



COLLEGE OF BUSINESS AND ECONOMICS

**“Analysis of market concentration in fuel importation for consumption in
Rwanda”**

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A dissertation submitted to the School of Economics

College of Business and Economics

University of Rwanda in partial fulfilment of the requirements for the degree of

Master of Regulatory Economics and Competition Policy

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June 2021

Declaration

I, Gilbert HAGENIMANA Reg. N°: 219015787, hereby declare that the research project named “Analysis of market concentration in fuel importation for consumption in Rwanda” presented in this report is my work that has never been presented or submitted to any other university or institution of higher learning for a degree.

Signed



Date 28th June, 2021

Gilbert HAGENIMANA

Certification

This is to certify that this work entitled “Analysis of market concentration in fuel importation for consumption in Rwanda” was conducted under my supervision and presented by Gilbert HAGENIMANA, Reg. N° 219015787, in partial fulfilment of the required for the award of Master of Science degree in Regulatory Economics and Competition Policy program in School of Economics, College of Business and Economics, University of Rwanda.

Supervisor

Signature.....

Dr. Etienne NDEMEZO

Date:..28...June, 2021

Dedication

To my parents, brother, sisters, and Lecturers.

Acknowledgements

The completion of this project is achievement of great efforts and sacrifices of many individuals in one way or the other. Primarily, I thank God the almighty for his everlasting love and mercy. I want to thank my parents for their unbelievable contribution during my studies. Thanks go to the Government of Rwanda for its Sponsorship. I thank Rwanda Utilities Regulatory Authority (RURA), and University of Rwanda-College of Business and Economics (UR – CBE) as well as the lecturers for their generous efforts.

Special thanks go to my supervisor “Dr. Etienne NDEMEZO” for his valuable guidance, proper advice, and his encouragement during this project. I wish to extend my sincere gratitude to my friends and relatives, classmates and colleagues for a large contribution in both the completion of the study and making my time enjoyable during the course. All of them and other whose names cannot be mentioned but who directly or indirectly helped and rendered great moral encouragement are highly appreciated. To all of you who spend your time to read this project, I just say may the almighty God richly bless you.

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List of Abbreviations

CR: Concentration ratio

EAC: East Africa Community

EEC: European Economic Community

EWSA: Energy Water and Sanitation Authority

HHI: Herfindahl-Hirschman Index

LPG: Liquefied Petroleum Gas

OECD: Organisation for Economic Co-operation and Development

RURA: Rwanda Utilities Regulatory Authority

UK: United Kingdom

U.S: United States of America

Abstract

This study evaluated a concentration level and attempted to define the structure of fuel imports market vis-à-vis sharing of essential facilities for fuel storage in Rwanda. Diesel and gasoline imports, secondary data obtained from the Petroleum imports & statistics Department of Rwanda Revenue Authority from 2013 to 2019, were used. The obtained data were analysed using descriptive-normative approach. Two measures of concentration that are sometimes referred to as competition measures (Samuel Yaw Akomea, 2013); Hirschman-Herfindahl index (HHI) and four firm concentration ratio (CR4) were employed in measuring the market concentration structure of fuel imports for use in Rwanda.

The results revealed that the concentration has gradually increased and created an oligopolistic structure with a decreasing competition. Alternatively, a required infrastructure sharing in the regulation has been somewhat complied with as the names of four big companies with highest import shares had been changing irrespective the ownership of a fuel depot for all considered periods of time. The conclusion drawn is that local guidelines regarding the assessment of market concentration, and merger proposals should be put in place since petroleum industry alerted the growth along with the market concentration that is often likely to worsen industry competition.

Keywords: Market concentration, Fuel imports market, Herfindahl-Hirschman Index, Four Firm Concentration Rate, Fuel depot.

Chapter One: Introduction

1.1. Background

Understanding the strength and intensity of competition within a market requires an economic analysis which is arraigned to be both complex, and time-consuming but to form a preliminary assessment of the strength of competition in a given market, competition agencies often cautiously rely on market concentration as an approximate indicator (OECD, 2018). Therefore, researchers sometimes employ concentration criteria to analyse markets of oil and other fuels like transportation fuel market.

Most of the transport fuels are petroleum-based fuels that are the main commercial sources of energy worldwide and Rwanda in particular. Nonetheless, due to the target of reducing greenhouse gas emissions, there are exciting efforts of the International Energy Agency (IEA) with European Economic Community (EEC) to find viable alternatives to petroleum-based products (Osimiri, 2001). Nowadays, the recording of petroleum products consumption at the national level is important for all oil-consuming countries as it is used in the process of creating long-term policies and strategies to maintain economic stability and development (Dalibor M. Marinković, 2012).

Since Rwanda is a land locked country without commercial petroleum resources, its economy depends on imports to satisfy the country's need for petroleum-based fuels. Around 92.9% and 7.1% of all petroleum products are imported in Rwanda from overseas through Tanzania and Kenya, respectively and then stored in fuel depots that are essential facilities of this sector.

In 2011, the total storage capacity of the country for petroleum-based fuels was 31 million litres. At that time, the Ministry of trade announced its plan to increase its capacity in collaboration with the Ministry of infrastructure by constructing new storage facility of 120 million litres and private investors were ready to work with the government (Fred, 2011). The primary goal of establishing the new petroleum storage facilities was to cope with the then increasing demand and global oil price fluctuations.

The Rwandan Energy Sector Strategic Plan 2018/19-2023/24 turned the target to a total petroleum storage capacity of 198 million litres. Even though the capacity is not yet reached, the work in progress made Rwanda reach the storage capacity of 112 million litres for petroleum products and

482.7 Metric tonnes specific for Liquefied Petroleum Gas product as of 2019 (RURA, 2019). This capacity is owned by both the government and the private sector.

The government vowed to reach the targeted fuel storage capacity and encourage the oil-marketing companies to benefit from the decrease of international oil prices by importing a big quantity of petroleum products (Africareview, 2016). Apart from that, the country wanted to engage the fuel-marketing companies in the re-export business so as diminishing the trade deficit.

Among the petroleum products, statistics show that diesel and gasoline are the highest imported products (RURA, 2019). These products are mainly retailed at petrol service stations or at bulk fuel delivery facilities also known as the consumer sites. The fuel imports for Rwanda have been fluctuating over the past years, whereby in 2016 counted up to 1.4% of all merchandise imported (knoema, 2016).

1.2. Problem statement

The lack of sufficient capacity for petroleum storage is one of the challenges to the fuel importation market in Rwanda. In the framework to alleviate that challenge, the country continues its plan to increase its storage capacity for petroleum products.

Currently, the country possesses four commercial fuel depots namely; Gatsata, Jabana, Kabuye, and Rusororo, which store transport fuels mainly used in road transportation, aviation, and power generation. Two of these fuel depots are owned and operated by private investors, while the two remaining are owned by the government and operated by independent operators under the long-term lease agreement. Other importers who don't own or operate fuel depots lease storage spaces from the above-mentioned operators. All those fuel importers sometimes re-export to neighbouring countries where it is beneficial.

