

THE IMPACT OF THE DIESELGATE VEHICLE EMISSIONS SCANDAL ON CUSTOMER EQUITY IN THE SOUTH AFRICAN AUTOMOTIVE INDUSTRY

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DECLARATION

I, Sylvester Deenan Pillay, hereby declare that this dissertation is my own original work. This work, being submitted as partial completion of the Master of Business Administration, has never been submitted at any university or institution, all the work of others used in this research paper has been acknowledged.

Signed: 

Date 26th November 2019

Abstract

Prominent German automotive manufacturers had been tampering with emissions for some time before it became public knowledge in September 2015. It is then that the term 'Dieselgate' was coined in reference to the scandal. As the scandal became public knowledge, manufacturers accused of emissions cheating faced challenges on several fronts, including legal, financial and environmental. While the 'backlash' as a result of the scandal was apparent in other countries, it was not as apparent in South Africa. This research paper set out to explore the impact that the Dieselgate scandal had in South Africa in terms of customer equity.

Data analysis was undertaken using a two-pronged approach. The first of these was analysis of vehicle sales data using a paired t-test. This was to understand whether sales had seen a decline pre-, as well as post-scandal. The results point to a sales decline, this highlights that Dieselgate was a factor even though other, unexamined factors, were not investigated. The second instrument used was a customer equity questionnaire, this provided insight into the real opinions of consumers in South Africa about the affected brands. The analysis revealed that the affected manufacturers operating in South Africa had seen no negative effects in terms of customer equity.

Based on the results, it could be said that market factors, which was not part of the research, play a great role in consumers' preferences or mindsets. Additionally, manufacturers can operate with a degree of latitude in certain markets. This is based on market factors in a specific market as well as the regulations imposed and enforced in that market. Lastly, customer equity is a complex theory that includes a multitude of converging theories. Based on this fact, it is currently difficult to evaluate customer equity in its entirety in a single paper. A comprehensive model is yet to be developed that can effectively measure customer equity in an all-encompassing way.

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List of terms and acronyms

The Dieselgate scandal or Dieselage – Reference to the emissions scandal that became public knowledge in September 2015

OEM – Original Equipment Manufacturer

CRM – Customer Relationship Management

CLV – Customer Lifetime Value

CE – Customer Equity

CP – Customer Profitability

BE – Brand Equity

RBT – Resource-Based Theory

RBV – Resource-Based View

VRIO – Valuable, Rare, Imitable, Organisaion

VRIN – Valuable, Rare, Imitable, Non-substitutable

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Chapter 1 - Introduction

1.1. Introduction

Changes in modern-day economies are apparent in terms of the way and speed at which business is conducted. These changes are being spurred on by emerging market developments, rapidly changing technology, digitization, increased customer automation, business models that are changing continuously, and consumer preferences towards ownership (Gao, et al., 2016). The automotive industry is no exception to this. Strong evidence suggests that four disruptive technology trends will drive the future of the automotive industry. These trends include diverse mobility, autonomous driving, electrification and connectivity (Gao, et al., 2016). Of particular relevance is the aspect of electrification, accelerated perhaps by the Dieselpgate scandal (Taylor and Schwartz, 2019).

The Dieselpgate scandal, also referred to simply as 'Dieselpgate', can be described as one of the most audacious instances of corporate fraud in the history of the automotive industry. It relates to an emissions scandal that involved the prominent German Original Equipment Manufacturer (OEM) Volkswagen (VW) (Parloff, 2018). For a decade (between 2006 and 2015) this company fitted diesel vehicles with 'cheat' or 'defeat' devices (Parloff, 2018). These devices ran sub-routine instructions that enabled diesel vehicles to detect testing conditions, thereby altering their performance in such a way that they received favourable emission results (Hotten, 2015). Also interesting to note, is that VW used their low emissions claim as part of their large marketing drive to sell diesel vehicles in the American market (Hotten, 2015). Further investigation into the Dieselpgate scandal revealed that other leading German O.E.M's (BMW and Mercedes-Benz) were part of this offending group with regard to diesel vehicle emissions (Schmitt, 2017). The entire Dieselpgate affair has already cost VW €30 billion, in the form of recall costs, brand damage, and loss of sales (Kable, 2019; Bailey, 2015). Furthermore, the fines and potential lawsuits resulting from VW's devious behaviour are likely to have an additional cost impact in the future (Bailey, 2015). The fact that VW is investing heavily in its electric vehicle development (€80 Billion) speaks volumes with regard to their intention of cleansing their brand image in the wake of the Dieselpgate scandal (Taylor and Schwartz, 2019).

