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CENTRE FOR COMPETITION, REGULATION AND ECONOMIC DEVELOPMENT

Working Paper[1]

AN EVALUATION OF THE EFFECTIVENESS OF THE LIQUID FUELS PRICE REGULATORY FRAMEWORK IN SOUTH AFRICA

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Abstract

This study evaluates the effectiveness of economic regulation of liquid fuels in South Africa against the main rationales for such regulation. Regulation is required in industries that have natural monopoly elements including essential infrastructure, weak competition, where there is a lack of information for consumers to make informed decisions and for social objectives. However, research shows that regulation can either stifle or facilitate competition. Regulators often face challenges of asymmetric information, allocating risk, utility accountability and applying the appropriate methodologies in order to facilitate investment and encourage efficiency. The dissertation provides an overview of the South African liquid fuels industry and its regulation. It considers the nature and extent of market power, critical infrastructure and the extent of vertical integration of the major Oil Companies. It focuses on whether regulation has effectively constrained market power in the coastal and inland markets, assesses the regulatory decisions regarding the new multi-product pipeline from Durban to Gauteng, assesses decisions regarding access to essential facilities and widening economic participation.

Keywords: Liquid fuels industry in South Africa, rationales for regulation, market power, access to essential facilities, wider economic participation.

[1] This working paper was completed as part of the requirements for the MCom Competition and Economic Regulation

Contents

List of tables and figures

1. Introduction

Liquid fuels are important because they facilitate the movement of people and goods that allows an economy to thrive (Department of Minerals and Energy, 1998). In this way, the liquid fuels industry contributes towards job creation, infrastructure development, community development and transformation in the South African economy (Tshifularo, Shahik, Dihlabi, Baart, Machumele, Magafela, Zingitwa, 2017). At the same time, liquid fuels production is scale-intensive and supplying the country requires various pipeline, storage, wholesale and retail infrastructure. The significance and relevance of this sector means that regulation is common, in South Africa as in other countries, to secure a supply that is easily accessible to all at fair and transparent prices.

The rationales for economic regulation include addressing market failures such as weak competition, positive or negative externalities, information asymmetries and social objectives (Broughton, 2011). In South Africa, this latter objective includes increasing black economic participation.

Product prices and operations of the liquid fuels industry in South Africa have been regulated since 1946 when all liquid fuels consumed in the country were imported and distributed by multinational oil companies. Regulations include the Petroleum Products Act,1977 (Act No 20 of 1997); the Petroleum Pipelines Act, 2003; Petroleum Pipelines levies Act, 2004; regulations to import and export crude oil, petroleum products and blending components. These regulations are formulated and implemented by the Department of Mineral Resources and Energy (DMRE) and the National Energy Regulator of South Africa (Nersa) (Sihlobo, 2016).

In the 1950s, the South African government sought to reduce its reliance on imported crude oil by establishing the South African Coal, Oil and Gas Corporation Limited (Sasol) as an inland national refining company. In 1954, it developed a main supply agreement (MSA) to ensure Sasol's growth. The MSA, signed by the coastal refining companies, specified that the coastal refineries would purchase their inland fuel requirements from the inland refinery (Das Nair, Mondliwa and Roberts, 2015).

By the 1960s, although most of South Africa's fuel demand was refined locally, international economic sanctions meant that the government needed to persuade and encourage the refining companies – BP, Shell, Mobil and Caltex – to remain and expand their operations in South Africa. The use of the import parity pricing system helped the government achieve this aim as its pricing framework allowed refining companies to make greater profits, which was an incentive for them to invest more and receive higher returns despite the sanctions (Mondliwa and Roberts, 2014).

A high degree of interventionist and protectionist regulation defined the synthetic fuels industry as the country sought to reduce its dependence on imported crude oil. The purchase of the inland requirements were based on the in bond landed cost, even though Sasol was a synthetic fuel producer that used locally sourced coal as an input. The in bond landed cost allowed synfuel producers to earn excessive profits as it was calculated on the basis of the import parity price when Sasol did not incur costs of importing crude oil or liquid fuels (Rustomjee, Crompton, Maule and Mehlomakulu, 2007).

The principles of the MSA were considered to have underpinned petroleum products regulation until 2003 (Competition Tribunal of South Africa, 2006). The MSA gave an advantage to inland refineries, particularly Sasol, and developed locational economies where inland refineries supplied inland demand and coastal refineries supplied coastal demand. Through the MSA, geographical markets were created. Natref and Sasol Secunda supplied the inland market and some overland exports. Shell and BP South African Petroleum Refineries (Pty) Ltd (Sapref), and Engen Petroleum Limited supplied the coastal market and transported product inland and to the Western Cape, and exported to other countries by sea. The Chevron refinery supplied the Western Cape market and serviced the export market by sea.

Competition was dampened by regulations to establish a local liquid fuels producer using the country's own natural resources. This was to ensure a security of supply when sanctions were imposed on the country during the apartheid era.

The logistical capacity to convey refined product inland from the coast was an essential component of the operational requirements of the coastal refineries (Competition Tribunal of South Africa, 2006). Durban coastal refineries had limited logistical coordination to convey product inland, which further constrained the ability of coastal refineries to compete with inland refineries. Liquid fuels were transported inland from the coast by road and rail pre-1960s.

Roberts, Vilakazi and Simbanegavi (2017) note that first entrants in various industries are likely to have gained their position either through state support and ownership or by being a subsidiary of a multinational corporation that established its footprint under colonial rule. This is true for the liquid fuels industry in South Africa. The companies that imported liquid fuels into the country and later invested in refining capacity were multinational oil companies. Sasol was state-owned until 1979 (Sparks, 2016), and received state support through the MSA. The implications are that the entrenched market power of incumbents could be of concern.

With the construction of refineries, the oil companies became vertically integrated across the entire value chain. This gave them control of key inputs and access to essential infrastructure such as ports, modes of transportation, depots and storage facilities. The industry became imperfectly competitive, with possible market power over geographic markets within the country, such as the inland region.

Despite the change in the political environment of the country, the structure of the liquid fuels industry did not change. The shared market power was largely facilitated by the manner in which the industry was regulated over the years; which raised strategic barriers to entry (Paelo, Robb and Vilakazi, 2014a).

Previous studies of the fuel pricing system in South Africa included:

- The report of the Moerane investigating team to the Minister of Minerals and Energy on the December 2005 fuel shortages released in June 2006, and
- The South African liquid fuels energy sector Windfall Tax Task Team (WTTT) report dated 09th February 2007.

These studies' recommendations to review the liquid fuels pricing framework were largely because the framework was seen as benefitting the oil majors, especially the synthetic fuel producers, while being a disadvantage for competition and consumers (Mondliwa and Roberts, 2014).

It is against this backdrop that this study will use previous regulatory decisions as case studies to evaluate their outcomes concerning the effectiveness of regulations on expanding constrained pipeline capacity, ensuring fair pipeline transport costs, accessing essential facilities and true depot-related costs for distribution, and retail regulation in South Africa.

The core research question is an evaluation of regulation and the effectiveness of the liquid fuels price regulatory framework in South Africa, taking into account different rationales for economic regulation. The primary areas of literature reviewed for this dissertation were the rationales for economic regulation, price regulation and facilitating access to essential facilities in vertically integrated industries, as these were the key characteristics of the liquid fuels industry and were therefore relevant for the research question.

2. Rationales for economic regulation

The following literature review will evaluate the debates in economic regulation and assist in providing a framework to evaluate the research problem. The rationales for regulation, characteristics of regulated industries, the objectives of regulation, challenges faced by regulators and how prices are regulated are the key topics that will form the framework.

