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COAL MARKETING IN SOUTH AFRICA:

THE INTRICASIES OF PRODUCT, DISTRIBUTION, PRICE AND PROMOTION IN DOMESTIC AND EXPORT MARKETS

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Master of Science in Engineering by advanced coursework and research:

A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in partial fulfillment of the requirements for the degree of Master of Science in Engineering

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DECLARATION

I declare that this research report is my own unaided work. It is being submitted to the Degree of Master of Science to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.

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_____day of _____year_____

ABSTRACT

The study aims at examining all the individual activities during the marketing process of bulk commodity coal. This involves integrating all the concepts of the marketing mix, namely: product, price, distribution and promotion. The marketing mix elements all focus on industrial marketing fundamentals, which are essentially different to those in usual product and service marketing. The marketing mix is discussed in theoretical and practical detail which is essential for reaching markets at optimal pricing structures to ensure the longevity of the producing company. The research was conducted on an exploratory descriptive basis.

The study focuses on ESKOM, Domestic Sales and Export Sales ex Richards Bay Coal Terminal, as the three existing markets for coal in South Africa. Reference is made to Durban and Maputo Terminals as alternative ports for coal exports from South Africa.

To Henk and Lara

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CHAPTER 1

INTRODUCTION

The study aims at examining all the individual activities during the marketing process of bulk commodity coal. This involves integrating all the concepts of the marketing mix, namely: product, price, distribution and promotion. The marketing mix elements all focus on industrial marketing fundamentals, which are essentially different to those in retail and consumer product and service marketing. The marketing mix is discussed in theoretical and practical detail which is essential for reaching markets at optimal pricing structures to ensure the longevity of the producing company.

The study focuses on ESKOM, Domestic Sales and Export Sales ex Richards Bay Coal Terminal, as the three existing markets for coal in South Africa. Reference is made to Durban and Maputo Terminals as alternative ports for coal exports from South Africa.

A comprehensive literature review concentrates on the relevant industrial marketing theory concepts, and includes a discussion of industry, business and marketing strategy. The literature review emphasises the exploratory and descriptive nature of the research conducted to complete the study.

In an effort to comprehend the development, growth and evolution of the South African coal industry, a complete discussion on market fundamentals is presented. These include examining Black Economic Empowerment and the influence of mining legislation after 1994. In terms of supply, each coal producing entity (including the Junior Mining Companies (JMC) involved with coal) is discussed with reference to its current production capacity and project pipe-line. Demand for domestic thermal coal centres around consumer facts on ESKOM, SASOL Synthetic Fuels and the remainder of the domestic market.

The study focuses on thermal coal as the ultimate product and its marketing in South Africa. Mining and production are viewed as the preliminary and first essential inputs to the ultimate marketing plan. In an effort to analyse the product, technical specifications and composition are the main determinants of product utilisation. Coal quality requirements for power generation and cement manufacturing are determined by burner and stoker qualities. Product specifications are derived and established for ESKOM, export and domestic products.

The distribution function divides the supply chain and its various technical fields to reflect the intricacies of the logistics chain based on road, rail and sea freight. Road transport has become an important coal transport mode in recent years. This is mainly as a result of a lack of rail infrastructure, but the impact on South Africa and its economy will be lasting. Railage is the most crucial supply chain component and the difference between General Freight Business (GFB) and Transnet Freight Rail (TFR) contracts is highlighted with a view to understanding the constraints. Although sea freight explore the final link in the supply chain for global customers in exports, Incoterms and sea freight concepts are examined mainly up to a free-on-board (FOB) basis.

Furthermore, a detailed assessment of price determination is made for all markets. Developments in coal price derivatives are reviewed with special consideration of the methodology of indices and hedging as a risk management tool. The pricing regime for ESKOM, domestic sales and exports have evolve over the past 8 years, but very aggressively since 2007 when economic structural changes became evident in the economy. This section focuses on explaining the changes that occurred and how the market operates within the new framework.

Promotion as the final element of coal marketing, embraces topics such as relationship marketing, market intelligence and ethics. The promotional elements of sales promotion, personal selling, advertising and publicity together with these three factors are essential for the successful placement, growth and longevity of a producer in the industry. Relationship marketing is confirmed as the single most important aspect for inter-organisational, global customer and supplier relationships.

The culmination of the research, facts and proposed future research is found in the final chapter. Market players cannot develop a marketing strategy without a

critical understanding of the market it operates within. This understanding of the market and its building blocks will grow, improve and sustain a coal producing company in its operating environment, dependant off course on the markets it produces for and the availability of infrastructure to the producing company.

Recommendations for further research are made, as the findings of the study allude to further marketing concepts and unexplored theories and practices.

CHAPTER 2

LITERATURE REVIEW

The literature review encompasses business marketing concepts, particularly the theory dealing with industry matters. Marketing theory is discussed in terms of the marketing mix and each field's components as the basis for the literature review.

The literature review is divided into logical sectors, discussing all relevant terms and theory from a strategic to operational viewpoint.

2.1 Business Marketing

Business marketing is defined as the marketing of products and services to commercial enterprises and governments for the products and services, they produce (Hayes, Jenster and Aaby: 1996).

The magnitude of business marketing is described by Dwyer and Tanner (2002), as purchases made by companies, government institutions and agencies account for more than half of the economic activity in industrialised countries, making business marketing an important activity.

Furthermore, Melnyk and Denzler (1996), consider this aspect of marketing as managing the interface between the customer and the company. It identifies the needs and expectations of the customer and communicates that information to the rest of the company. It also helps to shape these expectations through activities that communicate the capabilities of the company to current and potential customers. Marketing also monitors interactions between customers to identify any changes in needs and expectations, and it tracks competitors to identify any actions that might adversely affect the company's position in the marketplace. Bulk commodity

marketing plays a critical role in helping company managers identify the meaning of value to either current or future customers.

The marketing system identifies the major components that interact in the company's environment to enable the company to successfully provide products and or services to the marketplace. The external environment that influences the marketing system includes: the economy, culture, technology, demand, legal concerns, politics and raw materials. The internal environment of the marketing system includes: financial resources, personnel resources, research and development, capital equipment, suppliers, the corporate mission and corporate goals and objectives (Hisrich and Peters: 1991).

Marketing (of commodities) is both a set of activities performed by organisations and a social process. This indicates that marketing exists at both micro and macro levels. Micro-marketing looks at the customers and the companies that serve them, while macro-marketing takes a broad view of the production-distribution system (Perrault and McCarthy: 1996).

2.2 Marketing Strategy

The marketing strategy should have two purposes: (1) to provide broad guidance for the development of the business strategy, and (2) to guide and direct marketing activities. The marketing strategy has customer-focused objectives that guide and support the business strategy and decisions and actions with respect to target customers, price, product, promotion and distribution necessary to achieve the objectives (Hayes *et.al*: 1996).

The marketing mix describes the interaction of four factors that represents the core of the company's marketing system: product, price, distribution and promotion. Within each of the four factors that make up the marketing mix there are countless other variables. For example, the product area encompasses packaging, branding, product design and product development.

In pricing, management must be concerned with costs, discounts, freight and other price-related factors. Distribution represents those activities related to providing place utility to the customer, providing the product to the customer when and where it is needed. Choosing the type, number and location of distributors are some of the countless decisions that must be made as part of

the company's distribution plan. Promotion includes advertising, personal selling, sales promotion and publicity (Hisrich and Peters: 1991).

According to Cravens (1997), the marketing plan guides implementation and control, indicating marketing objectives and the strategy and tactics for accomplishing these objectives. Cravens (1997), furthermore describes the marketing plan in four phases, where all phases are underlined by information derived from each phase, market research as well as the evaluation of the plan and its performance.

The following phases are depicted:

Phase 1 – The preliminary analyses and screening phase. Here company and country needs are matched in terms of environmental uncontrollables, company character and screening criteria.

Phase 2 – Adapting the marketing mix to target markets, essentially analyzing the 4 Ps.

Phase 3 – Developing the marketing plan, which include situation analyses, objectives and goals, strategy and tactics, budgets and action plans.

Phase 4 – Implementation, evaluation and control of objectives, standards, assigning responsibilities, measuring performance and correcting errors.

2.3 The Industry

When profiling an industry, in this case, the South African coal producing industry as well as buyers domiciled in South Africa and globally, the following questions are asked:

- Who are the competitors? This include direct competitors as well as those sufficiently close enough to be taken into account (Hayes et.al: 1996);
- Who are the buyers, suppliers, potential entrants and possible substitutes, and what are their major characteristics? (Hayes et al: 1996)
- What is the size of the industry, and what is its growth rate in physical tonnes and South African Rand (ZAR) value?
- What are the key characteristics of the industry, in terms of its technologies, capital structures, logistical constraints and available natural resources?

The arena of competition within which an industry member should fight will be described in terms of its boundaries, its rules of the game, and its players.

Differentiated marketing aims to increase sales and efficiency by increasing the customer base. Demand thereby creates economies of scale in distribution and production (Hisrich and Peters: 1991).

Favourable factors are those that will positively affect a product's sales, and these are highly dependant on the type of product, as well as the market focus – consumer, industrial or governmental. Certain economic and business activity indicators will also provide an indication of probable sales of a product. These indicators include increased demand for goods; low unemployment rate; increasing consumer, industrial, and government purchases; reasonable balance of trade; and inventories in line with sales (economic supply and demand fundamentals).

Unfavourable factors are those that can negatively affect the sales of a product. The following indicators generally have a negative effect on sales: high interest rates; rising prices and threat of inflation; decline in construction; decline in automotive sales; labour discontent and strikes; restrictive monetary policy; and a decline in the stock market.

The coal industry is perceived to be in a mature phase, or coal as a product - to be a mature product. A mature industry or product is likely to involve a mass market, many channels, low prices, many competitors, lowest gross margins, high incentives to customers and trade, superior product quality and optimum capacity (Hisrich and Peters: 1991).

Perrault and McCarthy (1996), remark that wherever many companies sell homogenous products, such as coal, the demand curve seen by each producer tends to become flat. Markets tend to become more competitive, moving toward pure competition. On the way to pure competition, prices and profits are pushed down until some competitors are forced out of business, however, in long-run equilibrium, the price level is only high enough to keep the survivors in business.

Business-to-business market places (also referred to as B2B exchanges) are defined by Vogt, Piennaar and de Wit (2002), as electronic market places on

the Internet where suppliers and buyers interact to conduct business transactions. These market places provide an opportunity for huge value creation through the reduction in transaction costs, improved supply chain visibility, and more efficient allocation of supply and demand.

B2B communication occurs when an order from a customer is transmitted to the supplier after all the necessary marketing interventions have taken place. B2B communication can be done by telephone, fax, or via electronic data interchange (EDI) or the Internet (Vogt et al:2002).

2.4 Product

According to Dwyer and Tanner (2002), product is a collection of features and advantages and has benefit or satisfies the need of buyers. Product is defined in terms of core product – which is the tangible product that is offered. The augmented product is that part of the offering that is somewhat customised for each particular customer.

Figure 2.1 shows the "whole product" the customer buys and should be viewed as a bundle of tangible and intangible attributes from which customers derive benefit and value. The attributes and importance vary among customers. From some customers joint product development is an important attribute, for others it is the support of the firm's marketing effort. This suggests that the product is not a fixed element of marketing strategy. Rather, it is a variable whose attributes can be changed, depending on the needs of the particular customer or marketing segment.

Even for commodity products, normally considered undifferentiable, the whole product concept suggest opportunities exist for differentiation on attributes such as packaging, comprehensiveness of the product line, one-stop shopping convenience or special services. For all products the core of generic attributes should be the starting point of development of a whole product from which consideration is given to other product features appropriate for particular customer needs.

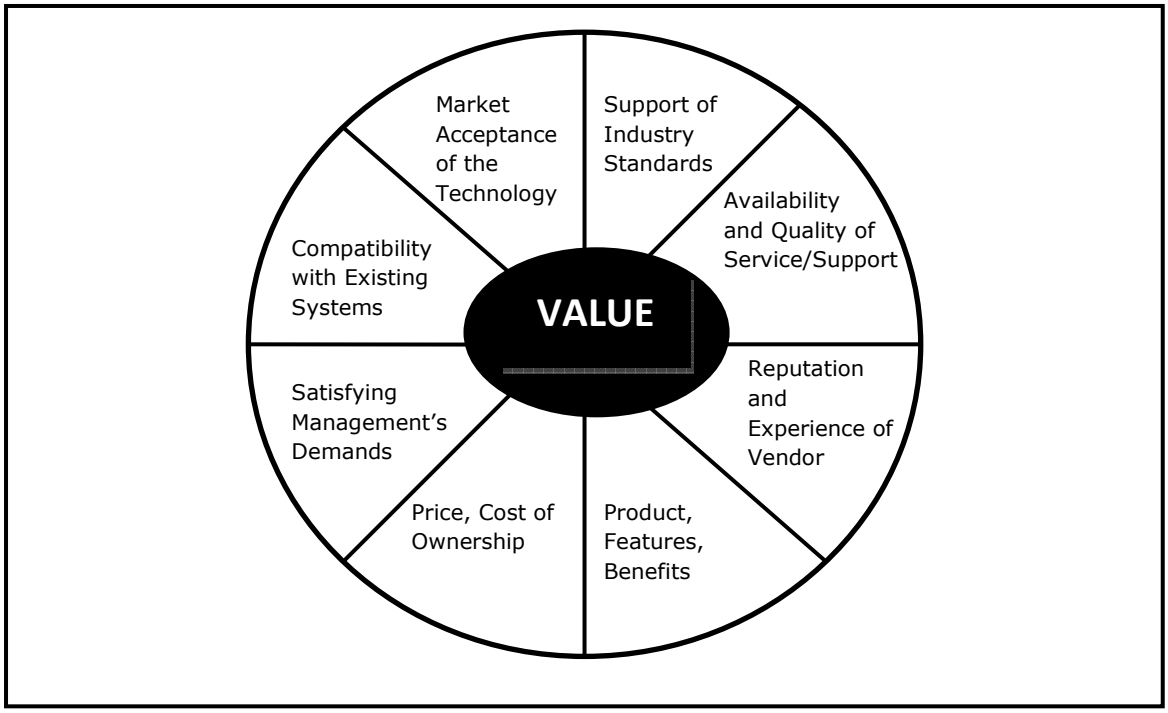

Figure 2.1 The whole product approach to value

(Source: Regis and McKenna, Summer 1994 (derived from Hayes et al: 1996).)

The concept of quality is inextricably intertwined with the concept of product. Melnyk and Denzler (1996), defined that quality represents how well the good or service meets or exceeds the expectations of the customer at the time of purchase. However, they also indicate that confusion surrounds the distinction between what quality is and what it is not.

According to a review of the literature there are five different views (and definitions) of quality:

- **Transcendental View** – A condition of excellence implying fine quality as distinct from poor quality. Quality is achieving or reaching for the highest standards as against being satisfied with the sloppy or fraudulent;
- **Product-Based View** – Differences in quality amount to differences in the quantity of some desired ingredient or attribute;
- **User-Based View** – The capacity to satisfy wants. In the final analysis of the market place, the quality of a product depends on how well it fits patterns of consumer preference;

- **Manufacturing-Based View** – Conformance to requirements. The degree to which a specific product conforms to a design or specification; and
- **Value-Based View** – The degree of excellence at an acceptable price and the control of variability at an acceptable cost. Best for customer conditions: (a) the actual use and (b) the selling price of the product.

Particularly important and interesting, specifically to commodity marketing and production is the concept of *Total Involvement in the Quality Undertaking*. Melnyk and Denzler (1996) argue that for a commodity product such as coal, which incorporates various entities in the production and delivery process, quality will rely on three different types of team work:

- **Vertical Teamwork** – Total Quality Management (TQM) requires on-going vertical co-operation between top management and functional groups. Actions within engineering must contribute to the strategic orientation and goals of the company.
- **Horizontal Teamwork** – Horizontal teams bring together representatives from various functional groups. The production of thermal coal will involve representatives from mining, beneficiation, marketing, logistics, quality assurance and finance.
- **Inter-organisational Teamwork** – The final type of teamwork brings together representatives of the company with suppliers and customers. This type of teamwork ensures that the firm coordinates its quality activities with those of suppliers, and these activities meet or exceed the expectations of customers.

2.5 Pricing

Business marketing looks beyond economic theories in the pricing decision process. Pricing of industrial products involve the company's costs, customers' perception of value, and competitors' prices for similar goods (The three C's). Beyond the three C's, most marketers must also make their pricing decisions in the context of the company's overall objectives for pricing policy. The company's objective remains to produce a profit. Profit objectives, however, may be stated in terms of return on investment or return on sales. It may also be stated in terms of expected gross margin or profit contribution after marketing expense (Hayes et al: 1996).

Few firms rely solely on a cost-based approach to pricing, although costs are a major determinant of profit. It is important to distinguish among fixed, semi-fixed and variable costs.

- **Fixed costs -** do not vary as a function of volume produced. It includes items such as physical plant and equipment, long term leases, or interest on long term debt.
- **Semi fixed costs -** do not vary as a function of volume produced but can be changed in the short term by management decision. It includes such items as salaries, general administrative expenses, R&D expenses, or advertising commitments.
- **Variable costs -** vary directly with the number of units produced. It include items such as raw materials, direct manufacturing labour, freight and commissions.

This holds true especially in the coal industry where cash cost is an important lever to establish a company's sustainability in a volatile market.

According to Nagle and Holden (1995:39) there are a number of key aspects of costs that need to be taken into account for pricing decisions. Few companies make an investment in fixed costs that cannot be recovered in an appropriate time period. Breakeven is a must, although few companies are interested in simply breaking even. The price, therefore must not only cover variable costs but must also result in sufficient volume so that the total contribution (revenue minus variable costs) covers all fixed costs and returns some desired level of contribution to profit, R&D or investment in other opportunities. Even fewer companies price below variable costs. Hence, a company's variable costs become the floor for the pricing decision. It is important to recognise that the term total cost takes on meaning only for a specific volume.

These relationships can be seen in a variation of the familiar break-even chart, as shown in Figure 2.2, adapted from Nagle and Holden (1995:50). A key concept is the per unit contribution or the difference between unit revenue and per unit variable cost. Break-even volume, where revenue equals total cost (Q1), is calculated by dividing fixed costs per unit contribution. In the illustration, the desired profit contribution is constant. Here the required volume is where revenues equal total cost plus desired contribution (Q2). While most companies avoid pricing at a level that falls

below what is considered total costs, there may be occasions when such a price will make a positive contribution toward fixed costs, even though they are not fully recovered.

The relation of fixed to variable costs is a critical aspect of pricing. In high fixed cost industries, (e.g. coal mining), high contribution margins are necessary to cover fixed costs. In times of economic slowdown, when the level of fixed manufacturing capacity substantially exceeds industry demand, pressure to secure orders that frequently lead to price wars with large reductions in price that still do not fall below variable costs provide at least some contribution margin.

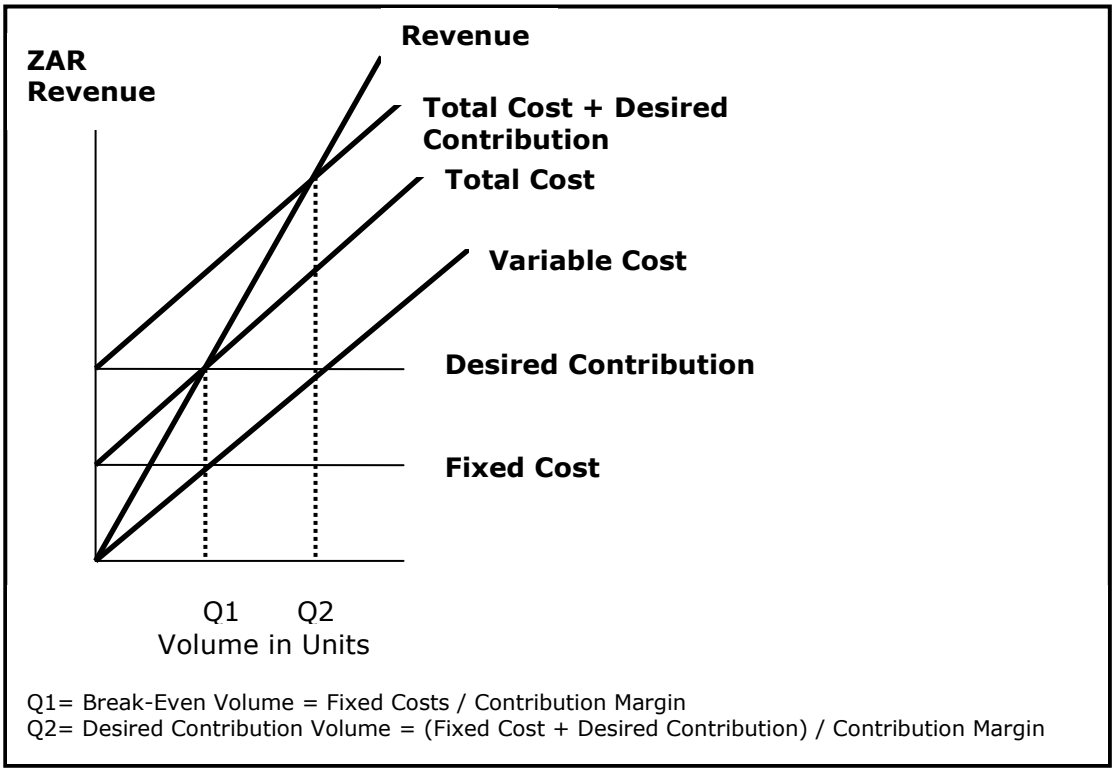

Figure 2.2 Variation on break-even analysis
(Source: Nagle and Holden 1995:50)

The impact of accounting policies and practices on costs should be noted, particularly IFRS' impact on depreciation, inventory valuation, and fixed asset valuation and impairment, e.g. when fixed costs include a depreciation component, accelerated depreciation schedules show higher costs.

Perhaps the most salient aspect of pricing is that customers are not passive entities in the exchange process. Rather they are professionals who carefully analyse a company's offerings in terms of value, both intrinsically and relative to competitive offerings. For bulk commodities such as coal, given that a terminal market exists, market price is transparent, and pricing is usually fixed, depending on the strategy of the producer and its recovery within the price.

The pricing decision must take into account the presence of existing competitors. For bulk commodities, such as coal, and mature products, the company's pricing flexibility will depend on the extent to which customers perceive differences between competitive offerings. In the coal industry, price leaders are found; that is, companies, by virtue of size, reputation or past practice play a major role in determining the overall level of prices in the industry. In some instances, the price leader may take the lead in initiating price changes that are widely followed by others in the industry. More frequently, and in particularly with respect to price reductions, the initiative to change prices is taken by smaller companies, but it is the action by the price leader that legitimises the new price level.

In times of increased demand the opportunity may exist to increase industry prices, but some companies may elect to forgo price increases in an attempt to increase share. Similarly, in times of increasing costs the pressure may exist to pass cost increases on to customers, but again, some companies may elect, instead, to forgo price increases in order to increase share (Hayes et al: 1996). Given the major volatility experienced in coal markets since mid-2008, market share increase became an important objective to producers, as the market created opportunities to take advantage of increased market share.

Coal products are directly related to the quantity of a customer's product or service being produced. Here, demand is fundamentally determined by the customer's demand, and total or industry demand for the product or service may not be influenced by price. In the long run, demand for capital goods is also associated with the quantity of the customer's product being produced. This suggests the difficulty of precisely estimating industry price elasticity of demand. Nagle and Holden (1995:53) maintain that assumptions can be made as to whether demand is in the elastic zone, in which case an industry

price increase will result in revenue decrease, or in an inelastic zone, in which case an industry price increase will lead to a revenue increase. These assumptions play a major role in determining price levels in an industry and can significantly affect responses to competitors' price moves.

If a company sells directly to its customers, it has complete control over the price at which it offers its product(s). Where distributors or other intermediaries are involved, the price at which goods are offered, should take theses costs into account in the price determination process. Vertical price fixing is illegal between producers and distributors.

Crowson and Sampson (2000), define risk, and specifically price risk, in terms of supply and demand fundamentals. Demand for coal is primarily influenced by the level and structure of economic activity, by technological developments, and by relative price levels. Strong economic growth will bring increased consumption and the restocking of industrial commodities. Increased prosperity and confidence about the future course of economic growth will also induce consumers to buy more goods and industrialists to invest in new plant and buildings.

During periods of recession or weak economic growth the opposite happens: fabricators and merchants will rapidly run down their inventories and buy their raw materials on a strictly hand to mouth basis. Consumers spend less and industrialists postpone capital spending programmes to curtail them. All these factors became evident in late 2008 and throughout 2009, as the coal industry started its recovery from the world-wide recession.

There is no reason to expect the various influences on supply and demand to move in offsetting ways. A natural disaster reducing supply can happen at any time, regardless of the state of demand, while a major strike is probably more likely to be staged when the product is in great demand. Since the supply of commodities is relative inflexible in the short term, changes in demand linked to cyclical fluctuations in business activity are directly reflected in changes in the level of inventories and in prices. Fluctuations in prices are seldom predictable with any degree of accuracy.

Hedging is defined by Crowson and Sampson (2000), as the process undertaken by users of derivative instruments to lock in the coal prices they

will pay or receive for future deliveries. This is done because the hedger wants to lock-in a known coal price on a particular operation, or because the coal prices currently available on the forward market are attractive and the hedger wishes to fix these prices against anticipated business. There are basically two main motivations for hedging:

- To lock in coal prices which are attractive relative to one's internal costs; and
- To secure a coal price to set against an external contract.

2.6 Distribution (Place)

Distribution modes in the coal industry are road, rail and sea freight. In some cases (ESKOM specific), conveyors are used to deliver coal to power stations, directly from the mine. This study focuses on the road, rail and sea transport of bulk coal products.

Road freight transport is more flexible and versatile than other modes of transport because of vast networks of roads. Currently in South Africa, as a result of a lack of rail infrastructure investment, and depleting coal reserves, road freight transport is often transporting bulk commodities, where rail freight cannot reach. Road freight transport is an essential part of the distribution channel for the following reasons:

- No rail lines available at consumer points;
- Rail lines are not immediately adjacent to producing mines;
- Inconsistency of rail freight service (Vogt *et al*: 2002).

Of all the forms of transport, road transport has the highest proportion of variable cost to total costs. The main reason is that:

- The road infrastructure is publicly owned; Government typically recover road-user cost responsibility through levies included in the price of fuel, thereby converting fixed cost into a variable transport expenditure;
- Terminal facilities are less capital intensive than the terminal facilities of other forms of transport; and
- The fuel consumption of road transport vehicles is relatively high, making fuel cost a proportionally larger variable cost component.

Rail transport can carry large and high-density commodities and bulk consignments, such as coal over long distances and at low cost. Rail

transport is therefore well suited to carry raw materials and semi-finished good. In the bulk, long-distance transport market, throughput and price are more important to the company than transit time.

Vogt *et al* (2000:48), note that due to the high capital investment in infrastructure (e.g. railway lines and terminal facilities, stations, marshalling and classification yards, sheds, goods depots and workshops) and the longevity of rolling stock such as freight wagons, the ratio of fixed costs to total costs are very high. Because the unit costs decreases when output increases, rail transport can gain the benefits of economies of scale when utilisation increases. As a result, rail transport posses a cost advantage over road transport with respect to bulk coal loads that are conveyed over long distances.

Sea transport or ocean carriage is the most cost-effective way of transporting high-bulk commodities over long distances and is therefore the most widely used international shipment method. Bulk carriers carry cargoes with low value-to-weight ratios, such as coal.

The cost structure of sea transport is characterised by a high proportion of variable cost due to the fact that the way (the sea) does not require investment and sea ports are not owned or supplied by shipping firms (Vogt et al:2000:56). Expenses at ports arise when a port is visited.

A terminal is a special area situated at the end of a route or where different routes meet, branch out or cross- including structures and equipment, where in-transit goods are transferred between different carriers, modes of transport or vehicles of the same mode. In Southern Africa, notably Richards Bay Coal Terminal (RBCT) and Grinrod TCM Matola coal terminal in Maputo.

Terminals provide a freight consolidation function by receiving small consignments and combining it into larger loads. Consolidation can maximize the utilisation of vehicle payload capacity. Terminals provide a bulk breaking service, warehousing and transferring service, as well as re-fueling, garaging, and maintenance of vehicles and equipment.

