age of your company?
4. How many employees do you have?

APPENDIX I – INSTRUMENT PART 4 – INTERVIEW QUESTIONS

The following themes were covered in semi-structured interview format:

1. Their change of strategy before and during the recent economic slow-down, plus where they are now. In particular, the rationale for these choices and the environmental forces that created the need to change.

2. The future role of major oil companies in the retail and commercial fuel supply industries.

3. How the commercial fuel industry is currently structured and how it is envisaged to change in the near future and how this will affect them.

4. Their perception of the effectiveness of Transnet's tender process.

5. What Transnet should be doing to promote SMME oil company development.

APPENDIX J – INSTRUMENT PART 4 – SUMMARISED INTERVIEW RESPONSES

SMME oil company #1 (Response 1 of 7)
Current configuration – Analyser
Business performance score – 15

1. Their change of strategy before and during the recent economic slow-down, plus where they are now. In particular, the rationale for these choices and the environmental forces that created the need to change.

   Came from a reactive stance where demand was very constant with a single large long-term contract accounting for at least 80% of business. During the peak of the slowdown they became more of an analyst in order to reduce operating costs. Now they are tentatively becoming more of a prospector to increase revenue. Resources have been increased to facilitate this.

2. The future role of major oil companies in the retail and commercial fuel supply industries.

   Major oil companies are already showing signs of wanting to become producers only. Some are happy to partner with an SMME to do all their distribution of commercial product.

3. How the commercial fuel industry is currently structured and how it is envisaged to change in the near future and how this will affect them.

   Larger majors with their preferred SMMEs. Preferred SMMEs have their own preferred micro suppliers. It is not possible to exist without a big brother.

4. Their perception of the effectiveness of Transnet's tender process.

   Mostly fair, discriminates against smaller companies with no in-house ability to load RTC's (RTC stands for Rail Tank Car, these are used for transporting fuel by rail.)

5. What Transnet should be doing to promote SMME oil company development.

Contractually force larger SMMEs with a Transnet supply contract to adopt smaller companies and help grow them by giving them a percentage of their Transnet business. Skills transfer should be another condition.

SMME oil company #15 (Response 2 of 7)
Current configuration – Analyser
Business performance score – 12

1. Their change of strategy before and during the recent economic slowdown, plus where they are now. In particular, the rationale for these choices and the environmental forces that created the need to change.

Business began during economic slowdown as an analyser (2008). This was an effort to gain a market foothold without wasting too much capital. Currently becoming more of a prospector in order to increase market penetration but will consider becoming a defender (temporarily) if a large supply contract comes their way.

2. The future role of major oil companies in the retail and commercial fuel supply industries.

International oil companies will focus on product production (refining). They will most likely sell their retail and commercial distribution business to operators. They will want to keep their branding intact. Retail sites are a powerful vehicle for displaying this branding. More emphasis on SMME oil companies doing their commercial distribution.

3. How the commercial fuel industry is currently structured and how it is envisaged to change in the near future and how this will affect them.

3 distinct tiers. Major oil companies (producers), larger SMMEs and micro oil companies. One tier supplies the other below. There is little variation to this structure.

4. Their perception of the effectiveness of Transnet's tender process.

Undecided, awaiting outcome of current tender.

5. What Transnet should be doing to promote SMME oil company development.

Choose SMMEs that are not already partners with a large oil company. They need the business, the ones with a larger partner do not.

SMME oil company #22 (Response 3 of 7)
Current configuration – Analyser
Business performance score – 10

1. Their change of strategy before and during the recent economic slow-down, plus where they are now. In particular, the rationale for these choices and the environmental forces that created the need to change.

Has had to change to an analyser from what sounded like a prospector. The analyser configuration is evident from their cost saving measures. Once revenues improve they will attempt to open up new markets, more of a prospector.

2. The future role of major oil companies in the retail and commercial fuel supply industries.

Primarily production and importation of petroleum products. Local majors (Engen and Sasol) will continue to operate their own retail network but foreign majors will slowly disinvest from retail and commercial distribution.

3. How the commercial fuel industry is currently structured and how it is envisaged to change in the near future and how this will affect them.