2.1. What is economic regulation and how are industries regulated?

Economic regulation is a form of government intervention in a market where the forces of demand and supply do not inherently achieve efficiency because of the various types of market failures that exist in those markets. Economic regulation minimises the potential negative effects of market failures in uncompetitive markets and coordinates the markets towards outcomes that are optimal and economically efficient for society.

Market failures are mainly classified as problems of asymmetric information, externalities and market power (Kodwani, 2000). Market power is usually enjoyed by natural monopolies in integrated industries, and forms the most prominent case for economic regulation (Baldwin, Cave and Lodge, 2011). The general justifications for economic regulation are:

- Weak competition: when a firm has a significant degree of market power or where the firm is operating as a monopoly, the firm would face no competitive pressure. This could result in high prices for consumers and there would be no incentive for the firm to be innovative.
- Externalities: a cost or benefit to a third party because of production or consumption of a good or service, which is either negative or positive. An externality may not affect the entity that causes it. Since third parties do not have control over externalities, regulation is required to control them. Externalities can affect an individual or have an impact on the society. Pollution is a common example of a negative externality that affects society as a whole. Positive externalities are those that benefit an individual and the society as a whole. Research and development conducted by a company can be a positive externality.
- Lack of information and/or difficulty making informed decisions: when customers do not have sufficient information to make informed decisions or when consumers are unable to make best decisions to suit their needs. If insufficient information is available to consumers or consumers are unable to make suitable decisions, firms face less competition and are able to exert their market power.
- Social objectives: ensuring that all, not only those who are willing and able to pay, have access to and are provided with essential goods or services for fairness, taking into account the positive externalities derived from the good or service. (Das Nair and Roberts, 2017a; Jalilian, Kirkpatrick and Parker, 2006).

Regulation can be light-handed or detailed. Light-handed regulation relies on competition law and competition authorities to address anti-competitive conduct ex-post, while the detailed form of regulation is normally ex-ante. Detailed regulation uses detailed instruments such as pricing, entry and exit, product quality and operational performance to reinforce competition law and regulate the conduct of the regulated entities (Uedin et al., 2008).

2.2. Characteristics of regulated industries

Economic regulation is applied in sectors where services are provided by public sector entities and industries that typically have natural monopoly or monopoly characteristics, such as telecommunications, postal services, gas, electricity, water, aviation and rail (Broughton, 2011). Typically, infrastructure industries that own and operate previously state-owned facilities used to produce basic services, and which have benefitted from the resources of the state, are regulated. These industries have two identifying features: they provide a distribution, transmission or transportation service through a network of cables, pipes and other facilities that have the benefit of economies of scale; and the efficiency of the utilities have an impact on the efficiency of other firms, as the nature of the service provided is an essential input (Uedin, Roy,Serratt and Armstrong, 2008).

From the above observation it is clear that often, infrastructure industries with monopoly parts in their value chains that provide a network of public goods and services are regulated with the objective of ensuring fair access and fair pricing. Industries such as liquid fuels do not have such infrastructure characteristics; however, there may be high levels of concentration and entrenched market power. In addition, the industry may be viewed as strategic, requiring regulation to incentivise investment and ensure security of supply.

2.3. Objectives and challenges for economic regulators

2.3.1. Objectives of regulation

According to (Baldwin, Cave and Lodge, 2011), the primary objectives of regulation should be to:

- increase the efficiency of the regulated industries
- provide incentives to regulated industries to meet the demand, improve the efficiency in production and provide services
- satisfy the expectations of the regulated firms' investors.

Regulation should facilitate competition without distorting the market and, in the absence of competitive markets regulation, should provide firms with proper incentives for meeting customer needs through efficient investment and operations (Uedin et al., 2008).

The effectiveness of economic regulation depends on the institutions and rules that facilitate it. For economic regulators to be effective they need statutory guidance regarding their tasks (Broughton, 2011).

Regulation should ideally facilitate competition without distorting the market and provide proper incentives to the regulated firms. The effectiveness of regulation, which is measured against whether its objectives are achieved, depends on the regulator.

2.3.2. Challenges faced by regulators

In trying to maximise the public good while protecting the interests of a utility and its shareholders, regulators face several challenges including (Macmillian, 2009):

- concerns about the adequacy of funding to carry out their mandate;
- information asymmetry;
- challenges emanating from insufficient powers to implement regulations and decisions;
- political challenges in implementing statutory mandates in a transparent, professional and impartial manner; and
- challenges in understanding and defining markets to determine the level of competition and kind of regulation required.

Many developing countries like South Africa, have not privatized their utilities, but have established regulatory agencies. An important challenge for these regulators is that the state-owned utilities do not often operate on a profitable basis. Government often seeks to achieve new investments, service expansion, and low prices while state-owned operators may want to satisfy other objectives. There is therefore conflict between the utility and the government because of differing objectives (Friard and Leyreloup, 1996).

Regulators must be well informed to avoid the information asymmetry that exists between the regulator and the regulated firms. Information asymmetry arises in many kinds of regulatory work where regulators know less than utilities about the risks, benefits and costs associated with participating in the regulated industries. Information asymmetry leads regulators to make bad decisions because they are unsure of the commercial and social value of regulated activities (Costello, 2012).

Regulators can realistically lessen information asymmetry, but cannot eliminate it. The more informed regulators are, the more likely they are to make good decisions.

Regulators are challenged by the allocation of risk of innovation costs between the utility and its customers and making utilities accountable for their actions while being fair to them and their shareholders (Costello, 2012).

2.4. Price regulation

A natural monopolist or firm with entrenched market power, if unregulated, is likely to charge excessive prices. The purposes of price regulation are to guard consumers from exploitation and to give investors certainty that they will receive a return for maintaining and developing the infrastructure required to provide the services or produce the goods (Baldwin, Cave and Lodge, 2011). However, the kind of price regulation that is appropriate is widely debated.

Two types of price regulation have been identified as methods that best meet the needs of the consumer and the investor. These are the rate of return (RoR) predominately used in the United States (US), and the price cap predominately used in the United Kingdom (UK) (Kodwani, 2000), they will be discussed in detail in the sections that follow. Other forms of price regulation include revenue cap and yardstick (benchmarking) regulation.

2.4.1. Rate of return

RoR regulation is when prices are set in a manner that covers the utility's production costs and includes a rate of return on capital that maintains an investors' willingness to replace or expand assets (Baldwin et al., 2011).

The main feature of RoR is to allow a firm to earn a fair return on its capital investment in the regulated activity. The firm is allowed to charge the price, and fix the output level and input mix, provided the profits do not exceed the allowed return.

RoR regulation is not designed to adjust prices to the changing long-run marginal cost of a dynamic market structure. In particular, the regulated price recovers an allowed rate of return and an allowed depreciation of a rate base equalling cumulative undepreciated investments. RoR regulation, which under-depreciates assets by ignoring innovation, misrepresents the path of prices relative to the optimal path. Regulated prices are initially too low because they fail to recover economic depreciation. However, regulated prices ultimately become too high because of the firm's entitlement to the allowed rate of return on a bloated rate base. Commensurately, RoR regulation eventually results in an economically deficient level of capacity and lacks incentives to retire old capacity and replace it with new capacity with lower operating costs (Biglaiser and Riordan, 2000)

In the main, RoR was observed to encourage inefficient behaviour by utilities and give little incentive for utilities to be innovative, and state-owned utility firms suffered from a poor understanding of the industry and regulatory capture (PennState College of Earth and Mineral Sciences, 2020).