International Commercial Terms (Incoterms) are a set of contractual instruments facilitating the sale and transport of goods in domestic and

international transactions. These are discussed in detail in Section 6. Incoterms are included in a contract of sale if parties:

- Complete a sale of goods;
- Indicate each contracting party's costs, risks and obligations with regard to delivery of the goods; and
- Establish basic terms of transport and delivery in short format.

2.7 Market Intelligence

Cravens (1997), states that information performs a vital strategic role in a company. Information capability creates a sustainable competitive advantage by improving the speed of decision-making results. Managers' models of their markets guide the interpretation of information and the resulting strategies designed to keep the company ahead of its competition.

Business marketing intelligence is the collection, analysis and interpretation of relevant internal and external marketing information. It is comprised of all kinds of market and marketing research; the collection and analysis of internal data; competitive analysis; analysis and reverse engineering of competitors' products; understanding how and where to add value for customers; and the process of synthesizing large amounts of informally gathered information about the environment (Hayes *et al*: 1996).

Cravens (1997), further affirms that marketing information capabilities include marketing research, marketing information systems, database systems, decision-support systems and expert systems. Research information supports marketing analyses and decision making. The information may be obtained from internal sources, standardised information services and special research studies.

Computerised information systems include management information systems, database systems and decision-support systems. These systems have capabilities for information processing, analysis of routine decision-making, and decision recommendations for complex decision situations.

The vast array of information processing and telecommunications technology that is available offers many opportunities to enhance the competitive advantage of companies. Coal producing companies have historically been

implementing direct order systems, such as SAP R/3 and using electronic data interface (EDI) systems to customers to create expected management information on a weekly, monthly and annual basis.

2.8 Relationship Marketing

The buyer-seller relationship is the close relationship between customers and their suppliers, and their mutual dependency strongly influences the product management process (Hayes et al: 1996).

Researchers have since the 1980's drawn attention to the need to retain, as well as attract, customers. Lovelock (1996) concurs with this, explaining that relationship marketing recognises the value of current customers and the need to provide continuing services to existing customers, so that they will remain loyal.

The research on relationship marketing and customer retention has taken various forms. For example, some research focus on constructs, such as trust and relationship commitment and how these relate to customer satisfaction and loyalty. Other researchers have focused on specific breakthrough strategies for retaining customers, such as building an effective recovery strategy for service failure situations or offering service guarantees to reduce risk and build loyalty.

In a research article, Sheth (2002) believes that a company must be selective in its use of relationship marketing. Indeed a company must consider segmenting the market into relational and transactional markets. Therefore, unlike total quality management (TQM), relationship marketing is likely to remain more selective and targeted.

Relationship marketing have indeed transformed into customer relationship management (CRM), with a hybrid of marketing relationship programmes that range from relational to transactional to outsourcing market exchanges and customer interactions.

The strategies thought to be most relevant to address strategic (coal) customer objectives are:

- Customer service;

- Key account management; and
- Customer communication – either personally via sales team or impersonally using another method of communication; and
- Product availability – the assured availability of current products is seen as more important than introducing new products (Palmer: 2002).

CHAPTER 3

RESEARCH DESIGN

The study will investigate exploratory and descriptive research.

The exploratory research is undertaken to gain a preliminary understanding of the nature, context potential impact and possible causes of as well as the possible factors contributing to the phenomena of minerals marketing, moreover that of coal marketing in the South African context.

The research involves a review of existing literature available on the topic and other qualitative data collection techniques. It involves an open and flexible research approach aimed at ensuring comprehension and generating insights and the research design evolves as the study reveals more about the issue under investigation.

In terms of descriptive research, the characteristics of situations, events, processes, and entities based on qualitative and or quantitative observations are described. This includes creating classifications, categorisations or typologies of entities, as well as describing the nature of the relationship between concepts.

This descriptive study provides a qualitative in-depth description of the coal industry, its processes, groups, companies and other organisations which contribute to the successful placement of the bulk material to customers, both domestically and internationally.

CHAPTER 4

SOUTH AFRICAN MARKETING FUNDAMENTALS

South Africa remains one of the most important coal producers in the world. Different grades of good quality coal are produced for export and domestic markets, with a vast amount of low quality material being consumed by the domestic electricity producer (ESKOM), and the synthetic fuel industry (SASOL).

As with the rest of the mining industry, the coal industry has evolved over the past 10 years whilst incorporating Black Economic Empowerment (BEE). The industry saw the birth of a thriving new Junior Mining Sector, and all major coal producers had to include a minimum of 26% BEE shareholding.

The major coal export facility, Richards Bay Coal Terminal (RBCT), has announced various new phases to increase the export allocation to Junior and BEE entities. Although the increase in terminal allocation have been welcomed across the board, Transnet Freight Rail (TFR), have cited that the rail capacity will not be available without significant capital expenditure over the next 8 years.

This chapter gives a detailed overview of BEE legislation in South Africa, in order to explain the changes of the industry over the past 14 years. The major producers will be discussed, along with the new Junior Mining fraternity to give an accumulated view of the producer market. ESKOM and SASOL are discussed as the major consumers of domestic coal. For completeness, the remainder of the domestic market is reviewed.

The coal supply situation in South Africa has been very topical over the past 18 months, due to the potential looming electricity crisis in the country. The continuing load shedding programs and ESKOM's public request for more coal has fuelled the question of how sustainable the thermal coal exports from South Africa would be in the medium to long term. This build-up has also

contributed in 2008 to the soaring export price with the API #4 hovering above the US$ 100.00/mt FOB level for a period of 6 months. A concise overview of the producer and consumer market will aim at giving a better understanding of the matters that drive the coal industry in South Africa. These matters include a historical overview of coal supply and demand from South Africa, Black Economic Empowerment, production breakdown per producer and capital expenditure plans and a consumer list detailing annual consumed tonnage.

4.1 South African Coal Statistics

The latest coal statistical information available from Department of Minerals is for the end of 2007. Although 2008 was the most tumultuous year in the history of coal, these statistics will only be available at the end of 2009.

Following in Table 2.1, South Africa produced 310.3 million tonnes ROM thermal coal, of which 245.3 million tonnes was of saleable quality in 2007. Production of total ROM yielded 53% from opencast, 40% from board-and-pillar, 4% from stoping and 3% from long wall mining methods.

Production increased marginally (0.2%) in 2007 to 245.3 million tonnes, although the year saw local sales tonnage increasing by 3.2% and export volumes declining by 2.1% to a suboptimal tonnage of 66.7 million tonnes.

Table 4.1 South African thermal coal production, domestic sales and exports 2000 - 2007

YEAR	PRODUCTION	DOMESTIC SALES		EXPORT SALES	
	Mt	Mt	Value R/t	Mt	Value R/t FOB
2000	222.5	154.1	56	68.8	160
2001	222.1	152.1	62	69.2	244
2002	218.9	157.2	74	69.2	279
2003	238.1	167.6	78	71.0	188
2004	241.5	177.8	75	67.9	212
2005	243.3	172.7	84	70.9	296
2006	244.8	176.2	90	68.1	315
2007	245.3	181.8	106	66.7	360

(Source: DME, SAMI 2007/2008)

The monetary value of coal per tonne increased for domestic and exported coal by R106/t and R360/t respectively. The five largest mining groups,

Anglo Coal, BHP Billiton, EXXARO, SASOL and Xstrata produced over 80% of the saleable production. Furthermore in 2007, South African coal was exported to 34 countries, of which 84.5% to the European Community (with the largest off-takers being the United Kingdom, Spain, France, Italy and Germany). Other regions constitute Africa, South America, the Far East and the Middle East.

4.2 Black Economic Empowerment in the South African Coal Industry

The BEE policy introduced by the newly democratically elected government, elected in 1994 in South Africa, counters the economic effects of the exclusion of black people as entrenched in the country's previous policy of apartheid. BEE aims to de-racialise the economic activity and ownership of assets in South Africa, which will ultimately lead to the transformation of the socio-economic landscape. BEE has since been implemented, but has also been encouraged in the coal industry in terms of employment equity, skills development and procurement.

4.2.1 A salient history of BEE

Early Empowerment (1994 – 2000)

Early empowerment was characterised by the ad-hoc transfer of equity ownership to a number of high profile black individuals facilitated in some instances by unsustainable funding structures. Initially, there was no legislation governing empowerment of regulating the level of equity ownership. Furthermore, the Government addressed empowerment by way of a promise of wide-scale privatizations, although the only significant privatizations have been Telkom SA Limited and Airports Company of South Africa. The Government went on to establish the National Empowerment Fund as a vehicle to receive allocations of shares in privatized entities on behalf of historically disadvantaged individuals. Companies in the private sector established schemes to encourage broad-based black participation.

Focused Empowerment (2000 – present)

Given the slow progress of empowerment and the limited success of the early empowerment deals, Government formalised the empowerment process by:

1. Promulgating the Broad Based Black Economic Empowerment Act (BEE Act);
2. Encouraging the development of various industry-specific charters; and
3. Releasing the Department of Trade and Industry's Codes of Good Practice (DTI Code).

These actions made empowerment imperative to maintaining market share and attain growth. Furthermore, BEE scorecards included in the charters and the DTI Code have increased the pressure on companies to negotiate sustainable BEE deals by prescribing measurement dates and allocation points to BEE ownership.

4.2.2 Legislation governing BEE in South Africa

The BEE Act provides legislative endorsement of the sector charters which must meet the objectives of the BEE Act. The BEE Act sets out clear objectives for achieving broad-based empowerment. The DTI Code has been issued as a guideline to the act, in order to facilitate the implementation of the BEE Act.

The final DTI Code was released and published on 1 November 2005 and deals with, amongst others, the measurement of equity ownership of BEE participants and the extent of BEE management. Whilst the DTI Code is effective for a period of at least 10 years, it is essential that private sector enterprises apply these principles and guidance in their interactions with organs of state and public entities in order to ensure full recognition for their empowerment efforts.

The Mining Charter was signed in 2002. The minimum black ownership requirement by 1 May 2009 was 15%, and 26% by 2014 at company or asset level. The following important measures in the Mining Charter are highlighted:

- Holders of "old order mining rights" are allowed a period of exclusivity in which to apply for conversion into "new order mining rights", otherwise the mining rights revert back to the State;
- The Mining Charter requires that ownership be measured using attributable units of production. The current debate is whether production is based on volume or value; and

- Historically Disadvantaged South Africans (HDSAs) ownership commitments can be offset against the value of the level of beneficiation.

4.2.3 Implications and development of empowerment

In South Africa today, the average BEE equity ownership regulatory requirement is 25%. Initial BEE transactions have been criticised for benefiting a small group of politically well connected black individuals, as a result, the second wave of empowerment has focused on including a broad-base of individuals such as staff and charitable trusts.

Due to the lack of available funds, most BEE transactions require significant vendor facilitation in the form of significant price discounts, reduced funding rates, donation elements, increased dividend payouts etc. This vendor facilitation ultimately results in a cost to shareholders, on average between 3% and 5%.

The following table constitutes current coal producing companies with its proportioned BEE shareholding:

Table 4.2 Current BEE shareholding in major coal producing companies

Producer	BEE Partner	% BEE Shareholding
Anglo Coal	Pamodzi Coal	15%
BHP Billiton (BECSA)	No BEE Partner Optimum and Koornfontein assets were sold to 100% BEEs	0 %
EXXARO Resources	Eyesizwe – Anglo / Newcoal transaction from listing Kumba coal assests in 2007	51%
Sasol Mining	Igoda through EXXARO Resources	26%
Xstrata Coal	African Rainbow Minerals	20.2%
Total Coal SA	Mmkau Mining	15-51%

(Source: DME Coal Industry Task Group, 2009)

The following table constitutes companies that have developed as a result of BEE legislation, and makes up most of the Junior Mining Companies (JMC). The effective BEE shareholding is as follows:

Table 4.3 Current Junior Coal Mining Sector BEE shareholding

Producer	% BEE Shareholding
Shanduka	> 50%
Worldwide Coal	> 50%
Anker Coal	< 25%
Mmkau Mining	100%
Leeuw Mining	100%
Endulwini Resources	100%
SACMH Ltd.	65%
Mashala Resources	> 25%
HCI Khusela	> 50%
NUCoal	< 25%
Keaton Energy Ltd.	< 25%
Coal Of Africa Ltd.	< 25%
Umcebo Mining	> 25%
Riversdale Mining	< 25%
Petmin Ltd.	> 25%

(Source: DME Coal Industry Task Group, 2009)

4.3 South African Producer Market (Supply)

The major suppliers of thermal coal to the export market are mainly located in three coalfields in South Africa namely, Witbank, Mpumalanga and Highveld coal fields. In the map below, all the coalfields in South Africa are represented. The Waterberg has been in development for the past 25 years, but the Limpopo and Soutpansberg coalfields are enjoying renewed attention for development

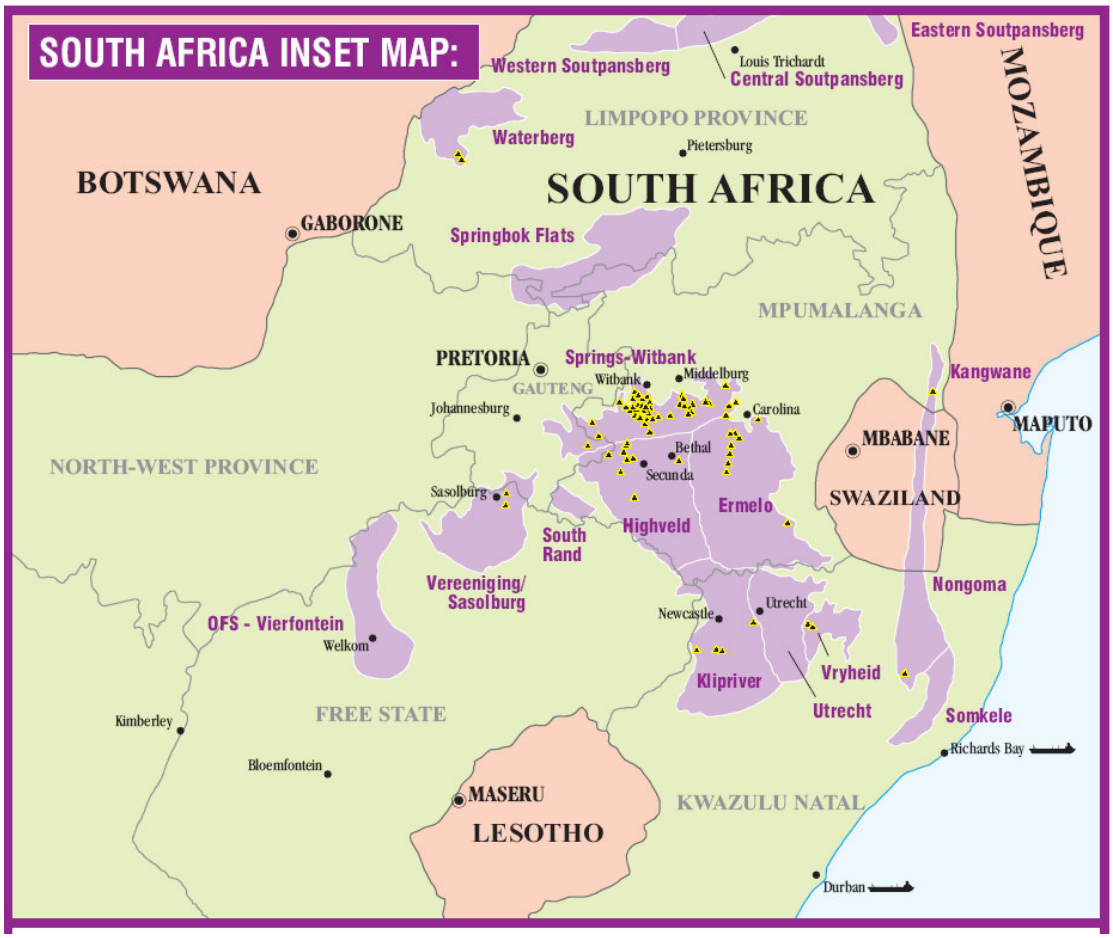

Figure 4.1 Map of the South African Coal Fields

(Source: DME Report of Coal Operations, 2009)

Total coal production in South Africa is approximately 244 million tonnes per annum. Of this, thermal coal exports has remained stagnant around the 65 million tonnes per annum level for the last couple of years although the current export capacity of the Richards Bay Coal Terminal (RBCT) is 72 million tonnes per annum. An additional 3 million tonnes per annum are exported through the Matola Coal Terminal in Maputo and Bulk Connections in Durban, resulting in total exports in the order of 68 million tonnes per annum (DME, 2009) Coal produced for ESKOM, SASOL and the remaining domestic consumers is discussed under Section 4.3, hereunder.

The top four coal mining companies (BHP Billiton, Anglo Coal, Sasol Mining and EXXARO Resources) in South Africa produce more than 80% of the country's total production and are also to major players in the thermal export market. Around 53 million tonnes of the 65 million tonnes exported are produced by these four producers, as well as approximately 100 million

tonnes of the 110 million tonnes consumed by ESKOM. The following is a detail description of their operations.

4.3.1 BHP Billiton Energy Coal South Africa (BECSA)

BHP Billiton Energy Coal South Africa (BECSA) operates 4 mines in South Africa, from which the total production is in excess of 40 million tonnes per annum. BECSA has over the last number of years not produced enough export thermal coal to fill their 26 million tonnes of allocation at RBCT. On average they have been buying 3 million tonnes per annum of third party coal to fulfil their export commitments.

Although BECSA does not have a BEE partner, since 2007 it has embarked on a new strategy for its South African operations. Firstly the Koornfontein mine was sold to Siyanda Resources and thereafter, the Optimum mine was sold to a BEE consortium, headed by the former COO Eliphas Monkoe. Secondly the planned expansion at RBCT to 91 million tonnes per annum will increase BECSA's allocation to 33 million tonnes. A decision was made that they will limit their export aspirations to 26 million tonnes per annum and have therefore decided to sell 6.5 million tonnes of allocation. The following table provides a summary of BECSA operations:

Table 4.4 Production capacity of BECSA

Mine	Million tonnes / annum	Coal Field	Life of Mine	Seam	Market
Douglas	10,432	Witbank	29	1,2,4 & 5	Export Steam RBCT Domestic Market
Middelburg	15,000	Witbank	29	1,2,4	Export Steam RBCT Duva, conveyor
Khutala	14,200	Witbank	29	2, 4 5	Kendal conveyor Export Steam RBCT
Klipspruit	564	Witbank	20	2, 4	Export Steam RBCT
Total	**40,196**				

(Source: BHP Billiton, 2008)

In order to sustain this export level as well as maintaining their supply to the domestic market, two new projects have been approved. Klipspruit Colliery has already started and is currently in the ramp-up phase. The mine should reach full production of 7.4 million tonnes per annum by the end of 2009. Of this production 4.5 million tonnes per annum will be exported and 2.9 million tonnes per annum will be sold to ESKOM. The second project entails the combination of Douglas and Middelburg Collieries in a new optimisation program of reserves, mining and beneficiation. The project should result in a total production of 22 million tonnes per annum by the end of 2009. A total of 12 million tonnes per annum will be exported and the balance will be provided to ESKOM. The BHP Billiton board has recently also approved the start of a feasibility study of the Weltevreden reserve with the aim of developing a mine with a potential production capacity of at least 10 million tonnes per annum. It is apparent from this new strategy that BHP Billiton should easily meet their long term commitments to both ESKOM and the export market.

4.3.2 Anglo Coal

Anglo Coal is most likely the most stable and focused coal producer in South Africa. Anglo operates 11 coal mines and has overtaken BHP Billiton as the largest coal producer in the country.

Anglo Coal operations comprise of the following mines below:

Table 4.5 Production capacity of Anglo Coal

Mine	Million tonnes /annum	Coal Field	Seam	Market
Greenside	3,182	Witbank / Highveld	4.5	Export Steam RBCT
Goedehoop	8,112	Witbank	2, 4	Low Ash Export Export Steam RBCT Local Met Market
Isobonelo	5,224	Highveld	4	Sasol Synfuels
Kriel	11,660	Highveld	4	Kriel Conveyor
Kleinkopje	3,690	Witbank	1,2 &4	Low Ash Export Export Steam RBCT Local Met Market
Landau	3,770	Witbank	1,2	Export Steam RBCT Local Steam
New Denmark	5,572	Highveld	4	Tutuka Conveyor
New Vaal	16,112	Sasol / Vereeniging	Top, Mid & Bottom	Lethabo Conveyor
Nooitgedacht	566	Witbank / Highveld	5	Export Steam RBCT
Mafube	870	Witbank	2	Arnot Truck Export Steam RBCT
Total	**58,758**			

(Source: Anglo Amercian,2009)

Anglo Coal has a project list that amounts to a total additional production of 37 million tonnes per annum at a capital investment of US$ 1.59 million over the next 10 years. Anglo also plans a coal gasification project in the Waterberg coalfield. This project will produce 23.9 mmcf at a capital investment of US$ 355 million. The table provided lists the coal projects according to completion date. It is clear that Anglo Coal is well positioned to provide long term secured coal supplies to both their export and domestic customers.

Table 4.6 Anglo Coal project list to increase capacity

Project Name	Estimated Full Production Date	Capital Expenditure US$ million	Million tonnes /annum
Zondagsfontein	2009	335	6,600
MAC West	2009	90	2,700
Elders O/C	2011	335	6,500
Elders U/G	2013	180	4,000
Heidelberg U/G	2013	120	4,000
New Largo	2017	530	13,700
Total		**1,590**	**37,500**

(Source: Anglo Amercian,2009)

4.3.3 Sasol Coal

Sasol Coal is in essence the third largest producer of coal in the country, but they have decided to retreat from the export market. Its main operations are the Sigma: Mooikraal Colliery near Sasolburg and the Bosjesspruit, Brandspruit, Middelbult and Syferfontein collieries and the Twistdraai export operations at Secunda.

Of the 46 million tonnes per annum production only the Twistdraai low ash product was exported at around 3.7 million tonnes per annum. In 2008, Sasol Coal entered into an agreement with EXXARO whereby the Twistdraai assets were placed in a new company called Igoda. EXXARO has an equity stake of 35% and will be responsible for the marketing of the 4 million tonnes per annum.

Table 4.7 Production capacity of SASOL

Mine	Million tonnes / annum	Coal Field	Market
Mooikraal	1,700	Vereeniging / Sasolburg	SASOL Synthetic Fuels
Bosjesspruit	43,000	Vereeniging / Sasolburg	SASOL Synthetic Fuels
Brandspruit		Vereeniging / Sasolburg	SASOL Synthetic Fuels
Middelbult		Vereeniging / Sasolburg	SASOL Synthetic Fuels
Syferfontein		Vereeniging / Sasolburg	SASOL Synthetic Fuels
Total	**44,700**		

(Source: SASOL, 2009)

4.3.4 EXXARO Resources

EXXARO Resources is the result of the merger between Eyesizwe Coal and the non-iron ore businesses of Kumba Resources. This merger has pushed EXXARO into the fourth largest place as a coal producer in the South African market. EXXARO operates 7 mines producing around 40 million tonnes per annum.

EXXARO has aspirations to increase their exports to around 5 million tonnes per annum but they also have a number of advanced projects in place to achieve this target and further production increases. The largest project is the second mine in Lepalale (Waterberg coal field) to feed the Medupi power

station. This mine will eventually produce 14 million tonnes per annum dedicated to the power station.

The following tables detail EXXARO's operations and projects in million tonnes per annum:

Table 4.8 Production capacity of EXXARO

Mine	Million tonnes / annum	Coal Field	Seam	Market
Arnot	3,985	Witbank	2	ESKOM
Grootegeluk	18,303	Waterberg	Upper & Middel Ecca	Matimba Conveyor Export Steam RBCT Local Met Market
Leeuwpan	2,422	Highveld	2, 4 & 5	ESKOM Export Steam RBCT Local Met Market
Matla	13,613	Highveld	2 & 4	Matla Conveyor
North Block Complex	1,913	Witbank	2	
New Clydsdale	1,369	Witbank	2	
Tshikondeni	381	Pafuri	Top	
Total	**41,986**			

(Source: EXXARO, 2009)

Table 4.9 EXXARO project list to increase capacity

Project Name	Domestic	Export	Estimated Full Production
Belfast	2,000		2009
Inyanda		1,500	2008
Sheepmoor	5,000	1,500	2013
Grootegeluk /Medupi	14,000		2014
Sintel Char	0,160		2009
Eerstelingfontein	1,000		2009
Diepspruit Reserve		1,3000	2009
Total	**26,460**		

(Source: EXXARO, 2009)

4.3.5 Xstrata Coal

Xstrata Coal South Africa produces around 20 million tonnes per annum of thermal coal from 11 operations. Xstrata mainly produces for the export and domestic ferro-alloy markets. The operations are detailed as follows:

Table 4.10 Production capacity of Xstrata Coal

Mine	Million tonnes / annum	Coal Field	Seam
Phoenix	1,014	Witbank	4
Tavistock	2,244	Witbank	4
Spitzkop	762	Mpumalanga	2
Tselentis	1,858	Ermelo	B, C
Arthur Taylor	1,760	Witbank	2, 4
Arthur Taylor O/C	2,400	Witbank	4
Boschmans	2,842	Witbank	2, 4
Goedgevonden	1,047	Witbank	
South Witbank	2,134	Witbank	4
Waterpan	2,188	Witbank	4
Witcons	1,200	Witbank	2
Total	**19,449**		

(Source: Xstrata, 2009)

Xstrata has concluded a BEE deal with African Rainbow Minerals (ARM) to form ARM Coal. ARM invested US$ 3.2 million for a 51% stake in ARM Coal and a 10% stake in Xstrata's South African coal operations, giving ARM an effective 20.2 % stake in the South African coal assets. The investment amount was used to finalise the development of the Goedgevonden project which is owned by ARM Coal giving ARM the controlling share of 51% in the mine. The mine is scheduled to reach full production in 2011 and should produce 3.5 million tonnes per annum for the domestic market and 3.2 million tonnes per annum exports.

Xstrata has also announced that they plan to invest US$ 1.1 billion in global coal projects which will bring an additional 16 million tonnes per annum to the portfolio by 2012. These projects are listed in the table below. Xstrata thus have sufficient projects to sustain their domestic and export commitments.

Table 4.11 Xstrata Coal project list to increase capacity

Project	Estimated Full Production	Capex US$ mil	Million tonnes/annum
Southstock 5 Seam U/G	2008	70	3,000
Klipoortjie	2009	75	1,500
Tweefontein	2011	350	4,500
Goedgevonden ext	2012	300	4,400
Zonnebloem	2012	400	3,000
Total		**1,195**	**16,400**

(Source: Xstrata, 2009)

4.3.6 TOTAL Coal South Africa

TOTAL Coal SA has 4 million tonnes of export allocation at RBCT. The company has been struggling to ensure equal production capacity, and as a result have been rolling out a number of projects of the past 2 years in order to guarantee full utilisation of its allocation. Forzando South and North were developed along with Dorstfontein to ensure a minimum tonnage of 2,5 million tonnes. TOTAL Coal is responsible for the development of the Tumelo Mine and Project, whilst its BEE partner Mmkau Mining is responsible for operations.

Table 4.12 Production capacity of Total Coal SA

Mine	Million tonnes /annum	Coal Field	Market
Forzando	2,200	Highveld	Export
Dorstfontein	0,700	Highveld	Domestic and Export
Tumelo Mine	0,600	Ermelo	Export using wash plant at Forzando
Total	3,500		

(Source: TOTAL Coal SA, 2009)

TOTAL Coal has one of the most significant BEE partners in the Coal Industry. Mmkau Mining with chief executive Bridgette Radebe, have ensured an additional Phase V RBCT allocation of 1 million tonnes. Although TOTAL Coal has been managing all the mines and operations in the portfolio, Tumelo was Mmkau Mining's first controlling attempt at operations. Speculation in the market is that Mmkau will eventually do a leveraged buy-out (on the back of listing rumours) whereby TOTAL Coal will exit the industry.

Table 4.13 Total Coal SA project list to expand capacity

Projects	Million tonnes / annum	Estimated Full Production	Coal Field	Comment
Penumbra			Ermelo	JV with Mashala Resources
Tumelo	0,600	2009	Ermelo	51% Mmkau Mining,
DCM 4 Seam		2010	Highveld	Feasibility, lower quality product
Total	0,600			

(Source: TOTAL Coal SA, 2009)

4.3.7 Junior Mining Companies (JMC)

A total of 23 junior mining companies produce approximately 16-18 million tonnes of coal per annum. 17 Of these companies have access to RBCT allocation through the Quattro Allocation programme, administered by the DME. The Quattro Allocation is 4 million tonnes per annum, made available by the RBCT shareholders since 2004.