There has also been a significant reaction in the wake of the Dieselgate scandal, some cities are committing to the restriction or complete banning of diesel vehicles in already polluted cities (Bailey, 2015). Furthermore, emissions testing procedures could become more stringent in the future in order for it to be more reflective of real-world driving conditions. This may increase the cost of diesel vehicles as it would need more expensive emissions cleansing equipment. This would most likely impact their popularity in a negative way (Bailey, 2015). Ironically, diesel vehicles were marketed as a 'cleaner' alternative to petrol vehicles prior to the Dieselgate incident as it had better fuel efficiency, and lower CO₂ (Carbon Dioxide) emissions (Bailey, 2015). As many as seventy VW employees are on the list of suspects in the Dieselgate investigation, while six VW group executives have already been imprisoned (Kerler, 2018).

In Germany, the home country of VW and other leading OEMs, the relationship between car manufacturers and lawmakers was of a friendly nature. Ultimately this coziness resulted in carmakers relying on officials watering down the more stringent European Union (EU) rules with regard to emissions (Kerler, 2018). Experts contend that politicians were partly to blame for the advent of Dieselgate as they had adopted a sympathetic stance towards the automotive manufacturers (Kerler, 2018). The Dieselgate scandal also raised awareness of the substantial gap between real-world emissions values and official certification ratings (Brand, 2016). This led to a situation whereby official certification ratings neither reflected the true impact of diesel emissions on the environment, nor the harm they caused to peoples health (Brand, 2016). The public, in turn, were unknowingly being misled due to this inherent flaw in the measuring system. To understand the gap in CO₂ emissions between real-world and official certification values, it should be noted that in 2001, it was 8% and by 2014 it had risen to a massive 40% (Bannon, 2015).

In light of the above events, this study sought to understand the effects of Dieselgate on customer equity (CE). CE is described by Rust, Lemon and Zeithaml (2004, p.110) as, "the total of the discounted lifetime values summed over all of the firm's current and potential customers". In simpler terms, CE is the value that is provided to a company by all current and potential customers over the lifespan of their relationship with that firm. While the Dieselgate scandal began in the United States, the effects of the scandal can be seen in all countries where consumers make use of diesel vehicles,

especially in Europe which includes the home country of the offending companies (Brand, 2015). This study will be undertaken with the intention of understanding how customer equity has experienced any potential effects for the automotive manufacturers in South Africa. South Africa is also a country where diesel vehicles are still prevalent (Mabuza, 2018).

This research aimed to establish whether Dieselgate had an effect on CE by firstly, establishing whether the affected manufacturers (Brand A, Brand B, Brand C, and Brand D) in South Africa experienced a decline in their sales between 2015 - 2018. Secondly, a close-ended questionnaire was used to gain vehicle users' real insights and impressions on prominent vehicle manufacturers. Chapter 3 provides a detailed explanation of the customer equity questionnaire. The aim of the study was to understand customers' perceptions of vehicle manufacturers, based on experience with the various brands, as well as information available in the media space. In light of various emission scandals that have affected certain vehicle manufacturers, the study was undertaken with the objective of analysing the influence these emission-scandals have had on customer equity in the automotive industry. While the data for both research instruments (sales data and questionnaire) was gathered using specific brand names, the names of the brands have been omitted from this research paper to prevent reputational harm.

This chapter, therefore, provides the background of the research study. Subsequently a justification for the study is made. Thereafter, an outline of the research problem and research objectives are outlined. Key concepts are then defined and clarified, followed by an overview of the methodology used in the study. The chapter concludes with an outline of the entire study.

1.2. Background to the research

The concept of customer equity is an approach to customer acquisition and retention as well as the management of customer value for the company (Pavlova, 2015). This is necessary in order for a firm to obtain a competitive advantage, enhance their marketplace presence, and increase market value (Pavlova, 2015). Thus, CE is viewed as a strategic asset, which is key to a company's performance. A continuous focus on CE is required, if it is to be used as a measure to drive performance (Vogel, Evanschitzky, and Ramaseshan, 2008). Furthermore, CE is seen as a driver for future

sales. Organisations also view customers as market-based assets and thus research that creates linkages between operational inputs, customer attitudes and equity is gaining prominence (Vogel, Evanschitzky, and Ramaseshan, 2008).