2.4.2. Price cap

Price cap regulation is when a price ceiling is set, that will be effective at a future date, below which a firm has price flexibility (Clemenz, 1991). The original intention of price cap regulation was to provide incentives for efficiency, with the idea that a regulated firm that has more information about its costs will act efficiently if it has an incentive to do so. However, there is usually a cost to providing incentives where information is asymmetric. Price caps, in contrast to RoR regulation, provide incentives to reduce quality to earn higher profits. To counter this, explicit quality regulations should be introduced.

The key differences in practice between price cap regulation and RoR regulation is the length of time between formal price reviews and the commitment of the regulator using a price cap not to revise prices between formal reviews. Price cap regulation has positively encouraged operating efficiency in regulated industries and, in general, investment incentives in the UK and the US have not been affected (Cowan, 2006).

It is often difficult for utility regulators to set prices that satisfy both the fairness and efficiency criteria. Some goods and services are vital components of business and consumer expenditure, and their pricing can have implications on the efficiency and welfare of businesses and consumers. The prices of such goods and services must be regulated to ensure outcomes that are acceptable to the community.

Price cap regulation encourages the regulated firm to be efficient while RoR allows the regulated firm to earn fair returns. Regulators must set prices that are both fair and efficient regulated prices; however, the regulator is often required to choose between fair and efficient pricing.

3. Overview of the liquid fuels industry in South Africa

The liquid fuels industry in South Africa is dominated by production using fossil fuels. Its limited crude oil and natural gas deposits, and an abundance of coal reserves, led to an advanced synthetic fuels industry that complements the refinery production of crude oil imported from countries such as Saudi Arabia, Nigeria and Angola. Liquid fuels such as petrol, diesel, residual fuel oil, paraffin, jet fuel, aviation gasoline and liquid petroleum gas are refined in the country.

According to the DMRE, in 2015 roughly 5% of its fuel requirements were produced from gas (gas to liquid), 39% from coal (coal to liquid), and 56% from crude oil. However, to meet the domestic demand, some liquid fuels had to be imported to augment the production shortfall (Ratshomo and Nembahe, 2018). From 2013 to 2018, on average more than 75% of the liquid fuels demand in the country were met through locally refined fuels, and the balance was imported.

3.1. Key role players in the industry

Seven South African Petroleum Industry Association (SAPIA) members own and operate refineries in the country; four of the refineries are at the coast and two are inland. Two are synthetic fuels refineries while four are crude oil refineries. Most of the fuel demand is produced at the coast, although most of it is consumed in the economic hub of the country, which is inland. South Africa's refining capacity is listed in Table 1 below (Ratshomo and Nembahe, 2018).

Table 1: Refining capacity in South Africa

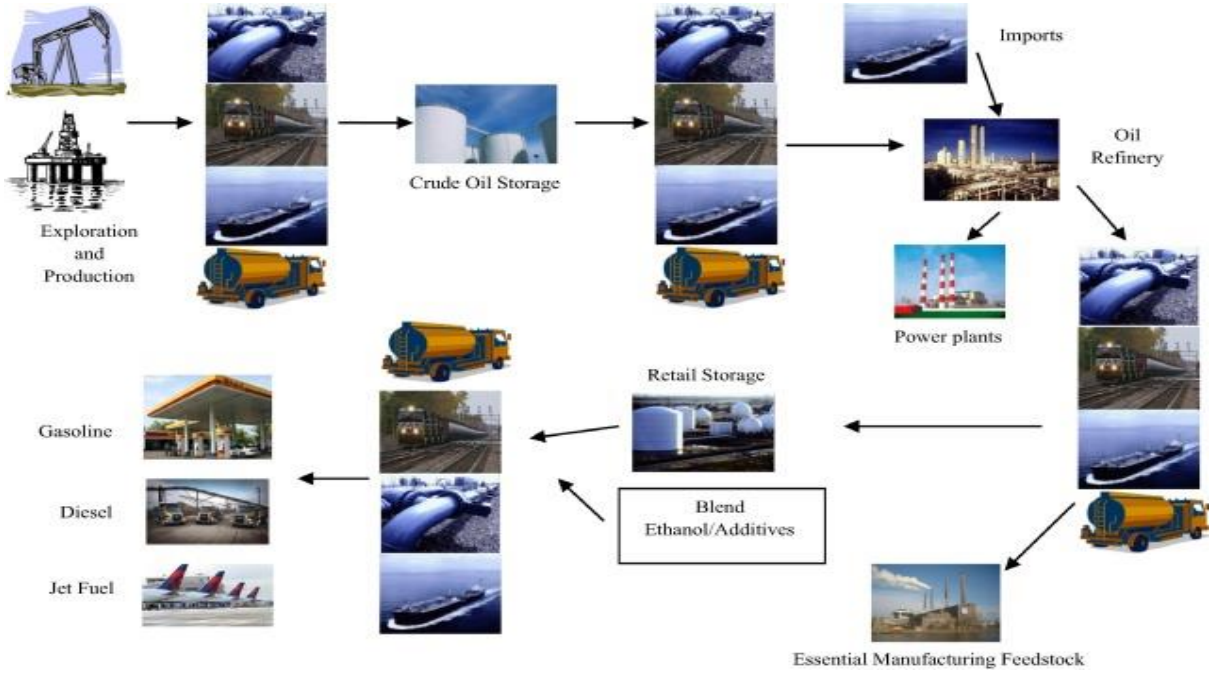
Refinery	Province	Feedstock	Name plate (bbl/d)	Share of total capacity (%)
Astron Energy (formerly known as Chevron)	Cape Town	Crude oil	100 000	14
Sapref (50% owned by Shell South Africa and 50% owned by BP)	Durban	Crude oil	180 000	26
Engen Refinery	KwaZulu-Natal	Crude oil	120 000	17
National Petroleum Refiners of South Africa (Natref, 64% owned by Sasol Oil and 36% owned by Total South Africa)	Free State	Crude oil	108 000	15
Sasol Secunda	Mpumalanga	Coal and natural gas	150 000	21
PetroSA	Western Cape	Natural gas	45 000	6

Refinery	Province	Feedstock	Name plate (bbl/d)	Share of total capacity (%)
Total share of capacity			703 000	100

Source: Ratshomo and Nembah, South African Energy Sector Report, 2018.

The oil companies listed in the table above dominate the industry. They own and operate refineries, have control and access to essential facilities such as import infrastructure, access to the Transnet pipeline and inland storage facilities. Sasol and Total SA have a locational advantage because they own and operate refineries inland, where approximately 60% of the liquid fuels are consumed. Figure 1 is an illustration of the industry value chain showing the various activities involved.

Figure 1: Illustration of the liquid fuels value chain



Source: Modeling downstream petroleum supply chain: The importance of multi-mode transportation to strategic planning, 2015.

3.2. Policy and regulation in the industry

The DMRE has dealt with licensing by issuing manufacturing, wholesaling and retailing licences, and by regulating pricing of liquid fuels in the industry. Its legislated mandate derived from the Petroleum Products Act 20 of 1977, as amended by Act 58 of 2003 and Act 2 of 2005 is to ensure secure and sustainable provision of energy for socio-economic development (Paelo, Robb and Vilakazi, 2014c).

The retail prices of all grades of petrol, illuminating paraffin and liquefied petroleum gas are regulated while the retail price for diesel is not regulated. The wholesale price of diesel is recommended by government which allows for commercial consumers to discount at wholesale level.