Consolidation among the JMC miner has taken place over the last 18 months. The largest was ex-politician now business man Cyril Ramaphosa forming a joint venture coal company with Glencore called Shanduka Coal. Glencore provided the funds to buy the operations of Wakefield, Kangra and Graspan with a total production of 7 million tonnes per annum.

The Royal Bafokeng entered the coal industry by buying the troubled Yomhlaba Resources, a listed company being suspended from the JSE due to a dispute with BHP Billiton. These assets with the purchase of Ilanga and a new brown field project Umlabu Colliery was used to form the new re-listed South African Coal Holdings (SACMH).

Table 4.14 Production capacity of Junior Mining Companies

Company	Mine	Total Production	Exports		Domestic
			Quattro	Other	
Elcoal	Elcoal	976		488	488
Shanduka	Various	7,204	2,117	1,000	4,087
Sudor	Halfgewonen	976			976
Anker	Golfview	800	197	400	203
Kuyasa	Delmas Coal	732			732
Black Gold	Eastside	214	200	14	0
NuCoal	Woestallen	268	207		61
Petmin	Springlake	410	242	100	68
	Somkele	400		400	0
Mashala	Wesselton	500	207	293	0
	Geluk	124		124	0
Endulweni	Black Wattle	600	250	150	200
Sumo	Kopermyn	244		244	0
Euro Coal	Polmaise	244	230	14	0
Stuart Coal	Delmas	170			170
MCV	Durnacol	421			421
Worldwide	Groenvallei	511	401	110	0
Leeuw	Vaalkrans	250	207	43	0
Zinoju	Aviemore	146	146		0
Hlobane CP	Hlobane	72			72
Scharighuizen	Nkomati	120		120	0
SACMH	Umlabu	63			63
	Ilanga	83	83		0
Umcebo	Umcebo	300	197		103
Riverdale	ZAC	291	150	91	50
Total		**16,119**	**4,834**	**3,591**	**7,694**

(Source: DME Coal Industry Task Team, 2009)

Consolidation of the Ermelo coalfields are expected to be imminent, as it is mainly mined by Junior miners, and prove to be the most accessible coalfield to be exploited next. 3 Coal companies were also listed on the Johannesburg Stock Exchange main board, being SACMH Ltd., Keaton Energy Ltd., and Coal of Africa. The table below provides a breakdown Junior coal miners and their respective production capacities.

A number of projects are under development by junior mining companies. The current project list predicts the production of an additional 55 million tpa within the next four to five years. The following table provides a tonnage breakdown per company.

Table 4.15 Planned capacity expansions by Junior Mining Companies

Junior Mining Company	Tonnage Expansion
Black Gold	3,000
Coal of Africa Ltd.	9,200
Elitini Coal	10,000
Homeland Energy	8,500
Worldwide Coal	2,000
Endulwini	700
Keaton Energy	2,000
Khusela	2,000
Kuyasa	6,000
Mashala	5,000
SACMH Ltd.	1,500
Sudor	8,900
Total	**55,800**

(Source: DME Coal Industry Task Team, 2009)

The implementation of these projects should lift the junior miner contribution to 71.6 million tonnes production per annum. At this stage export figures are not available but is all these projects are completed a total of 10 million tonnes per annum could be exported.

4.4 The South African Consumer Market

South Africa consumes approximately 175 million tonnes of coal per annum. The following sections will discuss South African consumption in some degree of detail.

4.4.1 ESKOM

ESKOM is a South African electricity public utility, established in 1923 as the Electricity Supply Commission (ESCOM) by the government of South Africa in terms of the Electricity Act (1922). The utility is the largest producer of electricity in Africa, is among the top seven utilities in the world in terms of

generation capacity and among the top nine in terms of sales. The company is divided into Generation, Transmission and Distribution divisions and together ESKOM generates approximately 95% of electricity used in South Africa.

Currently, ESKOM has 24 power stations in commission, consisting of 13 coal-fired stations (3 of which are in cold reserve storage, 1 nuclear station, 2 gas turbine stations, 6 hydroelectric stations and 2 pumped storage schemes. The total nominal capacity of ESKOM Power Stations is 42 011 MW. The net maximum capacity of ESKOM Power Stations is 36 208 MW (ESKOM Annual Report: 2008).

ESKOM consumes an estimated 110 million tonnes of coal per annum (DME Statistics, 2009).

Table 4.16 below shows the current coal-fired power stations in the ESKOM stable with accompanied installed capacity in MWe (Megawatt electrical), and base load generation percentages.

Base load (or base load demand) is the minimum amount of power that a utility must make available to its customers, or the amount of power required to meet minimum demands based on reasonable expectations of customer requirements. Base load values typically vary from hour to hour in most commercial and industrial areas. A base load plant is an energy plant devoted to the production of base load supply. Base load plants are the production facilities used to meet some or all of a given region's continuous energy demand, and produce energy at a constant rate, usually at a low cost relative to other production facilities available to the system. A two-shifting generation plant is a power plant that adjusts its power output as demand for electricity fluctuates throughout the day (Doyle, 2005).

Table 4.16 ESKOM power stations – capacity and generation

Power Station	MWe Capacity	Two-Shifting Generation	Base load Generation
Arnot	2100 MWe		90.72%
Duvha	3600 MWe		90.37%
Hendrina	2000 MWe		84.51%
Kendal	4116		90.69%
Kriel	3000		90.53%
Lethabo	3708		87.79%
Majuba	4110	35.28%	
Matimba	3990		92.09%
Matla	3600		92.16%
Tutuka	3654	60.56%	
Camden	1600	In process of re-opening	
Grootvlei	1200	Previously mothballed	
Komati	1000	IN process of re-opening	

(Source: Eskom, 2009)

Late in 2007, South Africa started experiencing widespread rolling blackouts as supply fell behind demand, threatening to destabilise the national grid. With a reserve margin estimated at 8% or below, such "load shedding" is implemented whenever generating units are taken offline for maintenance or repairs.

ESKOM and various parliamentarians attribute these rolling-blackouts to insufficient generation capacity, and the solution is the construction of additional power stations and generators. As of February 2008 blackouts were temporarily halted due to reduced demand and maintenance stabilisation. This drop in demand was caused by many of the country's mines shutting down or slowing to help alleviate the burden. However, regularly scheduled mandatory load shedding started in April 2008, to allow maintenance periods of power generators, and recovery of coal stockpiles before the winter, when electricity usage is expected to surge.

Expanding generating capacity will see an estimated spend of R300 billion over the next five years, with around 20 000 megawatts of additional capacity due to be online by 2025. Two major coal projects cited by ESKOM and the Government are:

- Medupi Coal Fired - 4800 MWe (proposed first unit commissioning - 2012)
- Kusile Coal Fired – 4800Mwe (proposed first unit commissioning - 2012)

4.4.2 SASOL Synthetic Fuels

SASOL Synthetic Fuels consumption: Estimated 42.5 million tonnes per annum (DME Statistics 2009).

The coal is consumed mostly for gasification feedstock and utilises coal for SASOL's complexes in Secunda and Sasolburg, and is produced mainly by SASOL Mining operations. SASOL is the second largest consumer of thermal coal in South Africa.

4.4.3 Remaining consumer market

Remaining coal consumption: Estimated 22.7 million tonnes per annum.

This includes approximately 4 million tonnes of anthracite and semi-soft coking coal. The estimated thermal coal consumption is 18 million tonnes per annum (DME, 2008).

Table 4.17 below provides the total coal tonnage consumption on an annual basis in South Africa.

Table 4.17 South African domestic coal consumption in 2008

Industry	**Consumption /annum**
Gold and Uranium Mines	8,736
Agriculture	27,324
Brick and Tile	68,628
Mining	536,040
Cement and Lime	815,532
Mittal Steel	1,083,372
Electricity	1,299,060
Metallurgical	1,531,560
Chemical Industries	1,754,628
Iron and Steel	3,156,144
Industries	3,845,256
Merchants and Domestic	8,599,320
TOTAL	**22,725,600**

(Source: DME, December 2008)

Most notably is the 8.5 million tonnes categorised under Merchants and Domestic. It is important to observe that these tonnages are distributed to the other industries, but via merchants and traders that buy from producers and on-sell to consumers. Thermal coal in the mentioned industries is utilized mainly for energy generation, and carbon reductants.

4.5 Summary

The South African coal market fundamentals include an understanding of production and consumption or market segmentation, which include the export, domestic sales, synthetic fuels and ESKOM markets. These market fundamentals are underscored by BEE or BBBEE participation. An understanding of BEE and BBBEE in the industry and the latest effective legislation promulgated by the Department of Minerals and Resources (DMR) is essential for optimal operation in the marketplace.

The introduction of BEE shareholding saw the development of a thriving Junior Coal Mining Sector. Apart from the major producers seeking at least 25% BEE shareholding from newly formed enterprises, approximately 30 new coal producing companies originated, as a result.

Subsequently, fundamental infrastructure issues such as access to TFR trains and RBCT allocation are now actively debated on a national scale.

Depletion of coal reserves in the traditional coalfields is looming, and development of alternative coal fields are pursued by major and junior producers. These companies, however, now have to prove its BEE shareholding for conversion of mining rights and application of exploration permits.

The following pie chart (Figure 4.2) shows percentage of annual production per producing company or group. The information is given on a cumulative basis, based on annual production and is not product specific.

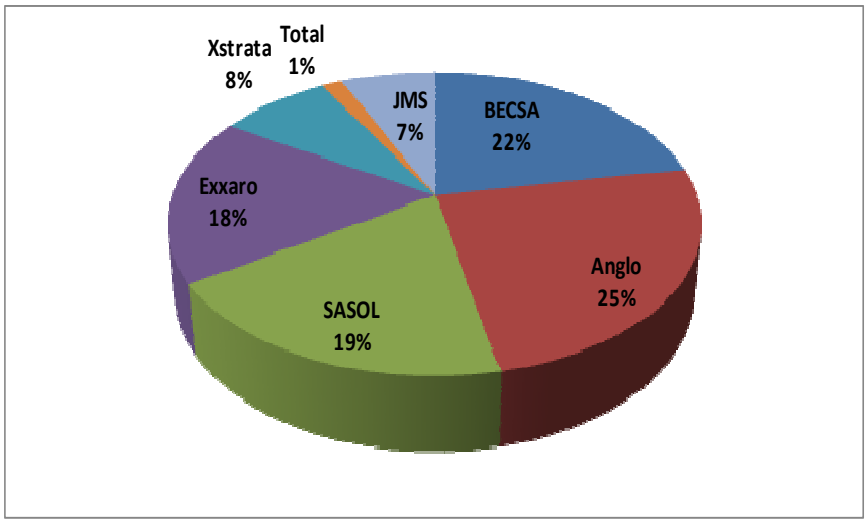

Figure 4.2 The South African producer market share

Anglo Coal remains the biggest producer constituting 25% of the South African producer market, whilst Total Coal South Africa is the smallest producer with RBCT allocation at 1% of the market. The JMS have grown to a 7% producing market share.

Figure 4.3 below shows the JMS producing market share.

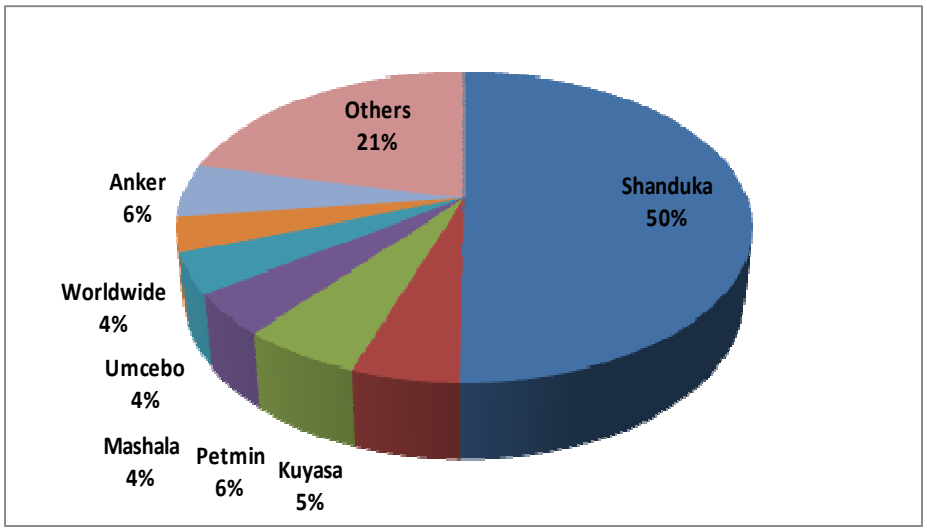

Figure 4.3 The Junior Mining Sector producer market share

Shanduka is the frontrunner in terms of JMS production, producing 50% of JMS produced coal. Petmin, Anker, Kuyasa, Worldwide, Umcebo and Mashala produce between 4% and 6% of JMS produced coal, and the remainder of producers are grouped under "Others". The other JMS players contribute between 1% and 3% of annual production.

South Africa produces approximately 245 million tonnes of coal on an annual basis, and constitutes the following end-consumers, as depicted in Figure 4.3.

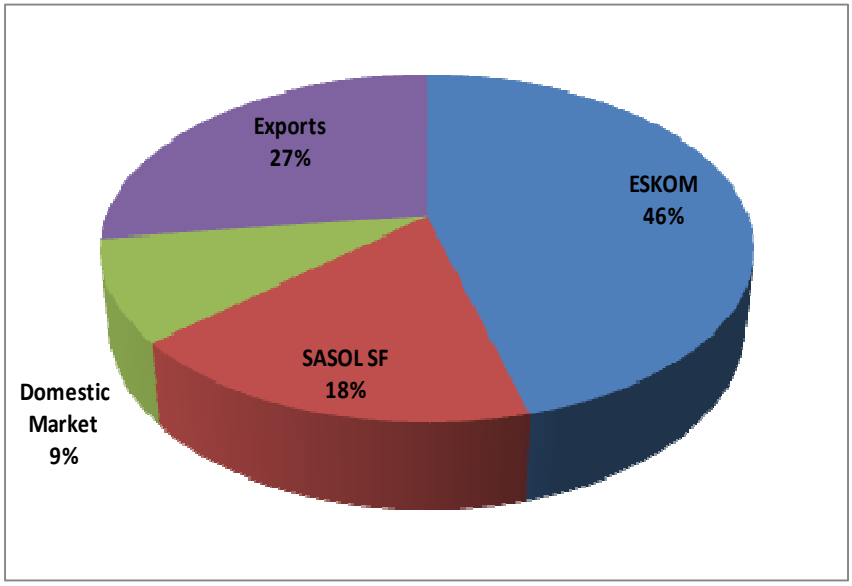

Figure 4.4 End consumer market share

The domestic consumer market is segmented further to illustrate domestic consumption on an industry basis in Figure 4.5. Gold and Uranium Mines, Agriculture and the Brick and Tile industries are omitted from the chart since it constitutes less than 1% of the entire market.

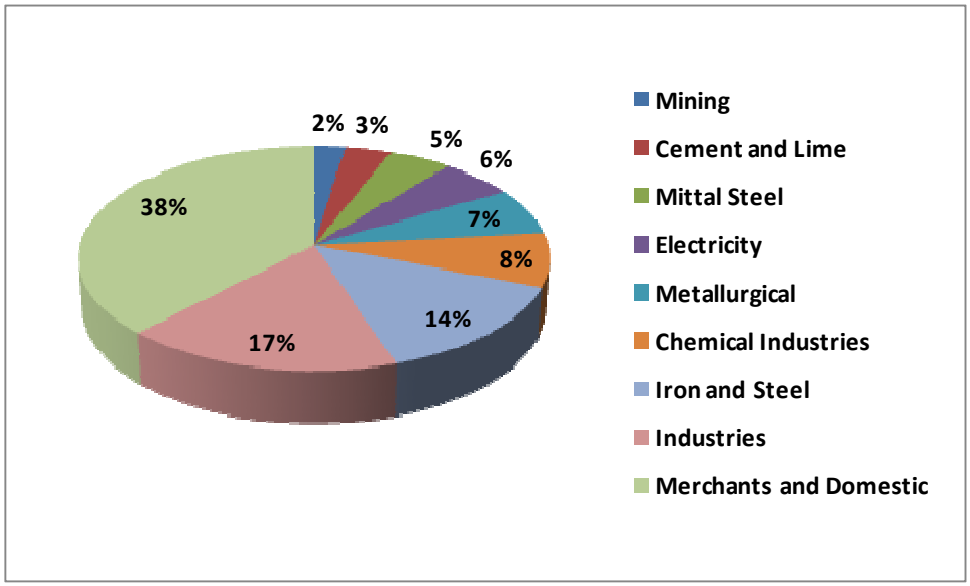

Figure 4.5 Domestic consumer market share

A number of very important projects are planned to increase production or replace depleted mines. The most important and certain projects to be in full production by 2012 are listed below. (Note that EXXARO's Grootegeluk is included as the project is of national interest).

Table 4.18 The most important planned coal projects in South Africa

Company Name	**Project Name**	**Million tonnes /annum**	**Estimated Date of Full Production**
BECSA	Klipspruit	7,400	2009
	Douglas-Middelburg	22,000	2009
Anglo Coal	Zondagfontein	6,600	2009
	MAC West	2,700	2009
	Elders O/C	6,500	2011
EXXARO	Belfast	2,000	2009
	Inyanda	1,500	2008
	Sintel Char	0,160	2009
	Grootegeluk	14,000	2014
	Eerstelingfontein	1,000	2009
Xstrata	Southstock 5 Seam	3,000	2008
	Klipoortjie	1,500	2009
	Tweefontein	4,500	2011
	Goedgevonden Ext	4,400	2012
	Zonnebloem	3,000	2012
Total / Mmkau	Tumelo	0,600	2009
TOTAL Project Production		**80,100**	

CHAPTER 5

PRODUCT

The bulk commodity or product in this study is thermal coal. Given the characteristics of South African coal production, semi-soft coking coal, coking coal and anthracite will not be discussed as part of this study. Thermal coal divided into 3 categories, namely ESKOM, Domestic and Export Sales, each product having its own petrographic characteristics, sizing, value-in-use and markets.

The market for thermal coal can be described as a mature market with very little in the way of product development. However, as coal resources are depleted on a global scale and mining conditions become more difficult, consumers adapt qualities where necessary and if possible.

Although geology dictates the product to be marketed, mining and beneficiation often has to be revised or additional beneficiation measures have to be applied to deliver a product according to consumer specifications. This always has a cost implication, and marketing and production has to measure the cost increase to the reigning market price at all times. The international cost curve based on FOB cash costs indicates the competitiveness of each coal producing nation. An understanding of the cost curve is essential from a macro economic perspective.

The importance of understanding thermal coal consumption lies in the technical understanding of burners, kilns and stokers, which is discussed in depth in this chapter. Marketing professionals need to understand technical conditions from each consumer, in order to forge relationships and ensure long term off-take from global customers.

5.1 Geology and Mining

The inherent quality of an operation's geology will determine its market focus. The geology will indicate the washability of the run-of-mine production,

which in turn will determine the product that can be sold into the market given that beneficiation and/or crushing and screening are required.

The mine plan is determined from extensive drilling as part of pre-mining exploration and dictates the marketing plan for years in advance. This is essential for planning in terms entering into long term contracts with consumers and buyers. The method of mining is usually a good determining factor to indicate the quantity of product that will be available for sales. Mining is characterised as either underground or open cast mining.

Underground mining in coal production is often referred to as adit mining, since it is not conventional underground mining with shaft sinking and the seams are reached from a surface incline. Different mining methods are used applied lower seam availability than for thicker seams, which indirectly indicate the quantities available from the geology. Lower seams (0.7-4 meters) have lower production yields than thicker accessible seams where (2-8 meters). Strip ratios in opencast mining indicate the amount of overburden that has to be removed within the mining area, to mine the coal available as part of the geology. Strip ratios vary from 1:1 to 1:7 and usually indicate the mining method, timing and cost before the actual product can be mined, but forms part of the ultimate production cost.

Some coals can be placed on the market without the need for any form of beneficiation. This does however, indicate that the seam thickness of the geology should be large enough to ensure clean seam mining. In the case of lower seam thicknesses screening, crushing, hand picking and beneficiation becomes essential. Such processes are costly and increase production costs, but ultimately ensure production of high quality product(s), and higher achieved prices.

Beneficiation plants are erected with the company's ability to produce run-of-mine and successfully feeding the plant without unnecessary stoppages. Beneficiation plants are characterized as a certain tonnage per hour feed, e.g. 100 tonnes per hour etc. This is also a clear indication to marketing on daily, monthly and annual production numbers in order to contract appropriately with consumers and buyers.

5.2 Production Cost

Costing is discussed in detail in Chapter 2, and it also related on a micro-economic level to pricing in Chapter 7. Production cost is discussed in this chapter from a macro-economic perspective, thus relating to each specific producing nation and its accompanied free-on-board (FOB) cash cost. This comparison is reviewed to gain insight into the competitiveness of producing nations, and indicates the lowest level of FOB pricing which an individual country can profitably relate to.

The production costs are aggregated for export pricing and exporters on a cumulative basis. The cash costs could be related for domestic costs (free – on-mine) by subtracting freight and port loading costs.

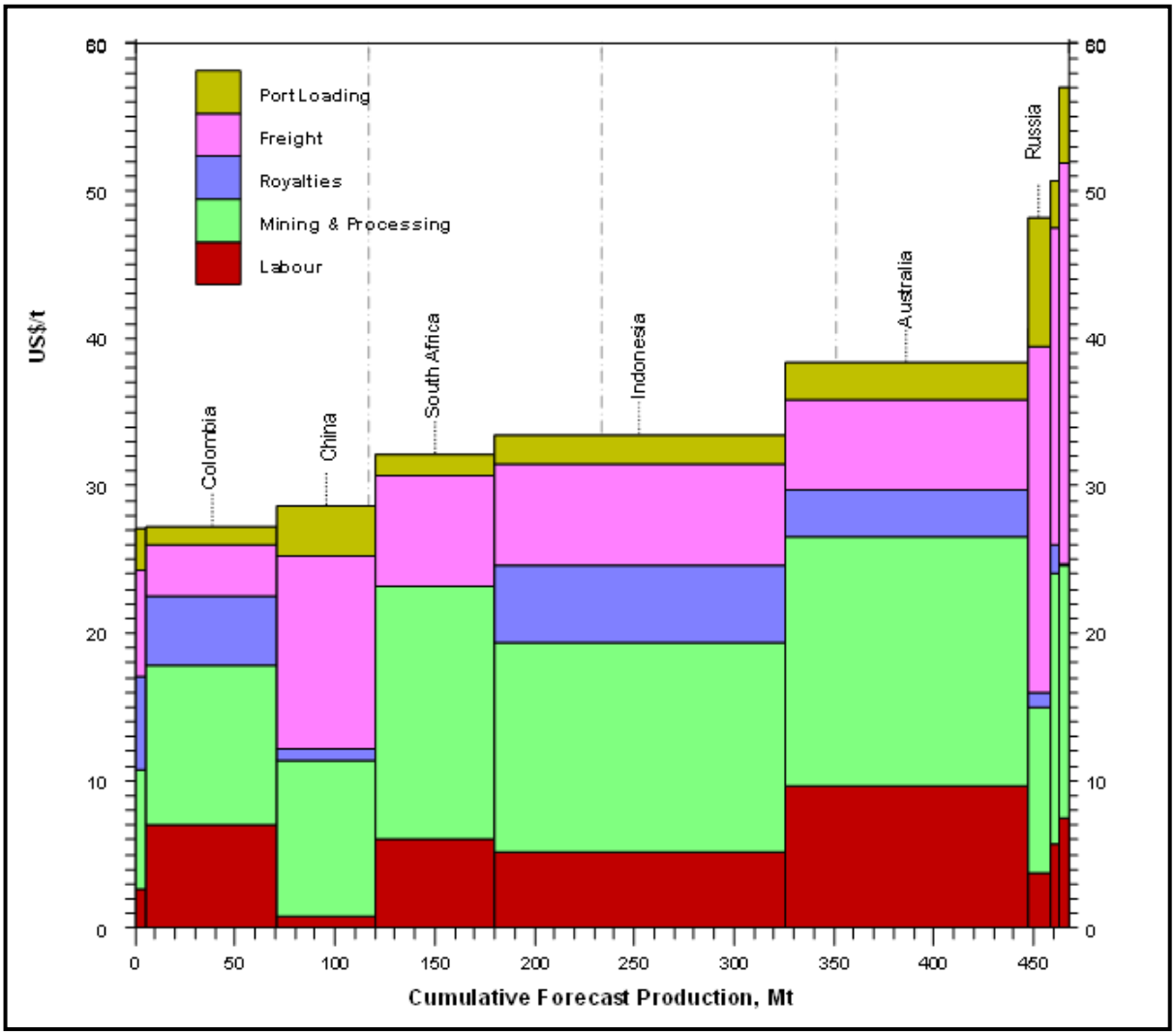

Figure 5.1 International cash cost curve

(Source: Macquarie Bank, Coal Analyses 2009)

Figure 5.1 depicts the various coal producing countries and its accompanied FOB cost, which comprises labour, mining and processing, royalties, freight and port loading. Table 5.1 supplements Figure 5.1 by representing the various different coal producing countries, their ranking in terms of cash cost and its annual production.

Table 5.1 Country ranking according to FOB cash cost

Country	Export Mt	Cash Cost US$/t	Rank
Venezuela	5.7	27.07	1
Colombia	65.4	27.20	2
China	49.2	28.59	3
South Africa	59.5	32.15	4
Indonesia	145.7	33.37	5
Australia	121.9	38.32	6
New Zealand	0.2	40.58	7
Russia	10.7	48.12	8
USA	5.0	50.64	9
Canada	4.7	57.03	10
Total / Average	**468.0**	**33.81**	

(Source: Macquarie Bank, Coal Analyses 2008)

Venezuela, Colombia and China rank 1-3 respectively on the international cost curve, indicating that their cash costs are the cheapest globally. South Africa ranks as number four on the international production cost curve, which indicates its competitiveness in global coal production, but also indicates its continuous drive to keep costs at a level below US$ 33/ tonne. Indonesia and Australia are by far the largest producers of coal (thermal and coking coal) and continuous to have a production cost level below US$ 39/ tonne. Canada, the USA, Russia and New Zealand are the highest cost producers and will be the first countries to loose its competitiveness when prices fall to production cost levels (at US$ 40 – 57).

5.3 Technical Analyses

Petrographic and proximate analyses throughout the production process are of paramount importance. Typically, a mining operation has to establish an on-site laboratory for these purposes. Currently in South Africa, mining

companies contract with third party independent service providers such as Inspectorate MacLauchlan and Lazaar, SGS, South African Bureau of Standards or Witlab. Major producers operate laboratories which are ISO and SABS accredited.

The on-site lab is an independent supplier of technical information on the geology via exploration activities, product in process and final product. The on-site laboratory has a major responsibility in terms of delivering in-time technical information to the production and marketing team in order to ensure that the product delivered to consumers and buyers is within prescribed specification.

Sampling is a key element of technical analyses and it is the responsibility of the third party independent on-site laboratory or the producer to provide skilled staff to ensure scientific and efficient sampling is done for analytical purposes.

5.4 Single Product and Multi Product Mines

Some geology only makes provision for power station coal, or lower graded domestic material. These mines are referred to as single product mines. Mines mining multiple seams can yield export or A-grade domestic material as well as power station coal. These are usually mega operations servicing production to ESKOM, municipal power stations, the domestic market and the export market.

5.5 Product Specification

Thermal coal is defined in terms of its typical quality. The typical quality is classified in the composite of proximate analyses, ultimate analyses, calorific value, forms of sulphur and milling. Consumers and buyers often request additional analyses on milling, ash composition and ash fusion temperatures.

Table 5.1 is a typical example of a specification sheet for marketing purposes taken from an operating mine in South Africa. The specification sheet is for typical export product, but can also be applied for domestic marketing

purposes. All the elements of analyses are reported herein, and form the basis of all initial marketing communications.