Although storage and hospitality agreements between the fuel importers and fuel depot operators are recommended by the existing regulatory framework, no study was conducted to evaluate the effectiveness of those agreements in infrastructure sharing perspective or to identify the concentration level in Rwandan fuel import market. In addition, most of the fuel depot operators are also the fuel importers i.e. they are vertically integrated in the value chain of fuel storage and fuel importation while such market structures and firms integration are usually concerned how

competitive they are (Simon Loertscher, 2014). Therefore, there is a need to determine the concentration level in imports market of transport fuels and evaluate if fuel depot operators apply infrastructure sharing required by the regulation.

Furthermore, in past, telecom and financial sectors in Rwanda encountered mergers and acquisitions of firms. For example, in 2018, RURA approved Tigo Rwanda acquisition by Airtel (Sabiiti, 2018). For this reason, the regulators of other sectors including downstream petroleum should be vigilant and aware of how to manage the proposed mergers with respect to the rules and conducted studies. The government institutions, which monitor and participate in the elaboration of the national trade policy of petroleum-based fuels should also have an insight into the concentration in the industry. Thus, this research is not only important to policy makers but also to all relevant stakeholders, and investors in their decisions making.

1.3. Objectives

1.3.1. Main Objective

The main objective of this study is to evaluate the level of concentration, and define the structure of the fuel import market in Rwanda.

1.3.2. Specific Objectives

The specific objectives of this research include;

- To investigate market concentration indices for fuel imports in the considered period;
- To examine ownership of a fuel depot, and whether the depots operators effectively put infrastructure sharing into action.

1.4. Scope of the research

Transportation fuels that are imported in Rwanda include diesel, gasoline, Jet-A1, and LPG, but this study focused on the importation of diesel and gasoline that are road transportation fuels and highly imported. The data covered the period from 2013 to 2019.

1.5. Layout of the dissertation

This study contains five chapters, where the first chapter presents a general introduction (background, problem statement, objectives, scope of the research, and research outline). The second chapter reviews the literature of previous research. The third chapter briefly discusses the research methodology. The fourth chapter focuses on data analysis and the discussion based on results. Finally, the fifth chapter provides the conclusion and recommendations.

Chapter Two: Literature review

This chapter reviews, in general, fuel overview, previous studies on market structure and concentration in the oil industry. It also provides an overview of essential facilities for fuel bulk storage.

2.1. Transportation fuels overview

The transportation fuels commonly used in engines of vehicles are obtained from oil refining or processing. From recent years, all countries in the world faced an increasing demand for transportation fuels and fought to control it to maintain the stability of economic activities where gasoline is used for cars, diesel for trucks and some cars, and kerosene for aircraft.

A study by Jaime Cevallos Sierra to estimate the road transport fuel consumption in Ecuador mentioned that, unlike other parts of the world, fuel consumption is not high in the transport sector of Latin America. However, the author revealed that consumption is expected to grow and his results showed that the biggest fuel consumers are the heavy-duty freight cargo, followed by light duty vehicles (Jaime Cevallos Sierra, 2016).

Different authors confirmed that most of the transportation fuels are mainly derived from crude oil. Dominique Casanave et al. in research on diesel fuels from biomass, the author mentioned that more than 95 % of transportation fuels used in the world are petroleum-based fuel. Nevertheless, it was found that the production of diesel derived from biomass known as biodiesel could be another potential source of energy to run vehicles (Dominique Casanave, 2007).

Furthermore, different studies were conducted to determine that biodiesel is feasible as an alternative fuel in a diesel engine. The study by S. Bari et al. to evaluate effects of pre-heating of crude palm oil before entering injection system and its performance in diesel engines stated that crude palm oil is one of the vegetable oils that is also potential for use in diesel engines. The results of the performance test showed that the crude palm oil performs as a fuel comparable to petroleum-based diesel (S.Bari, 2002).

Research conducted by Saheed Wasiu et al. to assess effects of different fractions of Biodiesel (B0, B7, B10 and B20) on the performance characteristics of direct injection compression ignition

engine showed also that high fraction biodiesel blends is a viable alternative fuel that guarantee better performance characteristics and a higher thermal efficiency of compression ignition engine (Wasiu, 2019).

The report availed by the European expert group on future transport fuels clarified that fuels blending ratio is necessary to maintain the fuel infrastructure. The experts stated that blending biofuels with fossil fuels not exceeding the limits specified by the fuel quality directive has the advantage that neither new engines nor new storage infrastructure are required (experts, 2011). In German, the minimum percentage of biodiesel in transport diesel was set at 7%.

Both biodiesel and petroleum-based diesel or their mixture are sold on the market in some countries. According to U.S. Energy Information Administration, biofuels are added to petroleum fuels whereby nowadays most of finished motor gasoline contains up to 10 % ethanol by volume while biodiesel and renewable diesel are available on the market (Nunez, 2019). It was recorded that petroleum products in 2019 accounted for about 91% of the total transportation fuels in the United States while biofuels, such as ethanol and biodiesel, contributed about 5% (eia, 2020).

2.2. Similar studies on analysis of market structure and concentration in the oil market

George Higson in his book contributed to the business economics theory and stated that “structure of a market refers to the number of firms in the market, their market shares, and other features that affect the level of competition in the market”. The author said that market structures are distinguished mainly by the level of competition that exists among firms operating in the market (Higson, 2011).

There are quite a few different market structures in which firms can work, and depending on the type of structure, the firms behave in accordance with the level of profits they can make (Zeder, 2020). The authors reminded that there are four basic types of market structures namely: perfect competition, monopolistic competition, oligopoly, and monopoly. Each structure has its own characteristics and according to Ismail Ukav, having information about the market structure and setting the level of competition is important for decision-makers (Ukav, 2017).

The wholesale in oil industry is usually classified as oligopoly market. The study by Anthea Paolo et al. to analyse entry barriers in the liquid fuel distribution in South Africa, the researchers

indicated that in 2006 the Competition Tribunal of South Africa banned a proposed merger between two oil-marketing companies named Sasol and Engen because it found that then market structure in petroleum industry was oligopolistic likely to cause a coordinated outcome since other companies could not compete with the proposed merger (Anthea Paelo, 2014).

In other countries, studies were conducted to analyse the competition in petroleum products retailing industry. In Croatia, a similar study was conducted whereby, among other things, the researchers evaluated the competitive structure and industrial concentration using concentration relationship, and Herfindahl-Hirschman index. It was found that the industry had an oligopolistic structure because the four firm concentration rates were 69.2% in 2004, 68.3% in 2005, and 69.9% in 2006, while HHI was 3603.72 and it concludes that the industry was consolidated having few firms dominated by the company named INA, Plc (Renko, 2008).