Nersa established in 2005 by the National Energy Regulator Act 40 of 2004 (Nersa Act), forms the second governing body of the fuels industry. According to Section 4 of the Petroleum Pipelines Act (PPA) 60 of 2003, the duties and functions of the regulator include setting tariffs for petroleum pipeline operations and approving tariffs for petroleum storage and loading facilities (Nersa, 2007). Nersa is guided by the PPA and the regulations which require that the RoR methodology be used in setting pipeline tariffs. Nersa's mandate included licensing the construction, operation and conversion of petroleum pipelines, and storage and loading facilities (Paelo, Robb and Vilakazi, 2014c).

Port access is regulated by the Ports Regulator and the Transnet National Port Authority (TNPA) (Crompton, Sing and Filter, 2020).

3.3. Liquid fuels pricing regulation

The price of liquid fuels have been administratively determined in South Africa. The in bond landed cost was introduced in the 1950s, with the establishment of the first refinery in South Africa, to reflect the price of imported fuel as the alternative to the actual cost of producing fuels locally. Revisions of the basis for its calculations included the 1995 introduction of a market spot price component. In 2003, the Basic Fuel Price (BFP) was introduced as an alternative to the in bond landed cost. The BFP calculated the alternative cost of importing refined product into South Africa, which established a deemed import parity price.

The BFP is used as a benchmark to cap domestic fuel prices at the refinery gate. In 2004, a revised BFP formula was implemented to reflect a re-evaluation of the real import parity price. The BFP element is reviewed on the first Wednesday of every month based on the average daily international price movements and exchange rate. The calculation of the BFP is done by Central Energy Fund on behalf of the DMRE (Maake, 2018).

The domestic elements were initially regulated through the marketing of petroleum activities return (MPAR) system (Paelo, Robb and Vilakazi, 2014a). The MPAR system involved petroleum-related activities outside the refinery gate and activities such as storage, transportation, distribution, marketing and administration (Mokoena and Lloyd, 2005). It sought to allow a benchmark return on marketing and assured wholesalers a margin of 15% on marketing assets. Following this system, the average oil marketing profit anticipated was a return on assets of 10-20%. If there were increases or decreases outside the range, a margin increase or decrease would be indicated (SAPIA, 2002). This system lead to an oversaturated retail market as oil companies over-invested in retail sites to benefit from the downstream profits permissible by the MPAR (Tait, 2009).

The RAS, introduced in December 2013, sought to regulate prices so that activities beyond the refinery gate were ring-fenced to eliminate actual and potential cross subsidisation. The RAS is calculated by constructing a benchmark service station averaging the costs of transport from 50 depots. Service stations found farther from the benchmark stations bear higher transport costs, which decreases the margin.

The liquid fuels pricing framework has evolved over the years all in efforts to ensure that there is sufficient investment in the industry and that consumers are guarded from exploitation by the charging of excessive prices.

3.4. Assessment of market power in the liquid fuels industry

According to the Competition Act, market power means the power of a firm to control prices, exclude competition or behave to an appreciable extent independently of its competitors, customers or suppliers. The integrated oil companies in South Africa have substantial market shares in sub-national markets. They cannot control the prices of liquid fuels in the country because the prices are regulated. However, they have the shared power to exclude competitors and customers because they have control over the key inputs, the liquid fuels produced and the essential facilities. Essential facilities are defined in the Competition Act as infrastructure or resources that cannot reasonably be replicated, and without which rivals cannot realistically provide goods or services to their customers. In this case import infrastructure, refineries and pipeline-connected storage facilities inland are the essential facilities.

The concentrated upstream market had few sources of fuel supply (Paelo, Robb and Vilakazi, 2014c). As indicated in Table 1 above, Sapref and Engen are the only refiners in the coastal areas around Durban, while Astron is the sole refiner in Cape Town. Their market power depends on imports, which had mostly been limited to the major oil companies owing to a combination of issues including a lack of access to transport infrastructure and the need for large balance sheets to hedge the risk involved. Oil companies, jointly, restricted access to the port facilities used to take in imported fuel at the Port of Durban through which the majority of liquid fuels are imported – and controlled access to the fuel pipeline that transports fuel inland (Paelo, Robb and Vilakazi, 2019). In fuel distribution, the refining companies are vertically integrated. Sasol and Total SA share market power inland, with imports constrained by the pipeline, and rail and road transport.

According to the National Energy Regulator Inland Security of Supply Report of 2019, the inland market consists of Gauteng, the Free State, Mpumalanga, Limpopo and the North West, while the coastal market consists of the Eastern Cape, KwaZulu-Natal, the Northern Cape and the Western Cape. The analysis in Table 2 indicates that on average, 57% of the volumes were consumed inland and 42% were consumed by the coastal markets. The focus on petrol and diesel volumes is because those products are currently transported by the Transnet pipeline from KwaZulu-Natal to the inland market.

Table 2: Inland and coastal markets consumption

Markets	2013	2014	2015	2016	2017	2018	Average
Inland	57,86	57,10	55,63	57,60	56,60	57,66	57,07
Coastal	42,14	42,90	44,37	42,40	43,40	42,34	42,93
Total %	100,00	100,00	100,00	100,00	100,00	100,00	100,00

Source: Analysis of sales volumes sourced from the DMRE website

The above indicates the significance of being located inland as a refiner, in this case Sasol and Total SA, and having access to the inland market through the Transnet pipeline to distribute liquid fuels. The most efficient mode of transporting liquid fuels to the inland region (where the majority of the national demand is located) is through the fuel pipeline owned and

operated by Transnet Pipelines, a subsidiary of Transnet SOC Limited (Transnet). The pipeline's efficiency is due to the large volumes that it transports at a time. Fuel is injected into the pipeline directly from the coastal refineries (Paelo, Robb and Vilakazi, 2014c).

The discussion above identified the structure of the liquid fuels industry and its main participants. The legislation, policies and regulation of the industry were examined and brought to light how favourable the policies and regulations have been to the incumbents. Initially, the regulatory reforms were to facilitate investment, promote the growth of Sasol and ensure the security of supply. However, this created an uneven competitive landscape that appeared to favour the oil majors and particularly Sasol, which is located inland where a majority of the liquid fuels are consumed.

3.5. The extent of vertical integration

The seven oil companies that own and operate refineries, have control and access to essential facilities (ports, storage facilities and the fuel pipeline) across the value chain dominate the industry. The extent of vertical integration is analysed in the sections that follow.

3.5.1. Control of inputs - Crude oil, coal and gas

South Africa has been largely dependent on imported crude oil to provide feedstock to the country's oil refineries, which produce fuels to meet the local demand. The South African oil majors – Shell, BP, Engen, Total and Sasol Oil– currently jointly own the single buoy mooring (SBM) in Durban, used to import approximately 80% of the country's crude oil demand (WSP Enviromental Proprietary Limited, 2018).

Sasol Oil also jointly owns a crude oil refinery with Total SA in Sasolburg (Natref), which pipes crude oil inland. Astron Energy receives its crude oil demand for its refinery in Cape Town through the Strategic Fuel Fund Saldanha Bay import terminal, which is transported by a pipeline to the refinery.

Sasol secured a coal supply through its mining operation business unit. The coal is sold for gasification and utility purposes to the Secunda refinery, for utility purposes to Sasolburg Operations and to the export market (Sasol Limited Annual Financial Statements, 2019). PetroSA owns and operates a gas to liquid refinery in Mossel Bay in the Western Cape. Feedstock is secured through offshore gas fields (*PetroSA Integrated Annual Report 2019*, 2019).