The typical quality is a result of an independent laboratory supplying the final analysis, which indicates that all elements within the specification sheet have been tested scientifically, and are true and correct. This analysis forms the basis of marketing of coal, and the same specification will be used when contracting is done.

Table 5.2 Typical specification sheet of coal quality

Typical Quality (all analyses on a air dried basis unless otherwise indicated)		
Proximate Analyses		
Inherent Moisture	%	3
Total Moisture	%	8
Ash	%	15
Volatile Matter	%	28
Fixed Carbon	%	54
Ultimate Analyses		
Carbon	%	70.8
Hydrogen	%	4.49
Nitrogen	%	1.61
Oxygen	%	23.1
Sulphur	%	1.4
Forms of sulphur		
Pyratic	%	0.878
Sulphatic	%	0.051
Organic	%	0.271
Total	%	1.200
Milling		
HGI		56
Abrasion Index		243
Ash Fusion Temperatures		
Reducing		
Deformation Temp.	°C	+1220
Spherical Temp.	°C	+1250
Hemisphere Temp.	°C	+1280
Flow Temp.	°C	+1320
Oxidising		
Deformation Temp.	°C	+1260
Spherical Temp.	°C	+1310
Hemisphere Temp.	°C	+1340
Flow Temp.	°C	+1380

Calorific Value		
Gross Specific Energy	MJ/kg	27
	kcal/kg	6500
NAR Specific Energy	MJ/kg	25
	kcal/kg	6000
Ash Composition		
SiO2	%	49.24
AI2O3	%	23.84
Fe2O3	%	11.07
TiO2	%	1.56
P2O5	%	0.30
CaO	%	4.81
MgO	%	1.73
Na2O	%	0.36
K2O	%	1.07
SO3	%	4.47
MnO	%	0.03
BaO	%	0.18
Sr	%	0.18
V2O5	%	0.05
Cr2O3	%	0.06
ZrO2	%	0.11
Total	%	99.05

(Source: EXXARO, Xstrata, SACMH: 2009)

The typical quality is reported for proximate analysis, ultimate analysis, forms of sulphur, milling, ash fusion temperatures, oxidizing temperatures, calorific value and ash composition. These analyses are discussed hereunder in full detail.

5.5.1 Specification parameters and elements

According to Doyle, (2005:1-15) the following parameters and elements are recorded for technical and typical specification in the marketing process:

- **Air dried basis:** This basis is equivalent to as analysed basis when the analyses have been performed on an air dried basis.
- **As received basis:** Analytical data calculated to an as received moisture content.
- **Dry basis:** Calculation of analytical data to a condition of zero moisture.
- **Proximate analyses:** Ash content as a percentage, volatile matter as a percentage, inherent moisture as a percentage, total moisture as a percentage, and fixed carbon as the sum of the aforementioned. Ash is the inorganic residue after the incineration of coal to constant weight under standard conditions is less than the mineral matter because of the chemical changes occurring during incineration, with most important differences being loss of water or hydration, loss of carbon dioxide, and loss of sulphurous gasses from sulphides. Volatile matter is the loss in mass, less that due to moisture, when coal is heated under standard conditions and out of contact with air. Inherent moisture is used to indicate air dried moisture. Total moisture in the coal as sampled and removable under standard conditions. Fixed carbon is a component of proximate analysis, calculated by difference, i.e. 100% less the sum of moisture, ash and volatile matter. Intended to give an indication of char yield.
- **Ultimate analyses:** The analysis of coal expressed in terms of carbon, hydrogen, nitrogen, oxygen and sulphur – all expressed as a percentage. The analysis refers to the carbonaceous material only and hence is expressed on a dry ash free basis or dry mineral matter free basis. Oxygen is estimated by difference.

- **Forms of sulphur:** Sulphur can be part of the carbonaceous material in coal or part of the minerals as sulphates or sulphised. Forms of sulphur dioxide during coal combustion, which is a pollutant and many countries, have regulations regarding emissions to the atmosphere. Pyratic, sulphatic, organic and the total sulphur content is the sum of the aforementioned three forms, expressed as a percentage. Where the sulphur is pyretic or sulphatic it is part of the mineral matter and its content can be lowered by beneficiation. Organic sulphur is distributed through the carbonaceous part of the coal and cannot be beneficiated to a lower content. Pyritic sulphur is often blamed for spontaneous combustion.
- **Calorific value:** Calorific Value is the energy value carried in he coal and the major indication of heat value that can be expected by consumers and buyers in their processes. Calorific value is expressed as Kcal/kg in exports markets and as Mj/kg in the domestic market. The index gives an indication of the propensity for the coal to cause slagging problems during combustion.
- **Milling:** Milling refers to the hardness of the material, and gives an indication of contamination with mining matter during the mining process. The Hardgrove Index and Abrasion Index indicate the milling of the product. The Hardgrove Grindability index relative grindability or ease of pulverization. High values indicate a coal easy to pulverize and low values indicate coals hard to pulverize. The Abrasion Index indicates the abrasiveness of coal by monitoring indicates the loss in weight of four metal blades which mechanically stir a sample of coal. The index is the number of milligrammes of metal abraded from the metal blades per kilogram of coal used.
- **Ash analysis:** Ash composes complex oxides and the ash analysis expresses this composition in terms of its component oxides. Ash generally consists of mostly silica (SiO2) and alumina (A12O3). The presence of large amounts of the oxides of iron (Fe2O3), calcium (CaO), sodium (Na2O) and or potassium (K2O) generally indicates an ash with low ash fusion temperatures. The ash analyses differ from the composition of minerals in the parent coal.
- **Ash Fusion Temperatures:** Ash Fusion temperatures are reported in terms of oxidizing and reducing characteristics and are expressed in temperatures range between 900oC up to 1600oC. The temperatures

which can be recorded are initial deformation temperature, softening temperature, hemisphere temperature and flow temperature.

5.6 Product Utilisation

Thermal coal is used for energy generation by two basic markets, namely the power generators and cement manufacturers. Power generators in the domestic market are ESKOM and municipal power stations, but also include kiln energy (for cement producers). In the export market, the use of coal is far more sophisticated in terms of the quality of material that can be utilised in processes. Cement manufacturers both domestically and for export consumption use thermal coal in the process of manufacturing.

5.6.1 Power generation

Coal fired power stations generate electricity via steam. At high temperature and pressure, steam is generated in the power station boilers and this drives the turbines to generate the electricity. When steam is used as generating medium, only one third of the available energy in the coal is utilised. The remainder is passed to the atmosphere vial cooling towers or water cooling, or can be utilised, as in Scandinavia, for district heating.

Modern power stations can achieve efficiencies of 35-38%, while older stations may only be 30% efficient with older smaller units achieving only efficiencies in the mid-twenty percentage (GWC Coal Handbook, 1991).

5.6.2 Pulverised coal firing

Merrick (1984) explains that pulverised coal firing is combustion of powdered coal suspended as a cloud of small particles in the combustion air. It does not require a supporting grate and therefore eliminates restrictions on equipment size, and the reason for its wide scale adoption is its suitability in very large boilers. Significantly more heat is released per unit volume than in stoker firing. Because the coal is carried by the combustion air, residence times are much shorter than for stokers, just a few seconds. Despite the short residence time, good burnout can be achieved as long as the coal is

sufficiently finely divided; depending on the rank of the coal, between 60% and 90% should pass through a 200 mesh screen (75 microns).

When considering a bituminous coal of medium or high volatiles, 70% of the coal should be this fine. The most important use of pulverised coal firing is in steam raising for electricity generation, but it is also the method used for firing cement kilns.

Pulverisation is usually achieved in air-swept impact or attrition mills that also classify the coal, and coal of the required fineness is pneumatically conveyed to burners in the walls of the furnace. The air that transports the coal through the mill to the burner is call the primary air and will be 20-25% of the total combustion air. It is heated to a temperature which will depend on the moisture content of the coal, but which is normally 250-350°C, and which is set so that the coal is dried as it passes through the mill and that the exit temperature as it leaves the mill and transports the coal to the burner, is no higher than 85°C. The remainder of the air, which is called the secondary air, is injected around each burner to promote fast combustion close to the burner tip (GWC Coal Handbook, 1991).

Indirect firing is when the pulverised coal is stored prior to combustion – direct firing is when the pulverised coal is burnt immediately as it has been pulverised.

Approximately, 10-40% of the ash ends up being removed from the bottom of the furnace with the rest removed as fly ash from the exhaust gas, normally by means of an electrostatic precipitator. The system can either be designed for the ash removal at the bottom of the furnace to be in a dry state, a dry bottom boiler, or for it to be a molten slag, a wet bottom boiler. Coals to be used in the latter type of furnace are restricted to those with a low flow ash fusion temperature, typically 1,250°C, though some furnaces are designed for 1,350°C.

An example of the wet bottom furnace is the cyclone furnace in which coal is injected tangentially into a cylindrical horizontal cyclone furnace and burns while it spirals to the opposite end. This system can handle larger sized coal than normal pulverised firing, and 90% of the ash is discharged as a molten slag but it has the drawback of a high NOx level. Generally, power stations

operate with dry bottom furnaces. There needs to be sufficient radiant heat transfer surface area in the furnace to ensure adequate cooling of the furnace exit gasses before it encounters the convective heat transfer surfaces to bring the temperature down to below 1,050°C so that it is below the initial fusion temperature of the ash (Merrick, 1984:358)

5.6.3 Burners

The following burners are classified by Doyle (2005) and the GWC Coal Handbook, (1991):

- **Pulverised coal firing burners**

  Burner function is to introduce the pulverised firing and the combustion air into the furnace in such a way that a stable flame-front is formed some distance from the burner. The aim is to achieve rapid and efficient mixing of the coal and the air, and to direct the incoming gasses so that the full volume of the furnace chamber is utilised but without impingement of the flame on the furnace wall.

Three main types of burners are used in dry bottom power station boilers, as discussed below.

- **Turbulent burners**

  Construction to these burners is the same as those used for oil-firing. Stable combustions are dependent on the fuel being sufficiently easily ignited for the flame to be established within the limits of an outer and inner recirculation eddy. The burners are usually spaced uniformly across the width of the front or rear wall. Each burner has its own independent flame envelope.

- **Tangential or corner burners**

  Coal and air are fed from each of the four corners and there is essentially a simple overall flame envelope. The flame does not develop close to the walls or burner and different fuel: air rations at the burners do not have such consequences as with wall fired boilers. The incoming streams are thoroughly mixed due to the rotation of the central core of gas. The burners can be tilted in a vertical plan between 30° above and 30° below the horizontal in order to control the position of the zone of maximum temperature up or down. There is therefore more control over the peak flame temperature with this type of burner and as a result, lower NOx levels can be achieved.

- **Down-firing burners**

  These burners are used for anthracite and semi-anthracite. The aim is to delay the mixing with secondary air until the coal/primary air mixture has been heated to 800-900°C, the temperature required for high rank coals.

5.6.4 Stokers

A stoker consist of a feed and a grate and is used for feeding coal into a furnace, distributing it over a grate, admitting air to the coal for combustion and providing a means for discharge of ash. Today's stokers can be sorted into three categories based on the wait in which coal is fed into the grate. The following burners are classified by Doyle (2005).

- **Underfeed stokers**

  Coal is introduced through retorts at a level below the location of air admission to the fuel bed, i.e. the coal is introduced into the combustion zone from below.

- **Overfeed stokers**

  Feeding A stoker in which is fed onto grates above the point of air admission to the fuel bed. The most common forms are the chain and travelling grate stokers which have a moving endless grate which conveys coal into and through the furnace where it is burned, after which it discharges the ash. In the chain grate stoker a moving endless chain acts as the grate surface. In the travelling grate stoker the grate is separate from but is supported on and driven by chains.

- **Spreader stoker**

  Coal is distributed into the furnace from a location above the fuel be with a portion of the coal burned in suspension and a portion on the grate. Spreader stokers can either be fixed bed with a stationary grate, or a dump grate in which fuel is fed onto a non-moving grate which is arranged to allow intermittent discharge of ash through tilting action of the grate bars in which the grate moves from the rear to the front of the boiler.

5.7. Coal Quality Requirements

The following specifications should normally be adhered to for pulverised coal firing and stokers (Doyle, 2005).

5.7.1 Pulverised coal firing combustion

Table 5.3 Required coal quality specification for pulverised coal firing combustion

Parameter	Limits	Comments
Total Moisture	Max. 15% (ar)	Reduces net calorific value. Creates handling problems if too high. Limits higher for lignites and low rank coals.
Ash	Max. 20% (ad)	Reduces calorific value
Volatile matter	Min. 20-25% (daf) Max. 20-25% (daf)	For conventional pf burners. For down fired pf burners.
Calorific value	As high as possible	With suitable equipment almost any calorific value fuel can be utilised.
Sulphur	Max. 0.8-1.0% (ad)	Maximum value dependent on local emission regulations.
Nitrogen	Max. 1.5-2% (daf)	Various limits apply in a few countries only because of the NOx emissions.
Chlorine	Max. 0.2-0.3% (ad)	Causes ash fouling problems in boilers.
Hardgrove grindability index	Min. 45-50	Lower HGI values require larger grinding capacity and more energy.
Maximum size	Max. 40-50mm	Dependent on capacity of grinding equipment.
Fines content (-3mm)	Max. 25-30%	High fines content can increase moisture content and create handling problems.
Ash fusion temperatures	Various	Dry bottom boilers – IDT greater than 1200ºC. Wet bottom boiler – flow temperature less than 1300ºC

(Source: Doyle, 2005)

5.7.2 Stokers

Table 5.4 Required coal quality specification for stokers

Parameter	Limits	Comments
Total Moisture	8-15% (ar)	If too low, fines can be blown away from the bed without burning
Ash	7-30% (ad) 3-35% (ad)	For overfeed stoker. For spreader stoker. Minimum ash content required so grate will be protected from reflected heat.
Volatile matter	25-40% (daf)	
Maximum size	30mm	
Size consist	Max. 30%-3mm	If too high can be blown from bed.
Ash fusion temperature	IDT min. 1200ºC	Ash melts and clinkers if too low.
Crucible swelling number	Max. 3	High swelling coals give uneven combustion.

(Source: Doyle, 2005)

5.8 Cement Production

Albeit that cement plants throughout the world differ one from the other, they all perform the same basic process.

Grinding and blending of raw materials to give a uniform chemical composition of calcium carbonate, silica, alumina, iron oxide and other components. The blended mix is introduced into a kiln to remove all moisture. Calcinations at about 800ºC take place during which carbon dioxide is evolved. Final clinkering takes place at about 1400ºC. The clinker is cooled, ground, mixed with 3-5% gypsum and dispatched as cement.

The two basic processes in cement production are the wet and dry processes, which are named after the manner in which the raw mix is ground and introduce into the kiln. The mix is introduced into the kiln as slurry with 20-40% moisture in the wet process. Reduction of moisture content improves plant fuel efficiencies. The mix is ground and introduced dry into the kiln in the dry process. Dry process kilns are generally shorter because there is no need to evaporate the slurry moisture from the mix. Fuel efficiencies are improved as well (Doyle, 2005 and GWC Coal Handbook, 1991)

5.8.1 Cement kilns

These kilns are rotating cylinders up to 200m long and 6m in diameters. They are inclined at a few degrees from the horizontal to assist in the movement of the contents down the kiln and are fired from the end opposite to introduction of the mixture. Pulverised coal is the most common fuel. Ash forms part of the product, so its composition should be suitable; it should also not induce build-up on the walls of the kiln. These requirements are generally not onerous.

5.8.2 Burners for cement kilns

A fairly long flame is needed and flame stability not required as a result of the high temperature in the kiln. A simple form of burner is sufficient in which the pulverised coal and primary air enter through a central pipe and the rest of the combustion air is drawn in around this pipe after passing through a heat exchanger in which it received heat from the clinker leaving the kiln.

5.8.3 Cement plant efficiencies

Cement production is an energy intensive process involving both heat (clinker production) and electricity (grinding of feed and clinker). Modern plants in use

currently, use the dry process and have pre-calcination and pre-heaters consume around 80kWh of electricity per tonne of clinker and 750kcals of heat for each kg of clinker produced. Less modern dry process plants use up to 1100kcals of heat/kg of clinker and older wet process plants can use up to 1700kcals/kg of clinker produced.

Table 5.5 Coal consumption in cement plants

Type of Plant	**Heat required kcal/kg clinker**	**Tonnes clinker per tonne coal***	**Tonnes coal* per 106 tonnes clinker**
Most modern dry process, pre-heating	750	8.0	125,000
Less modern dry process, semi-dry process	1100	5.5	180,000
Least modern wet process	1700	3.5	280,000

* Calorific value = 6000 kcal/kg net as received basis.

(Source: Doyle, 2005)

5.8.4 Coal quality requirements

There are few limitations on coal quality for cement production, but the table hereunder gives an outline of the coal specification requirements and limitations.

Table 5.6 Required coal quality specification for cement kilns

Parameter	**Limits**	**Comments**
Total moisture	Max. 15% (ar)	Creates handling problems if too high.
Ash	Max. 25% (ad)	Generally little influence – composition must suit kiln feed composition.
Volatile matter	Virtually no limit	
Calorific value	Various	Depends on grinding capacity and throughput.
Sulphur	Max. 2% (ad)	Dry process. Limit less severe for wet process.
Chlorine	Max. 0.1% (ad)	Dry process. Limit less severe for wet process.
Hardgrove grindability index	Various	Limit set by capacity o grinding equipment and CV of coal used.
Maximum size	Max. 30-50mm	Dependent on grinding equipment.
Fines content (-3mm)	Max. 25-30%	Creates handling problems if too high.

(Source: Doyle, 2005)

5.9 ESKOM Product Specification

ESKOM has a dedicated procurement department, which include a technical and commercial team. This team ensures that the contracted product quality can be consumed by an assigned power station.

Saleable product from a producer is usually paired with an ESKOM power plant that has the ability to use the specific product and is at a fair distance from the power plant. When contracting with a producer is done, ESKOM has a Standard Operating Procedure (SOP) whereby it is contractually stated that product has to be on stockpiled for a minimum of 3 days, and that these stockpiles will be pre-certified by the ESKOM technical team. Operationally, the producer has to follow the SOP in detail to ensure following of the contractual obligations ESKOM is instructing in terms of product quality.

The table hereunder specifies the ESKOM required product, and the rejection column indicates when the product will be unacceptable for ESKOM. The coal specification for the 13 operational power plants is essentially the same with permutations on ash content, sulphur and abrasivenss index. Sizing is specified to be 0x40mm product.

Table 5.7 ESKOM coal specification and rejection ranges

Parameter	Units	ESKOM	Rejection
Calorific Value (basis)	MJ /kg (NAR)	21	20
Total Moisture	Maximum % (AR)	10.0	12.0
Ash	Maximum % (AR)	25-33	>35
Volatile Matter	Minimum % (AR)	20	20
Sulphur	Maximum % (AR)	1.0	2.0
Abrasiveness Index	Maximum	500	550

(Source: ESKOM Technical Team, 2009)

Should the producer supply coal in the rejection range in respect of qualities other than volatiles, which shall be rejected immediately, ESKOM shall impose penalties. Penalties equivalent to 30 – 50% of the cost of free-on-truck coal for the period is imposed, given that these are single production days.

If rejected material is produced longer than three days, ESKOM will reject the total free-on-truck cost of coal for each day. As a result, ESKOM has the right to instruct the producer in writing to stop delivery until such time as

ESKOM is satisfied that the Coal qualities are acceptable. Furthermore, ESKOM has the right to cancel an agreement should any coal quality be in rejection range for any cumulative 7 (seven) days of a specific calendar month.

5.10 Domestic Sales Product Specification

The domestic coal market uses different sized products. These products are produced from active screening. Three coal products, according to sizing are consumed domestically:

- Duff - 0 x 6 mm;
- Peas – 6 x 25 mm; and
- Small nuts – 25 x 40mm.

The domestic market also has the ability to consume A-D grade coal. The distinction between grades of coal is dependent on the ash content and calorific value. The lower the ash content and higher the calorific value, the higher the grade of coal, as indicated below. Note that domestic coal calorific value is expressed as MJ /kg, whilst export product calorific value is expressed in kcal/kg.

Table 5.8 Domestic coal specification

Parameter	Units	A Grade	B Grade	C Grade	D Grade
Calorific Value	MJ /kg ad	>27.5	>26.5	>25.5	>24.5
Total Moisture	Maximum % (AR)	12.0	12.0	8.0	8.0
Ash	Maximum % (AR)	15.0	16.0	18.	21.0
Volatile Matter	Minimum % (AR)	24.	23.	23.0	23.0
Sulphur	Maximum % (AR)	1.0	1.0	1.0	1.5

(Source: South African Classification, 2009)

A product mix is indicated in Table 5.8. The table provides information on the coal consumers (industry) within the South African coal market coupled with the coal sizing and grade of material that can be consumed within that industry.

Table 5.9 Domestic product mix for grade and size

Industry	Coal Grade	Coal Sizing
Gold and Uranium Mines	A; B	Small Nuts
Agriculture	B; C; D	Peas
Brick and Tile	C; D	Duff
Mining	A; B	Peas, Small Nuts
Cement and Lime	A; B; C	Duff
Mittal Steel	A; B;	Small Nuts
Electricity	B; C; D	Small Nuts, Peas
Metallurgical	A; B	Small Nuts, Peas
Chemical Industries	A; B	Small Nuts
Iron and Steel	A; B	Small Nuts
Industries	A; B; C; D	Small Nuts, Peas
Merchants and Domestic	A; B; C; D	All

(Source: South African Classification, 2009)

5.11 Export Product

Export coal in South Africa is classified as RB 1 and RB 2 (RB = Richards Bay) coal. The classification of RB product is as a result of the globalCoal platform that was commercialised in 2000. Although RBCT has 17 stockpile grades, export material mainly constitute these product specifications, semi-soft coking coal, anthracite and 10% thermal or pulverized coal injection material. For the purposes of this report, only RB 1 and RB 2 will be discussed, being 15% thermal coal.

Export coal product in South Africa is fairly generic in terms of the maximum and minimum parameter distinction for RB 1 and RB 2 coal, with only higher volatile matter in RB2.

Export product, is mainly classified as such if the product has a sizing similar of 0 x 50mm, a calorific value of 6000 kcal/kg and an ash lower than 15%. Sized material with a sizing of 6 x 40 mm and hard grove index of a minimum of 60 is exported ex Durban Dry Bulk Terminal. The reason for this is that Durban Port is a soft loading facility which is essential for loading sized material.

The exact RB 1 (and RB 2) coal specification is tabled hereunder:

Table 5.10 Typical export specification for South African thermal coal

Parameter	Units	RB1 Maximum	RB1 Minimum
Calorific Value	kcal/kg (NAR)	6,000	5,850
Total Moisture	% (AR)	12.0	
Ash	% (AR)	15.0	
Volatile Matter	% (AR)		22.0 *
Sulphur	% (AR)	1.0	
Hardgrove Index		70	45
Ash Fusion Temp	^{o}C		1,250
Calsium Oxide in Ash	% (DB)	12	
Sizing	0 x 50 mm		

* For RB2 Specification, volatile matter has to be a minimum of 25%
(Source: SCOTA, 2009)

South African producers have seen a permutation, of what has always been known as standard export specification, with the emergence of India as a major buyer. Higher ash content with associated lower calorific value material is bought by Indian consumers since Indian power plants are designed to utilized lower quality input coal. Producers are often faced with the decision to beneficiate lower quality material at a higher yield, but at a discounted price.

5.12 Summary

In considering thermal coal as the product consumed by ESKOM, the export and the domestic market, it is clear that each market has distinctive product specifications and marketing terms associated with it. This means that the product sold to ESKOM is intrinsically different to the product that South Africa exports, and to the A-D grade products used in domestic industries.

Production of each product originating from different coal seams is often interdependent as geology and mining makes provision for different products from one mining process. Differentiation in product only occurs once beneficiation takes place. Geology and washability of the coal is the first step in developing a marketing plan and strategy. The producer cost curve, based on FOB cash costs is the curve ranking each producing country in terms of costs competitive and contribute to South African producers driving cost down in an effort to stay globally competitive. It has to be noted that production is derived from multi-seam mining in South Africa, and middling product is often the delivered ESKOM product. It would be highly inefficient and unprofitable

to mine only particular coal seams and not extracting value from multiple seams for ESKOM and export products.

Technically, the product is the most important element in the marketing mix, since the technical analyses and composition is marketed in bulk, and the product is bought from a technical specification. It is evident that the marketing manager should have superior technical (preferably mining or metallurgical) knowledge of the product, but also of the process in which the coal will be used as energy fuel. The technical specification sheet is the fundamental starting block of marketing coal, and a full understanding of proximate and ultimate analyses, ash fusion temperatures, calorific value and ash composition is essential for successful marketing.

Thermal coal is used by the various markets in two applications - power generation and cement manufacturing. Coal is used either in a pulverised or sized form as feeder fuel in burners and stokers. Stokers and burners have different specifications and usually the product can be adapted in terms of size for optimal utilisation. In cement manufacturing coal is fed according to the kiln feed composition and fine material is used. Technically, the marketing manager need a full understanding of the product required by individual customers, based on their stoker, burner or kiln specifications and requirements.

Table 5.10 represent a summary of the different coal products with its typical specification. As indicated, it is clear that the parameters not only differ per product, but each product has individual parameter applications. The information is summarised for ESKOM, domestic and export market products. Products can be marketed on a dry, air dried or as received basis, and the marketer should ensure that the consumer or buyer understand the basis of contracting.

Table 5.11 Thermal coal product specifications summarised

Parameter	Units	ESKOM	Domestic	Export
Calorific Value	(NAR)	21-24 Mj/kg	24.5-27.5 Mj/kg	5850-6000kcal/kg
Total Moisture	% (AR)	8-12	8-12	8-12
Ash	% (AR)	25-34	15-21	15
Volatile Matter	% (AR)	20-30	23-30	22-20
Sulphur	% (AR)	0-2	0-1.5	0-1.0
Hardgrove Index			45-70	45-70
Ash Fusion Temp	^{o}C			1.250
Phosphorus	%		0.001-0.01	0.001-0.01
Calsium Oxide in Ash	% (DB)			12
Sizing		0x40mm	0x6mm 6x25mm 25x40mm	0x50mm

CHAPTER 6

DISTRIBUTION

Distribution of bulk coal is discussed in light of contemporary South African logistics. The distribution of coal is a value-adding action, since a particular cost is associated with the method of distribution, which includes a channel, road, rail or shipping costs. The distribution pattern dictates when a product is in fact sold or when risk is transferred from seller to buyer. This point also indicates the terms of the sale and the delivery point which is explained in terms of international Incoterms.

An important aspect of distribution is whether a channel structure is used. Channel structures are the utilisation of an agent or trader to act as a third party to move the commodity from the producer to the consumer, often pricing in a commission or fee.

Distribution forms part of the integral marketing strategy and plan and apart from place value, also has storage characteristics, which in coal is an important issue since coal has the risk to spontaneous combust if not stockpiled correctly or shipped at the appropriate time.

Although access to distribution channels are often viewed in simplicity and access is assumed, this is not the case for coal producers in South Africa. Participation in the rail infrastructure of South Africa requires rigid financial guarantees and contracting with General Freight Business (GFB) and Transnet Freight Rail (TFR) are done on different terms. Export allocation through Richards Bay Coal Terminal (RBCT), have been a contentious subject for many years in South Africa, since the terminal is historically privately owned by the major coal producers, and this restricts junior BEE miners from participation. The other available ports in South Africa have restrictions which will also be discussed in detail.

6.1 International Commercial Terms (Incoterms)

Incoterms are the worldwide standard for the interpretation of trade terms. The International Chamber of Commerce (ICC) developed these terms to serve as a set of uniform rules for the interpretation of commercial terms defining the costs, risks and obligations of sellers and buyers in international goods transactions. The current version is called Incoterms 2000.

Incoterms are a set of contractual instruments facilitating the sale and transport of goods in international transactions. However, Incoterms are not implied by default in an international sales contract, it must be specifically be included in the contract. The contract should expressly refer to the rules of interpretation, as referred to in Incoterms 2000. Additional contract provisions should ensure proper application of the terms. Incoterms are not laws, but precise definition of the costs, risks, and obligations of both parties in a contract. In the case of a dispute, courts and arbitrators will look at: (1) the sales contract; (2) who has possession of the goods; and (3) what payment, if any, has been made (Vogt et al, 2002:257).