A study conducted to analyse market concentration and investment efficiency of firms in the Nigerian petroleum-marketing sub-sector, Kehinde Adekunle Adetiloye et al. found that the HHI of the market was 2000 that meant that the market was slightly concentrated since the HHI was greater than 1800. Furthermore, researchers found that CR4 was more than 80 per cent, which meant that the market was slightly highly concentrated and controlled by four of the firms in the industry (Adetiloye, 2015).

Few years ago, the palm oil has been used as a main raw material in the production of biodiesel. The study by H.H. Masjuki, M.A Kalam, et al. investigated policies with regard to biofuels revealed that the government of Malaysia compelled fuel marketers to blend 5 percent palm biodiesel with 95 percent petroleum diesel, and the regulation obliges the petrol service stations to sell that fuel mixture since 01st January 2010 (H.H. Masjuki, 2013). Therefore, it is comparable to the addition of 10 percent ethanol into gasoline in the United States (Pool, 2014). In that regards, other studies focused on looking into concentration level in different palm oil markets.

Oluwadare, Imoudu, and Ogundari conducted a study using the Hirschman-Herfindahl index (HHI) and the concentration ratios (4 firm & 8-firm) for measuring the market concentration of palm oil market in Ondo State, which is one of Nigeria's States. The results revealed that the market structure for palm oil was then perfectly competitive (D.A. Oluwadare, 2009).

Alternatively, the government of Indonesia vowed to oblige biodiesel containing 30% palm-based fuel by January 2020, which is the highest mandatory mix in the world with a purpose to curb expensive fossil fuel imports (Reuters, 2019). It was mandatory since 2018 that the biodiesel sold across Indonesia to have 20% palm-based fuel mix, using fatty acid methyl esters (FAME) made from palm oil (Christina, 2019). In that country, the studies that were conducted about mixture of 20% biodiesel with 80% fossil fuel (B20) produced a positive effect on the economic, social and environment (Fitriani Tupa R. Silalahi, 2019). Erlinda Muslim et al. had also assessed the palm oil market of Indonesia and the results showed that the structure is Oligopoly market with four largest companies having more than 40% as the concentration ratio (CR4) (Erlinda Muslim, 2008).

Market power could be one of the best parameters to assess the competition in oil and transportation fuels markets. Unfortunately, researchers showed that econometric estimates of demand and supply elasticities should be calculated to identify market power. But then again, because of the lack of reliable data and the fact that elasticity changes over time, regulators and economists often use simpler measures since past data may not apply to the current situation (Christopher D. Piros, 2013). Thus, the mentioned measures are the market concentration indices.

2.3. Market concentration indices

The contribution of Jean Tirole in his book to the theory of industrial organisation stated that the market concentration also known as industrial concentration signifies the distribution of market shares among firms within a given industry, and thus economists endeavoured to get it for being used in econometric and antitrust analysis (Tirole, 1988).

In measuring the concentration levels of the banking industry in Ghana, Akomea and Adusei indicated that the idea of ascertaining the market concentration is to identify how many firms account for the majority of the sales or products supplied in a given market, and whether new firms can manage to compete within that market (Samuel Yaw Akomea, 2013). The same authors also mentioned that market concentration measures are referred to as competition measures.

The empirical comparison research conducted by Maurizio Naldi and Marta Flamini stated that concentration indices are useful instruments within the industrial organisation literature since they are used to measure the level of competition within an industry (Maurizio Naldi, 2014). The two

major internationally recognised measures that are used in evaluating the market concentration are the Herfindahl-Hirschman Index, and m-firm Concentration Ratios.

For an industry made up of n firms, it may have m firms that own a considerable portion of the market. For $m < n$, the m -firm concentration ratio (CR_m) consists of adding up the m highest shares in the industry i.e. $CR_m = \sum_1^m \alpha_i$ (ordering the firms so that $\alpha_1 > \dots > \alpha_m > \dots > \alpha_n$). α_i is a market share of i^{th} firm and $\alpha_i = \frac{q_i}{Q} * 100$ where ($i = 1, \dots, n$ and $\sum_{i=1}^n \alpha_i = 100\%$) (Tirole, 1988).

CR_4 has been widely used until 1982, but there is no restrictions on the range of “ m ” values for concentration ratios CR_m . It must consider only the market share order of the largest companies. For example, CR_5 is applied in the UK while CR_4 , CR_8 , and CR_{20} are used in the US (Krivka, 2016). However, the major drawback associated with the concentration ratios is that they don't consider market shares of all firms of the industry.

In 1984, among other indicators of market concentration, the U.S. Department of Justice that is the primary market concentration guide adopted the Herfindahl-Hirschman Index (HHI) as a concentration measure for merger reviews. The HHI is based on the Cournot model and consists of adding up the squared market shares of firms in the relevant market (Lijesen et al, 2002). Moreover, the big advantage of HHI over the Concentration Ratio is that, for analysis, it takes into account all firms in the market (Samuel Yaw Akomea, 2013).

Different researchers conducted studies to find if there is any difference or similarity between CR and HHI. For example, the study entitled “similarities and differences between CR and HHI as an indicator of market concentration and market power” summarised the findings on concentration measures and types of markets as follows (I. Pavic et al, 2016) :

- The result-showing HHI less than 1500 is the same as CR less than 45; both of these results indicate a non-concentrated market, which has an effective competition or somewhat a part of monopolistic competition;
- The result-showing HHI ranging between 1500-2500 is the same as CR ranging between 45-60; both of these results indicate a moderately concentrated market that has a part of monopolistic competition or somewhat a loose oligopoly;

- The result-showing HHI greater than 2500 is the same as CR greater than 60; both of these results indicate a highly concentrated market, which has a tight oligopoly or a dominant firm.

2.4. Essential facilities for fuel bulk storage

Determination that a facility is essential varies with respect to legal regimes. In South Africa, the competition act defines essential facility as an “infrastructure or resource that can unreasonably be duplicated, and without access to which competitors can unreasonably provide goods or services to their customers” (Nkuna, 2013).

In 1986, the Restrictive Trade Practices Commission (RTPC) assessed competition in the Canadian Petroleum Industry regarding the issues associated with dominance of major oil company over petroleum refineries, product terminals, pipelines, and their vertical integration into petroleum product marketing. The big companies used to compete against rivals who sold or retailed the supplied fuel oil and gasoline. Applying the U.S. “essential facility” doctrine, the commission found that the refineries, and large terminals are essential facilities in the Canadian petroleum industry and then, the commission concluded that effective assurance of product supply to efficient independent petroleum marketers and to potential entrants would be sufficient to ensure competitive downstream petroleum market (Siclen, 1996). So, fuel depots are usually considered as essential facilities.

Peter Perkins, Johann Fedderke, and John Luiz conducted a study to analyse economic infrastructure investment in South Africa. Based on the results, the authors pointed out that policymakers should focus on encouraging the right type of infrastructure at the right time considering that the maintenance along with the expansion of infrastructure are important dimensions of supporting economic activity in a growing economy, provided that individual projects are chosen on the basis of appropriate cost benefit analyses (Peter Perkins, 2005). Thus, this theory could be a good tool to either country that must establish new essential infrastructure like fuel depots for the case of Rwanda.