The above illustrates the extent to which the seven oil companies control key inputs for the manufacturing of liquid fuels in the country.

3.5.2. Access to import infrastructure

According to the Transnet Port Development Plan (2017), the country's fuel refining capacity had become insufficient to meet the local demand, making it increasingly reliant on importing refined fuel products at liquid bulk terminals within the ports. Durban handled the majority of liquid bulk volumes at 83% of the national total demand, followed by Saldanha Bay at 7% and Cape Town at 3% (Transnet Port Development Plan, 2017).

The main port facilities for landing liquid fuels in Durban are owned by the major oil companies, which includes part-ownerships of refineries and other facilities. Port facilities in Durban are of particular interest because they are closer to the Transnet pipeline injection points. In order to land liquid fuels , an independent player would have to negotiate with the major oil companies for access to this infrastructure (Paelo, Robb and Vilakazi, 2014b).

It is therefore not possible to import liquid fuels into the country without access to the essential infrastructure which the oil companies control access to.

3.5.3. Distribution and storage - Transnet pipeline and connected storage facilities

There are various modes of transport that can be used to distribute refined products from the refineries to areas of demand. Other modes of transportation available for distributing liquid fuels are road and rail. To transport products via the Transnet pipeline, the product is injected from the refineries into the pipeline at various points along the pipeline route. There are intake stations at the refineries in Durban at Sapref and Engen, Sasolburg at Natref and Secunda at Sasol Oil.

The significance of the Transnet pipeline in distributing liquid fuels to the inland market is evident. Transport like road and rail distribute much lower volumes of product, as observed in Table 3, which makes them more costly compared to the much lower costs of the pipeline. The oil majors have a significant competitive advantage because of the exclusive access they have to the essential facility, the Transnet pipeline.

Table 3: Modes of liquid fuels distribution to inland storage facilities

Mode of distribution	2015-16	2016-17	2017-18	2018-19
% of road volumes	8	6,4	7,5	2,6
% of rail volumes	5,5	7,0	7,9	4,1
% of pipeline volumes	86,5	86,6	84,6	93,3

Source: Xolo, 2020

The oil majors own and operate 82% of the major pipeline-connected storage facilities, by capacity, either as joint ventures or individually, excluding storage capacity at OR Tambo International Airport (Xolo, 2020). The significance of having a storage facility connected to the pipeline is that it secures an end-to-end operation for the oil majors and secures its ability to distribute product to consumers inland. Without access to a storage facility connected to the pipeline, non-integrated fuel wholesalers are at the mercy of oil majors to efficiently transport products into the inland market, which makes them unable to effectively compete.

It has been observed that the oil majors have control of key inputs, manufacturing plants, access to the Transnet pipeline and control of key storage facilities. The oil majors are therefore significantly integrated across the liquid fuels value chain.

Regulation and the pricing framework ensured the profitability of refining companies, provided an incentive for the refining companies to invest in assets and encouraged the

refining companies to remain and expand operations because of the high returns despite the sanctions during apartheid (Mondliwa and Roberts, 2014).

The unfortunate outcome is that, since incumbent firms were established and were able to vertically integrate across the value chain, their positions had become entrenched. The extent of vertical integration compounded the effects of scale economies and distribution networks, the costs of building brand awareness in retail markets and the marketing costs for new entrants. Oil majors were vertically integrated at various levels of the value chain, making it difficult for independent firms to enter the market and compete because they often have to rely on key inputs from oil majors, significant capital outlay and access to essential facilities (Roberts, Vilakazi and Simbanegavi, 2017).

4. Evaluation of the performance of regulation against the rationales

This section is an evaluation of the impact of regulation on market outcomes and competition. The effectiveness of regulation in the liquid fuels industry is assessed against the following rationales for regulation:

- Constraining upstream market power in the inland market, including the role of pipeline access and pricing
- Constraining upstream market power in the Western Cape coastal market
- Facilitating access to essential facilities (through licence conditions)
- Incentivising investment through price regulation.

The recommendations of the WTTT are also evaluated.

4.1. Constraining upstream market power in the inland market

Where there are firms that have a significant degree of market power or where a firm is operating as a monopoly, regulation is required to constrain the market power. This constraint prevents these firms from influencing prices, volumes and quality, and may facilitate competition.

As observed by the WTTT, the inland and synfuels producers have market power subject to the ability of buyers to turn to alternatives. The inland refineries owned by Sasol and Total SA have a locational advantage as far as accessing the largest liquid fuels consuming market at lower transport, handling and distribution costs compared to the coastal refineries. Sasol, in particular, also benefitted from extensive historic state support and protection, underpinning its low-cost production. The regulatory mechanism for liquid fuels in South Africa also benefits Sasol in two visible ways: through market price support and carbon tax exemption (Pant, Mostafa and Bridle, 2020).

Rival sources of liquid fuels are from the coastal refineries and imports, which depend on being able to transport the fuel inland at a competitive price. The regulatory challenge, therefore, combines supporting pipeline infrastructure capacity and access to this infrastructure by actual and potential rivals, along with price regulation. Prices that are set by regulation are the BFP, RAS margins and the pipeline charges.

Higher pipeline charges mean inland producers can set higher prices for their product. Lower pipeline charges benefit inland motorists; however, the costs of the pipeline need to be covered.

The Transnet Durban to Johannesburg pipeline (DJP) was commissioned in 1965 and extended to Pretoria West in 1972 (Competition Tribunal of South Africa, 2006). Transnet is a diversified transport and logistics group wholly owned by the South African government. It operates the country's rail network through the Transnet Freight Rail division; ports through the TNPA; and the petroleum pipelines system, petroleum storage facility and a gas pipeline through Transnet Pipelines division (National Energy Regulator of South Africa, 2020).

As part of its report, the Windfall Tax Task Team recommended that a new regulator be established to ensure that pipeline tariffs would be fair and transparent, and that no shipper would unduly benefit from pipeline tariffs (Crompton et al., 2007). The Nersa Act came into effect in September 2005, and the PPA came into effect in November 2005.

Nersa subsequently took over the pipeline tariff regulation and issued an operating licence to Transnet in March 2007. It also commenced setting maximum tariffs for the Transnet pipeline in the 2007-08 financial year, to prevent unjust discrimination on tariffs, services or facilities.

In determining the pipeline tariffs, Nersa was guided by the PPA and the regulations determining that the RoR methodology would be used (National Energy Regulator of South Africa, 2015).

It became evident in year 2006 that the DJP capacity was not large enough for coastal refineries to exert an effective competitive constraint on the inland refineries (Competition Tribunal of South Africa, 2006). To counter Sasol's inland market power over prices, coastal refiners had turned to rail and road transport (at higher prices) given that the DJP was already constrained.

The DMRE, Nersa and the industry decided that the aging DJP needed to be replaced to meet the projected growing demand. In September 2007, Nersa approved the expansion of the DJP by approving the Multi-Product Pipeline (MPP) construction. The capital cost of the MPP project was estimated at approximately R12 billion; pricing and access to the pipeline was determined after licensing the construction.

Another motivating factor for expanding the pipeline infrastructure, although not mentioned in Nersa's reasons for the decision, was the fuel shortages experienced in December 2005, which were attributed to the inadequate capacity of the logistical infrastructure (Moerane, 2006).

4.1.1. Rolled-in vs incremental approach

Tariff design divides costs among the different functions performed by the pipeline system, and then determines the costs and usage of those functions. Some costs are mutual to every unit of throughput, while other costs may be subject to other variables. With expansions to an existing pipeline, there may be tariff issues about whether expansion costs should be rolled into an existing rate base and charged to all shippers equally or kept separate and charged only to particular shippers. In determining the approach, numerous factors needed to be considered (Canada Energy Regulator, 2020).