In light of the above, the necessity to understand CE in the context of the Dieselgate scandal is apparent. This is further substantiated by the Resource-Based View (RBV), which draws linkages between customers as market-based assets and Customer Relationship Management (CRM), with CRM being a component of CE (Estrella-Ramon, et al., 2013). RBV is the focus on a firm's internal resources and capabilities. Additionally, RBV focusses on how the resources are utilized in the formulation of strategies as the basis for creating a sustainable competitive advantage (Madhani, 2010). While RBV focuses on internal resources, the aim is to strategically compete in the external business environment (Madhani, 2010). Although certain incompatibilities exist between the principles of marketing and RBV, a common emphasis exists between leveraging resources to create sustainable value for the organization's stakeholders, particularly customers (Srivastava, Fahey and Christensen, 2001). A firm can have a customer-based advantage when certain segments of its products are preferred over the offerings of rival companies (Srivastava, Fahey and Christensen, 2001). It can then be argued that VW and the other OEMs who altered software to cheat were not using their internal resources to compete in a fair manner. Instead, they chose to gain an advantage over their rivals in the diesel vehicle segment by means of underhanded practices.

The internal resources that create a competitive advantage for an organisation should also fit the Value, Rare, Inimitable, and Organisation (VRIO) framework (Cardeal and Antonio, 2012). A resource generates value when it allows a company to create and employ strategies that drive efficiency and effectiveness. The rarity of a resource refers to its lack of availability to competitors, while inimitability refers to the lack of duplicability of a resource, that cannot easily be replicated. Lastly, organisation refers to the organisation itself, and how the business and its processes are structured to create value for the end customer in a unique way (Cardeal and Antonio, 2012). Furthermore, not all resources are strategic in nature, nevertheless a competitive advantage is attained when resources are heterogeneous and immobile (Madhani, 2010). Based on the above, emission efficiency, was the resource that could not be

easily replicated for diesel engines, and VW resorted to alternative means in order to make their products 'appear' more competitive.

Vogel, Evanschitzky and Ramaseshan (2008) identified three CE drivers that positively influence customer loyalty intentions, these include value equity, brand equity, and relationship equity. In addition, customer loyalty intentions positively affect future sales. This means that customer loyalty intentions is of particular interest to organisations, as it directly impacts future profitability.

A further dimension to customer equity that is of relevance, is Customer Lifetime Value (CLV). The general belief is that existing customers are more profitable to a firm (Jain and Singh, 2002). This is due to the price premium paid by loyal customers, additional sales garnered through referrals, savings realized by serving existing customers and increased revenue due to increased sales to existing customers (Reichheld and Teal, 1996 cited in Jain and Singh, 2002, p.34). Estrella-Ramon, et al. (2013) identified two different ways of managing CLV, at an individual and aggregate level. The latter of these is pertinent when considering CE and the Dieselgate scandal. VW attempted to gain market share in America by creating products that deceived customers. The result was a 'fabricated' CE, that lasted only for a short time, i.e. the competitive advantage gained, if any, was ultimately not sustainable. Furthermore, the CE driver of brand equity is particularly relevant in the context of the Dieselgate scandal.

While there are many measures of brand equity, there are two broad measurement approaches that assess firstly, what consumers feel and think of a brand (consumer-based brand equity) and secondly, one based on value or share in the marketplace (sales-based brand equity) (Datta, Ailawadi, and van Heerde, 2017). Moreover, a study conducted by Delgado-Ballester and Munuera-Alemán (2005) found a positive correlation between brand trust, brand loyalty, and brand equity. This study highlights the importance of brand equity, not as a singular concept, but rather as a more complex concept made up of various elements. This once again shows its central role in attracting and keeping customers loyal to a brand, as well as the fact that companies need to work hard at building brand equity over time (Delgado-Ballester and Munuera-Alemán, 2005). The brand equity established by VW and other OEMs involved with the diesel emissions scandal could then be potentially destroyed as the result of a singular event.

1.3 Statement of the problem

The advent of the Dieselgate scandal has had a significant effect on the automotive industry (West, 2018). Sweeping changes are coming, most notably with regard to the acceleration of electric vehicle development and regulation changes (West, 2018).

Consumer preferences towards diesel vehicles have been negatively impacted, particularly in Europe, where the sales of diesel vehicles saw significant drops in the wake of the Dieselgate scandal. In 2017 for example, France saw a sales decline for diesel vehicles to below 50% of market sales for the first time in nearly two decades (Petzinger, 2018). Consumers have realised that while consumption figures were what primarily drove the market in favour of diesel vehicles, the important focus should have been on CO₂ emissions and this points to consumers maturing in their understanding and expectations of vehicle technologies. When a CO₂ comparison is done between petrol and diesel vehicles, the advantage of diesel vehicles becomes less apparent (Petzinger, 2018).