The study by Clare Pope et al. in Australia’s LNG sector about the possibility of infrastructure sharing and infrastructure access highlighted how among other things a geographical location and an available capacity, in existing infrastructure that had already been constructed or owned by

incumbent firms, should be assessed to enhance the development of the economically viable oil and gas resources in the future (Clare, 2015).

Refusal to provide access to an essential physical property is a wide-ranging subject but it was little described by Pinar Akman in the paper published in 2017, where the author, using a positive and normative evaluation under EU competition law, examined the theory of abuse in Google search. The author highlighted that a Court of Justice had emphasized that it is not necessary to prove that the refusal of the service is likely to eliminate a competition in the market against the firms requesting access and that the refusal cannot be quantitatively vindicated, it is also necessary to prove that the service in itself is essential to carry on that firm's business and that there is no existing possible substitute for the requested service. For access to be deemed essential, it would not be economically viable to replicate the infrastructure that delivers a service similar to the one that had been being provided by the incumbent firm, i.e. a facility cannot be considered essential if there is a possible substitute thereof (Akman, 2017).

If there are no technical, legal or economic obstacles that prevent the construction of a property to provide the needed service, the concerned facility would not be considered as essential in the relevant industry. Otherwise, it is an essential facility which could be the case of a fuel depot Rwanda.

Chapter Three: Methodology

3.1. Research design

A descriptive design was used in this study. With this research design, the descriptive-normative approach was used where the results of the study were compared with the norms.

The descriptive design is therefore justified for this study since it includes an array of the research objectives with the purpose to evaluate the concentration level and define the structure of fuel imports market in Rwanda.

3.2. Population

The population of interest in this study consists of all companies or entities that have imported diesel fuel and gasoline during the considered period i.e. from 2013 to 2019.

Since there are few petroleum-marketing companies and other relevant entities involved in importing fuel into Rwanda, this research approach ensures that the data obtained enhance confidence in the results and conclusions. This approach made the study feasible from the standpoint of cost, time and accuracy.

3.3. Data collection method

This study used the secondary micro-data of diesel and gasoline imports. They were obtained from the Petroleum imports & statistics Department of Rwanda Revenue Authority. They consist of all fuel market companies and other private companies that import fuel for use in Rwanda. These data enabled to capture the overview of incentives that are gained by the fuel depot operators vis-a-vis other fuel importers and wholesalers who do not operate those essential facilities.

3.4. Data analysis techniques

Data in this study were analysed using CR₄ and HHI indices. The data were used to compute the market shares of firms, which import transport fuels. Thereby, the market shares helped find the above-mentioned HHI and CR₄ indices.

Formula: $\alpha_i = \frac{q_i}{Q} * 100$ Where

q_i - represents the quantity of diesel or gasoline imported by an individual Company in a certain year;

Q – represents the total quantity of diesel or gasoline imported by all companies in a certain year

α_i – represents the market share of i^{th} individual Company in a certain year;

$$HHI = \sum_1^n \alpha_i^2$$

$$CR_4 = \sum_1^4 \alpha_i$$

The Herfindahl - Hirschman Index (HHI) is the most widely accepted market concentration measurement in literature, and sets the criteria for assessing other concentration indices (Pehlivanoglu, 2013). Since Rwanda has no specific guidelines to measure market concentration level, the results of HHI were interpreted and conclusions were drawn using the market concentration guide of 2010 used by U.S. Department of Justice and Federal trade commission widely considered as international acceptable standards (Samuel Yaw Akomea, 2013) .

That guideline provides thresholds to analyse the market concentration under 3 sections (Pehlivanoglu, 2013), but with different values:

- Non-concentrated markets: an HHI value below 1500;
- Low concentrated markets: an HHI value of 1500-2500;
- Highly concentrated markets: an HHI value above 2500.

Furthermore, the HHI thresholds provided by the guidelines on the assessment of horizontal mergers under the Council Regulation of European Communities (EC) on the control of concentrations were also used to interpret the results.

The interpretation of CR_4 index results were done using the ranges accepted by TSI (Turkish Statistical Institute) for defining the market structure where $CR_4 < 30$ shows a low level of concentration with a competitive market, the range of $30 \leq CR_4 < 50$ shows a medium level of concentration with a decreasing and monopolistic competition structure , the range of $50 \leq CR_4 < 70$ shows a high level of concentration with a decreasing competition and oligopolistic structure, and $CR_4 \geq 70$ shows a high level of concentration with an emerging monopolistic structure.

Chapter Four: Data analysis and findings

4.1. Introduction

This chapter describes data analysis and interpretation of the research findings. The data in this study was summarised and presented in form of tables and graphs. The chapter introduces the growth of fuel imports and documents concentration level in the market.

As shown by the following figure (1) on the graphs (A) and (B), the diesel and gasoline imports have progressively grown, and thus the fuel imports market concentration was analysed in the section 4.2, and interpretation thereof was extended in section 4.3 on the ownership of a fuel depot to operate in Rwanda.

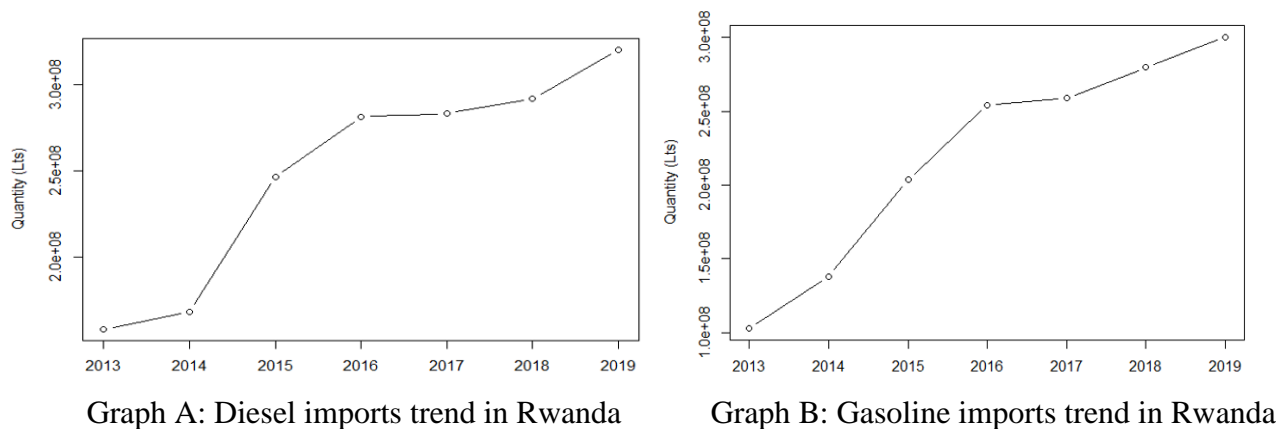
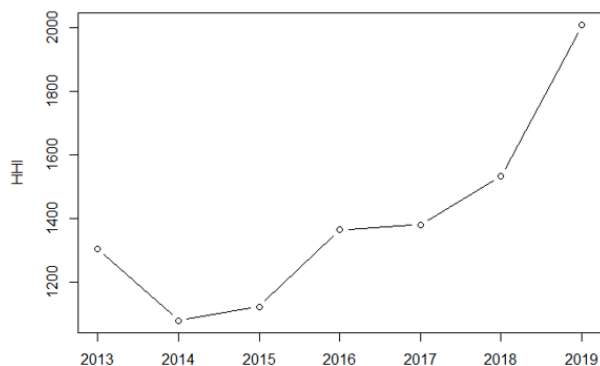