Incremental tariffs are tariffs derived from a design methodology that allocates capital and operating costs of new facilities to their own cost pool, distinct from the costs of the existing facilities (Canada Energy Regulator, 2020). Rolled-in tariffs, to the contrary, are tariffs resulting from a design methodology in which the capital and operating costs of new facilities are added to those of the existing facilities as part of one cost pool for all the pipelines. Tariffs are designed to recover the annual cost of providing service. All shippers who receive the

same service pay the same tariff and tariffs only differ according to factors such as volumes and distance (Canada Energy Regulator, 2020).

In setting the prices for the MPP the regulator had to decide which assets to include, how to assess them and the allowable return, along with the appropriate measures of other costs.

In 2009-10, Nersa consulted stakeholders and other affected parties in order to move from an unknown historical basis of setting tariffs to a known systematic basis for setting pipeline tariffs. Nersa's consultations included setting pipeline tariffs using the rolled-in approach and the incremental approach. At the time of consulting on this decision, Transnet Pipelines had an approved regulatory asset base of R4 billion for the existing major pipelines.

An incremental approach would therefore mean that those relying on the MPP to bring refined product in from the coast would pay a much higher price, while Sasol and Total SA would continue to enjoy low pipeline charges based on the low valuation of the existing asset base. Total SA and Sasol were in favour of the incremental approach and opposed the use of the rolled-in approach. The coastal refiners were, naturally, in support of the rolled-in approach (National Energy Regulator of South Africa, 2011).

In 2011-12, Nersa decided to set pipeline tariffs using the rolled-in approach. The decision on the approach was to allow for the pipeline to be expanded without disadvantaging the coastal shippers, as the tariff was based on the service regardless of whether a new or an old pipeline was used to provide it. Since tariffs would vary according to the distance and volume, coastal refineries would be encouraged to ship their own inland requirements to compete with the inland refineries.

This worked in favour of one of Nersa's objectives in using the rolled-in approach, which was to constrain the market power of the inland refineries. The consolidation of the pipeline system volumes lowered the tariffs for the newer pipelines. In this way, the expansion of the capacity to transport liquid fuels from the coast to the inland market did not disadvantage the coastal refineries.

4.1.2. Outcomes of the MPP project

Table 4: Analysis of pipeline tariffs

	Transnet Pipeline asset base		Reason for change in the regulatory asset base (RAB) [1]	Tariffs to Alrode in (c/l)		
Financial year	**RAB (R' million)**	**(%) change in RAB**		**From Sasolburg**	**From Secunda**	**From Durban**
2008-09	3 474	-	First Nersa Transnet Pipelines tariff determination.	2,4	3,6	12,3
2009-10	4 078	17,4	Increase in RAB due to financing costs of the MPP project included.	2,1	3,2	10,9
2010-11	5 979	46,6	Admission of MPP capital costs at 75% from the date of operation. (3* 16-inch pipelines from Jameson Park to Alrode, Alrode to Langlaagte and Kendal to Waltloo).	2,3	3,4	11,6
2011-12	9 601	60,6	Transnet did not have traceable records to prove the historic value of its non-current assets at the start of tariffs being set. Nersa had to investigate and determine the starting regulatory asset base. The Nersa study was completed on 25 March 2010. Results were implemented in the 2011-12 decision. Borrowing costs were capitalised. Rolled-in approach adopted.	1,7	3,3	18,0
2012-13	19 922	107,5	Admission of the 24-inch pipeline from Durban to Johannesburg into the RAB.	2,00	4,1	22,0
2013-14	19 900	-0,1	Nersa disallowed Transnet capital projects cost capitalised.	1,7	4,4	23,4
2014-15	18 981	-4,6	50% admission of terminal two (TM2) assets.	2,2	5,1	27,2
2015-16	22 110	16,5	50% admission of the pipeline closeout assets.	2,3	5,4	29,1

	Transnet Pipeline asset base		Reason for change in the regulatory asset base (RAB) [1]	Tariffs to Alrode in (c/l)		
Financial year	RAB (R' million)	(%) change in RAB		From Sasolburg	From Secunda	From Durban
2016-17	26 447	19,6	33% admission of terminal one (TM1) and TM2 assets.	2,8	6,4	34,5
2017-18	25 959	-1,8	Deferment of 2016-17 TM1 and TM2 assets (33%).	2,8	6,5	34,6
2018-19	35 802	37,9	Admission of the tightlining costs and remainder of TM2 assets.	3,4	7,9	41,2
2019-20	36 319	1,4	Admission of the close out on tightlining assets.	3,8	8,8	45,7
2020-21	33 127	-8,8	Indexing of operational assets. Transnet Prudency review findings implemented through a clawback.	4,2	9,8	51,0

Source: Transnet Pipelines Tariff decisions by Nersa for financial periods 2008-09 to 2020-21

The MPP construction increased tariffs substantially due to its very substantial cost overruns and project delays. Transnet had forecast the MPP project's final cost since inception at R12 billion; however, this escalated to R29,5 billion as per the 2020-21 Transnet tariff application (National Energy Regulator of South Africa, 2019). The considerable increase in cost led Nersa to increase the RAB and the resultant allowable revenue to Transnet for the pipeline system in order to meet the rate of return (Table 4).

The Durban to Alrode charge quadrupled from 12,3 cents per litre (cpl) in 2008-09 to 51 cpl in 2020-21 (Table 4). In 2011-12, the initial increase to 18 cpl was caused by the adoption of the rolled-in methodology. The close to triple increase, from 18 cpl to 51 cpl over the decade from 2011-12 to 2020-21, was due to the methodology including the MPP assets (at the higher ultimate value of the construction of the pipeline) into the RAB.

While the decision to use the rolled-in approach meant the capital and maintenance costs for new and old pipelines were pooled to determine the destination tariffs, the result was a substantial increase in the costs of transporting the product inland.

If the original investment forecast of R12 billion for the project had been met, the tariffs would not have escalated significantly and the intended objectives of the MPP and the rolled-in approach would have been achieved. Below is an assessment of tariffs using the rolled-in approach had the MPP project costs not substantially escalated. This assessment uses the pipeline asset values from the 2012-13 reasons for decision, escalated by inflation each year (**Table 5**).

Table 5: Counterfactual analysis of pipeline tariffs

Financial year	RAB (R'million)	Sasolburg to Alrode (c/l)	Secunda to Alrode (c/l)	Durban to Alrode (c/l)
2012-13	15 513	2,8	5,3	29,1
2013-14	16 413	2,9	5,6	30,8
2014-15	17 332	3,1	5,9	32,5
2015-16	18 230	3,3	6,2	34,2
2016-17	19 376	3,5	6,6	36,3
2017-18	20 290	3,6	6,9	38,1
2018-19	21 233	3,8	7,2	39,8
2019-20	22 215	4,0	7,6	41,7
2020-21	22 881	4,1	7,8	42,9

Table 5 indicates that when comparing the actual tariff of 51 cpl from Durban to Alrode with the counterfactual tariff of 42,9 cpl, coastal shippers are paying 8,1 cpl (or 19%) more than they should have been paying. Moreover, the pipeline became more expensive than the rail alternative.