While there is much information available on Dieselgate for the European markets, this dissertation will focus specifically on the South African market, a market where consumer expectations are very different from those in Europe. South African consumers, for instance, have a large preference for the second-hand market, with annual new car sales having declined over the past decade (Parker, Messaris and Bax, 2016). Additionally, carpooling and ride-sharing are major trends influencing the European market because of the congestion experienced in their cities. On the other hand vehicle ownership in sub-Saharan Africa still has aspirational value (Parker, Messaris and Bax, 2016). Lastly, the European automotive market is relatively mature when compared to that of sub-Saharan Africa (Parker, Messaris and Bax, 2016).

In the media space, diesel has been demonised in the eyes of the average consumer (Mathieson, 2015). Considering the above information, it is critical to understand whether it was just diesel technology that has been affected by the Dieselgate scandal, or whether it has also influenced consumers' perceptions of the companies involved. VW is currently involved with a brand cleansing campaign, investing heavily in electric vehicle development as a new focal point (Bailey, 2015). This is an attempt by VW to make Dieselgate fade in the memory of consumers. But has it been able to do so effectively?

Thus this study, amongst other things, also intends on exploring whether the Dieselgate scandal has made its way into the minds of the South African consumers and thus impacting their purchasing decisions. Based on this, this study will look at whether the Dieselgate scandal had any effect on the sales of new vehicles in the South African market and secondly, whether Dieselgate affected the way that consumers perceive certain automotive brands in South Africa?

1.4 The objectives of the research study

The objective of this research is to investigate whether new vehicle sales and customer equity were affected by the Dieselgate scandal for the selected brands (Brand A, Brand B, Brand C, and Brand D) in South Africa. Evidence of this relationship will present a foundation for future marketing activities and opportunities for the affected brands to strengthen their customer equity.

1.4.1 Specific aims

The aims of the study were:

1. Assess the new diesel vehicle sales in the South African market for a defined period, both prior to as well as post Dieselgate using statistical analysis to establish whether there is a difference between the time periods.
2. Assess the overall new vehicle sales in the South African market for a defined period, both prior to, as well as post Dieselgate using statistical analysis to establish whether there is a difference between periods.
3. Assess overall new vehicle sales for Brand A, Brand B, Brand C, and Brand D in the South African market for a defined period prior to, as well as post Dieselgate, using statistical analysis to establish whether there is a difference between the time periods.
4. To establish whether Brand A, Brand B, Brand C, and Brand D suffered a loss in customer equity by comparing pre- and post-Dieselgate periods for the customer equity drivers (brand, value, and relationship).

1.4.2 The research question

The Dieselgate scandal left the car industry in a state of crisis. In the wake of the Dieselgate scandal diesel engines lost favour with consumers, and automotive manufacturers faced trouble on a multitude of fronts: financial, environmental and legal, (West, 2018). Based on this, the research question was posed as:

Did the advent of Dieselgate have an influence on vehicle sales and customer equity for Brand A, Brand B, Brand C, and Brand D in the South African automotive market?

1.5 Hypotheses of the research study

An hypothesis is understood to articulate the premise with which any research is undertaken and understood (Bang, et al., 2012). Furthermore, according to Bang, et al. (2012, p.18), "It articulates and de-limits the validity of the studies and frames the methodological landscape". Based on this, the following hypotheses were formulated based on the research question posed in the preceding section, subsequent to an extensive review of the literature available on the subject.

Hypothesis H1

H₀1: Diesel vehicle sales were not affected by Dieselgate

H_a1: Diesel vehicle sales were affected by Dieselgate

Hypothesis H2

H₀2: Overall vehicle sales were not affected by Dieselgate

H_a2: Overall vehicle sales were affected by Dieselgate

Hypothesis H3

H₀3: Affected manufacturers vehicle sales were not affected by Dieselgate

H_a3: Affected manufacturers vehicle sales were affected by Dieselgate

1.6 Significance of the study

This research and its outcomes will be beneficial to the automotive industry at large, as it will provide insight into customer behaviour. Consumer behaviour is based on the way companies conduct their business and whether customers are treated in an ethical manner. Additionally, the research will provide insight on whether customers distance themselves from brands based on practices that not only affects their products, but also impacts human health at large, as a result of negative company behaviour.

In light of the resource-based view, this research provides insight into how organisations can leverage their resources to build a sustainable advantage, instead of dishonestly fabricating an advantage over competitors. Fabricated advantage

ultimately will result in large losses, that are significantly greater than the gains obtained by adopting deceptive practices.