Figure 1: Diesel and gasoline imports trends

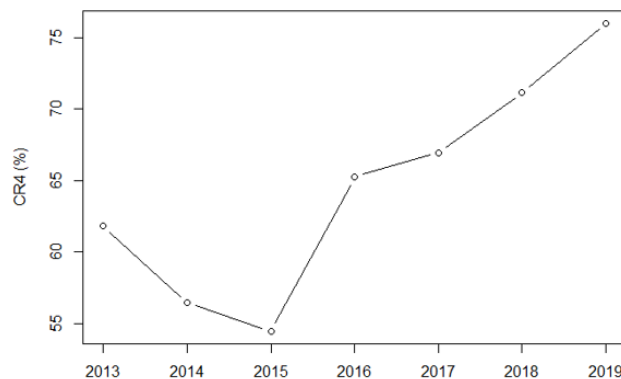
4.2. Analysis of concentration in diesel and gasoline import market

4.2.1. Concentration in diesel import market

Based on the findings of this study, the diesel import market has grown with the concentration increase. The following graph detail the market concentration from 2013 to 2019 in diesel import market:



Graph C: HHI trend for diesel imports market



Graph D: CR4 trend for diesel imports market

Figure 2: HHI, and CR4 trends for diesel import market in Rwanda

The HHI values of the diesel import market decreased from 1,304.21 in 2013 to 1,078.20 in 2014, as it is identified in the graph C of figure (2) and values in table 1, the trend was downward. Nonetheless, the HHI has increased again in 2015 and continued constantly rising to reach 2,009.62 in 2019. The HHI values were in general below the 1,500 threshold value during 2013-2017. Because of that, the diesel import market in Rwanda was classified as “a non-concentrated market”. However, HHI values became higher than the 1,500 threshold from 2018, which resulted to classify the diesel import market as “a low concentrated market”. table 1 clearly shows how the market was defined using computed HHI values.

Table 1: The HHI Values, Value Ranges and Market Definition for diesel imports in Rwanda

| <i>Year</i> | <i>HHI</i> | <i>HHI value range</i> | <i>HHI Market Definition</i> |
|-------------|------------|-------------------------------|------------------------------|
| 2013 | 1,304.21 | HHI < 1500 | Non-concentrated market |
| 2014 | 1,078.20 | HHI < 1500 | Non-concentrated market |
| 2015 | 1,121.45 | HHI < 1500 | Non-concentrated market |
| 2016 | 1,364.43 | HHI < 1500 | Non-concentrated market |
| 2017 | 1,379.78 | HHI < 1500 | Non-concentrated market |
| 2018 | 1,532.38 | $1500 \leq \text{HHI} < 2500$ | Low concentrated market |
| 2019 | 2,009.62 | $1500 \leq \text{HHI} < 2500$ | Low concentrated market |

Having the upward trend of HHI values, and it meant that the market concentration increased while competition decreased (Pehlivanoglu, 2013).

The increase of HHI was associated in 2015 with Jabana fuel depot that was brought in operation at the end of the year in October. Likewise, HHI increase was related in 2018 to the upgrade of Rusororo fuel depot. That depot had 22 million litres of fuel storage capacity from 2016, but the capacity was increased in 2018 and got to 32 million litre capacities in operation. The upgrade ended up by 2019 and left Rusororo fuel depot with a storage capacity of 60 million litres. Instinctively, the respective import shares of market players have been augmented with new storage capacity, and in turn increased the HHI of diesel import market. This justifies how the market concentration in diesel imports grew hand in hand with the petroleum industry and the market growth.

Applying the assessment guidelines of horizontal mergers under the Council Regulation of European Communities (EC) on the control of concentrations to the HHI results of diesel import market, it showed that any proposal of mergers or acquisitions, which can happen is likely to increase the market concentration yet the existing concentration has already reached and exceeded the concerned HHI ranges. The guideline has set not to question the competition for a merger with a post-merger HHI between 1,000 and 2,000 and a change below 250, or a merger with a post-merger HHI above 2,000 and a change below 150 (EEC, 2004).

The CR₄ index values in the graph D of figure (2) and table 2 provided the good picture to define the diesel import market in Rwanda. The CR₄ trend decreased constantly during 2013-2015. In that period, the existing fuel depots were Gatsata depot and Kabuye depot that were operated by Kobil Petroleum (Rwanda) Ltd and Energy Resources Petroleum Ltd, respectively. The then operational storage capacity was 9,356,000 litres for diesel product. Having the decrease of CR₄ in diesel import market from 62 % in 2013 to 54 % in 2015, it meant the shares were gained by other participants in the market. During that period, except the then former EWSA, the parastatal that had 28.33 % of all diesel imports for their own use in the generation of electricity in 2013, it was found that there had been no other private company that ever gained the diesel import market share of 25 % or above. According to the guidelines on the assessment of horizontal mergers under the Council Regulation of European Communities (EC) on the control of concentrations; a firm with

the limited share not exceeding 25 % of the entire market, it does not impede an effective competition in the market (EEC, 2004).

After the decrease of CR₄ index values until 2015, table 2 shows that it had immediately risen until 2019 and reached 76 %. The CR₄ index values intuitively increased in the same period when the new Jabana fuel depot was brought in operation in October 2015, and the new Rusororo fuel depot that was brought in operation on 11th June 2016. From then on, the diesel imports share of the four big companies have been continuously risen compared with the past situation. That justified again how market concentration in diesel imports had grown with the petroleum industry and the market growth.