Majors and large SMMEs only. Smaller oil companies have little relevance and most will not survive the coming years as the larger SMME oil companies will force them out of business. This is because the larger companies have been expanding their market penetration to include areas previously only served by smaller oil companies.

4. Their perception of the effectiveness of Transnet's tender process.

As with all state owned enterprises, ineffective and unfair to SMMEs.

5. What Transnet should be doing to promote SMME oil company development.

Guarantee that a larger percentage of their demand is given to SMMEs, in particular those without a close relationship to a major oil company.

SMME oil company #10 (Response 4 of 7)
Current configuration – Analyser
Business performance score – 17

1. Their change of strategy before and during the recent economic slow-down, plus where they are now. In particular, the rationale for these choices and the environmental forces that created the need to change.

Has a few large reliable clients in the mining sector. Has been broadening scope of services to improve revenue to make up recent losses. This includes buying their own transport company and investing in their own strategic storage facility. Also invests in infrastructure on customers' property, sells fuel by consignment. Has had to improve operational efficiency to reduce costs and find new ways of making more money from existing customers. Very much like an analyser. May have been a reactor/defender in the past. There was a long period of stagnation that only ended when the recent economic downturn started.

2. The future role of major oil companies in the retail and commercial fuel supply industries.

They will continue to dominate and control the retail and commercial sectors of the industry. Even if their involvement is indirect. This is due to their favoured SMMEs (in which they may have a vested interest) get preferential supply and pricing.

3. How the commercial fuel industry is currently structured and how it is envisaged to change in the near future and how this will affect them.

The oil majors still control the market either directly or indirectly through their favoured large SMME companies. Small SMMEs has little chance of surviving, let alone growing into a large SMME.

4. Their perception of the effectiveness of Transnet's tender process.

Ineffective and unfair. Respondent believes that he is wasting his time by participating in the recent Transnet tender.

5. What Transnet should be doing to promote SMME oil company development.

Not to classify SMMEs with oil major shareholding as SMMEs. These should be regarded as majors. Only true SMMEs without major oil company investment should get business earmarked for SMMEs.

SMME oil company #2 (Response 5 of 7)
Current configuration – Prospector
Business performance score – 17

1. Their change of strategy before and during the recent economic slowdown, plus where they are now. In particular, the rationale for these choices and the environmental forces that created the need to change.

There has been no change in strategy at all. This company chases after every business possibility that they can find. In all cases the CEO will ensure that the staff has all the resources they need to pursue the business opportunity. Very much a prospector strategic style.

2. The future role of major oil companies in the retail and commercial fuel supply industries.

The both international and local majors are becoming less involved in the distribution and marketing of fuel. In the future this will all be done by affiliated SMMEs. At some stage these will become majors themselves.

3. *How the commercial fuel industry is currently structured and how it is envisaged to change in the near future and how this will affect them.*

Currently it is the oil majors and their affiliates at the top, followed by larger unaffiliated SMMEs that are big enough to buy directly from an oil major. Finally the small SMMEs that serve clients that are too small for most other SMMEs to consider. In the future it will be on just two levels, the majors and their affiliates and the small SMMEs doing jobs regarded as unprofitable by the majors. Unaffiliated large SMMEs must partner with a major oil company or face downsizing or extinction.

4. *Their perception of the effectiveness of Transnet's tender process.*

Reasonably effective. Seems to be fair.

5. *What Transnet should be doing to promote SMME oil company development.*

Recognition should be given to SMMEs that display superior management ability and future potential. Current financial success is of less importance.

SMME oil company #9 (Response 6 of 7)
Current configuration – Prospector
Business performance score – 13

1. Their change of strategy before and during the recent economic slowdown, plus where they are now. In particular, the rationale for these choices and the environmental forces that created the need to change.

Has maintained a consistent strategy from their beginning. The business has been growing consistently in small increments. Recent economic slowdown did not affect them in any great way. Previous behaviour is indicative of an Analyser. Recently their strategy has been changing to take advantage of the oil majors' withdrawal from front line marketing of commercial fuel. This has made them more aggressive and risk taking. This includes increased gearing and investment into infrastructure to cater for greater capacity and a broader range of services. Typical behaviour of a Prospector.