This study is also important to organisations that are considering new technology in the automotive industry, namely electric and autonomous vehicles (Gao, et al., 2016). This is of particular relevance in light of the entry of newcomers from the technology world such as Tesla, Google, and Uber, especially when they are making such huge strides in dictating the future of mobility (Wade, 2018).

Lastly, the outcomes of this research are not only applicable to automotive manufacturers or manufacturing organisations, but to any organisation that seeks to do business in an underhand fashion in order to gain a competitive advantage.

1.7 Research study outline

1.7.1 Chapter 2: Literature review

Chapter 2 reviews and discusses the current literature, and outlines key concepts that include the main topic of customer equity with its related drivers, that is: brand equity, value equity, relationship equity, customer lifetime value, and customer relationship management. Furthermore, four models related to customer equity are evaluated and discussed. This chapter closes with discussions regarding the resource-based view and the Valuable, Rare, Inimitable, and Organisation (VRIO) framework.

1.7.2 Chapter 3: Research methodology

This chapter outlines the design details of this research, including the paradigm where the study is located (positivist), the type of study undertaken (quantitative as well as descriptive), the dual approach used to assess customer equity, the research instruments used and the data collection and analysis techniques utilised for the research study.

1.7.3 Chapter 4: Results and discussion

The statistical interpretation of the data gathered for the purposes of this study are outlined and discussed in this chapter. The initial section of this chapter outlines the paired *t-test* conducted for firstly, the sales of diesel vehicles for 21 months prior, as well as 21 months post-Dieselgate. The second paired *t-test* includes overall sales data for the same periods of 21 months prior to, as well as 21 months post-Dieselgate. The section of chapter 4 subsequent to the initial section, provides an overview of

respondents' profile, including the crucial question about awareness of the Dieselgate scandal. The closing portion of this chapter outlines the results of the customer equity questionnaire research instrument by means of descriptive statistics. The value, brand, and relationship driver questions are analysed for each of the focal brands (Brand A, Brand B, Brand C, and Brand D). The chapter then concludes with a discussion regarding the results.

1.7.4 Chapter 5: Limitations, implications, recommendations for future research, summary and conclusion

In terms of the limitations of the study, a number of factors that were not included in the study are outlined. The implications of the study are outlined together with recommendations study based on the findings, as well as particular avenues for future research are mentioned here. The chapter then closes with a summary of the results and discussion, as well as the final conclusion.

1.8 Conclusion

This chapter provided an outline for the study.

The statement that informed the research along with the objectives and specific aims of the research was revealed briefly. Furthermore, the significance of the study was discussed, along with the final outline of the subsequent chapters.

The next chapter will review the current literature relevant to the subject and will provide a theoretical context to the study.

Chapter 2 - Literature review

2.1 Introduction

This chapter explains the concepts of customer equity (CE) (including its drivers), brand equity, value equity and relationship equity. Some prominent models of CE are also reviewed. Customer lifetime value (CLV), a further dimension of CE, is also outlined, as well as customer loyalty intentions, and customer relationship management. The resource-based view and the internal resources that create a competitive advantage for organisations, known as the VRIO framework (valuable, rare, inimitable, and organisation), are topics that conclude the chapter.

In light of the resource-based view above, it is important to understand that an organisation's resources are what give it its competitive advantage, which means that it must be difficult for competitors to replicate. Resources, as a source of competitive advantage, is further related to CE in the sense that it is built by an organisation with its customers over a period of time. The relevance of resources to this study is the fact that original equipment manufacturers (O.E.M.'s) involved in the emissions cheating did not compete fairly in the market by using their resources in an ethical manner. Instead these O.E.M.'s chose to use their resources to manipulate consumers into believing that their products were superior. Bearing this in mind, the study will aim to establish whether the Dieselgate scandal has impacted CE for the manufacturers in question.

2.2 Customer equity (CE)

The concept of customer equity (CE) can be defined as the acquisition and retention of customers. This includes the approach to the management of customer value for an organisation over the lifetime of the customers' relationship with the organisation (Blattberg and Deighton, 1996). This concept considers the maintenance of long-term relationships with customers for consumer-orientated firms in guaranteeing sustainable market performance (Blattberg and Deighton, 1996). The management of CE leads to a company gaining a competitive advantage, expanding their market presence, and enhancing their market value. Furthermore, the management of CE is seen to be a dynamic and integrated marketing system, which makes use of information gained on customer behaviour and techniques for financial assessment

(Pavlova, 2015). The original concept of CE was proposed by Blattberg and Deighton in 1996 and has since been researched and refined by numerous authors (Bick, 2009).