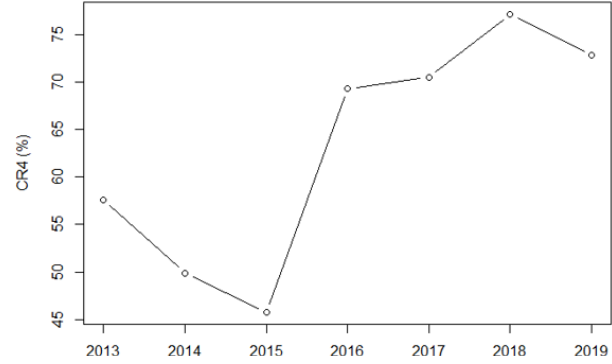
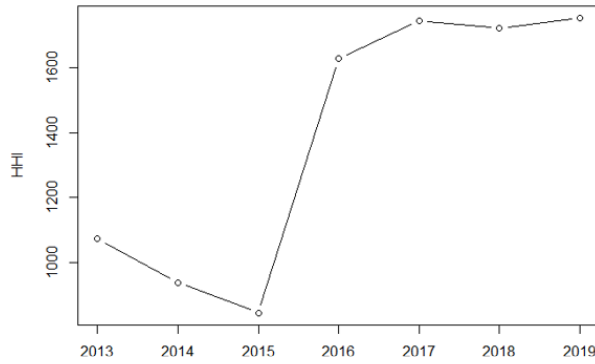
Table 2: The CR₄ Values, Value Ranges and Market Definition of diesel imports

| <i>Year</i> | <i>CR₄ value</i> | <i>CR₄ range</i> | <i>CR₄ Market Definition</i> |
|--------------|-----------------------------|-----------------------------|---|
| 2013 | 62 % | $50 \leq CR_4 < 70$ | Oligopolistic structure with a decreasing competition |
| 2,014 | 56 % | $50 \leq CR_4 < 70$ | Oligopolistic structure with a decreasing competition |
| 2,015 | 54 % | $50 \leq CR_4 < 70$ | Oligopolistic structure with a decreasing competition |
| 2,016 | 65 % | $50 \leq CR_4 < 70$ | Oligopolistic structure with a decreasing competition |
| 2,017 | 67 % | $50 \leq CR_4 < 70$ | Oligopolistic structure with a decreasing competition |
| 2,018 | 71 % | $CR_4 \geq 70$ | Emerging monopolistic structure |
| 2,019 | 76 % | $CR_4 \geq 70$ | Emerging monopolistic structure |

Source: CR₄ values computed based on market shares of four biggest importers. The data have been compiled year by year as obtained from RRA

4.2.2. Concentration in gasoline imports market

The study's findings showed that the gasoline import market had also notably grown with the concentration increase. The following graphs detail the market concentration from 2013 to 2019 in gasoline imports market:



Graph E: HHI trend for the gasoline imports market

Graph F: CR4 trend for the gasoline imports market

Figure 3: HHI, and CR4 trends for gasoline import market in Rwanda

The HHI values of the gasoline import market decreased from 1,073.95 in 2013 to 845.95 in 2015, as it is identified in the graph E of figure (3) and values in table 3, the trend was downward.

Nonetheless, HHI has immediately increased again from 2015 and fluctuated rising to reach 1,752.17 in 2019. The HHI values of the gasoline import market were in general below the 1,500 threshold value during 2013-2015. Therefore, the gasoline import market in Rwanda was classified as “a non - concentrated market”. However, HHI values became higher than the above-mentioned threshold from 2016, which resulted to classify as “a low concentrated market”. Table 3 shows clearly how the market was defined using the computed HHI values.

Table 3: The HHI Values, Value Ranges and Market Definition for gasoline imports

| <i>Year</i> | <i>HHI</i> | <i>HHI value range</i> | <i>HHI Market Definition</i> |
|-------------|------------|------------------------|------------------------------|
| 2013 | 1073.95 | HHI < 1500 | Non-concentrated market |
| 2014 | 939.45 | HHI < 1500 | Non-concentrated market |
| 2015 | 845.56 | HHI < 1500 | Non-concentrated market |
| 2016 | 1,626.90 | 1500 ≤ HHI < 2500 | Low concentrated market |
| 2017 | 1,743.87 | 1500 ≤ HHI < 2500 | Low concentrated market |
| 2018 | 1,720.52 | 1500 ≤ HHI < 2500 | Low concentrated market |
| 2019 | 1,752.17 | 1500 ≤ HHI < 2500 | Low concentrated market |

Source: HHI values computed based on market shares of importers. The data have been compiled year by year as obtained from RRA

The upward trend of HHI values, and it meant that the competitive structure declined relative to previous periods (Pehlivanoglu, 2013).

The findings showed that the application of Council Regulation of European Communities (EC) on the control of concentrations to the HHI results of gasoline import market warns to assess attentively the mergers that can be proposed in Rwandan petroleum industry because the computed values have reached the concerned range between 1,000 and 2,000 since 2016.

The CR4 index values in table 4 and graph F of figure (3) were used to describe the gasoline import market in Rwanda. The four firm concentration ratio (CR4) decreased from 58% in 2013 to 46% in 2015. The then total operational storage capacity for commercial purpose was 9,513,000 litres for gasoline product that had been owned by Gatsata, and Kabuye fuel depots. However, The CR4 index values have immediately increased and reached 77.14 % in 2018 but again decreased to 72.77% by the end of 2019. The same scenario like diesel market caught the gasoline import market, market concentration went hand in hand with the market growth because big companies have benefited the country's plan of sensitizing the companies to import big quantities since the market environment has been conducive to their goals (Africareview, 2016).

Table 4: The CR4 Values, Value Ranges and Market Definition of gasoline imports

| <i>Year</i> | <i>CR4 value</i> | <i>CR4 range</i> | <i>CR4 Market Definition</i> |
|--------------|------------------|--------------------|--|
| 2013 | 58 % | $50 \leq CR4 < 70$ | Oligopolistic structure with a decreasing competition |
| 2,014 | 50 % | $50 \leq CR4 < 70$ | Oligopolistic structure with a decreasing competition |
| 2,015 | 46 % | $30 \leq CR4 < 50$ | A monopolistic competition structure with a decreasing competition |
| 2,016 | 69 % | $50 \leq CR4 < 70$ | Oligopolistic structure with a decreasing competition |
| 2,017 | 70 % | $50 \leq CR4 < 70$ | Oligopolistic structure with a decreasing competition |
| 2,018 | 77 % | $CR4 \geq 70$ | Emerging monopolistic structure |
| 2,019 | 73 % | $CR4 \geq 70$ | Emerging monopolistic structure |

Source: CR4 values computed based on market shares of four biggest importers. The data have been compiled year by year as obtained from RRA

4.3. Ownership of a fuel depot in operation

The requirements set out in the Rwanda standard RS141-2 for storage and distribution of petroleum products in aboveground-bulk installations necessitate fuel depots to be sited in remote areas or be sited in urban areas at three hundred metres (300 m) from other activities. That condition was found to be a high entry barrier because the size of the country and land availability had hampered an installation of a new fuel depot in Rwanda. Since the duplication was complicated and the facilities are used as petroleum-based fuel terminal, fuel depots are essential facilities in Rwanda as it conforms to the literature (Nkuna, 2013) (Siclen, 1996).