2. The future role of major oil companies in the retail and commercial fuel supply industries.

Expect to see a dramatic pull-back of all oil company majors from front line marketing in both retail and commercial sectors. There are many opportunities for SMMEs with sufficient capital to invest in capacity building infrastructure.

3. How the commercial fuel industry is currently structured and how it is envisaged to change in the near future and how this will affect them.

Almost all the business is done by majors and their SMME affiliates, these can be regarded as the first tier. Below this there are the none-affiliated large SMMEs. There is currently only room for two of these large non-affiliated SMMEs. Small SMMEs make up the third tier. With the exception of affiliated SMMEs supplying none-affiliated large SMMEs, each tier supplies the tier below. In the future it will only be majors and small SMMEs. Non-affiliated large SMMEs need to find a major oil company as a partner or rapidly build infrastructure to become a major themselves.

4. Their perception of the effectiveness of Transnet's tender process.

Reasonably convinced that it works and is free and fair. Opinion is pending the results of the current fuel tender.

5. What Transnet should be doing to promote SMME oil company development.

Use the successful large SMMEs to help the small SMMEs. In other words some of the Transnet volume needs to be distributed by smaller SMMEs using the larger SMMEs' infractructure.

SMME oil company #18 (Response 7 of 7)
Current configuration – Reactor
Business performance score – 15

1. Their change of strategy before and during the recent economic slowdown, plus where they are now. In particular, the rationale for these choices and the environmental forces that created the need to change.

Used to be a prospector but now needs to develop a winning strategy or the business will be facing liquidation. Not sure how to tackle the future. Waiting for some direction from the market. May downsize and look after better customers until more demand materialises.

2. The future role of major oil companies in the retail and commercial fuel supply industries.

Foreign major oil companies will pull back into a refining role. The resulting vacuum will be taken over by their favoured large SMMEs. Local majors will pull back only in the commercial market. As with the foreign majors their favoured SMMEs will fill this void. The remaining scraps will be for the small SMMEs.

3. How the commercial fuel industry is currently structured and how it is envisaged to change in the near future and how this will affect them.

Major oil companies and their affiliates at the top and small oil companies at the bottom. Very little in between and impossible to move from the bottom into the majors. This particular SMME is considering selling their business to a major oil company.

4. Their perception of the effectiveness of Transnet's tender process.

Has no faith in the process and believes it to be corrupt as with all other state tenders.

5. What Transnet should be doing to promote SMME oil company development.

Give business to real SMMEs and not one of the major oil company's affiliated SMMEs.

APPENDIX K – PERMISSION FROM EMPLOYER TO CONDUCT RESEARCH

TRANSNET

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A Division of Transnet Ltd

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July 12th, 2010

PERMISSION TO CARRY OUT RESEARCH INVOLVING FUEL SUPPLY TENDER RESPONDENTS

To whom it may concern,

One of TFS's employees, Geoff Haw will be conducting academic research into fuel industry SMMEs as part of his MBA study and has my full permission to do so. All the data that he will be collecting will be for his use and eyes only and not be made available to any other Transnet employee or affiliate, including members of the fuel industry. The thesis that he will be compiling will be reviewed by myself, prior to submission to ensure that full confidentiality has been preserved.

Geoff Haw will not be involved in any way with the current fuel tender, nor will he be allowed to influence the proceedings in any way.

Yours sincerely,

Zeyd Timol
CEO : Transnet Fuel Solutions

APPENDIX L – TIERS WITHIN THE COMMERCIAL SOUTH AFRICAN OIL INDUSTRY

	Supplied by	Sells to	Distribution channels	Storage facilities	Retail network
Major oil companies	Own refineries Imports from overseas parent Loans from other major oil companies	Small oil companies Very large end users. E.g. Anglo Mines, Transnet	Rail, Road and pipeline	National network of depots	Yes
Small oil companies	Major oil companies	Micro oil companies Large farms and transport companies Very large end users. E.g. Anglo Mines, Transnet	Road	Regional network of depots	Very few retail outlets
Micro oil companies	Small oil companies	Small end users (small farms, transport companies, industrial uses-boilers, furnaces)	Road	No storage	None