With regard to marketing management, CE theory's approach is grounded in a number of converging research streams that include service quality, direct marketing, brand equity, and relationship marketing (Hogan, Lemon and Rust, 2002). When these streams are integrated, the concept of CE highlights the aspects of assessing the relationships with customers, defining strategies for long-term relationships with customers, maximising the value of cash flows from customers, and increasing the company's market value (Gupta, Lehmann and Stuart, 2004).

Rust, Lemon and Zeithaml (2004, p.110), on the other hand, define CE as "the total of the discounted lifetime values summed over all of the firm's current and potential customers". Using this definition, customers and CE ought to be more central to many firms than the concepts of brand and brand equity, even though current management practices and metrics do not reflect this (Rust, Lemon and Zeithaml, 2004). Furthermore, this customer-centric approach should be reflected by a shift being made from a product- to a customer-based strategy. (Rust, Lemon and Zeithaml, 2004). In terms of a consumer-based strategy, generating consumer insights is important for companies who wish to persuade consumers to purchase their products or services. These insights can further assist companies in developing the correct products and services (Hamilton, 2016). It is important to note that a consumer-based strategy differs from consumer research in that it leverages insight in order to further develop an organisational strategy (Hamilton, 2016). It is important to note that in light of the above, a company's strategic opportunities are best considered in terms of a company's ability to improve the CE drivers (Rust, Lemon and Zeithaml, 2004).

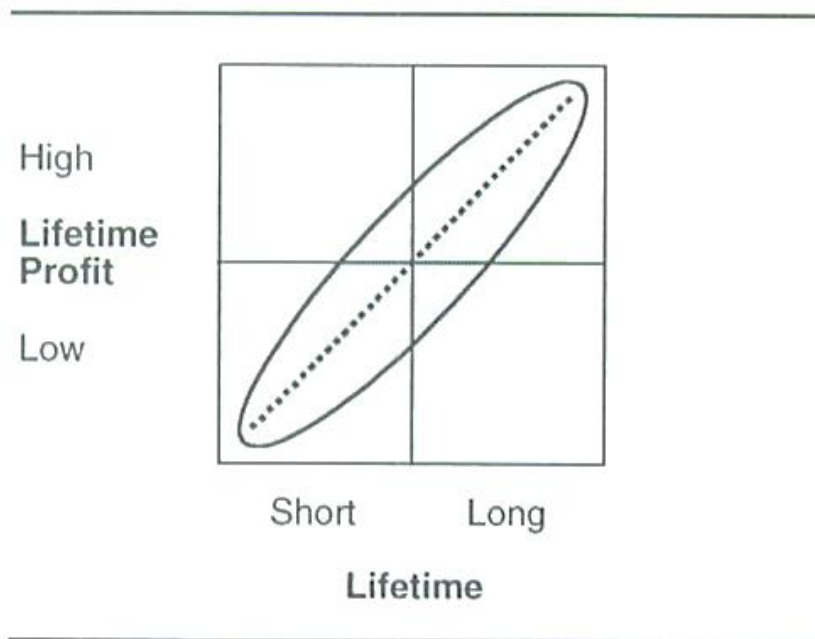
Another important aspect of CE is that it can be used as an asset by marketers to drive shareholder value (Blattberg and Deighton, 1996). The danger in this approach is that company management in the midst of increasing pressure, will focus on short-term targets and in the process, sacrifice long-term investments. This is a very narrow-minded approach (Bick, 2009). CE is defined as an intangible asset, an asset that is used to drive shareholder value over the longer term and this is counter to a short-term focus by management. Furthermore, brand equity (BE) is another intangible asset that companies can use to drive shareholder value (Zaichowsky, Parlee and Hill,

2010). Brand equity can be defined as the set of assets or liabilities inherent in a brand that either add or subtract value for a firm and its customers (Aaker, 1996). Evidence can be seen in the fact that branding has, for quite some time, been used to differentiate the products or services of a firm from those of its competitors (Mindrut, Manolica and Roman, 2013). The concept of BE, while not mutually exclusive to CE, overlap in some primary areas. These areas are seen to be the acquisition of customers for current offerings, cross-purchasing of new products by existing customers, the ability of a firm to add a premium to the price of their products or services, and lastly, a reduction of marketing expense (Kumar, Ramani and Bohling, 2004; Romero and Yagüe, 2015). Perhaps, the most important of the differentiating factors is that, BE has an impact primarily in the acquisition of new customers for a company, while CE focusses specifically on the retention of current customers with future purchases (Bick, 2009).