Furthermore, the Ministry of trade in Rwanda has fixed the throughput fee of eight Rwandan francs (8 Frw/litre) per each litre stored in the depot. This amount is paid by an importer or a fuel wholesaler to the company that operates a particular fuel depot. That could be a direct incentive to a company with potential funds for investment and attraction to be vertically integrated in both fuel depot operation and importation.

Nevertheless, in the study, it was found that all fuel depots operators do not conduct a wholesale or fuel importation. Among four operators of commercial fuel depots in Rwanda, Jabana fuel depot's operator was found interested in providing fuel storage services not in fuel wholesale. Discussing the depot manager, they emphasised that it depends on the business model whereby their company had chosen to provide fuel storage services instead of wholesaling which is fair to their clients who store imported fuel in Jabana depot for wholesale.

Based on the findings, the computed shares of the fuel importers showed that ownership of a fuel depot to operate does not guarantee operators to be the importers of fuel into Rwanda with highest imported quantity shares. As it was shown in the appendix A of this report, it was found that the names of four big companies with highest shares had not been the same for all time considered in this study. It was found that the operator might be in the four big fuel wholesalers without having a fuel depot to operate and it conformed to that big does not always mean better (Adetiloye, 2015). However, a close monitoring would be in place because few companies have fuel depots and compete with others in the Rwandan fuel imports market as long as the effective HHI values results showed that both gasoline and diesel imports market had been low concentrated until 2019. In addition, a study that had been conducted by Simon Loertscher and Markus Reisinger in 2014 to

analyse the competitive effects of vertical integration when firms exert market power upstream and compete in quantities downstream, it emphasised that the competition authorities should be cautious about a vertical integration when the integrating firm faces many competitors in the relevant market, though it could be tolerated otherwise (Simon Loertscher, 2014).

Chapter Five: Conclusion and recommendation

This study was conducted in order to investigate market concentration indices for fuel imports in the considered period, examine ownership of a fuel depot, and whether the depots operators effectively put infrastructure sharing into action. The study used secondary data sources from the Petroleum imports & statistics Department of Rwanda Revenue Authority. The analysis shows that until 2015, both diesel and gasoline imports market in Rwanda have been competitive with no signs of high concentration. Nonetheless, from then on, the markets concentration has increased so the structure changed and be oligopolistic structure with a decreasing competition. That supported the existing literature that mentions a wholesale in oil industry as oligopoly market and it is the same as found in South Africa by Competition Tribunal (Anthea Paelo, 2014). The analysis also shows that for seven years, firms that appeared in four big fuel importers kept changing as well as their market shares and it indicates that infrastructure sharing for storage of petroleum-based fuel in Rwanda has no problematic issues related to the competition.

Although fuel import market is advantaged to work in a conducive environment, it is not in a position that thoroughly assures the continuity of a good service delivered by the fuel depot operators. The identified increase in market concentration it may end up lessening the competition among market players though no complaint ever lodged against each other. The conclusion drawn out of the study and recommendation is that policy makers and regulators should look forward and put in place the guidelines regarding the assessment of market concentration and mergers / acquisition proposals since downstream petroleum industry alerted the growth along with the market concentration.

One obvious weakness of this study, the results cannot assure full compliance with regulations in terms of infrastructure sharing since the import data obtained could not reveal the sisterhood of companies to enable finding out if there is a priority privilege granted for storing fuel in the Rwandan commercial fuel depots. Therefore, sales dataset-showing companies' relationship is recommended. Besides, this study focused on importation or wholesale side using overseas' market concentration assessment thresholds.

Once the competition policy regulations will be adopted in Rwanda or in EAC region; it will, therefore, be advisable for future researchers to take it into consideration and use the same methodology to study the wholesale market of the petroleum-based fuel in Rwanda.

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Appendix A: Computed shares of the fuel importers annually

Table 5: Diesel, and gasoline imports market shares in 2013

| <i>Diesel imports market shares in 2013</i> | | <i>Gasoline imports market shares in 2013</i> | |
|---|--------------|---|--------------|
| <i>Company</i> | <i>share</i> | <i>Company</i> | <i>share</i> |
| EWSA | 28.33 % | Kobil Petroleum (Rwanda) Ltd | 20.34 % |
| Kobil Petroleum (Rwanda) Ltd | 14.48 % | Engen (Rwanda) Limited | 16.12 % |
| Engen (Rwanda) Limited | 10.64 % | Societe Petroliere Ltd | 13.24 % |
| Societe Petroliere Ltd | 8.35 % | Source Oil Ltd | 7.87 % |
| Others | 38.20 % | Others | 42.43 % |

Table 6: Diesel, and gasoline imports market shares in 2014

| <i>Diesel imports market shares in 2014</i> | | <i>Gasoline imports market shares in 2014</i> | |
|---|--------------|---|--------------|
| <i>Company</i> | <i>share</i> | <i>Company</i> | <i>share</i> |
| Kobil Petroleum (Rwanda) Ltd | 19.77 % | Kobil Petroleum (Rwanda) Ltd | 16.35 % |
| Societe Petroliere Ltd | 17.02 % | Societe Petroliere Ltd | 12.08 % |
| Engen (Rwanda) Limited | 11.33 % | Engen (Rwanda) Limited | 11.45 % |
| Delta Petroleum (Rwanda) Ltd | 8.33 % | Hass Petroleum (Rwanda) Ltd | 9.97 % |
| Others | 43.55 % | Others | 50.15 % |

Table 7: Diesel, and gasoline imports market shares in 2015

| <i>Diesel imports market shares in 2015</i> | | <i>Gasoline imports market shares in 2015</i> | |
|---|--------------|---|--------------|
| <i>Company</i> | <i>share</i> | <i>Company</i> | <i>share</i> |
| Societe Petroliere Ltd | 25.22% | Societe Petroliere Ltd | 15.80 % |
| Energy Resources Petroleum Ltd | 11.10% | Mount Meru Petroleum (Rwanda) Ltd | 11.31 % |
| Engen (Rwanda) Limited | 9.13% | Energy Resources Petroleum Ltd | 9.92 % |
| Kobil Petroleum (Rwanda) Ltd | 9.03% | Kobil Petroleum (Rwanda) Ltd | 8.78 % |
| Others | 45.52 % | Others | 54.19 % |
| | % | | |

Table 8: Diesel, and gasoline imports market shares in 2016

| <i>Diesel imports market shares in 2016</i> | | <i>Gasoline imports market shares in 2016</i> | |
|---|--------------|---|--------------|
| <i>Company</i> | <i>share</i> | <i>Company</i> | <i>share</i> |
| Societe Petroliere Ltd | 21.61 % | Mount Meru Petroleum (Rwanda) Ltd | 29.80 % |
| Energy Resources Petroleum Ltd | 20.52 % | Energy Resources Petroleum Ltd | 20.67 % |
| Mount Meru Petroleum (Rwanda) Ltd | 13.41 % | Societe Petroliere Ltd | 9.75 % |
| Merez Petroleum Ltd | 9.70 % | Ukod Oil (Rwanda) Ltd | 9.04 % |
| Others | 34.76 % | Others | 30.74 % |