The impact of the changes in the RAB and resultant allowable revenue have had an impact on the pipeline charges, which are also a component in the regulated liquid fuels prices set by the DMRE. The Durban to Alrode tariff is used to determine the transport costs referred to as the fuel-pricing zone 9C, which is the zone referenced when the DMRE publishes monthly fuel price release statements. The higher pipeline charge thus raised prices to inland motorists and raised the profit margins of inland refiners.

From 2010-11 onwards, as MPP assets were admitted into the RAB (Table 5), the Durban to Alrode tariff increased by an average of 16% per year. The Sasolburg to Alrode and Secunda to Alrode tariffs increased by 7% and 11% on average respectively as the rolled-in approach spread the costs of the MPP across the pipeline network. The MPP project costs have had a significant impact on the rate of tariff increases and have ultimately made it more costly for the coastal companies, in particular, to access the inland market by pipeline. In doing so, it undermined the coastal refineries' ability to constrain the market power of the inland refineries.

By way of comparison, the impact of the escalating MPP costs and their inclusion in the regulated tariff setting had the effect of increasing the pipeline cost for transport from Durban to Pretoria (somewhat further than Alrode). In 2020-21, according to Nersa estimates, transport by rail cost 54,9 cpl and transport by pipeline cost 59,1 cpl. The MPP had therefore completely failed to constrain inland market power. The full capacity of the old DJP had suppliers at that time turning to rail as an alternative to purchasing from inland refiners, which was exactly the situation in 2020-21, only this time it was due to the higher pipeline tariff.

The Averch–Johnson type of effect can be seen in Transnet's MPP project. While the high costs are not necessarily due to over-engineering ('gold-plating'), they are associated with weak incentives to constrain cost overruns, as the overruns led to higher allowable revenues being earned, which generated greater profits. The MPP project investment and the use of the rolled-in approach could have had the intended outcome, had the MPP project costs not kept escalating.

These outcomes point to a range of questions, with the benefit of hindsight, about the regulatory process.

At the beginning, one of the regulator's shortcomings was that when the MPP construction licence was approved, Nersa did not have an approved pipeline system tariff-setting methodology. It was not prudent of the regulator to allow such a large investment with the high degree on information asymmetry between the regulator and the utility prevalent (without establishing how the costs would be recovered). The tariffs should have been able to generate adequate income to recover approved costs and to fairly apportion charges to users relative to the costs and benefits of different services.

Nersa's efforts to provide coastal companies with fair and reasonable cost access to the inland market was eroded by this poor investment decision, poor planning and bad project management by Transnet. This also highlights the challenges regulators typically face when regulating state-owned utilities – differing objectives and lack of accountability.

Nersa did very little to examine the business case for the MPP when issuing the licence for the construction of the pipeline. This was a case of information asymmetry between the utility and the regulator. The reasonableness of projected annual growth in fuel demand, planned pipeline capacity, project timelines and cost estimates were not verified. Although the expansion of the pipeline's capacity was required due to the aged DJP, information asymmetry, the use of the RoR methodology and other challenges regulators face when regulating state-owned entities, had adverse effects.

Although there have been some attempts through regulation, the inland market power has not been effectively constrained by the pipeline expansion project and mechanisms introduced by Nersa to ensure that coastal companies do not pay more than is required to access the inland market. It is still cheaper for the coastal refineries to source their inland requirements from the inland refiners given the lower pipeline tariffs from the inland refineries.

4.2. Constraining upstream market power in the Western Cape

Regulating to constrain market power at the coast relates to facilitating the entry of independent storage operators or non-integrated wholesalers. A majority of the capacity licensed by Nersa from 2013 was storage capacity for operators at the ports. The TNPA, through government's Operation Phakisa strategy, facilitated the introduction of five new port facilities through concessions to the private sector (Transnet National Ports Authority, no date).

We evaluated the regulatory decisions made in terms of their impact on market entry and increased competition, focusing in particular on the decision to license the Burgan Cape Terminals where Astron (previously Caltex/Chevron) was effectively a monopolist in the Western Cape.

Nersa issued a licence to Burgan Cape Terminals (Pty) Ltd (Burgan) on 9 December 2014 to construct and operate a storage and loading facility, and a pipeline. The storage facility had a combined design capacity of 118 670 m^3, a loading facility and a pipeline that connected the storage facility to the Astron Energy refinery.

Burgan was a private company registered in terms of the South African company laws. The company was 70% owned by Burgan Infrastructure (Pty) Ltd, which in turn was a wholly owned subsidiary of Vitol Tank Terminal International. Burgan's remaining 30% was owned equally by the Thebe Investment Corporation and Jicaro (Pty) Ltd (National Energy Regulator of South Africa, 2014).

To comply with section 17 of the PPA, applicants must publish notices of applications inviting members of the public to submit objections to the application to the energy regulator. Astron

Energy objected to the application. In its objection, Astron Energy raised concerns regarding the potential impact Burgan would have on its refinery operations and the possibility of Burgan being used for the bulk import of liquid fuels, therefore reducing its market share in the Western Cape.

Nersa resolved that Astron Energy controls both lower cost sources of supply to the Western Cape, as it was the only producer and controlled the only infrastructure for delivering products by sea. This was undesirable from a competition point of view. The Burgan loading facilities would give those companies that currently supply the Western Cape market another option for bringing fuel into Cape Town, which was likely to promote a more competitive outcome than the status quo. Burgan could lower barriers to entry for new players; as had been observed, the oil majors owned most infrastructure and uncommitted capacity existed in theory more than in practice.

Nersa observed that Astron Energy overstated the risks it would have been exposed to because Burgan's proposed tank capacity could only store a limited volume of cleaner fuels. Nersa considered the competitive landscape and security of liquid fuels supply into the future when licensing the Burgan facility in December 2014.

Essentially, this case study evaluated how regulation was used to constrain Astron Energy's market power. Although Astron Energy tried to protect its monopoly position in the Western Cape, Nersa used its regulatory authority and opposed Astron Energy's objection.

When a firm does not face effective competitive pressure it is considered to have market power. Market power can be thought of as the ability to sustain prices above competitive levels or restrict output or quality below competitive levels (Office of Fair Trading, 2004). Astron Energy did not face effective competition in the Western Cape before Burgan received its licence, because the oil majors and other participants in the industry relied on Astron Energy's output, port facilities and, to some extent, its storage capacity to supply the market.

The following market outcomes were observed after Burgan was granted a licence by Nersa:

- According to Burgan's facility utilisation reports submitted to Nersa from 2017-18 to 2019-20, non-integrated companies had an average third party access rate of 53%, mainly for diesel storage. This is significant as competitors can discount on diesel to increase sales.
- The Burgan Cape facility had integrated the Cape Town and Durban markets through coastal shipping as additional storage capacity and port facilities are available.
- Burgan's clients with refinery capacity in Durban shipped their Western Cape requirements to Burgan for storage; they were no longer reliant on Astron Energy's refinery output.
- Burgan's facility utilisation reports showed that a Durban refining company had contracted a major portion of Burgan's capacity, which it had used consistently from 2017-18 to 2019-20.

The licensing of the Burgan facility is an example of how regulation can be used to ensure markets work better. The benefit to security of supply was realised. The market power that Astron Energy held in the Western Cape was effectively constrained through regulation.

4.3. Ensuring access to essential facilities

A range of strategic barriers were found to make it challenging for entrants to participate in the liquid fuels wholesale sector. Barriers to entry occur when an incumbent firm has a benefit over future entrants and from privileges to production or distribution or privileged access to key inputs, facilities or markets (Office of Fair Trading, 2004).