Incoterms 2000 are grouped into four categories – the E, F, C and D terms. For purposes of the study of coal, only the most relevant categories are reflected in the table hereunder, and domestic terms are reflected which include carriage not involving sea freight.

Table 6.1 Incoterms categories

Group	Code	Name of term
Group E Departure	EXW	Ex Works (named place)
Group F Main carriage unpaid	FOM FOT FOR FAS FOB	Free On Mine (named place) Free On Truck (named place) Free On Rail (named siding) Free Alongside Ship (named port of shipment) Free On Board (named port of shipment)
Group C Main carriage paid	CFR CIF	Cost and Freight (named port of destination) Cost, Insurance and Freight (named port of destination)
Group D Arrival	DES	Delivered Ex Ship (named port of destination)

(Source: Vogt et al, 2002: 258)

The following two tables specify the costs, risks and obligations and should be read in conjunction in understanding the responsibilities of both the buyer and seller for each of the eight Incoterms.

A definition for each term is included in Table 6.2 in the first column, together with the type of payment for each transaction as per a typical coal contract. The table should be read from left (Seller / Exporter Premises) to the right-hand side (Buyer / Importer Premises). The red arrows are indicative of risk and cost. The table headers in between are indicative of the chronological actions of shipping coal to its end destination. He solid red arrows start at the seller and ends at the indicated Incoterm transportation or shipping activity. This means that the seller's responsibility ends where the dotted line starts, which in turn, indicate the start of the buyer's responsibility, with respect to the following:

- The conditions that constitute completion of delivery;
- How one party ensures that the other party has met the required conditions;
- Which party must comply with requisite license requirements and/or government imposed formalities;
- The mode and terms of carriage;
- The stage when the risk of loss will transfer from the seller to the buyer;
- How transport costs will be divided between parties; and
- The notices that parties are required to give to one another regarding the transport and transfer of goods.

Table 6.2 Description of Incoterms in terms of buyer and seller risk and cost at specific locations

As indicated in Table 6.3 hereunder, when read in conjunction with Table 6.2 above, finalise a concise description of action actions and costs borne by either the seller of the buyer.

Table 6.3 Description of Incoterms in terms of buyer and seller responsibilities

SERVICES	Ex Works	Free Carrier*	Free Alongside Ship	Free Onboard Vessel	Cost & Freight	Cost Insurance & Freight	Delivered Ex Ship
Warehouse Storage	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Warehouse Labour	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Export Packing	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Loading Charges	Buyer	Seller	Seller	Seller	Seller	Seller	Seller
Inland Freight	Buyer	Buyer/ Seller	Seller	Seller	Seller	Seller	Seller
Terminal Charges	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller
Forwarder's Fees	Buyer	Buyer	Buyer	Buyer	Seller	Seller	Seller
Loading On Vessel	Buyer	Buyer	Buyer	Seller	Seller	Seller	Seller
Ocean/Air Freight	Buyer	Buyer	Buyer	Buyer	Seller	Seller	Seller
Charges On Arrival At Destination	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
Duty, Taxes & Customs Clearance	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
Delivery To Destination	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer

* Include Incoterms for inland carriage (FOM/FOT/FOR)
(Source: Vogt *et al*, 2002)

6.2 Channel Structures

Distribution channels in domestic and international trade are the marketing routes that coal follows to flow from the seller (producer/ exporter) to the buyer (consumer/ importer). A seller can choose an appropriate distribution channel for its coal once it has identified a target market (Adendorf and De Witt, 1999).

An appropriate distribution channel enhances the efficiency of the domestic and international marketing effort. Seller and logistics managers involved in

domestic and international marketing and distribution must acquaint themselves with distribution channels as they need to understand their own organizational shortcomings, historical and cultural product flow to customers.

Successful international marketing often results from partnering with a key intermediary who has access to distribution channels in the foreign market. Sellers need to appreciate the importance of the role of intermediaries in getting products to their target markets and ensuring that they receive them at a reasonable price.

According to Adendorf and De Witt (1999), forming a business alliance with a reputable partner who can channel export products to appropriate distribution points is called a 'push strategy'. The longer the distribution channel, the greater the number of intermediaries and this results in less profit accruing to the seller. Sellers use the following criteria to determine the length of their distribution channels:

- Complexity of technical requirements;
- Lifespan of the product;
- Price of the product;
- Service requirements; and
- Turnover.

If coal producers (sellers) were to market their coal to end-users by means of their own sales force, they would be the only profit-earning party. However, direct marketing in foreign countries may be very difficult and extremely expensive, eroding all profits. Exporters therefore have to trade off the costs and benefits of employing intermediaries instead of conducting their own sales, and of continuously monitoring the situation. Choosing to deliver products directly is called a 'pull strategy'.

Producers who enter the international market may be tempted to entrust the entire export process to an established international distributor. In doing so, seller may not become aware of the way consumers react to their coal. Furthermore, all the initiative for increasing market share rests with the distributor. This strategy of cost avoidance may cost producers dearly in lost marketing opportunities.

Traditionally sales agents were required in markets such as Japan and India. During the last number of years Japanese steel mills and utilities started buying directly from suppliers circumventing the traditional Japanese trading houses. In India large companies are changing their procurement policies to buy directly from suppliers. In European markets the marketing of coal has been done directly for a number of years. The exception to this is the sale of thermal coal to the industrial market in southern India. A number of small cement, brick and ferro-alloy producers require coal in this region and they prefer the coal to be delivered to their factories directly. A sales agent will be needed to distribute the coal to the various customers from the discharge port.

Domestic agents and traders are often used by producers that cannot incur the cost of establishing a marketing function, or they choose to only focus on production. The following domestic distributors and traders operate within the South Africa domestic market. These companies distribute in excess of 8 million tonnes coal from producers to domestic users annually (DME Statistics: 2008).

- Wescoal Ltd.;
- Cullen Coal;
- Coal Marketing Services;
- Macphail Distributors; and
- Glencore South Africa.

International traders and agents have been operating locally in South Africa for decades. These companies are used by major and junior producers the like, although they do give junior miners and Quattro members low cost access to the international market. Junior miners almost exclusively use traders to export their coal through common stockpile allocation at RBCT and other terminal. The tradability of coal as a commodity at the different terminals sees traders often buying from major producers and then channelling it into the international market. Glencore is by far the biggest trader present in South Africa, but with international accolades as trader and agent. Glencore negotiated a dedicated stockpile at RBCT a number of years ago, which enhanced its trading business, whilst other traders have to use the common stockpile. Coal Procurement is oldest profitable South African trading company, trading coal internationally, mostly through Maputo and Durban.

The following international traders and agents are operational within the South African market:

- Glencore South Africa and Glencore International AG;
- Coal Procurement SA;
- Cargill;
- Noble;
- Oxbow; and
- Vittol.

6.3 Road Transport

According to the Department of Transport, South Africa moves approximately 700 million tonnes of freight domestically annually, 74% by road and 26% by rail. Most of freight in South Africa is moved by road because it is more flexible than rail transport.

With the deregulation of road transport in the late 1980's, together with failings of the rail system, a migration in cargo ensued from rail to road, which has resulted in high growth in cargo movement by road. In general, road transport has responded well to the demands of the freight industry, having short turnaround times and enabling sophisticated transport logistic systems that respond to complex client supply requirements.

Relative to other modes of transport, the road system is facing serious degradation as a result of underlying shortcomings from increased road usage. The reason is twofold, one being that investment levels in the road network are estimated to be half of what it should be. Secondly, the significant increase in heavy vehicle traffic volumes on the road networks is shortening the maintenance and rehabilitation cycles of the road network (Department of Transport, 2009).

Initiatives that have been implemented to curb the practice of overloading on the country's roads have resulted in an unintended consequence of heavy vehicle transporters circumventing the primary road system by using the secondary road network instead. This road network is not designed for heavy loads and high heavy vehicle traffic exposure, and thus rapidly deteriorating,

resulting in efficiency and road safety problems (National Freight Logistics Strategy: 2005).

6.3.1 Coal road haulage

Road haulage in the coal industry is a major business in South Africa today. Road haulage is contracted on a Rand /tonne /kilometer basis, given the DME report on reigning price for Diesel 0.005%, generally in Zone 9C (Gauteng).

Road haulage is done by 30 tonne loads, or a maximum of 60 tonnes when interlinked trucks are utilized. Coal is transported in South Africa between the following points:

- Plant to stockpile;
- Mine stockpile to rail siding;
- Mine stockpile to buyer / consumer stockpile;
- Mine stockpile to distributor depot;
- Distributor depot to buyer / consumer stockpile; and
- Mine stockpile to port – only in the case of Kwa-Zulu Natal anthracite producers which are in very close proximity to the respective ports.

Dependant on the Incoterms of the coal sale contract, the producer (or mine) usually contracts with the road haulage company for transport between said points. A vast number of road haulage companies have developed in South Africa over the past 10 years, mostly as procurement policies developed to include BEE road haulers. A number of major road haulers have since included BEE partners, but enterprise has grown significantly to individual companies owning 200- 300 trucks in order to facilitate road transport in the coal industry.

Depending on the size of the producing mine (or company) and the distance haulage required, a large or smaller road haler is usually contracted by the producer. Flexibility in terms of operating hours, number of trucks and security are major concerns that the contracting party should consider.

6.3.2 ESKOM road transport

ESKOM only procures coal on a free-on-conveyor (FOC), free-on-truck (FOT), or free-on-rail (FOR) basis. ESKOM prefers to negotiate and pay transporters, since it has the advantage of economy of scale, but moreover, since it has a very strict procurement policy to use BEE companies in the transport function.

Forced by environmental groups, community stakeholders and road safety regulations, ESKOM is currently in the process of reducing road transport to its various power plants. ESKOM has engaged in an alternative strategy to rail coal to the power plants that have access to sidings on-site. This strategy will be on-going in an effort to reduce road transport with 25% by 2010.

The current economic climate constitute that this will be possible. However, considering that 80% of all chrome mines, 25% of platinum mines and 10% of coal mines in South Africa have entered into a care and maintenance phase, rail capacity is available. Should the economy reach its turning point, and Transnet have not made provisions for additional capacity, the rail capacity will most likely not be available. In addition to the slowed economic activity, ESKOM has publicly estimated that it would need 40 new coal mines to supply in its planned demand from 2011 onwards.

6.3.3. Domestic road transport

Wherever consumers do not have rail siding available for discharge, or the producing mine do not have access to a siding, road transport is used. Depending on the size of the seller and buyer, the larger company will usually negotiate the road transport contract. The sales contract is then set as free-on-truck or delivered at the consuming plant.

6.3.4 Export Road Transport

When coal is exported, it has to be delivered to a loading rail siding. Road transport is contracted for this function, should the mine stockpile and siding not be in a very short distance (shorter than 500 meters).

The ports in South Africa do not accept road haulage into stockpiles, although producing mines that are in very close proximity (less than 70 kilometres), have special arrangements with ports to accept road hauled coal, e.g. Springlake Anthracite and Riversdale Anthracite.

6.4 Rail Transport

According to Transnet (Transnet Annual Report: 2008), approximately 82 million tonnes of coal is transported by the rail system in South Africa on an annual basis. This number is dependent on capacity and operational efficiency by Transnet.

The following map provides the rail line infrastructure linking the centre of the country to the east coast. Although other General Freight Business (GFB) lines run through the rest of the country, the lines indicated in the map are at the centre of the coal industry and are generally referred to from a Transnet perspective.

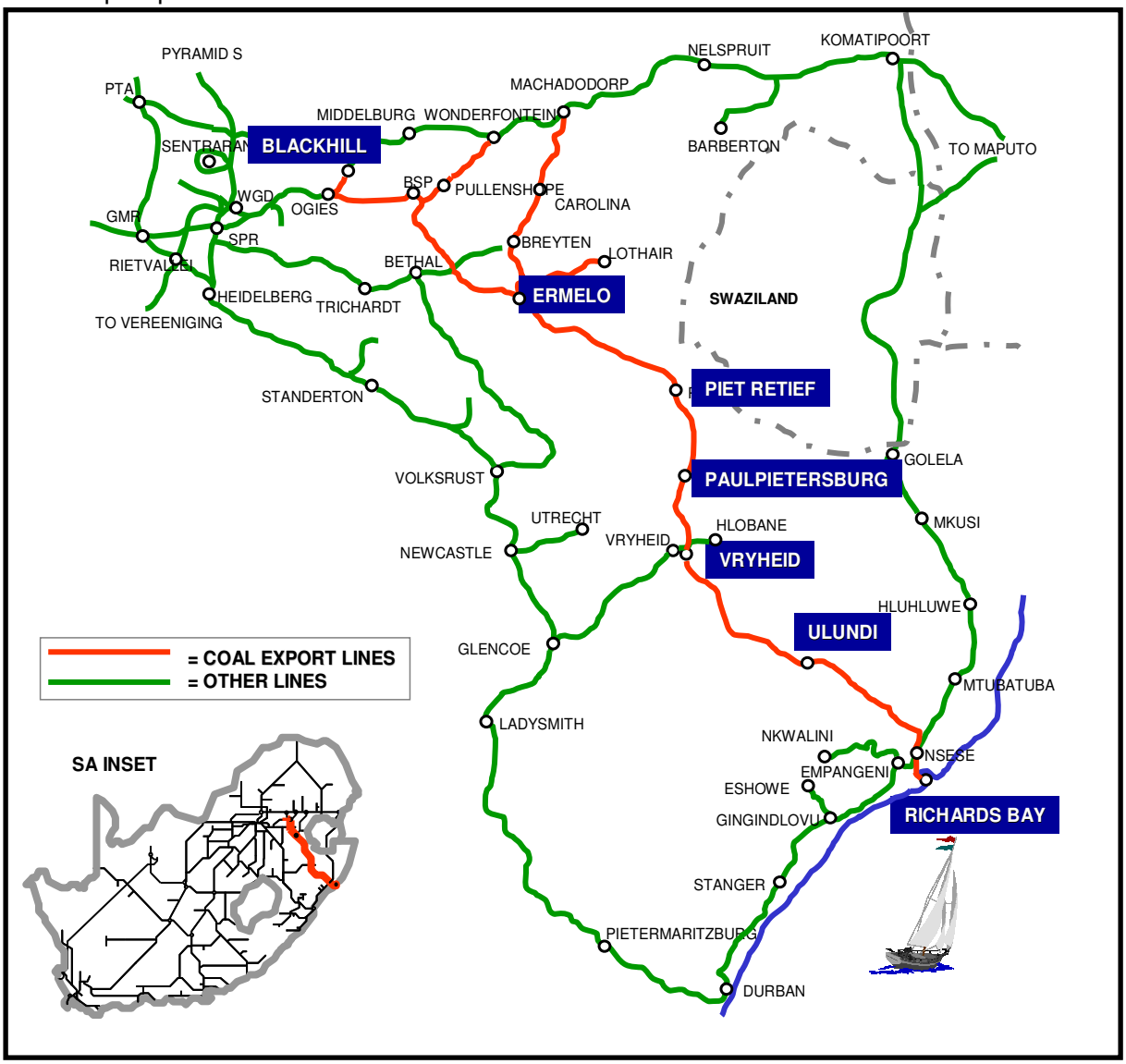

Figure 6.1 South African rail infrastructure

(Source: TFR, 2009)

The 'red' line, as indicated in Figure 6.1, is viewed as the most important line, operated by Transnet Freight Rail (TFR) and carrying up to a planned 67 million tonnes per annum. The 'green' or other lines are the rail lines carrying domestic coal to domestic consumers and export coal to Durban and Maputo ports. These lines are operated by General Freight Business (GFB). There are vast differences in capacity and rank between the two line systems, which will be discussed hereunder.

6.4.1 Rail transport for exports

- **RBCT Exports**

The coal export line was commissioned in 1976 with an initial capacity of only 4.2 million tonnes per annum. It has grown to a capacity of 72 million tonnes per annum in 2006/7 (although only 67 million tonnes have been achieved). The line was initially managed by separate entity within Spoornet called CoalLink. CoalLink employed 2 000 people and operated a rolling stock of 7 400 wagons and 235 locomotives. The average distance from the Witbank / Middelburg coalfields to RBCT is 600 km. The success of CoalLink can be attributed to this independency and the fact that CoalLink has exclusive and preferential use of the line to transport coal to RBCT. In late 2007 it was decided to integrate CoalLink into the restructured TFR business (TFR Public Presentation: 2009).

Rail performance has declined in recent years from a capacity of 72 million tonnes to a maximum of 67 million tonnes in 2006, and the worst in 2008 of 60 million tonnes. With the expansion of RBCT came the aim of exporting 91 million tonnes within the next 5 years.

The coal export industry has cited that the bottleneck in achieving the increase in export coal volume from the current declined rail performance figure of 60 million tonnes per annum to the planned 91 million tonnes per annum is TFR. However, TRF maintains that the export of 91 million tonnes per annum is not only questionable but it will take longer than 5 years to match the rail capacity with the export capacity at RBCT. The main arguments posted by TFR (TFR Public Presentation: 2009) are:

- According to TFR's own assessment an attainable long term export rate based on mining performance and evaluation of the mining project pipe line will only be 77 million tonnes per annum;

- Increasing capacity by 25 million tonnes per annum from an estimated 66 to 91 million tonnes per annum is larger than the total production of any of the current producers;
- Additional investment is required for the upgrade of the line and the procurement of additional rolling stock is required and this will take time. TFR's estimation is that the rail capacity of 91 million tonnes per annum can only be reached by 2014/15;
- Capital investment required to reach the target rail capacity will amount to US$ 2.8 billion, with expenditure starting in 2009;
- Given the current trends, new capacity investment is a risk;
- The risk-reward profile is skewed. TFR will have to take 95% of the risk and only obtain a reward of 6 to 8 % (figure based of a coal price of US$100.00/mt CIF ARA).

Based on the above arguments, TFR increased tariffs by an average of 38% in January 2009, with a back-dated payment to be made from July 2008. In order to address their risk exposure, TFR also announced that it will not invest capital without some form of security.

The following approaches to the expansion will be followed by TFR:

- Comprehensive Market Due-diligence, which include global and domestic market conditions and the coal commodity cycle and price competitiveness of South African producers;
- Collaborative, open-book planning process with all stakeholders;
- Operate within the framework set by the Competition Commission;
- Expansion targets and investment linked to contracted volumes only; and
- Continuous business risk assessment and mitigation.

TFR and RBCT are currently on a mutual drive to optimise scheduling for all RBCT exporters.

- **Durban and Maputo Exports**

Coal transported by rail to Durban and Maputo ports fall under GFB. Block loads (train mass) are usually only 1 200 tonnes as opposed to 5 800 or 8 400 tonnes per train run by TFR.

Producers exporting sized coal (usually to Turkey) have to export via Durban port as it is the only soft-loading facility in the country. These producers usually contract with GFB for railage of the coal, adhering to the stockpile constraints and shipping schedule of the port.

TCM Matola in Mozambique has been used as an alternative port for 15 years. This port has been used mostly by smaller junior producers with no access to RBCT. The greatest constraint has been the relationship between Transnet and CFM, specifically when rail trucks leave South Africa and enter Mozambique, and the related turn-around time for these trucks to return to South Africa. The rail line also needs upgrading between Rosanna Garcia and Maputo, an issue which is currently receiving private equity attention. TCM Matola is currently the best alternative for produces without RBCT allocation, but the costs associated with railage are much higher than for TFR railage, and considering that block loads are considerably smaller, it takes effective planning and an astute logistics team to effectively export through Mozambique.

6.4.2 Rail transport for ESKOM and domestic consumers

Rail transport for ESKOM and large domestic consumers such as PPC, Sappi, the ferro-alloy industry and platinum smelters all contract with GFB for domestic railage of coal. Siding capacity for loading and discharge are the same as for TFR business. Usually, fewer rail wagons and wagons with smaller capacity are used for in-land business.

6.4.3 Rail Contracting

TFR has recently concluded a new 10 year rail contract with all the RBCT users. This included a different penalty system and a 38% rail hike. A standard service level agreement was negotiated with the rail company, contracting a service based on volume, rail rate and an overall weekly capacity plan for the entire industry. TFR contract individually with the major producers, and collectively with the Quattro members through Mhlatuze Bay Administrators.

GFB users are contractually bound by either an annual contract or on a monthly usage contract. GFB Railage rates are approximately 50% higher

than the dedicated TFR rates, as general freight include all bulk freight moving in South Africa, and this is seasonal of nature, i.e. soft commodities.

In order to be able to negotiate an acceptable rail rate the following issues should be considered:

- Guaranteed train load rates;
- Guaranteed train turn-around-times; and
- Guaranteed quantities of coal to be moved per year

An integrated rail plan, in balance with sales and production, is provided to TFR and GFB on a regular basis. This plan should include a weekly, monthly and annual plan. The weekly plan will be revised on a weekly basis to reflect the actual requirements for the next week and will be used as the execution plan. The monthly plan is used by TFR and GFB to schedule rolling stock and train slots a month in advance and the annual plan will be used by TFR and GFB to plan capacity as required by the mine. It is of utmost importance that the entire sales channel be optimised and managed to ensure a high level of service delivery to customers.

Siding access and usage is an essential element of rail access in South Africa. If a mine does not have an affiliated siding, it can either part use with another company that holds a lease or operate a private siding, or build a new siding in close proximity to the mine. Often capacity does not exist to part use, and the only option is to build a new siding.

TFR Properties are responsible for siding leases. The land on which the siding is build is owned by TFR, but the user can lease the land and then operate the siding given TFR rules and regulations in terms of safety and environmental requirements. Usually the lease is valid for 4 years and 11 months and renewable after this time. Sidings can not be sub-leased.

When a producing company decides to build a new siding, it can either do so on TFR land or on its own acquired land. Accredited consulting engineer firms are commissioned to design the siding, which has to be approved by TFR Industry. Not only has the producing company have to adhere to providing and Environmental Impact Assessment (EIA), but also adhere to the operational regulations and rules of the Rail Safety Regulator. TFR Industry will sign-off all final construction, and the Rail Safety Regulator will issue a

permit for operations to start. New sidings currently reach final costs of between R20 – R55 million, but are 24 hour operated sites with a maximum turnaround time of 6 hours per 100 trucks.

6.5 Terminal Access and Ocean Freight

Coal export terminals are the final mode of distribution when contracting is done on a FAS or FOB basis. Producing companies (sellers) will only sell on a CFR or DES basis, if its internal marketing and logistics function is sophisticated enough to handle freight. This is usually on done by the major producing companies, and the freight offices are often located in London, Singapore, The Hague or Geneva.

A brief overview of shipping will follow, in order to explain the wide field of expertise that marketing professionals are dealing with in the process to market coal as a commodity.

6.5.1 Shipping and logistics

Operational parameters in shipping refer particularly to the suitability of a terminal to load various classes of bulk carriers. Bulk carriers are characterized by three dimensions namely:

- The length overall (LOA);
- The width of the vessel (beam); and
- The maximum allowable draft of a fully laden vessel (draft).

The physical dimensions of the berth/s in a terminal dictate the maximum dimensions of vessels that can be loaded at the terminal. As an example if a berth has a maximum depth of 17 m, the terminal will only allow vessels with a maximum draft of 16 m to be loaded at the berth. It is thus apparent that not all bulk carriers can be loaded or discharged at all coal terminals. A terminal will have an advantage if it is able to accommodate a large variety of vessels, thus having flexibility in minimising freight rates by loading the lowest cost vessels for each of the required routes i.e. RBCT (Doyle 2005: 64).

The load rate guaranteed by the terminal as well the discharge rate guaranteed by the discharge port have a profound impact on freight rates. The time it takes to load a vessel is determined by the load rate and as the

cost of chartering a vessel is based on the duration of the voyage the time taken to load the vessel is included as part of the voyage time. The higher the guaranteed load rate, the faster the vessel will be loaded and thus the lower the ultimate freight rate payable.

Commercial factors such as port charges, canal charges, local taxation regimes, bunkering patterns and prices, and political considerations can also affect competitiveness. From a charter party point of view, the allowed turn time could also influence competitiveness of a specific port. In general, turn time of 12 hours is standard in most ports. RBCT requires a turn time of 18 hours, for example.

The three types of bulk carriers used in coal shipping are the following:

- **Handymax:** Typically 150-200 meters in length, though certain bulk terminal restrictions dictate that many handymax ships are just less than 190 meters in overall length. Modern handymax designs are typically between 35 000 and 60 0000 tonnes deadweight (DWT) in size, have five cargo holds, and four cranes of 30 metric ton lifting capacity;
- **Panamax:** Ships are of the maximum dimensions that will fit through the locks of the Panama Canal, and are typically 294 meters in length and have a displacement of 65 000 tonnes DWT; and
- **Capesize:** Ships are cargo ships originally too large to transit the Suez Canal (i.e., larger than panamax vessels). To travel between oceans, such vessels used to have to pass either the Cape of Good Hope or Cape Horn. Vessels this size can now transit the Suez Canal as long as they meet the draft restriction of 18.91metres as of 2008. Capesize vessels are typically above 150,000 tonnes DWT. A standard capesize bulker is around 175,000 DWT. The large dimensions and deep drafts of such vessels mean that only the largest deep water terminals can accommodate them (Doyle, 2005:66-67).

6.5.2 South African coal loading ports

- **Richards Bay Coal Terminal**

The Richards Bay Coal Terminal (RBCT) is the major coal export facility for thermal coal exports from South Africa and is the largest export facility in the southern hemisphere. It was originally established by the Transvaal Coal Owners Association (TCOA) in 1974.

Access to the terminal is limited to shareholders and each shareholder is allocated a specific annual tonnage as well as specific stockpile space (grade). This operational philosophy provides the opportunity for a shipper to build a cargo on an allocated stockpile and then chartering a vessel to arrive when the stem is ready to load. This thus limits demurrage charges at the terminal to a minimum. The terminal has passed through various expansion phases as listed in Table 6.3.

Table 6.4 RBCT expansion phases

Phase	Year	Increment (million tonnes)	Total (million tonnes)
I	1976	12	12
II	1979	12	24
III	1984	20	44
III+	1991	9	53
IV	1995	10	63
IV+	1999	9	72
V	2009	19	91

(Source, DME Coal Industry Task Team, 2009)

In 1998, frustrated by not getting allocation access at RBCT, a rival group of mining companies, – ISCOR Mining (now EXXARO), ESKOM Enterprises and Anker Coal investigated the building of a private terminal called the South Dunes Coal Terminal (SDCT) in the Port of Richards Bay. In order to prevent the building of a new terminal the RBCT shareholders offered the SDCT members access to RBCT through a dedicated 6 million tonnes per annum. The SDCT members accepted this offer and this 6 million tonnes per annum became know as the SDCT tonnes. These tonnes have partly become available in 2009.

RBCT terminal operators (a non-profit organisation controlled by Phase IV shareholders) came under pressure from the government and junior miners to allow access to non-shareholders. The terminal operators agreed to make 4 million tonnes per annum available to non-shareholders. Junior miners wanting to export had to apply and allocation was awarded on conforming to a set of conditions, although BEE credentials featured strongly. The 4 million tonnes per annum was finally allocated to a total of 18 junior mining companies and became known as the Quattro tonnes. Quattro allocation is administered on a collective basis by Mhlatuze Bay Administrators (a non-profit organisation controlled by the

DME). Quattro has been operational since 2004. The current allocation of tonnage per company is depicted hereunder.

Table 6.5 RBCT allocation by South African producers

Mining Company	Phase IV+	Quattro	SDCT	Phase V	Total / Company
BHP Billiton	26.960				26.960
Anglo	19.780			1.246	21.026
Xstrata	15.050			1.539	16.589
Tot	4.090			0.422	4.512
Sasol (EXXARO)	3.600			0.369	3.969
Kangra (Shanduka)	1.650			0.173	1.823
Eyesizwe (EXXARO)	0.870	0.289		0.086	1.245
Siyanda				1.652	1.652
SDCT				1.652	1.652
EXXARO		0.105	2.000	1.102	3.207
ESKOM Enterprises			3.000		3.000
Anker		0.197	1.000		1.197
Black Gold		0.200			0.200
Endulwini		0.250			0.250
SACMH		0.207		0.500	0.707
Leeuw		0.207			0.207
Mashala		0.207			0.207
Mmakau		0.247			0.247
Polmaise		0.230			0.230
Shanduka Coal		0.197			0.197
Shanduka Res		0.270			0.270
Tweewaters Fuel		0.242			0.242
Umcebo		0.197			0.197
Nucoal		0.207			0.207
Worldwide Coal		0.401			0.401
Riversdale		0.150			0.150
Slater		0.197			0.197
Total	**72.000**	**4.000**	**6.000**	**9.000**	**91.000**
Cum Total	**72.000**	**76.000**	**82.000**	**91.000**	

Note: () indicate controlling company; * Company names indicate shareholders

(Source: DME Coal Industry Task Team, 2009)

In terms of Phase V, the industry in general had been very skeptical about the increase from 82 million to 91 million tonnes per annum. A number of market analyst and mineral economists are of the opinion that the 19 million tonnes per annum increase is not sustainable in the long run.