Table 9: Diesel, and gasoline imports market shares in 2017

| <i>Diesel Imports Market shares In 2017</i> | | <i>Gasoline Imports Market shares In 2017</i> | |
|---|--------------|---|--------------|
| <i>Company</i> | <i>share</i> | <i>Company</i> | <i>share</i> |
| Mount Meru Petroleum (Rwanda) Ltd | 21.39 % | Mount Meru Petroleum (Rwanda) Ltd | 33.04 % |
| Excel Energy Ltd | 17.67 % | Excel Energy Ltd | 15.85 % |
| Societe Petroliere Ltd | 17.27 % | Oryx Oil Musozi Ltd | 12.20 % |
| Oryx Oil Musozi Ltd | 10.64 % | Societe Petroliere Ltd | 9.35 % |
| Others | 33.03 % | Others | 29.56 % |

Table 10: Diesel, and gasoline imports market shares in 2018

| <i>Diesel imports market shares in 2018</i> | | <i>Gasoline imports market shares in 2018</i> | |
|---|--------------|---|--------------|
| <i>Company</i> | <i>share</i> | <i>Company</i> | <i>share</i> |
| Societe Petroliere Ltd | 23.06 % | Mount Meru Petroleum (Rwanda) Ltd | 26.35 % |
| Mount Meru Petroleum (Rwanda) Ltd | 18.62 % | Oryx Oil Musozi Ltd | 21.69 % |
| Oryx Oil Musozi Ltd | 18.04 % | Societe Petroliere Ltd | 16.66 % |
| Excel Energy Ltd | 11.45 % | Excel Energy Ltd | 12.43 % |
| Others | 28.83 % | Others | 22.87 % |

Table 11: Diesel, and gasoline imports market shares in 2019

| <i>Diesel Imports Market Shares In 2019</i> | | <i>Gasoline Imports Market Shares In 2019</i> | |
|---|--------------|---|--------------|
| <i>Company</i> | <i>Share</i> | <i>Company</i> | <i>Share</i> |
| Societe Petroliere Ltd | 36.02 % | Oryx Oil Musozi Ltd | 27.71 % |
| Oryx Oil Musozi Ltd | 19.55 % | Mount Meru Petroleum (Rwanda) Ltd | 25.73 % |
| Mount Meru Petroleum (Rwanda) Ltd | 13.83 % | Societe Petroliere Ltd | 13.50 % |
| Vivo Energy (Rwanda) Ltd | 6.60 % | Kobil Petroleum (Rwanda) Ltd | 5.82 % |
| Others | 24 % | Others | 27.24 % |

Table 12: Names of all companies along with their businesses considered in the research

| No | Company Name | Undertaken business |
|-----------|---------------------------------------|---|
| 1 | Kobil Petroleum Rwanda Ltd | Gatsata depot operation and Fuel importation |
| 2 | Oilcom (Rwanda) Ltd | Jabana depot operation |
| 3 | Oryx Oil Musozi Ltd | Kabuye depot operation and Fuel importation |
| 4 | Societe Petroliere Ltd | Rusororo depot operation and Fuel importation |
| 5 | Delta Petroleum Ltd | Fuel importation |
| 6 | Discentre Ltd | Fuel importation |
| 7 | Energy Resources Petroleum Ltd | Fuel importation |
| 8 | ENES Ltd | Fuel importation |
| 9 | Engen Rwanda Ltd | Fuel importation |
| 10 | Excel Energy Ltd | Fuel importation |
| 11 | Fair Energy Ltd | Fuel importation |
| 12 | GAPCO Rwanda Ltd | Fuel importation |
| 13 | Gasoil Ltd | Fuel importation |
| 14 | GBE Rwanda Ltd | Fuel importation |
| 15 | GITRACO Ltd | Fuel importation |
| 16 | GP Global Rwanda Ltd | Fuel importation |
| 17 | Gulf Energy Rwanda Ltd | Fuel importation |
| 18 | Harjit Mangat Ltd | Fuel importation |
| 19 | Hashi Energy@Ltd | Fuel importation |
| 20 | Hass Petroleum Rwanda Ltd | Fuel importation |
| 21 | International Organizations | Fuel importation |
| 22 | International Petroleum Suppliers Ltd | Fuel importation |
| 23 | Intracorp Ltd | Fuel importation |
| 24 | Job Petroleum Ltd | Fuel importation |
| 25 | Kivu Energy Ltd | Fuel importation |
| 26 | Afri Oil (Rwanda) Ltd | Fuel importation |

| | | |
|----|-----------------------------------|------------------|
| 27 | Lake Petroleum Rwanda Ltd | Fuel importation |
| 28 | M. Line PetroStation Ltd | Fuel importation |
| 29 | Maxi Station | Fuel importation |
| 30 | Merez Petroleum Ltd | Fuel importation |
| 31 | Mogas Rwanda Ltd | Fuel importation |
| 32 | Mount Meru Petroleum (Rwanda) Ltd | Fuel importation |
| 33 | New Global Oil Ltd | Fuel importation |
| 34 | Be Energy Ltd | Fuel importation |
| 35 | Olympic Energy Ltd | Fuel importation |
| 36 | OM Ltd | Fuel importation |
| 37 | COCIRWA Ltd | Fuel importation |
| 38 | REG Ltd (former EWSA) | Fuel importation |
| 39 | Shire Petroleum Ltd | Fuel importation |
| 40 | Danium Ltd | Fuel importation |
| 41 | SOPEY Ltd | Fuel importation |
| 42 | Source Oil Ltd | Fuel importation |
| 43 | STIPPAG Rwanda Ltd | Fuel importation |
| 44 | Ukod Oil Rwanda Ltd | Fuel importation |
| 45 | Vivo Energy Rwanda Limited | Fuel importation |

Source: Rwanda Revenue Authority_Petroleum imports & statistics Department

Appendix B: Introductory letter for data collection



UNIVERSITY of
RWANDA

CBE - SCHOOL OF ECONOMICS

OFFICE OF THE COORDINATOR - POSTGRADUATE PROGRAMS

Kigali, 20th August 2020

Dear Sir/Madam,

Re: TO WHOM IT MAY CONCERN

Mr. **Gilbert HAGENIMANA** is a full time student in Regulatory Economics and Competition Policy. He is now conducting a research project as one of the partial requirements for the **Master of Science in Regulatory Economics and Competition Policy** degree award.

This letter is therefore to kindly request you to grant him any assistance to successfully conduct research in your organization under the project title "**Analysis of market concentration in importation of fuels for sale in Rwanda.**"

Any assistance rendered to him will be highly appreciated.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Ruhara Mulindabigwi Charles', written over a circular stamp.



Dr. Ruhara Mulindabigwi Charles
Coordinator of Postgraduate Programs
School of Economics