Various provisions associated with access to customers, access to infrastructure and facilities, and the vertically integrated nature of the sector posed barriers to participation and effective competition in liquid fuels supply in South Africa (Paelo, Genna and Vilakazi, 2017). In the South African liquid fuels industry, access to the Transnet pipeline posed a barrier to participation for non-integrated participants.

The Transnet pipeline was an essential facility because it connected the coastal and inland refineries for an efficient distribution of liquid fuels to the inland market where 60% of the liquid fuels in the country were consumed. Therefore, access to the pipeline was necessary to effectively compete in the industry. Oil majors had long had an advantage of privileged access to this essential facility because of their connection to the pipeline from their refineries to inland depots, which new rivals did not have.

The analysis below assessed whether regulation facilitated access to essential facilities and whether access had a positive impact on the participation of non-integrated participants. The analysis focused on Vopak Terminals and Royale Energy.

4.3.1. Vopak terminals

In 2009, Vopak Terminal Durban (Pty) Ltd was licensed as an existing facility (National Energy Regulator of South Africa, 2009). The Vopak facilities in Durban, Farewell-King site and Fynn site had previously been connected to the DJP and the connection was maintained when the MPP project was commissioned. In 2017, the Vopak facility in Jameson Park, Gauteng was granted the right to interconnect to the Transnet pipeline. For the first time, major open-access independent tank terminals connected to the MPP, connecting an independent storage facility operator from the Port of Durban with Gauteng (Vopak, 2017).

However, this investment decision may not have entirely assisted in allowing non-integrated wholesalers increased access to the inland market because Vopak had been operating as an independent storage facility operator prior to Nersa's establishment, and the majority of its customers were the oil majors.

More than 70% of Vopak's coastal capacity was contracted to oil majors while the remainder was contracted to non-refiners. Vopak's interconnection to the Transnet pipeline may therefore not have been as effective in facilitating non-integrated participation as perceived, and therefore may not have lowered the barriers to entry for non-integrated participants.

Through the use of written storage allocation mechanisms by storage facility owners, Nersa tried to ensure that uncommitted capacity was made available to independents. However, significant access to storage capacity by independents in practice has not materialised (Paelo, Robb and Vilakazi, 2014a).

Although the interconnection was the first of its kind by an independent storage facility operator in South Africa, it may not have benefitted non-integrated participants in the industry because the majority of Vopak's storage capacity was still contracted to oil majors.

4.3.2. Royale Energy Terminals

The entry of Royale Energy Terminals (Pty) Ltd (Royale) in 2018 was considered notable because Royale was the only non-integrated wholesaler to own and operate storage capacity connected to an essential infrastructure – the Transnet pipeline. Royale was able to do this because it had acquired existing facilities inland, in Klerksdorp (North West) and Langlaagte (Gauteng), which BP Southern Africa (Pty) Ltd (BP) withdrew from through the Nersa licence revocation process.

Royale's access to the pipeline-connected facilities did not occur directly because of regulation but as a reaction to market forces. BP applied to revoke the operational licences and its exit, which could have been caused by the reduced wholesale margins that came with the introduction of the RAS (discussed below) facilitated Royale being able to acquire the pipeline-connected storage facilities.

A competitor cannot enter or effectively participate in the market if it does not have access to an essential facility (Office of Fair Trading, 2004). Royale's access to pipeline-connected storage facilities lowered the barriers to entry for non-integrated participants.

4.4. Incentivising investment in the terminals and storage market

Over time the instruments used for regulation in the liquid fuels industry have differed, but the main objective of regulation has been to facilitate and support investment in various parts of the value chain (Crompton, Sing and Filter, 2020).

As discussed in Section 3.3 under subheading "Liquid fuels pricing regulation", the PAR was introduced in 1984. The wholesale margin was calculated to ensure that oil companies had a 15% return on all assets managed. The MPAR was introduced in 1990. The wholesale margin was calculated to ensure that oil companies had an average of 15% return on all marketing assets. The underlying reason for this methodology was to incentivise oil companies to develop the downstream petroleum industry.

The RAS was introduced in 2013 and has been reviewed annually in December by the DMRE (Crompton, Sing and Filter, 2020). The retail margin was the biggest component of the RAS, with the wholesale, secondary storage and secondary distribution margins being of less consequence.

Excessive investment in fuel retail service stations occurred due to extremely regulated margins, this resulted in an ineffective distribution of capital to a service sector in an industry that required more capital investment (Crompton, Sing and Filter, 2020).

Since the full implementation of the RAS however, the wholesale margin decreased significantly. Over time, since NERSA was established in 2005 investment in storage facilities has mainly been decreasing. From the RAS's implementation to date, 82 facilities were removed from the market. Of the storage facilities removed from the market, 66% were facilities previously owned by oil companies that were licensed by Nersa as existing facilities.

The main imperative of RAS was to support manufacturing and retail margins for security of supply reasons. However, the same support was not given when the wholesale margin is assessed.

Based on the recent investments by large independent storage operators such as Burgan in the Western Cape and Oiltanking Grindrod Calulo at the Port of Ngqura in the Eastern Cape, there has been interest in the liquid fuels storage market. However, the interest can only be expected to grow if the pricing framework is reviewed because the current regulation does not incentivise investment in the storage sector. Given that the current regulatory mechanisms protects domestic refining capacity and there has been little increase in the capacity while imports have been consistently increasing; the South African government needs to reconsider its protectionist approach to the refining sector (Crompton, Sing and Filter, 2020).

Considering the percentage of revoked storage licences, the RAS model has not been effective in facilitating investment in the terminals and storage market. Instead, oil majors optimised the number and capacity of storage facilities that they owned and operated because of lower wholesale margins. Due to the large sunk costs, storage facility investors had to either secure customer commitment with oil majors or acquire a facility that had previously been owned by an oil major to make a reasonable return and be profitable.

5. Conclusion

This research evaluated the effectiveness of regulation and the pricing regulatory framework in the liquid fuels industry. The evaluation considered expansion of the constrained pipeline capacity, pipeline transport costs, access to essential facilities and storage-related costs for distribution in South Africa. Regulation was evaluated to assess whether it addressed market failures without creating more inefficiencies and, ultimately, whether competition had been facilitated through regulation in the industry.

The analysis finds that pipeline regulation has not effectively constrained the market power of the inland refineries. The expansion of the pipeline project was fraught with challenges such as project delays which led to cost overruns. The inefficiency of the utility impacted the other firms because the service provided by it is an essential input. NERSA failed to manage the impact of the cost overruns of the expansion project; this could be due to the information asymmetries between the regulator and the utility and other challenges faced by regulators when regulating state-owned utilities. The use of the rate of return methodology (RoR) by the regulator in determining tariffs did very little to encourage efficiency from the utility.

Evaluation of the Burgan Cape Terminals case in the Western Cape Province provides an example of how regulation was used to constrain market power of Astron Energy which effectively controlled access to the market and limited competition.

With regards to incentivising investment in the storage market, it was also found that investors are only able to recover the amounts allowed through the liquid fuels price framework, which are based on the RAS determination. This makes it difficult for new entrants that have high capital costs, high operating costs and low volumes to effectively compete with incumbent firms that have an established network and customer base.

It can be concluded that the presence of market failures in the liquid fuels industry supports the need for regulation. Regulators however need to address the challenges faced in regulating the industry to ensure inefficiencies are not created. The price regulation methodologies adopted in the industry by the various regulators can also be reviewed to ensure utility accountability and wider participation are achieved. Access to essential infrastructure remains as a key competitive hindrance for non-integrated participants in the industry, which has not adequately been addressed through regulation.

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