APPENDIX M – Z VALUE TABLE

Z-Score	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.7	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.8	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

APPENDIX N – T VALUE TABLE

Table of t values

Tail robability ail	2-tail	Degrees of Freedom 1	2	3	4	5	6	7	8	9	10	12	15	20	25	30	40	50	1 00	1000 ≈ ∞	Confidence Levels 2-sided	1-sided
	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
	0.8	0.325	0.289	0.277	0.271	0.267	0.265	0.263	0.262	0.261	0.260	0.259	0.258	0.257	0.256	0.256	0.255	0.255	0.254	0.253		
	0.6	0.727	0.617	0.584	0.569	0.559	0.553	0.549	0.546	0.543	0.542	0.539	0.536	0.533	0.531	0.530	0.529	0.528	0.526	0.525		
5	0.5	1.000	0.816	0.765	0.741	0.727	0.718	0.711	0.706	0.703	0.700	0.695	0.691	0.687	0.684	0.683	0.681	0.679	0.677	0.675		
	0.4	1.376	1.061	0.978	0.941	0.920	0.906	0.896	0.889	0.883	0.879	0.873	0.866	0.860	0.856	0.854	0.851	0.849	0.845	0.842		80%
7	0.34	1.691	1.242	1.132	1.082	1.054	1.036	1.024	1.015	1.008	1.002	0.994	0.986	0.977	0.973	0.970	0.966	0.963	0.959	0.955		
5	0.3	1.963	1.386	1.250	1.190	1.156	1.134	1.119	1.108	1.100	1.093	1.083	1.074	1.064	1.058	1.055	1.050	1.047	1.042	1.037		
4	0.28	2.125	1.467	1.315	1.248	1.211	1.187	1.171	1.159	1.149	1.142	1.131	1.121	1.110	1.104	1.100	1.095	1.092	1.086	1.081		
3	0.26	2.311	1.556	1.385	1.311	1.270	1.244	1.226	1.212	1.202	1.194	1.182	1.171	1.159	1.153	1.148	1.143	1.139	1.133	1.127		
2	0.24	2.526	1.654	1.462	1.379	1.333	1.304	1.284	1.269	1.258	1.249	1.236	1.224	1.211	1.204	1.199	1.193	1.189	1.182	1.176		
1	0.22	2.778	1.763	1.545	1.453	1.401	1.369	1.347	1.331	1.318	1.308	1.294	1.280	1.266	1.258	1.253	1.246	1.242	1.234	1.227		
	0.2	3.078	1.886	1.638	1.533	1.476	1.440	1.415	1.397	1.383	1.372	1.356	1.341	1.325	1.316	1.310	1.303	1.299	1.290	1.282	80%	90%
9	0.18	3.442	2.026	1.741	1.623	1.558	1.517	1.489	1.469	1.454	1.442	1.424	1.406	1.389	1.379	1.373	1.365	1.360	1.350	1.342		
8	0.16	3.895	2.189	1.859	1.723	1.649	1.603	1.572	1.549	1.532	1.518	1.498	1.478	1.459	1.448	1.441	1.432	1.426	1.416	1.406		
75	0.15	4.165	2.282	1.924	1.778	1.699	1.650	1.617	1.592	1.574	1.559	1.538	1.517	1.497	1.485	1.477	1.468	1.462	1.451	1.441		
7	0.14	4.474	2.383	1.995	1.838	1.753	1.700	1.664	1.638	1.619	1.603	1.580	1.558	1.537	1.524	1.516	1.506	1.500	1.488	1.477		
65	0.13	4.829	2.495	2.072	1.902	1.810	1.754	1.715	1.687	1.666	1.650	1.626	1.602	1.579	1.566	1.557	1.546	1.539	1.527	1.515		
6	0.12	5.242	2.620	2.156	1.971	1.873	1.812	1.770	1.740	1.718	1.700	1.674	1.649	1.624	1.610	1.600	1.589	1.582	1.568	1.556		