It is apparent from the production discussion in chapter 5 that the major mining companies - BHP Billiton, Anglo Coal, Xstrata, EXXARO and Total will maintain their export quantities over the long term. If the tonnage from Shanduka is added it will be safe to say that the total from these companies is 79 798 million tonnes per annum, which will be sustainable over the long term.

Considering the project pipeline of junior mining companies it should be possible for the majority of them to sustain their exports in the long term. However questions still arise on the 3 million tonnes per annum, allocated to ESKOM Enterprises, the 1.197 million tonnes per annum allocated to Anker Coal and the 1.652 million tonnes per annum allocated to SDCT.

ESKOM acquired its allocation as a member of SDCT. At that stage ESKOM had some mining assets which were housed in a subsidiary company, ESKOM Enterprises. The ESKOM board has decided to divest in non-core business and the mining assets were sold. ESKOM has announced that the 3 million tonnes per annum SDCT allocation is up for sale, but for the last 18 months, very little information had been forthcoming from the state enterprise.

Anker Coal SA has been struggling over the last couple of years and was subjected to many failed hostile take-over bids. The life spans of their current operations are not sufficient to sustain the export allocation in the long term and they have not been successful in obtaining new reserves.

SDCT is a management company and does not have any mining operations. With EXXARO being accommodated already and ESKOM divesting it will be difficult for SDCT to source 1.652 million tonnes per annum on a continued basis.

In summary then it seems that sufficient long term tonnage is available to sustain a minimum of 85 million tonnes per annum. TFR, however, will remain the major concern in terms of railage capacity of the 85 million

tonnes. Junior BEE mining companies will continue to put pressure on RBCT shareholders and the DME to make additional allocation tonnage available at the terminal.

- **Durban**

The Bulk Connections terminal in the port of Durban is the only export facility in the region that is able to soft-load sized coal. The port is limited to Handymax vessels and although it has a design capacity of 3 million tonnes per annum it only handles approximately 1.5 million tonnes per annum due to insufficient rail services to the port. This port will retain its current customers who focus on the export sized coal market.

- **Maputo**

The Matola Coal Terminal is owned and operated by Grindrod Limited a major international logistics company. The terminal is the closest export facility to the Witbank and Middelburg coal fields at only 415 km.

The terminal has over the years maintained an average export quantity of 1.2 million tonnes per annum and has secured three major anchor customers. Although the terminal has aspirations to increase its coal exports to 2 million tonnes per annum by 2010, it is not sure if the rail support from TFR and CFM will be available. The port is limited handling Handymax and Panamax vessels up to 65 000 tonnes loaded.

6.6 Summary

The physical distribution of coal in South Africa might well be the most contentious issue in the industry. Mostly, a lack of capacity is to blame in each mode of transport, which worsens with the continuous entrance of new JMS and BEE players.

An understanding of Incoterms, specifically Ex Works, FOM, FOT, FOR, FAS and FOB are essential to managing coal deliveries and contracting with ESKOM, domestic consumers and for exporting coal. The implication, cost and responsibility considered for each Incoterm is different and the marketing function should not only understand these intricacies, but also be able to manage, cost and deliver upon any requested mode of transport.

The concept of distribution and channels also includes channel members such as traders and agents. Complete knowledge of each agent and trader's capabilities, cost and service levels is essential as the producer will relinquish its sales function to these channel members. Channel members have different functions, costs and responsibility in the domestic and export market functions.

Road transport is predominantly used in the absence of rail sidings, but to a large extent by ESKOM. The significant increase in road transport over the past five years has seen serious deterioration of national roads since only 30 tonnes of coal can be moved by a single road truck, and vast tonnages are currently moved by contracted road transporters, of which a large number are emerging BEE players as a prerequisite to the mining scorecard.

Transnet provides the TFR and GFB services to coal producers. TFR only contracts with RBCT shareholders and allocation members, whilst other producers have to contract with significantly smaller GFB wagons to transport coal to alternative ports (Durban and TCM Matola). Railage to ESKOM and domestic customers (Mittal, Sappi, PPC etc.) is based on both producer and consumer rail siding requirements and the companies' effectively managing loading and discharge requirements.

In terms of exports, TFR had also re-negotiated the industry's contract to reflect stringent conditions in terms of cancellations and the industry will be required in 2010 to contract for a 10 year period. TFR is currently planning major capital expenditure in terms of maintaining the RBCT line, but also adding additional rolling stock wagons and locomotives. The capital expenditure is based on increased planned port capacity and will be implemented over eight years.

Private and partnership sidings are the key to access to trains, and without access to a siding, a mining group have very little access to export trains, or trains delivering coal to the domestic market. Major siding projects are currently underway implemented by both large and small producers at major cost. There is however, a mismatch in TFR capacity and current production numbers for export, and TFR will address this with annual increased guaranteed capacity, based on its capital expenditure programme.

Railage and port allocation go hand-in-hand in the South African context. RBCT shareholding and allocation constitute the pie chart in Figure 6.2. This is based on the planned 91 million tonnes expansion capacity.

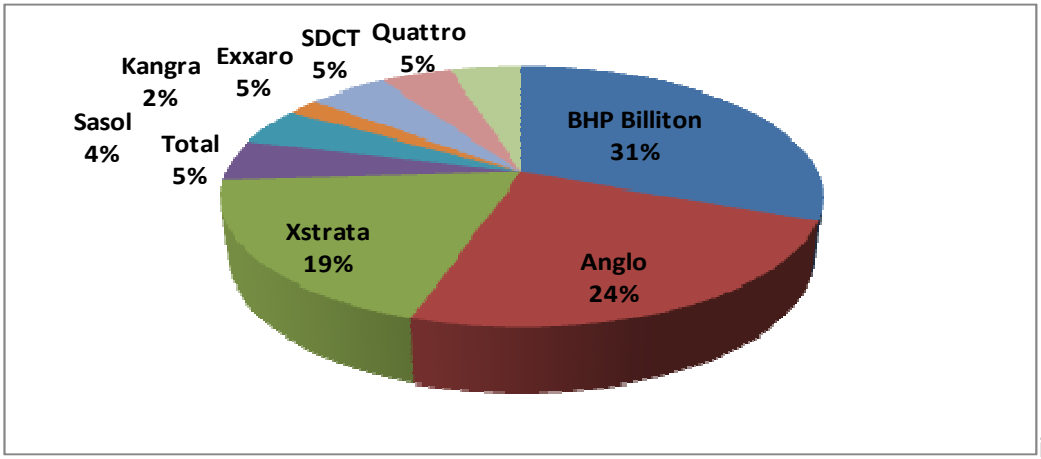

Figure 6.2 RBCT shareholding and allocation per company

The companies in Figure 6.2 have automatic contracting ability with TFR for trains, as a result of their allocation percentages in RBCT. The Phase V expansion has been delayed from March 2009 to October 2009, and producers do not have any indication of the commissioning of Phase V. This is mainly as a result of TFR not committing to a 91 million tonnes railage capacity. The expectation is that TFR will only guarantee 77 million tonnes for the next 3 years, and ramping up to 81 million tonnes by 2014, and 91 million tonnes by 2019. This has major implications on current shareholders and prospective Phase V shareholders of RBCT, as mines have been planned and commissioned in expectation of the expansion.

The Quattro utilisation is based on 17 companies organised to use 4 million tonnes of allocation, and are managed as a group, which leaves very little autonomy to deal with RBCT and TFR directly. Together with DME, and the Coal Industry Task Team, Mhlatuze Bay Administrators was formed to assist and manage the allocation in Quattro.

Durban and Maputo ports are respectively used for sized and un-sized product exports by companies which have no allocation at RBCT, and these companies deal directly in its own capacity with GFB and the ports.

Coal export companies furthermore, have to manage arrange and be knowledgeable about freight and shipping logistics. The three coal terminals have different terminal and shipping regulations, which exporters have to adhere to and understand in great detail.

Shipping logistics include port stockpile management, vessel acceptance, laycan date planning, loading instructions and bill of lading documentation. This specialised function has to be managed in-house and will form part of the marketing department function.

CHAPTER 7

PRICE

Pricing is different for each delivered segment (ESKOM, domestic and export), and often the three different markets have an inter-related relationship at specific time intervals. The relationship between the different markets and its pricing were not as strongly defined historically as it has converged over the past two years. Although ESKOM and export products have completely different product specifications, many mines produce both these products, and pricing is often calculated as a function of a cost sharing basis.

In 1998, a pricing platform for globally traded coal was established, called GlobalCoal. From the platform, and indices for FOB RBCT and Newcastle and CIF Europe prices were established, called API 4, API Newcastle and API 2 respectively. This was the start of a terminal market that brought transparency to the industry for the first time, and risk management by derivative trading instruments were introduced. Standardisation of product specifications was effected, namely, RB1 and RB 2 specification for thermal coal.

Pricing still remains a function of supply and demand. South African domestic supply and demand follows the same economic cycles as the global industry, although it does not account for electricity fundamentals, which are essentially ESKOM-driven. An understanding of the global macro–economic environment and the domestic micro-economic environment is essential to plan and execute optimal pricing structures for the three coal markets.

South African domestic prices started vacillating around the API 4 Index in 2007 when structural changes, such as definite cost hikes in the industry became evident. This had a major impact on pricing within the domestic sphere as demand and supply fundamentals were directly applied.

ESKOM prices are usually fixed within a band and dependant on the producers' status as a BEE or BBBEE player and given the technological advances in the beneficiation of the coal supplied to ESKOM. ESKOM usually pay at the bottom of the band if the coal is mined as ROM and supplied, versus that the ROM goes through a particular stage of beneficiation, generally to reduce the abrasive index. ESKOM also have long term contracts with major producers in excess of 1 million tonnes per annum. The pricing structure for these contracts is also different based on cost-plus pricing, which will be discussed in detail in the study.

The various characteristics of pricing in the different segments, starting with export and globally traded coal is discussed in this section. The influence of export prices on domestic coal prices and finally, ESKOM pricing are discussed.

7.1 Export Pricing

7.1.1 Supply and Demand fundamentals of the global coal trade

The following macro-economic, environmental and seasonal factors influence the demand and supply of coal, and are generally an indicating factor of the direction of the market over the short term, which include forward prices.

Demand

- GDP growth projections per nation or major economic activity per region indicates an increase in demand for electricity and energy and vice versa;
- Long vessel queues and high stocks in discharging ports affect demand negatively, and is an indication that demand might becoming depressed, and usually signals the start of a price downturn;
- Traders taking long positions on a particular indexed coal, resulting in above normal levels of stocks building up once the price index starts to fall, which further exacerbates an already down-turning price trend;
- Dry summer conditions can result in reduced barging capacity along the major rivers which are used for in-land coal transport;
- The Brent Crude price has become an indicator of the direction in which coal prices will move, as it lags Brent Crude with 3-5 days. This is mainly as both commodities are energy fossil fuels;
- The unwinding of thermal coal paper positions by financial institutions and banks;

- Global economic sentiment and the projected impact on China GDP growth and other economies, particularly India and Brazil. High growth in developing economies indicate increasing coal consumption;
- Ocean freight rates and the Bulk Commodity Index is a leading indicator of demand for bulk commodities;
- The depreciation and/ or appreciation of coal producing countries' (Australia, South Africa, Indonesia) currencies against the US Dollar. Currency depreciation usually has a lowering effect on US Dollar coal prices, and appreciation of these currencies usually sees coal prices increase. The vacillation effect takes between 5 and 10 days on average;
- The effect of construction and increased Nuclear power plants as an alternative energy source;
- The effect of Carbon trading, and Clean Coal requirements have a diminishing affect on coal demand, and often these elements make the price of tradeable coal more expensive than reigning market prices; and
- Sentiment, above fundamentals often drives the market, but only for a short period.

Supply

- Reserves and resources available, mine-ability and stage of development of projects indicate planned supply. Planned supply is usually driven by demand already expressed;
- Economic activity in terms of energy (electricity) generation is a major indication of policies to restrict coal exports from producing nations. Once the State of a particular nation places a moratorium on or use related governmental policies to restrict thermal coal exports, supply immediately is reduced on a global scale Other producing nations immediately start planning to supply in the short fall. To this end, in terms of global thermal coal supply, China's influence remains critical. China moved from a net importer of thermal coal position in March 2008, to a net exporter of coal by the end of that year. Infrastructure bottlenecks in China have also raised concerns within China about their ability to fully satisfy domestic demand.
- Lack of funding for development of projects – mining, infrastructure, exploration and new power projects. This is particularly evident in current market conditions which are viewed as a global financial crisis.

- Producing nations continue to be constrained by rail and port capacity. Prices increase when supply is constrained by these factors. Most applicable is the queue of 40 vessels waiting to load at Australian ports, or the widely publicised rail incapacity in South Africa, which is decreasing supply on an annual basis.
- The last time there was a major financial meltdown was in 1998 in Asia just as a large number of Independent Power Plants were about to be constructed. Most were never built and the thermal coal price dropped and stayed down until 2004. The recovery in 2004 was significant but one needs to bear in mind the impact such a situation can have. Many power stations and steel mills (and expansions) which are on the drawing board but factored into the supply/demand balance may need re-consideration. By the same token, the same could be said to apply to supply side expansions, especially those that rely on the promoters' ability to borrow money.

7.1.2 Contract and spot pricing

Contract and spot pricing is utilised simultaneously by large producing companies to effectively get the most optimal pricing in any financial year. Given the preference of the buyer, contract or spot pricing is usually negotiated. The pricing strategy will guide the seller's preference for contract or spot pricing, which include important considerations such as cost curve placement of the producing country and placement of the individual company on the cost curve.

Contract pricing is referred to as fixed price for a specific volume over a specified time period. Contract pricing is done fixed for contracts over a period of time. Examples are the following:

- US $ 80.00 FOB RBCT; 300 000 Metric Tonnes to be delivered July – September 2009;
- US $ 82.50 FOB RBCT; 1,000,000 Metric Tonnes per annum, for 3 years, starting September 2009.

Spot pricing is done for spot sales, or for contracts where spot pricing is preferred and indicated as such. Usually for shorter tenor contracts, but longer term contracts can also be priced for spot. Spot pricing is determined by the weekly API 2 and API 4 indices (discussed in 7.4). For purposes of

this chapter, reference will only be made to API 4, except if otherwise indicated. Examples are the following:

- Spot sale in RBCT – immediately traded. 120 000 Metric Tonnes; API 4 which is the current spot price, according to published index on Fridays, or according to over-the-counter available pricing data;
- 120 000 Metric Tonnes; Delivered Q4 2009; Pricing API 4. (API 4 Index from every Friday will then be will then used for invoicing – cumulatively or otherwise negotiated by the parties.
- A form of risk management is also to price 50% of a contract at a fixed price and 50% of the contract at API 4:
- 120 000 Metric Tonnes; To be delivered between June and August 2009. 50% of contract priced at API 4 and 50% of contract priced at US$ 65.00 FOB

7.1.3 Price curves for thermal coal

The price history of thermal coal prior to 2003 was collected by regional information services such as South African Coal Report and published on a quarterly basis. Price information could only be bought from publishers, but it was at least one quarter after negotiations have been concluded, and detail on regional prices was often skewed.

Since the inception of the tradable indices, API 2 and API 4, information had been obtainable on a weekly basis, and on a daily basis from bids and offers on the OTC market. Buyers and sellers have since had the advantage anticipate market movements or negotiate on most current achieved prices.

Thermal coal prices ex South Africa had consistently been in the range of US $ 18-27 per tonne FOB since the 1980's until late 2003. At the end of 2003, prices lifted above US$ 30 /tonne FOB, and since 2004 have never been lower than approximately US$ 39/tonne FOB.

Figure 7.1 denotes the API 2 and API 4 price curves for the past 5 years. The difference between the API 2 and API 4 curve is implied freight. Freight cost is the difference between the RBCT FOB price and the delivered price in Europe (ARA). As indicated by the curves in the figure, thermal coal prices fluctuated between US$ 45-60 FOB in the period between November 2004 and September 2007. After October 2007, thermal coal (and coking coal

alike) prices rallied to unprecedented levels, almost reaching US$ 200/tonne FOB in July 2008.

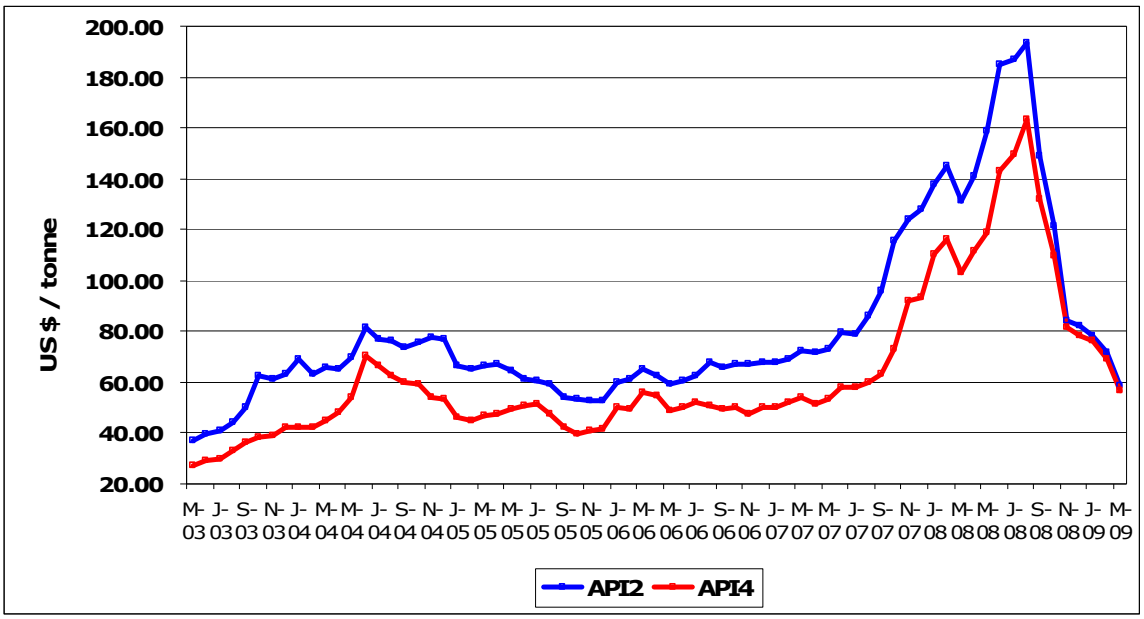

Figure 7.1 API 2 and API 4 Price Curves
(Source: Reuters, May 2009)

A global commodity boom controlled both producers and buyers at the time. The global boom saw heavy speculative participation from hedge funds, which saw prices rallying for almost 12 months. In October 2008, major global financial crises erupted and prices plummeted in free-fall to levels below US$ 60/tonne FOB. The financial crises have influenced producers and consumers alike as demand had diminished and over supply became evident on a global scale.

Currently, producers and sellers are struggling to find price direction in the market. Demand for thermal coal has been significantly altered, and a subsequent oversupply situation is evident. The terminal coal market supplies forward curves on a weekly basis to the industry. Forward curves aim at directing the market price for a maximum forward period of 3 years. Forward curves are derived from micro and macro-economic information, coupled with price information from most recent trades.

Producers and consumers use forward curves for various different reasons, and for indicative price levels at different timeframes. Forward curves often

form the basis of the hedging decision, indicating a decreasing or increasing price over the 3 year period.

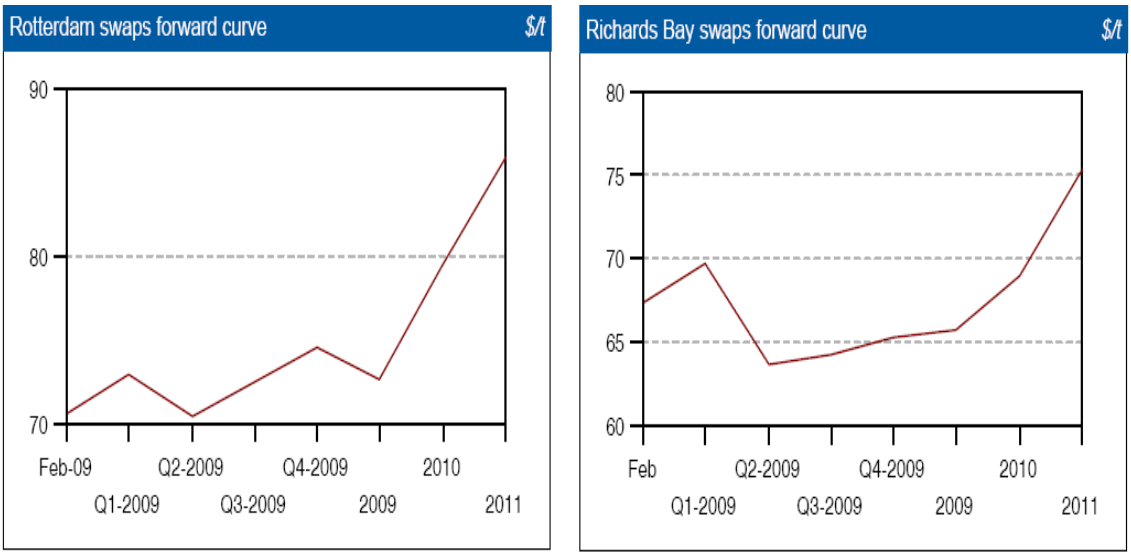

Figure 7.2 Rotterdam (API 2) and Richards Bay (API 4) forward curves

(Source: Argus Coal Report, May 2009)

As seen in Figure 7.2, both the Rotterdam and Richards Bay forward curves have a steep upward tail curve. Overall, the curve is viewed to be in contango, which indicates a strong increase in price over the 3 years (tail part of curve higher than starting point). In the event that the tail part of the curve is lower than the starting point of the curve, called backwardation, it implies that forward period price s set to decrease. In Figure 7.2 above, a view is taken in February 2009. It is clear that the short term price is set to decline (backwardated) by Q2 2009, but it then changes to a contango position to show a steep price increase by 2011. The difference between the Rotterdam and Richards Bay curve is implied freight, which is the difference between loaded and delivered material.

7.2 Coal Risk Management and Derivative Trading

7.2.1 The approach to risk management

According to Pringle (1985:4-3), there are four stages of continuous risk management:

- **Identification:** Identify the risks that can be managed (production risk, credit risk, coal price risk, rail and freight price risk, currency risk etc.)

- **Quantification:** Assess the severity of the risk (i.e. its impact on the business, and the probability of occurrence. This makes it easier to rank the risks in the order of preference to actively manage it.
- **Managing:** The company must now establish a strategy of how to manage the risk. The company must understand the impact of the risk, and the impact of managing it, along with the costs involved. The company must then plot a course of action as to how to deal with the risk management.
- **Monitoring:** Risk factors vary from time to time, and the company should continuously update its risk management strategy in order to cope with changes in the risk profiles. Additionally, a control process must be implemented which ensures that the trades are kept within their mandate for risk management actions

For the purposes of risk management in this section, the term hedging will be used. Hedging is relevant to coal price risk and currency risk. Adapted from Haug (2007:198), the key issues related to coal price hedging are the following:

Credit: The coal market is not currently a cleared market, and hence there is no day to day margining. As a result, and with prices being somewhat volatile, swaps counterparties may see rather large changes in their credit exposure to each other. Currently, most companies that trade coal swaps are very careful as whose credit they will accept. Moreover so now that many companies have credit default status;

Performance: Performance or production risk is very relevant when hedging, as changes in the coal availability will immediately impact the effectiveness of the hedge;

Liquidity: The liquidity of the market directly affects the ability of a risk manager to effectively hedge. It is important that a large position can easily be bought or sold without major movements in the market, and generally the maturity of a market impacts on its liquidity; and

Strategy: Implementing a risk management strategy is of vital importance. Generally, the most important is to keep transaction confidential, to use the most suitable financial institution, act decisively when the opportunity arises, and stick with the goals (i.e. to sell or buy at a fair price).

7.3 The Basics of Hedging Coal

7.3.1 An index

An index refers to a price marker that is supposed to be representative of the underlying market price of a specific product for delivery during a specific time period. An index can be objectively or subjectively derived. Traditional transactions (physical) can be linked to indices whilst swap trades (derivatives) are always based on an index. Furthermore, an index (1) provides independently determined benchmark pricing; (2) allows parties to trade "at market"; (3) promotes security of off-take and supply even during times when buyers and sellers have very different views on where prices should be; and (4) provides flexibility (Pardo, 2008:74).

Buyers and sellers can independently hedge their cargoes, and thus they can achieve different prices form the same cargo. However, where derivatives are used, buyers and sellers must take care to clearly identify what objectives they wish to achieve. Derivatives, when used properly, provide a very effective risk management tool.

Critical elements for an Index to work effectively are:

- Liquidity and transparency – the index must attract a sufficiently large group of buyers and sellers. This group normally does not just consist of producers and consumers, but also traders and financial institutions;
- The index numbers must be determined using reliable methodologies. This can be by using reputable publications, or by using trading platforms. Both such systems have been effectively used in other commodity markets; and
- The market participants need to be comfortable that index numbers reflect the actual physical market.

7.3.2 Available indices

For the international coal market, there are currently two relatively liquid publication based indices, one for coal delivery into Europe (API 2) and another for coal delivery ex South Africa (API 4). There are also web based indices, of which the Newcastle index is the most liquid (globalCOAL NEWC). Others are being developed for the Far East markets.

For purposes of this chapter, only the traded indices from and related to South Africa will be discussed, i.e. API 4 and API 2.

7.3.3 Publication based indices

European Index: The TFS API 2 index, for coal delivery into ARA (Amsterdam, Rotterdam and Antwerp, which are the major coal ports in Europe). This index is related to coal coming from Russia, South Africa, Colombia, Indonesia, Australia and others. Physical coal traded into this market is approximately 190 million tonnes per year, of which a reasonably large portion is priced against the index. Financially traded coal, which also settles against this index, is now approaching 650 million tonnes per year, and growing (which is a phenomenal achievement, considering that the financial coal deals only started trading in 1998, showing that this market has been one of the fastest developing derivative markets).

South African Index: The TFS API 4 index is for coal delivery from South Africa. It relates to coal exported from Richards Bay Coal Terminal. Physical coal exported via this terminal is currently approximately 60 million tonnes per year, and coal derivative trades against this index are currently over 250 million tonnes per year. This index only started trading in February 2001, showing good growth since then.

Australian Index: The Argus / McCloskey Newcastle index is for coal shipped from Newcastle. Although this index has not had many physical or paper trades against it and suffers from a lack of liquidity, trade has increased over the past 18 months.

7.3.4 Web based indices

South African Index: The RB 1 Index is for coal delivery from South Africa. Similarly to the API 4 index, it relates to coal loaded at RBCT. Large volumes of this specification coal are traded on the OTC broker market.

Australian Index: The NEWC Index is for coal delivery from Newcastle. This index is based on a relatively liquid market, where large volumes of NEWC specification coal are traded on the globalCOAL website as well as in the OTC market.

7.3.5 Compilation of an index

PUBLICATION BASED = TFS API 2, 4 and Newcastle Index:

These indices are all calculated and published by independent publications on a weekly basis, and the average of the weekly numbers for any given month makes up the official index number for that month. The numbers are based on a combination of actual deals and a market survey for prompt delivery (being within the 90 days).

The relevant publications available are as follows:

- The prices used for TFS API 2 (CIF ARA) are the average numbers of the McCloskey Coal Report and the Argus Energy Coal Daily Report;
- The prices used for TFS API 4 are the average numbers of the McCloskey Coal Report, the Argus Energy Coal Daily Report and the South African Coal Report;
- The prices used for the Newcastle Index (FOB Newcastle) are the average of the numbers of the McCloskey Coal Report and the Argus Energy Daily Coal Report; and
- The prices used for Argus / McCloskey FOB Newcastle are the average of the numbers of the McCloskey Coal Report and the Argus Energy Coal Daily Report.