2.2.1 Customer lifetime value (CLV)

Customer Lifetime Value (CLV) is a very closely associated aspect of CE. Put simply, CLV is the measure of current and future revenues of consumers (Berger and Nasr, 1998). This is an important concept, as it is more profitable for organisations to retain existing customers (while focussing on customer satisfaction), than it is for that same organisation to constantly renew its customer base (Reinartz and Kumar, 2003). Figure 2.1 below demonstrates this concept. It shows that the longer an organisation maintains a relationship with a customer, the more profitable that customer will be to the organisation over the long-term (Reinartz and Kumar, 2000). It is also understood that most authors contend that CLV considers the concept of the time value of money (Pfeifer, Haskins and Conroy, 2005). It is further argued that the word value in CLV should have the exact meaning as it does in the financial world, i.e. that the valuation of an asset is determined by its net present value (Pfeifer, Haskins and Conroy, 2005). Bearing this in mind, the customer relationship can then be conceptually defined as an asset with net present values and all future values discounted to match the present value. To achieve parity with financial principles, CLV should then be measured on the present value cash inflows, as well as outflows that are accrued by the company over the lifetime of the relationship with any customer. Lastly, it should be noted that this does not form part of the notion of profit (Pfeifer, Haskins and Conroy, 2005).

Figure 2.1 - Lifetime-Profitability association. Reinartz and Kumar (2000, p.19)