55	0.11	5.730	2.760	2.249	2.048	1.941	1.874	1.830	1.797	1.773	1.754	1.726	1.699	1.672	1.657	1.647	1.635	1.627	1.613	1.600		
5	0.1	6.314	2.920	2.353	2.132	2.015	1.943	1.895	1.860	1.833	1.812	1.782	1.753	1.725	1.708	1.697	1.684	1.676	1.660	1.646	90%	95%
45	0.09	7.026	3.104	2.471	2.226	2.098	2.019	1.966	1.928	1.899	1.877	1.844	1.812	1.782	1.764	1.752	1.737	1.729	1.712	1.697		
4	0.08	7.916	3.320	2.605	2.333	2.191	2.104	2.046	2.004	1.973	1.948	1.912	1.878	1.844	1.825	1.812	1.796	1.787	1.769	1.752		
35	0.07	9.058	3.578	2.763	2.456	2.297	2.201	2.136	2.090	2.055	2.028	1.989	1.951	1.914	1.893	1.879	1.862	1.852	1.832	1.814		
3	0.06	10.57	3.896	2.951	2.601	2.422	2.313	2.241	2.189	2.150	2.120	2.076	2.034	1.994	1.970	1.955	1.936	1.924	1.902	1.883		
25	0.05	12.70	4.303	3.182	2.776	2.571	2.447	2.365	2.306	2.262	2.228	2.179	2.131	2.086	2.060	2.042	2.021	2.009	1.984	1.962	95%	
2	0.04	15.89	4.849	3.482	2.999	2.757	2.612	2.517	2.449	2.398	2.359	2.303	2.249	2.197	2.167	2.147	2.123	2.109	2.081	2.056		98%
17	0.034	18.71	5.284	3.712	3.166	2.895	2.734	2.628	2.553	2.498	2.454	2.392	2.333	2.276	2.243	2.222	2.195	2.180	2.150	2.123		
15	0.03	21.21	5.643	3.896	3.298	3.003	2.829	2.715	2.634	2.574	2.527	2.461	2.397	2.336	2.301	2.278	2.250	2.234	2.202	2.173		
12	0.024	26.51	6.338	4.241	3.541	3.200	3.000	2.870	2.778	2.710	2.658	2.582	2.511	2.442	2.403	2.378	2.346	2.328	2.292	2.261		
1	0.02	31.82	6.965	4.541	3.747	3.365	3.143	2.998	2.896	2.821	2.764	2.681	2.602	2.528	2.485	2.457	2.423	2.403	2.364	2.330	98%	99%
07	0.014	45.47	8.363	5.175	4.173	3.700	3.428	3.253	3.131	3.041	2.972	2.873	2.781	2.693	2.642	2.610	2.570	2.547	2.501	2.462		
05	0.01	63.65	9.925	5.841	4.604	4.032	3.707	3.499	3.355	3.250	3.169	3.055	2.947	2.845	2.787	2.750	2.704	2.678	2.626	2.581	99%	99.5%
03	0.006	106.1	12.85	6.994	5.321	4.570	4.152	3.887	3.705	3.573	3.472	3.330	3.197	3.073	3.003	2.957	2.902	2.870	2.808	2.754		
02	0.004	159.2	15.76	8.053	5.951	5.030	4.524	4.207	3.991	3.835	3.716	3.550	3.395	3.251	3.170	3.118	3.055	3.018	2.946	2.885		
01	0.002	318.3	22.32	10.21	7.173	5.893	5.208	4.785	4.501	4.297	4.144	3.930	3.733	3.552	3.450	3.385	3.307	3.261	3.174	3.098	99.8%	99.9%
05	0.001	636.6	31.59	12.92	8.610	6.869	5.959	5.408	5.041	4.781	4.587	4.318	4.073	3.850	3.725	3.646	3.551	3.496	3.391	3.300	99.9%	99.95%
01	.0002	3183	70.70	22.20	13.03	9.678	8.025	7.063	6.442	6.010	5.694	5.263	4.880	4.539	4.352	4.234	4.094	4.014	3.862	3.733		99.99%
5	.0001	6366	99.98	27.99	15.54	11.18	9.082	7.884	7.120	6.594	6.210	5.694	5.239	4.837	4.620	4.482	4.320	4.228	4.053	3.906	99.99%	