WEB BASED = RB and NEWC indices, both from globalCOAL:

Both the RB and NEWC indices are calculated by using a combination of actual deals done on the platform and an average of bids and offers within a certain range in order to arrive at index number. This is usually done at the end of each week, and a monthly number is compiled from the weekly averages.

7.3.6 Utilising an index

An index is used with physical and derivative transactions, given it is for hedging or speculative purposes (Pringle, 1985: 4-8, 9).

Physical Deals: Index pricing can be used for either spot or contract (term) business. This becomes particularly useful where buyers and sellers cannot agree on what fixed price to use, but they still wish shipments to continue. Similarly, where the parties have a strategy to continuously price coal "at market", index pricing becomes very effective. Buyers and sellers simply agree which index period will apply to each relevant shipment and the seller invoices the buyer once the index numbers becomes known. For example,

the parties can agree that the shipment will be priced against the average index number for the month of shipment. Should the shipment take place very early in the month, the parties may consider doing a provisional invoice for cash flow purposes, and the final invoice once the month average index is published.

Derivative Deals – Hedging: As an example, a buyer has bought a cargo at index. After the purchase, but before delivery, the market conditions might change, and perhaps the buyer now firmly believes that coal prices will rise. The cargo may thus be invoiced at higher numbers than initially expected. As a result, the buyer might want to convert to a fixed price basis, using derivatives, in order to limit the risk that prices will increase. Thus, a fixed price is locked in, effectively hedging the purchase against higher prices.

Derivative Deals – Speculative: Some companies, (producers, consumers, financial institutions and traders) have set up coal trading desks in the European market, and a similar trend is expected in the Far East. The trading desks are prepared to do deals, other than pure hedging. They are prepared to speculate on pricing movements, either in the physical or financial markets, and thus, will enter into speculative deals. This is a specialised business strategy, and any company considering this route needs to carefully consider its objectives and methods. Speculative trading is part and parcel of any developed market, and contrary to popular belief, speculators provide much needed liquidity to the market (Adapted from Pringle, 1985: 5-15, 18).

7.3.7 Settling index deals

Physical: Coal shipped against an index is simply invoiced for at the relevant official index for the relevant month or quarter of shipment. Although coal sales trade against an index vary from Handy sized vessels to Cape sized vessels, it is possible to buy and sell coal in clips of 5 000 tonnes each (but always subject to the minimum load regulations of the relevant port).

Financial: Coal derivative deals are traded in clips of between 5 000 tonnes per month, or multiples thereof. Where a trade is done for a quarter or for a year, the tonnage is still refer to on a monthly basis, i.e. a deal done for

Calendar 2007 for 20 000 tonnes per month, covers 240 000 tonnes. Deals settle monthly, so at the end of each month the fixed price of each deal is compared to the index price for that relevant month, and a cash settlement takes place between the parties. Generally, deals are done for the next two or three months, the next six quarters, and the next three years. On occasion, deals are done for settlement three or four years out, and for structured deals it is possible to get quotes up to ten years out.

The coal derivative market is not an exchange traded market and is not cleared. No daily margining takes place and counterparties fix credit lines between themselves. Brokers will quote minute-by-minute forward numbers against the relevant indices, and it is thus easy to follow changes in the market. At the end of each day, counterparties use broker reports to market-to-market their book positions.

7.3.8 Hedging – Swaps, Futures and Options

By definition, a derivative is a paper transaction which value depends, at least in part, upon a related commodity, in this instance coal. Derivative therefore is the generic term, the three main sub groups being swaps, futures and options (Pardo, 2008:74-77).

A ***swap*** is a paper agreement between two counterparties: A buyer who believes in higher coal prices over a nominated period and a seller who believes in lower coal prices over a nominated period. The name swap arises from the fact that the transaction is effectively an exchange of a fixed price (the swap price) for a floating price (the chosen index).

A ***future*** is an agreement to buy/sell, on an organised exchange, a standard quantity of a specific commodity, financial instrument, or currency at a future date at a price agreed between two parties (coal swaps are not exchange traded).

An ***option*** is a contract, which confers the right but not the obligation to buy or sell an asset (being either a swap or physical coal) at a given price on or before a given date. For the purpose of this chapter, options will not be discussed, since the liquidity for options is very small, which make options extremely expensive.

A bid is made by a buyer, indicating the price the buyer is willing to pay; and an offer is made by a seller, at a price a seller is prepared to sell at. The

bid/offer spread is the difference between the buy and sell prices. In order to get a deal done, one party often has to cross the spread to meet somewhere between (i.e. the buyer has to increase his buy price and /or the seller has to decrease his sell price).

7.3.9 Hedging – A Forward Swap Example

API 4 is used as an example – the example will hold the same for API 2, Newcastle Index and Freight Forwards. Please see Figure 7.4 and 7.5 hereunder:

The Producer (Seller) wishes to lock in a fixed monthly API 4 price for Coal from April 09 to September 09.

The transaction: Producer (seller) sells a Fixed Price Swap and buys a Floating Price Swap. A suitable financial institution buys a Fixed Price Swap and sells a Floating Price Swap. Floating Price Swap is the 6 monthly average price of API 4, quoted by TFS/McCloskey/ Argus reports.

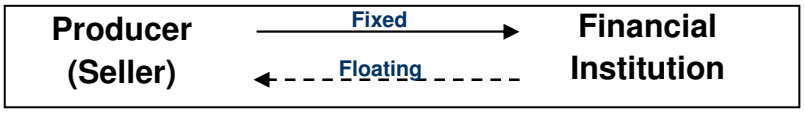

Figure 7.3 Transaction flow of a hedge

The major attribute to using a forward swap is that a guaranteed price is locked in, whilst no upfront premium is payable. Opportunity costs arise if the price moves higher than the fixed or locked-in price, but the producing company is guaranteed the fixed price. The fixed price swap is transacted for April to September 2009 at a fixed price of $ 54/t.

There is an exchange of cashflows between Producer (Seller) and the financial institution that reflects the monetary value of the difference between the Fixed Price and the monthly average of API 4 quoted by TFS/McCloskey /Argus reports.

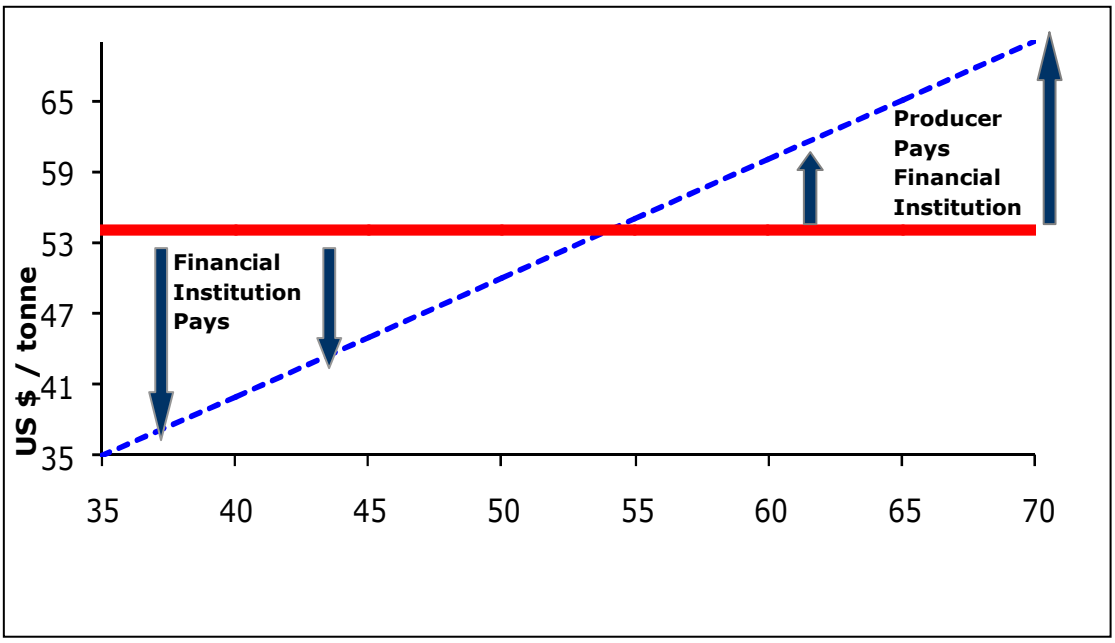

Figure 7.4 Cash flows of a forward swap
(Source: Standard Bank, 2008)

7.3.10 Cost of hedging

Generally, the cost of hedging coal is relatively cheap. Broker costs are very low, varying from $0.02 to $0.04 for paper transactions, to $0.05 upwards for physically brokered coal deals. Some structured or option transactions may involve slightly higher brokerage. Broker costs are generally paid at the end of the month in which the deal is done (irrespective of when delivery of the coal takes place or when the swap deal settles). Indirect costs to hedging is that the documentation (ISDA) and administration can be quite time consuming, and financial institutions have to apply for Reserve Bank approval and approve credit lines for transacting.

7.4 Domestic Pricing

Historically, domestic pricing was based on in-land supply and demand fundamentals, based on South African economic activity and a fair input cost. Export prices played a minor role, as transfer pricing was not relevant.

Since 2005, the domestic market saw significant changes. These changes can be attributed to a structural change in cost economics, but at the same time, sentiment to demand had a major impact. Producers started applying transfer pricing to domestic production whereby consumers were forced to

pay approximately the same price in SA Rand for coal domestically consumed, as the price in US Dollar received for exports. Producers took advantage of the rally in export prices during the time, as well as sentiment that coal might be in tight supply. This was all exacerbated by the ESKOM demand situation, and that ESKOM claimed it had been under-supplied as a result of growing exports.

Table 7.1 below constitutes current domestic prices per product and grade, free-on-truck, excluding Value Added Tax in Rand.

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Table 7.1 Domestic pricing for products distributed in the in-land market

Grade	Rand FOT	Duff	Peas	Small Nuts	Large Nuts
A Grade	R	520	650	600	600
B Grade	R	450	600	600	600
C Grade	R	400	550	530	530
D Grade	R	300	550	530	530

(Source: EXXARO Domestic Marketing, 2009)

The prices above showed a 41% increase year-one-year between 2007 and 2008, and a 60% decrease between 2008 and 2009. It is evident that the global recession and depressed coal prices filtered to the South African domestic coal market.

Producers develop a pricing strategy based on available sales tonnage per market, given that the correct qualities per market can be supplied according to its geology and mine plan. Export allocation and access to infrastructure coupled with achievable prices dictate where the producer will ultimately market and sell coal. Often an optimisation programme is utilised to effectively select the correct off-takers, based on their ability to pay asked prices.

7.5 ESKOM Pricing

ESKOM prices are usually fixed within a band and dependant on the producers' status as a BEE or BBBEE (Broad Based Black Economic Empowerment) player and given the technological advances in the beneficiation of the coal supplied to ESKOM.

ESKOM usually pay at the bottom of the price band if the coal is mined as ROM and supplied, as opposed to ROM that goes through a particular stage of beneficiation, generally to reduce the abrasive index. These contracts are based on Cost Plus pricing. Cost Plus pricing indicates a percentage added to the cost of producing the coal for ESKOM. The percentage margin is usually between 10% and 30%, depending on the producer keeping costs at a minimum.

ESKOM also have long term contracts with major producers in excess of 1 million tonnes per annum. The pricing structure for these contracts is also based on Cost Plus pricing. Since these contracts were negotiated between 5-10 years ago, have a tenor of a minimum of 5 years and given the mass quantity, the margin is usually between 10% and 20%.

7.6 Summary

The macro-economic pricing of coal is dependent on the cost structure for each company or operation, and the FOB cash costs are indicative of the producer's longevity as a market player (see Chapter 5).

On the micro-economic level, pricing will be derived from fixed and variable cost structures and return on investment prerequisites. Although the micro- and macro-economic fundamentals of costs are the foundation of pricing, the different consumer markets follow different pricing regimes i.e. export prices in general dictate domestic price structures by applying transfer pricing, whilst ESKOM generally operates on a cost-plus structure.

Export pricing have always been based fundamentally on global supply and demand fundamentals and have either been contracted or spot price contracts. The coal market have however, evolved to the extent that financial institutions, commodity traders and hedge funds are now participators trading the commodity based on its price volatility. This resulted in the determination of price based on volatility, rather than actual demand and supply. Chinese and Indian-lead energy demands have contributed to the major growth in global coal demand, whilst supply side economics have been focussing on infrastructure solutions in Australia, Indonesia and South Africa.

Furthermore, the industry had to absorb structural changes such as renewed nuclear interest and planned power plant construction and the effect of carbon trading and clean coal technologies and requirements.

In recent years, the development of coal derivatives has contributed significantly to forward price hedging. The API #2, API #4 and API Newcastle indices are published on a weekly basis by Argus International and McCloskey Coal Research and are used for price setting, forward derivatives and contracting.

Furthermore, the RB1 and RB2 indices have also been developed for South African OTC traded coal. The use of derivative pricing is for producers are exclusively for risk management, although speculative practices by hedge funds have contributed to the vast growth of this terminal market.

Swaps, futures and options are the traded derivates available in coal trading. Although swaps and futures are widely traded, the coal market's illiquidity restricts the trading of options.

Domestic (ferroalloy, cement, paper and pulp and Mittal) coal price structures are set by each industry, derived from reigning FOB export prices. Producers base domestic prices on import parity fundamentals. When export prices are favourable, it dictates domestic coal prices since producers would rather export at a premium than to sell product domestically. Since domestic prices relate closely to FOM prices, producers are eager to sell domestically. Consumers have been arguing import parity citing the influence of the constricting port capacity in South Africa.

Albeit those South African domestic prices rose in conjunction with export prices in recent years, the global economic downturn saw domestic prices plunge based on international demand fundamentals in late 2008. Export prices have showed some recovery during 2009, but considering the strong Rand, domestic prices have lost over 50% of its 2008 value. Domestic contracts generally escalate each year with a percentage of Producer Price Index (PPI), but the latest market movements have shown that prices could decrease.

ESKOM pays relatively low prices, based on the comparative low quality of the coal it consumes. The national electricity producer has been under tremendous scrutiny following electricity shortages in 2008. ESKOM requested new quotations from all its current suppliers, and the industry reacted overwhelmingly to participate in the project. ESKOM is expected to review current contracts, whilst still incorporating BEE and BBBEE scorecard fundamentals. ESKOM pricing is a function of substituted production cost, and ESKOM favours a cost-plus structure. In lieu of expected increases in electricity prices, the coal producing industry is confident to receive an increased percentage on cost.

CHAPTER 8

PROMOTION

The promotion of a producer's product starts with an integrated approach to market intelligence and relationship marketing. The producer needs to understand the macro and micro economic environment it is operating within. This knowledge only develops once a producer become an active participant within the industry and partaking in the many opportunities to promote the company and its product.

Relationship marketing is the foundation of promoting a product such as coal. Active coal marketing in South Africa has been evolving since 1974, which was the operational start date of RBCT. Domestic marketing has been developing since the late 1980's as more producers came into being, product diversification increased and transfer pricing became eroded between parent companies and their subsidiaries.

Active reports available on a weekly and monthly basis developed only since the early 2000, as no terminal market existed for coal up to that point. Once the derivative market opened and started full trading, have reports and information become commonplace as part of the marketing function. Together with relationship marketing, the information available aids marketing departments and directors in developing and executing a sustainable marketing strategy, based on ethical trade.

The section on promotion focuses on various promotional efforts, and the significance thereof within the South African context of coal production.
Promotion is communicating information between seller and potential buyer or others in the channel to influence attitudes and behaviour (Perrault and McCarthy 1996:420-421). The marketing manager's main promotion job is to tell target customers that the right Product is available at the right Place at the right Price.

In commodity marketing (or industrial marketing), several promotion methods exist – sales promotion, advertising, personal selling and publicity, see Figure

8.1. These are described hereunder in terms of its relevancy to a mining company and commodity producer. It is important to note that only certain promotional methods are relevant in industrial marketing. Since the target market is often specified and concentrated, mass promotional methods which are used in fast moving consumer markets will be ineffective and too expensive with little reach in the coal industry.

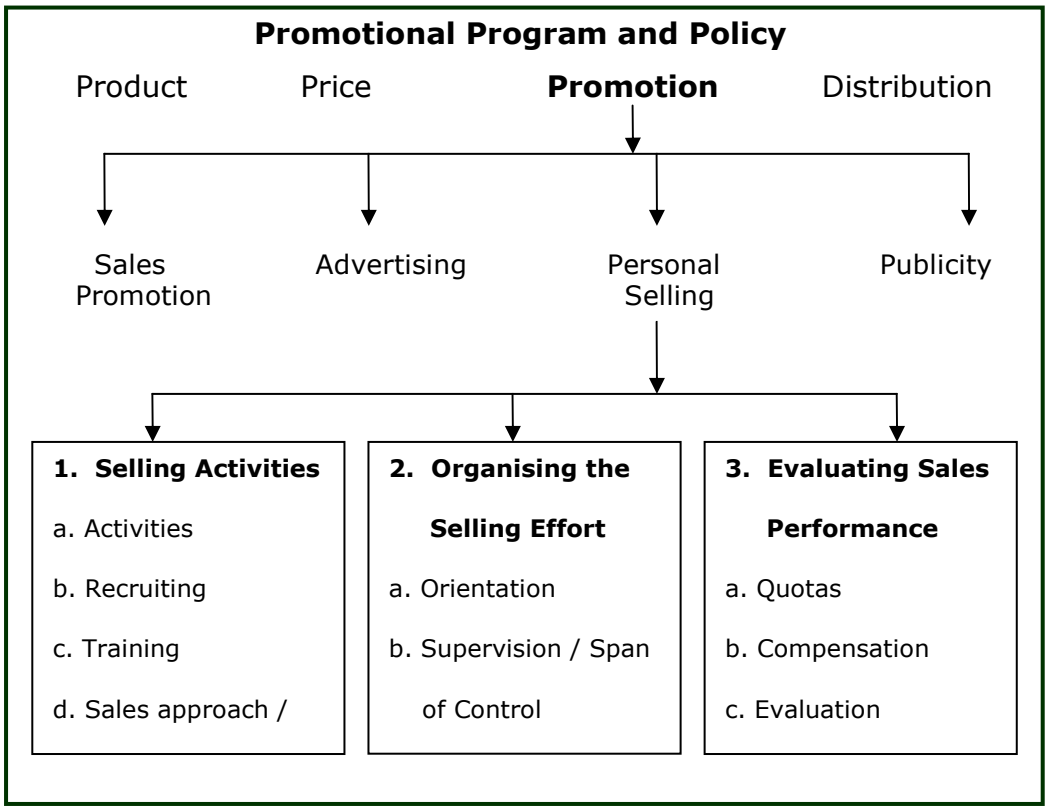

Figure 8.1 Promotional program and policy
(Source: Hayes et al., 1996)

8.1 Sales Promotion

Sales promotion consists of various promotional activities, including conferences, trade shows, displays and trade incentives. Sales promotion expenditures are substantially more than any amount spent on promotional activities.

The reason for the high cost associated with sales promotion is company personnel need to register for these events, which are usually quite expensive, and depending on location, entails travelling (international and local) and accommodation. New and large companies also wish to buy display

space, and these companies have to provide visual material and a resource to operate the stand. Trade incentives are not common, but producers, traders and consumers often enter into optional trade incentives, whereby the buyer or the seller has an option to extend the contract by pre-determined tonnages. Often a company employee is invited to present the company at the conference, which is also an opportunity to active sales promotion.

The following conferences are essential for Coal Industry presence. It is important that the same individual attend the different events, as this person will become the brand ambassador and relationships will be forged initially with this person.

- **CoalTrans South Africa:** Annual event in Johannesburg in September;
- **CoalTrans Europe:** Annual event in an European city, the annual international coal event.
- **McCloskey Coal Europe:** Annual international event in Nice in May.
- **McCloskey Coal Conference:** Annual event in Cape Town in January.
- **Fossil Fuel Foundation:** Twice per annum in Johannesburg and Durban.
- **Mining Indaba**: Annual event in Cape Town in February.

8.2 Advertising

Advertising is any paid form of non-personal presentation and promotion of goods or services by a specified company. Advertising is not a preferred industrial marketing tool, but coal producing companies can consider a market development strategy in terms of the low cost per exposure, the variety of media (journals and newspapers, internet advertisement), control of exposure and the consistent message content. Listed coal producers or new producers entering the market are often participants in industry advertising. Coal producers usually participate in a few, but important print advertising opportunities per year, and are as follws:

- Mining Weekly –Coal Supplement;
- Engineering news – Coal Supplement; and
- Mining Review – Coal Edition

Furthermore, coal companies wishing to enhance or build the company brand can run a web-based advertising campaign. Coal industry players read daily information on the web, and this has become a significant tool to build

awareness. The following websites are significant in covering the coal industry, the players and any considerable change in market movements:

- MiningMx;
- Mineweb; and
- Mining Weekly Online.

8.3 Personal selling

Personal selling is the oral presentation in a conversation with one or more prospective purchasers for the purpose of making a sale. Personal selling is expensive as it includes travelling, accommodation and entertainment, but have unique strengths. Salespeople can target and interact with potential buyers to answer questions and overcome objections, accumulate market knowledge and provide feedback. The art of relationship marketing is found in personal selling, and this is also the starting point of relationships with market players, (see section 8.2). Sincere and ethical relationships compliment personal selling.

Referring to Figure 8.1, personal selling is divided into 3 sets of sales management activities as identified by Churchill, Ford and Walker (1990) in Hayes et al, (1996: 373,375, 377). Although different strategies for products yield different propositions for each if the three areas, the proposition relevant in coal marketing is achieving superior performance on the critical measures of sales of products and increased volume and market share. Figure 8.1 indicate the following specific activities:

- **Selling activities and account management policies**
    - Focus on a relatively narrow range of activities such as product presentations, prospecting for new customers and identifying new market opportunities;
    - Recruiting sales persons with high levels of technical skills;
    - Low emphasis on sales training, high emphasis on product training; and
    - Reflect a system sales or major account management sales strategy, and encourage a customer orientated selling approach.
- **Organising the selling effort**
    - Reflecting a customer organisation;
    - A company marketing department, focussed particular coal

- products; and
- High technical support with focus on trial cargoes, as and when it is required.

- **Evaluating the selling effort**
  - Setting quotas based on production, infrastructure and port capability and allocation;
  - Compensating marketing personnel on a straight salary plan; and
  - Adopting a behaviour-based control system.

Active personal selling determines ***WHO*** should be addressing potential and existing customers (given technical skills paired with technicality of products, i.e. thermal and coking coal) ***WHERE, WHEN and WHY.***

8.4 Publicity

Publicity is non-personal stimulation of demand for a product by means of commercially significant news planted in the mass media and not paid for directly by the company. However, publicity can be negative as well as positive, and cannot be controlled. Since the company does not purchase the media coverage, publicity is a cost effective method of communication. Again, publicity will only be considered by coal producers to establish the company in the mining industry, given that it is a large or listed entity, or it has an aim of promoting its safety, environmental or community accolades and involvement. Usually, publicity is not used to primarily to sell coal products, but it can be effectively used to keep the industry and market updated on projects, and development within the company.

8.5 Relationship Marketing

Relationship marketing in the coal industry involves more than a single organisation. The nature and scope of strategic relationships among various partners is discussed, as depicted in Figure 8.2 below.

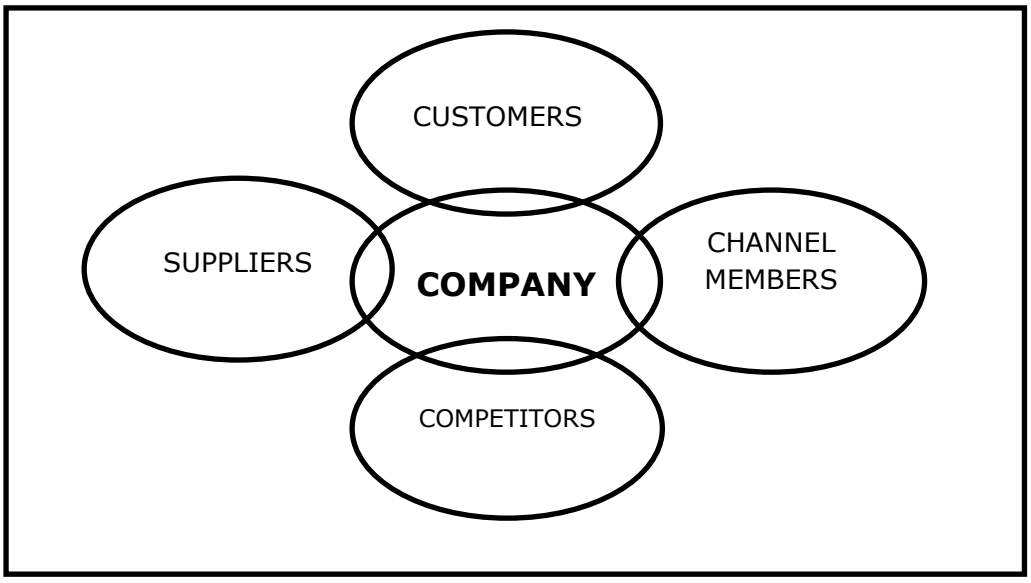

Figure 8.2 Strategic relationships among various partners
(Source: Cravens, 1997)

The drivers of inter-organisational relationships and the logic of underlying collaborative relationships are discussed, along with the various different relationships among companies and organisations, and issue concerning global relationships.

8.5.1 Inter-organisational relationships

Christopher, Payne and Ballantyre (1991:21) state that strategic relationships among companies and organisations consider the elements of overall competitive strength – technology, costs and marketing. Unlike tactical relationships, the effectiveness of these strategic agreements among companies can affect the long-term performance of the business. In the coal industry today, several factors create a need to establish cooperative strategic relationships with other companies and organisations. These influences include the diversity, turbulence, and riskiness of the global business environment; the escalating complexity of technology; the existence of large resource requirements; the need to gain access to global markets; and the availability of information technologies for co-ordinating inter-company

operations. According to Cravens (1996: 218) the drivers of these relationships fall into two broad categories, namely (1) environmental turbulence and diversity and (2) skills and resource gap. These will be illustrated as part of the discussion on the types of organisational relationships.

8.5.2 Types of Organisational relationships (see Figure 8.2)

- **Supplier Relationships:** Relationships with suppliers of raw materials and equipment are managed by the mining team responsible for extraction and beneficiation. These relationships are important in terms of technological developments and cost-saving production methods. Relationship marketing ensures that a company can stay at the forefront of production development;
- **Channel Member Relationships:** Relationships with channel members in South Africa are increasingly important, given the restrictions on capacity to transport bulk materials. These relationships include traders, agents and specifically, road transporters, TFR, RBCT and other ports used for exports. Distribution is planned in advance, but urgent changes can only be effected if a good relationship exists between the parties. Good relationships are built, based on timeous information sharing relating to availability of product or resources, payments receivable and mutual respect between individuals. Usually, the entire marketing and logistics department are responsible for these relationships and relationship marketing efforts;
- **Customer Relationships:** Relationships with customers are often seen as an obvious bond, although not more important than the other strategic relationships mentioned. Firstly, the coal producer needs to be customer focused, understanding needs and wants and how to satisfy requirements and preferences. In the coal industry, this constitutes an astute technical ability in terms of logistics and product. Relationship strategies need to recognise differences in the value of customers. A coal producer will focus heavily on customer relationships if it has a high production rate, prioritising customers in terms of value to the company. Higher valued companies will receive more relationship marketing efforts than lower valued customers, given their geographical location and access;
- **Competitor Relationships:** Relationships with competitors have become an important asset within the South African coal industry. Given logistic difficulties, competitors do assist one another with product supply when a vessel laycans and in the Junior mining sector, these relationships are often the origins for consolidation strategies. Given the fierce competition to gain

access to ports and trains, it is essential that coal producer competitors understand their environment, and what functional competition is expected within the industry. Relationship marketing with competitors is either done directly to the competitive company, or indirectly at various industry functions and conferences between marketing directors or managers.

8.6 Market Intelligence

Market intelligence constitutes a daily and weekly understanding and interpretation of domestic and international movements in the market. These movements include weather conditions which affects producers, rail accidents, port congestion, consumer production, ramp-up of new production entities, calling for tender participation, capital expenditure announcements and economic indicators.

Morris (2009:408-409) states that intelligence studies is an on-going activity, and includes external environment monitoring and assessment of internal performance measures; impact analyses; feasibility studies; profitability, pay-off, and acceptance analyses; performance studies; comparative studies and marketing audits. Since the coal industry became a terminal market, information are more readily available from accredited and accepted sources. The reports available for domestic and international market analyses to reach the intelligence as set out by Morris (2009:408-9) are the following:

- **The South African Coal Report:** Published by Wood Mackenzie (previously Barlow Jonker), is a monthly report on domestic production and consumption in South Africa. This report gives important intelligence on projects, producers, consumers, prices and domestic market indicators;
- **The McCloskey Coal Report:** This report is published monthly, and reviews international market movements in terms supply, demand and price. This report gives important medium term intelligence on coal prices, producers and consumers, the effects of global weather, resource incidents and global shipment of coal for the month;
- **The McCloskey Weekly Fax:** A weekly publication that summarises price movements and immediate market movements that impact supply and demand, such as force majeure incidents, mine accidents and weather forecasts;

- **The Argus Daily Coal Report:** A daily report on the previous day market movements and the reasons for volatility shifts;
- **McCloskey e-mail service:** This is an hourly updated subscription service. As information is released to the market, this service interprets and distributes it for immediate consumption;
- **The London Commodity News:** A brokerage information service that is free of charge and distributed every day. Very useful concise coal market information, particularly on stock levels at dispatching and receiving ports.
- **Analyst reports:** Macquarie Bank, Barnard Jacobs Mellett, JPMorgan, Deutsche Bank and Citi Group publish monthly reviews of companies and the market in general. Good market intelligence to interpret producer movements on a global scale;
- **Reserve bank and commercial bank reports:** Weekly and monthly economic reviews are vital to understanding international and domestic commodity markets. This market intelligence is used to make effective assumptions on pricing, the exchange rate and supply and demand of coal by South African industries;
- **Daily exchange rate report:** Commercial banks have up-to-date information available on daily traded exchange rates. When banks are not used, Reuters is utilised for 5 minute updated rates, and interpretation in terms of landed ZAR price can effectively be made on a daily basis.

8.7 Export marketing platforms for trading

An extension of the promotional function in terms reaching producers and consumers has undoubtedly been the web-based trading platform GlobalCoal, Over-the Counter brokers (OTC), voice brokers and credit and clearing houses.

Essentially these platforms are business-to business marketing tools and the industry have embraced it since 2000. The coal industry market place has evolved to enjoy enhanced transparency, real-time trading, total anonymity, process efficiency, and trading and hedging advice. On-line brokers have been a very important part of the process and they play a vital role in trading. Brokers assist in the promotional function by matching up counterparties by continually canvassing the entire market for the highest bids and the lowest

offers in all of the various indexed products. These brokers also provide new market entrants with advice regarding the development and execution of trading strategies.

The following brokerages actively broker coal swaps as well as physical products and effectively play an active role in promotion:

- Amerex – London and Singapore;
- Evolution Carbon – New York;
- GFI – London;
- GlobalCoal – London;
- ICAP – London and South Africa; and
- TFS –London.

8.8 Ethics

According to Gummesson (2000:229) marketing ethics are the moral standards that guide marketing decisions and actions. Each individual develops moral standards based on his or her own values. This explains why opinions about what is right or wrong often vary from one person to another, from one society to another, and among different groups within a society. Even so, such opinions may have a very real influence on whether a company's marketing decisions and actions are accepted or rejected.

Marketing ethics are not a philosophical issue – it is also of pragmatic concern. The following issues are embraced and build the foundation for a code of ethics. This was adapted from the American Marketing Association (AMA) in Perrault and McCarthy, (1996:47):

8.8.1 Responsibilities of the marketer (producing company)

Marketers must accept responsibility for the consequences of their activates and make every effort to ensure that their decisions, recommendations and actions function to identify, serve and satisfy all relevant publics, organisations and society. This must be guided by:

- The basic rule of professional ethics: not knowingly to do harm;
- The adherence to all applicable laws and regulations;
- The accurate representation of education, training and experience; and
- The active support, practice and promotion of ethics.

8.8.2 Honesty and fairness

Marketers shall uphold and advance integrity, honour and dignity by:

- Being honest in serving consumers, clients, employees, suppliers, distributors and the public;
- Not knowingly participating in conflict of interest without prior notice to all parties involved; and
- Establishing equitable fee schedules including payment or receipt of usual customary and or legal compensation for marketing exchanges.

8.8.3 Rights and duties of parties in the marketing exchange process

Participants in the marketing exchange process should be able to expect that:

- Products and services offered are safe and fit for the intended process;
- Communications about offered products are not deceptive;
- All parties intend to discharge their obligations, financial and otherwise in good faith; and
- Appropriate internal methods exist for equitable adjustment and / or redress of grievances concerning purchase.

8.8.4 Ethics in product development and management

- Disclosure of all substantial risks associated with product or service usage;
- Identification of any product component substitution that might materially change the product or impact on the buyer's purchase decision; and
- Identification o extra-cost added features.

8.8.5 Ethics in promotion

- Avoidance of false and misleading advertising;
- Rejection of high pressure manipulations, or misleading sales tactics; and
- Avoidance of sales promotions that use deception or manipulation.

8.8.6 Ethics in distribution

- Not manipulating the availability of a product for purpose of exploitation;
- Not using coercion in the marketing channel; and
- Not exerting undue influence over the reseller's choice to handle a product.

8.8.7 Ethics in pricing

- Not engaging in price fixing;
- Not practicing predatory pricing; and
- Disclosing the full price associated with any purchase.

8.8.8 Ethics in marketing research

- Prohibiting selling under the guise of conducting research;
- Maintaining research integrity by avoiding misrepresentation and omission of pertinent research data; and
- Treating outside clients and suppliers fairly.

8.8.9 Ethics in organisational relationships

Marketers should be aware of how behaviour may influence or impact on the behaviour of others in organisational relationships. They should not demand, encourage or apply coercion to obtain unethical behaviour in their relationships with employees, suppliers and customers. The following should be adhered to:

- Apply confidentiality and anonymity in professional relationships with regards to privileged information;
- Meet obligations and responsibilities in contracts and mutual agreements in a timely manner; and
- Avoid manipulation to take advantage of situations to maximise personal welfare in a way that unfairly deprives or damages the organisation.

8.9 Summary

Industrial promotion of coal is different form general retail or services marketing and promotion in that it is a bulk commodity which cannot be advertised for sales. However, sales promotion, advertising, personal selling and publicity form part of the promotional programme of coal as a commodity, although only certain promotional methods are relevant to industrial marketing.

Sales promotion is viewed as relationships which can also be formed with new and prospective buyers at international and national conferences, given the available promotional activities which also include displays and trade

incentives. A number of important domestic and international conferences are annually organised and have become well renowned for effective promotion, i.e. McCloskey and CoalTrans conferences.

Advertising is not used for the promotion of sales, but moreover for the promotion of the company as market participant, and can done via electronic and printed media. Advertising can play an important role in the promotion of the company's investor relations or gaining cognisance as a new or growing market participant.

Personal selling is the most important element of the promotional effort as it encompasses most of the selling effort and the relationships to fulfil the supply chain to the customer. The objective is to achieve superior performance on the critical measures of sales, increased volume and market share. This can only be attained by direct involvement and management of the product supply chain, especially when the product has to be delivered to the buyer.

Publicity cannot be controlled, but as part of the promotional programme needs to be managed in terms of taking advantage of information reaching the market on developments and production projects within the company. Privacy in terms of strategy and market share needs control and should not be used as a publicity tool.

The most important aspect of promotion and marketing products to the domestic, ESKOM or export consumer market is relationship marketing. Relationship marketing includes relationships to all stakeholders in the marketing effort, and includes inter-organisational, suppliers, competitors, channel members and customers. Internal relationships will dictate the effectiveness of the marketing effort between production (mine), logistics (loading and stockpiling), finance (invoicing) and marketing (technical after sales service and customer management).

External relationships with suppliers, channel members (agents, traders, TFR, port), customers and competitors (on a national and international scale) are based on the need to increase market share and producing efficiently at low cost, whilst aiming to be a responsible corporate citizen. These relationships are the primary foundations of commodity marketing.

Market intelligence is vital to operate as a member of the producing fraternity, as it forms the basis for relationships and to take advantage of market opportunities. Not only can weekly and monthly publications be used for this purpose, but the OTC market and the participating brokers prove to be a rated source of knowledge and intelligence. Internal and external relationships are also an important source of market intelligence and information needs weekly and monthly collation to benefit the organisation at all relevant levels.

Ethics guide the process of marketing and distribution and needs to be upheld to the highest standard. Successful marketers have a good comprehension of ethical standards and responsibility to the producing company, the customer and all channel members, which ultimately constitute the market. Ethics plays an important role in product development, promotion, distribution, pricing and marketing research.

CHAPTER 9

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This chapter will include the salient features of each section discussed in this study. Recommendations for future research are made in terms of each relevant section. Albeit that a considerable amount of information had been presented, the market evolves constantly. As a result, recommendations for future research are made after each section, which based on market intelligence which is currently driving the sustainability of this market.

9.1 The South African Producer (Supply)

The South African producer market historically consisted of the major mining groups represented in South Africa, i.e. Anglo Coal, BECSA, Xstrata, SASOL, TOTAL Coal South Africa and Kangra. These companies constituted captive ESKOM production and the majority of South African exports.

The promulgation of the Minerals and Petroleum Resources Development Act (MPRDA) 28 of 2002 saw the emergence of a very active Junior Mining Sector. This sector mainly constitutes BEE and BBBEE companies, with the most notable EXXARO Coal, which was formed from Kumba Resources and Eyesizwe Coal in 2006.

Although most of these companies produce less than 1 million tonnes per annum, the Mining Charter and procurement scorecard dictates that domestic coal consumers and ESKOM be supplied from these companies. Most coal producers cannot participate in the ESKOM market without producing an export product, and vice versa.

The privately owned RBCT made 4 million tonnes of port allocation available to these junior miners, and this allocation is managed by the DME and the Coal Industry Task Team (CITT). RBCT made a decision to expand the port to a capacity of 91 million tonnes per annum and successful BEE applicants will

become shareholders in the port at commissioning of the expansion. Notably, African Rainbow Minerals, Mmkau Mining, EXXARO Coal, Anker Coal, Umcebo and Worldwide Carolina Coal will become the new breed of exporters through the world's largest coal exporting terminal.

Production in South Africa is most active in the Mpumalanga province, although the Limpopo province with the Waterberg reserves is growing fast. Coal producers are dependant on infrastructure to transport coal, and major infrastructure development is currently undertaken to ensure a successful supply chain.

Recommendations for Future Research

Ann assessment of the depletion of the Mpumalanga coal reserves, and the migration of coal suppliers to the Limpopo Province. The historical geographical supply area is bound to change within the next 5-10 years. This will have a major impact on rail infrastructure, FOB costs and probably the quality of coal available for consumption domestically and for exports.

The resurrection of and return to the Kwa-Zulu Natal coal reserves should also be considered. A number of companies and the DMR are advocating the resurrection of these coalfields, and a FOB cash cost comparison with the Limpopo reserves should provide significant insight.

Consolidation within the BEE market. More than 20 BEE companies currently operate in the South African Coal Industry, and 18 of these have to share in Quattro allocation (4 million tonnes) at RBCT. The view is that economies of scale and competitiveness are ignored, and consolidation between these companies will yield far greater success in BEE mining and transformation.

In 2008, a major skill shortage was published. Skills transfer to the Junior Mining Sector can shed important light and insight to the staffing of this sector, as skills (talented individuals) are often recruited from larger companies

9.2 The South African Market (Consumer)

Approximately 27% of all saleable coal produced in South Africa is exported to energy providers, cement plants and metallurgical players in mainly Europe, South America, China, and India.

ESKOM consumes substantial tonnages of low grade coal and contributes to 46% consumption of saleable production. SASOL Synthetic Fuel consumes 18% of South African production which is entirely produced by SASOL Mining. The remaining 9% of saleable production is consumed by the domestic market, which is divided in 12 user groups. 38% Of the domestic market production is traded by merchants, which signals that an extensive trading market is also operating within South Africa.

Recommendations for Future Research

The impact on domestic production as ESKOM increases its demand within the next 5 years. The developing coal fields and infrastructure that will supply in this significant growth has to be examined and quantified.

The role of domestic channel members and the quantification of their potential margins have to be researched. The issue of B2B activities between major producers and consumers needs to be examined whilst taking into account the role of domestic channel members.

The role of SASOL developing new mines to feed its production to SASOL Synthetic Fuels for the next 20 years. The impact on the South African reserve and resource base as SASOL's development starts.

The emergence of Independent Power Plants and the implication for domestic consumers. This research will prove to be significant as these plants are not regulated by ESKOM, and will consume similar B-D grade product, as currently consumed by domestic users.

9.3 South Africa in the Global Coal Market Context

World coal production reached 6,488 million tonnes in 2007, following a four year period of average growth averaging 6.5% per annum. Table 9.1 ranks the largest producers of coal and the country ranking for exports on a global scale. Note that this is total coal production and includes hard coking, thermal and anthracitic coals.

Table 9.1 World coal production and exports 2007

Country	Production		Exports	
	Mt	**Rank**	**Mt**	**Rank**
China	2549.1	1	53.7	6
USA	1052.0	2	53.4	7
India	484.4	3	1.2	12
Australia	395.3	4	243.6	1
Russia	313.7	5	100.7	3
South Africa	247.7	6	67.7	4
Indonesia	259.2	7	202.2	2
Poland	147.8	8	11.8	10
Kazakhstan	86.4	9	23.0	9
Colombia	71.7	10	67.2	5
Canada	69.4	11	30.8	8
Ukraine	59.0	12	3.4	11
Other	752.3		47.7	
TOTAL	**6844.0**		**906.4**	

(Source: DME, SAMI 2007/2008)

South Africa ranks as the 6th largest producer in the world, whilst being the 4th largest exporter. South Africa's production is expected to increase with ESKOM building additional power plants to supply in the growing demand for power by Africa's largest economy. Export production is also expected to increase, given the expansion of RBCT port capacity, although this growth will be dependant on TFR railing capacity.

Recommendations for Future Research

The effect of the delayed 2009 RBCT expansion commissioning on South African coal producers in terms of capital expenditure, decreased GDP output and loss of income and taxation. These effects might also include premature mine closures.

The impact of an appreciating ZAR on coal export returns. It is important that the market understands a 10% change in US$ and ZAR terms.

Evaluating Southern African countries as new sources of coal production in Southern Africa. These will include Mozambique, Botswana, Zambia and Zimbabwe. The study needs to relate to infrastructure determination with special mention of railage from these countries and utilisation of Walvis Bay and Beira Port.

9.4 From Geology to Mining to Product

The project or mine geology is the fundamental starting block of the resource model, the financial feasibility study and ultimately the business and marketing plan of the company. The mining method for extraction is determined based on the geological model, and beneficiation capacity erected based on the washability curves yielded by ROM material.

The activities to reach mineable production are as follows:

- Early exploration;
- Detailed exploration to develop a pre-feasibility study;
- Developing and testing washability curves based on borehole analyses;
- Development of mine plan and beneficiation facility, which include mining method and plant design;
- Obtaining of new order mining right, Environmental Impact Assessment on beneficiation area and development of social and labour plan to underwrite the objectives of environmental and community sustainability; and
- Pre-mining exploration on an on-going basis to sustain an optimal mine plan.

Once a project reach operational status, the operations are defined in terms of the original geology, mining and beneficiation, infrastructure, railage and port costs are added to determine the FOB cash costs. These costs are essential to determine firstly a country's competitive production position, and secondly a company's competitive ranking within a particular geographical area.

The FOB cash cost curve is the ultimate indication whether a company will profitably produce if nominal prices decrease as a result of market conditions. The cost curve is also an important management tool to plan for continuous

improvement in order to manage competitiveness and ensure the decrease of real costs.

Recommendations for Future Research

The trading of reserves based on in-situ and ROM calculations. The determination of reserves should be based on activities in the area as well as the life cycle point in which the project finds itself.

9.5 Product Specification

Coal marketing as a function can only be initiated by a full product specification, which is used as the basis of discussion between a producer and consumer. The offered product has to be presented as a typical specification to buyers, and has to include proximate analyses, ultimate analyses, forms of sulphur, hardgrove index indications, ash fusion temperatures, analyses on calorific value and an ash composition. Products can be marketed on a dry, air dried or as received basis, and the marketer should ensure that the consumer or buyer understand the basis of contracting.

Companies historically developed its branded typical specification sheet based on the parameters set out above. In terms of domestic and ESKOM marketed coal, these specification sheets are widely used.

The export market evolved to such an extent that the Standard Coal Trading Agreement (SCoTA) specification parameters are used for basic trading. This standard specification is known as RB1 and only includes analyses on calorific value, total moisture, volatile matter, ash, sulphur, hardgrove and grindability index, ash fusion temperature and calcium oxide in ash.

The study set out to compare and distinguish between the different basis of reporting and product specification for each market, i.e. ESKOM, domestic (in-land) and export.

Recommendations for Future Research

Value-in-use study per customer, i.e. domestic ferroalloy producers; European and Indian thermal coal consumers and sized consumer market in Turkey. This study is important to understand the potential pricing between markets,

and possible substitution. Based on these findings, producers will strategise around a market of choice, and production will yield the specific product quality to equal an acceptable return.

Blendability of product on South African and international stockpiles. Producers require an understanding of its product blendability on stockpiles at various port destinations. The value of this is to form alliances with other producers and to create enhanced products in demand by end-consumers. Understanding and determining the blendability of ESKOM consumed products can be of the same value.

9.6 Product Utilisation

Thermal coal is mainly used for energy generation in boilers, burners and kilns. The two main markets are identified as electricity generators and cement manufacturers.

The size fraction of utilised coal is equally important, and the development of pulverised coal injection since the 1970s saw sophistication and optimised usage of thermal coal in powdered form.

ESKOM utilises coal for electricity generation, based on high ash thermal coal consumption. The energy value required by ESKOM is inferior to domestic (A-grade) and export quality production, but is customed for use in these power plants. Moreover, the mineable product originates from different geological coal seams which dictate that mining will yield more than one product, marketable to different consumers. Efficiency and profitability are optimised by extracting value from multiple seams.

Similarly, production for export and domestic utilisation is of superior quality with substantial higher energy and calorific values, and products are custom produced for these markets. The exception is B, C and D-grade production destined for the domestic market, although these products will not be the desired quality for ESKOM utilisation.

Superior technical knowledge and analyses are demanded of the technical and marketing teams servicing the customer, albeit based on the specific utilisation of the product.

Recommendations for Future Research

The impact of electrostatic precipitators on coal consumption in Europe. The study has to define the increased or decreased use of coals with high sulphur contents. This has to be studied considering that the remaining world coal reserves have high sulphur contents.

The impact of Carbon Emission Trading on product consumption and substitution after 2010. The EU specifically needs to be evaluated as a buyer and importer of coal, which is also heavily scrutinised for its contribution to reduced carbon emissions. Individual countries in the EU will contribute significantly to this analysis.

9.7 Channel Structures for Distribution

Various channel structures exist in the three markets under discussion. Agents and traders operate as middlemen between producers and ESKOM, domestic consumers and international buyers and traders.

Small, medium and large producing entities have to consider the attributing value an agent or trader could add to a specific business. The reasons for utilising services from agents and traders could vary from lack of marketing skills, specific cultural barriers, the stage of current product life cycle, or the complexity of technical marketing required.

Added value should be the main driver for utilising the services provided by domestic or international distribution structures, although producers should be selective in choosing agents and traders for representation. These structures have been developing and evolving for the past 20 years, and compliments the distribution function of coal as a commodity, since these companies have enhanced access to logistics and infrastructure, which could be essential for smaller companies.

Channel structures are often utilised on short-term basis to gain access to higher prices or blending facilities.

Recommendations for Future Research

Determination of relevant channel members at a specific life cycle stage. It has to be determined which members, the quantity and the specific strategy or reason these members are to be utilised in the introductory, growth, maturity and decline phases of the product.

Current cost and determination of cost of channel members per market, i.e. export, domestic and ESKOM should also be determined and evaluated in terms of return on investment and return on equity.

9.8 Incoterms and Contracting

Incoterms form the basis of any domestic or export sales contract, and is the worldwide standard for the interpretation of trade terms.

An understanding of Group E (ex works), Group F (FOM, FOT, FOR, FAS, FOB), Group C (CFR, CIF), and Group D (DES) terms are essential for successful contracting inside or outside the borders of South Africa. The seller stipulates its risk and responsibility in terms of the trade contract, and the buyer assumes risk and responsibility on the same basis.

Incoterms inherently include the conditions of a delivery which stipulate requisite licences, government regulations and the overall framework for using a mode of transport to fulfil a transaction at a specific time and place.

Recommendations for Future Research

Interpretation of free-on-carriage as an Incoterm, where production and marketing is done on different continents. This is relevant for multi-national corporations producing in e.g. Columbia and South Africa, but fulfilling its marketing function in Europe.

Contractual comparison between SCOTA and OTC agreements. This study has the potential to develop markets for a producer, whilst using international and B2B platforms for trading.

The impact of Incoterms on tradable Letters of Credit (L/Cs). Although this study will be all encompassing on L/Cs, the significance of Incoterms and the thorough understanding thereof will become evident.

9.9 Modes of Transport

Coal in South Africa is transported by conveyor belts (ESKOM and SASOL), road (30 tonne road hauling trucks), railage (5800 and 8400 tonnes per block load), and vessels sailing from Durban, Maputo or RBCT (handy size, panamax and cape size vessels).

Increased road transport has been affecting national roads and safety in South Africa and this can mainly be attributed to a lack of rail infrastructure and a growing demand for domestically traded and ESKOM consumed coal.

South African rail infrastructure will need minimum capital expenditure of at least R 4bn over the short term to maintain and develop the immediate needs of the coal industry. The recent expansion of RBCT to facilitate 91 million tonnes remain questionable as TFR is not committing to rail capacity of more than 73 million tonnes in 2010. Railage to alternative export facilities is further exacerbated as GFB is responsible for this whilst providing a much smaller fleet with greatly decreased capacity.

Producer sophistication dictates a company's participation in shipping, and exporting parties are dependent on competent logistics and shipping teams taking responsibility for bulk movement of coal.

The most prevalent issue in South African coal logistics remain railage and the industry is not expecting major growth or opportunities without the commitment of TFR going into the future. The country is optimistic about the future of commodities, but only increased infrastructure, rail and railage will make increased output a reality.

Recommendations for Future Research

The impact of Private Public Participation (PPP) on rail projects. Given the lack of rail infrastructure in South Africa, PPPs on locomotives, track and

wagons need to be investigated with specific attention to the role of the Government and its participation to such options.

The planned TFR capital expenditure programme in South Africa, and its impact on GFB and TFR lines. Capital amounts, areas and timing have relevance in forming an optimal opinion on the planned and probable investments.

The impact of the Competition Act on railage in South Africa, given the homogeneity of coal producers. Recently, TFR formed a task group for these purposes, and major changes are expected to minimise collusion. These changes and limitations need to be articulated.

9.10 South African Port Allocation

RBCT remains the key coal exporting facility in South Africa. Albeit in the hands of private shareholders since its inception in 1976, its Phase IV and V expansions recently made provisions for inclusion of BEE Junior Mining Companies.

Depleting reserves and mine-to-rail infrastructure constraints have seen RBCT shareholders sub-leasing allocation to smaller developing producers, although some major shareholders had to develop new projects to sustain their export allocation.

The effect of some 18 new coal producing companies also saw a renewed constraint in port allocation in South Africa. The Quattro Allocation is insufficient for any junior company to gain economy of scale, and the freight differential between state-owned ports and RBCT make competing within the international coal arena very complicated.

Although state-owned ports make provision for coal exports, the recently depressed markets can not sustain the FOB cash costs generated at these ports. Port allocation cannot be viewed in isolation and accompanied rail capacity remains the single most important element in planning and executing coal exports through the available port network in South Africa.

Recommendations for Future Research

The feasibility of Richards Bay Dry Bulk Terminal in depressed markets needs to be analysed. Given lower prices but very few alternatives, the business case for RBDBT has to be examined in terms of producers buying into existing markets as the only option available.

A global perspective of nationalisation of port networks. Given that RBCT is a privately owned port in South Africa and excludes new and BEE producers, a global perspective will enhance the opinion on nationalisation of such assets.

The link between port and rail capacity in terms of the operational supply chain needs to be evaluated. By probing port and rail capacity, a company can strategise around its production capacity and marketing ability for domestic and export markets and switching products in the supply chain to adhere to logistical constraints.

9.11 Export Pricing and Risk Management

Participation in the export market depends on various factors such as size of production, access to infrastructure and particular channel structures, and the influence a single producer can have on price.

An understanding of export pricing, based on global supply and demand fundamentals is vital to anticipate changes in domestic product pricing and ultimately to produce changes in pricing strategy for each product and market. Planning horizons in mining can be extended periods and often future off-take contracts are required for financial assistance to establish the project. Managing the resulting risk or re-defining any financial risk in terms of pricing can be done by utilising derivative instruments.

With the development of the terminal market for coal, financial institutions became important market players and risk management through hedging and limited options. Coal players currently have the opportunity to fix or hedge future prices which can determine a company's financial stability or success in projects.

Price forward swaps give market players the opportunity to interpret contango or backwardated curves to the best advantage of the company, but a hedging strategy and adhering to international trading standards are prerequisites. The indices used in derivatives are internationally recognised and form an important basis of sales contracts.

Recommendations for Future Research

Development of a derivative and trading strategy for an individual coal consumer and producer. All actions pertaining to derivative trading needs to be determined and a step-by-step guide developed to direct a consumer or producer to become a trader of coal derivatives.

Studying and determining the qualities of producers that classify them as price setters or followers in the international market. Is the market small enough to dictate a price to, and should all producers simply follow market prices?

Foreign ownership of producing assets and how it influences profitability of a coal producer. This is currently the case of AIM and London listed entities with reserves or operations in Indonesia and South Africa. It is important to understand foreign investment and its desired returns on local producers.

9.12 Domestic and ESKOM Pricing

Price determination for domestically placed coal production as well as ESKOM product has evolved as a result of major volatility in export prices experienced since mid-2008 and structural economic changes in South Africa. It has to be noted that the quality of domestically consumed and ESKOM product differs substantially, and substitution is only possible between domestically consumed product and export product (limited to A-grade domestic product).

Coal producers having access to export allocation dictated major price increases to domestic consumers, on the basis of rather exporting production than remaining in the domestic market. Previously, domestic prices were similar for every grading of coal and the general annual escalation was based on a percentage of Producer Price Index.

ESKOM announced in late 2009 that it will revisit its procurement strategy and enquired new proposals from its existing suppliers. Although the outcome of the tender process is not yet public domain information, expectations are that ESKOM will be paying increased prices for coal, and passing the price increase on to consumers of electricity. Historically, ESKOM priced at Rand per tonne, but this also changes to Rand per gigajoule heat value.

Recommendations for Future Research

The impact de-regulation of electricity supply will have on ESKOM and the South African economy. Certainly a topic of debate over the past 10 years. It is important to understand why de-regulation has not yet transpired in South Africa, and which foreign models can be used and applied in South Africa.

The influence of carbon emission limitation on domestic consumers, specifically, ferroalloy producers and SASOL Synthetic Fuels needs to be investigated. These companies need to limit their carbon footprint, given that most are foreign listed entities. Will South Africa eventually adhere to international standards of emission reduction and when will this happen? Could this expedite the process for South Africa to participate on a global scale of carbon emission reduction?

9.13 Relationship Marketing Yields Market Intelligence

The successful marketing of commodities is premised in understanding products, customers, technology, markets, prices, channels and the internal and external factors influencing these on a weekly, monthly and annual basis.

Market intelligence and analyses are the tools utilised to fully understand the market place, but presence over a medium to long term horizon provides the insight required to operate in an ever-changing environment. Relationship marketing can only be fully developed over a period of time, and will ensure optimal market intelligence and interpretation of market movements.

Recommendations for Future Research

The effect of electronic commerce on commodity marketing needs further investigation. Whilst this incorporates the effects of B2B commerce and OTC trading, the question remains: "why are relationships still so important and essential in commodity marketing?"

The constraints of culture and language barriers in international commodity marketing should be researched to determine whether different strategies are essential per specific region. It should be determined which regions or countries in the world will require similar language and culture for commercial trading.

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