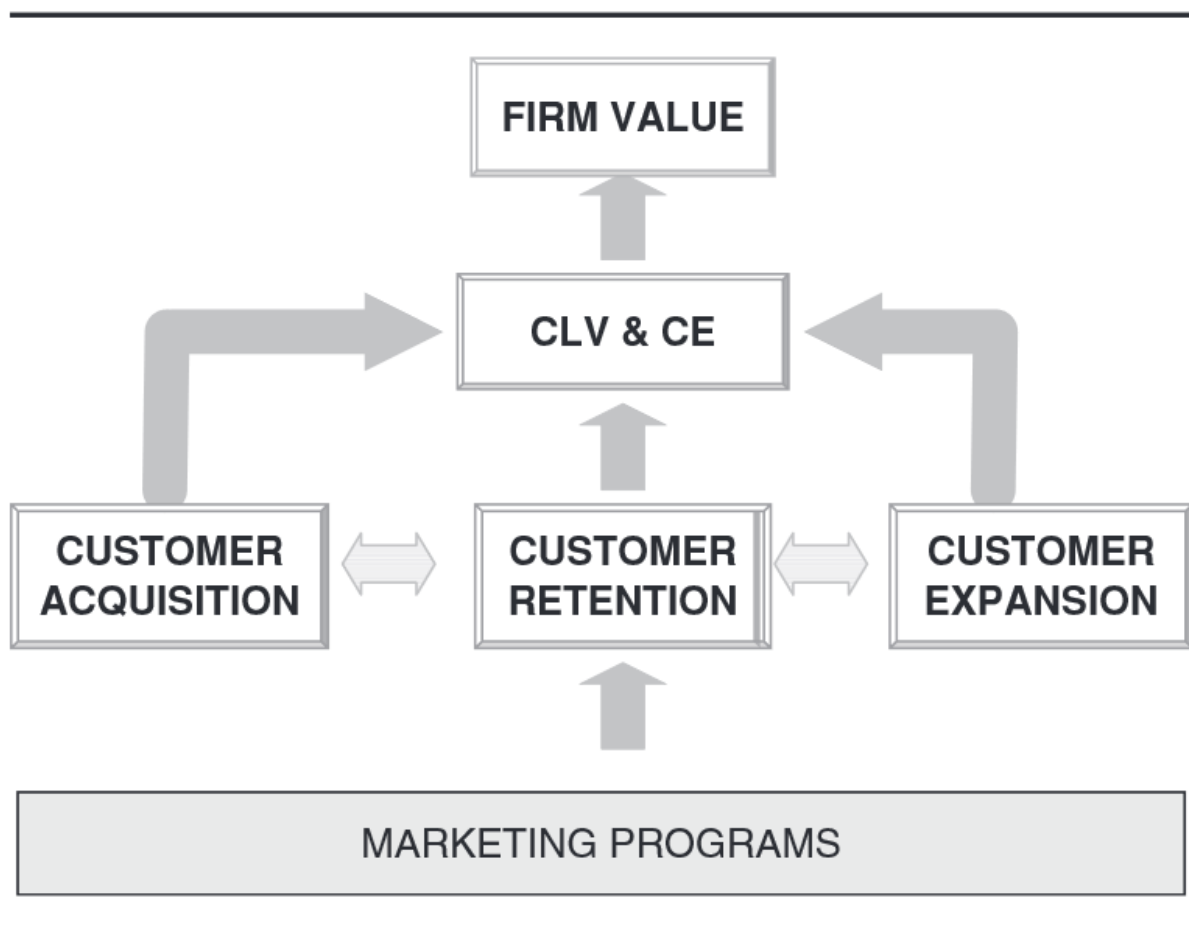


There is a further distinction between CLV and customer profitability (CP). CP can be defined as the revenues earned in terms of the customer relationship over a specific period, less the costs associated with the customer relationship (Pfeifer, Haskins and Conroy, 2005). From a financial perspective it can then be seen that the difference between CLV and CP is in the distinction between value and profit. This means that value refers to an items worth, whereas profit is the difference between revenues and costs over a specific period. Furthermore, when considering future cash flows, a customer could currently be unprofitable, but still maintain a positive CLV (Pfeifer, Haskins and Conroy, 2005).

A basic premise of CLV is that it is inherently tied to customer equity (Gupta, et al., 2006). A basic framework that shows the relationship between marketing programmes and the influence on customer behaviour. This is in terms of customer acquisition, retention, and cross-selling, which has been utilised by many researchers. Furthermore, this then influences CLV and CE which also influences a company's value or profitability through its customers (Gupta, et al., 2006). The conceptual framework (Figure 2.2) highlights various links that researchers have attempted to model. The first of this is the research into the impact that marketing programmes have on customer acquisition, retention and expansion (or cross-selling). The second use of the framework is to understand the relationship between the various components of

CLV. Some examples of this may be the relative importance of some of the components of the model or the linkages between CLV and CE to company value (Gupta, et al., 2006). Some weaknesses of the existing research into CLV and CE include the measures of satisfaction and purchase intent. These aspects showed inconsistency when measured across the same subjects at a later period which creates a method bias when compared to using actual purchase. Additionally, while transactional data is available for the entire customer base, attitudinal measures make use of only a sample of the customers (Gupta, et al., 2006).

Figure 2.2 - Conceptual framework for modelling customer lifetime value. Gupta, et al. (2006, p.140)



2.2.2 Customer equity model review

Blattberg and Deighton (1996)

Earlier models of customer equity placed an emphasis on organisations having an understanding of their customer base. The derived optimisation model made use of information on customer acquisition and retention. The model utilised acquisition and retention curves based on data of current acquisition and retention spend, as well as success rates and acquisition and retention ceilings. These curves were then used to determine the optimal customer acquisition and retention levels (Blattberg and Deighton, 1996).

This model contributed towards the formation of a mathematical model which was to be used as a guide for marketing with respect to the amounts spent on customer acquisition and retention in an attempt to maximise CE. In addition, this CE model also provided a list of guidelines that could be used to assist organisations in maximising their CE. However, the model has one limitation - it does not distinguish between the various market-spend components which include add-on or cross-selling into an account.

Rust, Zeithaml and Lemon (2000)

The CE model developed in 2000, focused on the drivers of customer equity, these are: value equity, brand equity, and relationship/retention equity. The model's basic premise is that customers will make purchase decisions based on their perception of whether the value drivers including price, quality, and value-for-money or general perceptions are satisfied (Rust, Zeithaml and Lemon, 2000).

The value equity drivers are also stated to be cognitive, objective, and rational (Rust, Zeithaml and Lemon, 2000). Value can also be defined in terms of the perceived value received (based on aspects specific to the customer such as quality), when compared to what he/she gives in return (price and non-monetary value such as time or effort) (Rust, Zeithaml and Lemon, 2000). Based on the above, a company can improve CE by providing more value to the customer for a lower price. Moreover, organisations are able to manage sub-drivers of value equity by identifying the situations where value equity is most important (Rust, Zeithaml and Lemon, 2000).

Brand equity is best described as an intangible asset which involves the customer's subjective assessment of a brand. The factors or sub-drivers that influence a brand's perceived value are customer attitude towards the brand, brand awareness, and brand or corporate ethics (Rust, Zeithaml and Lemon, 2000). The brand equity driver is typically of more importance with low-involvement purchases that don't involve complex decision-making processes (Bick, 2009).

Retention/relationship equity activities aimed at building customer relationships, with the goal of maintaining repeat purchases and enhancing the prospects of increased spending by existing customers. A firm can utilize loyalty programmes, community building programmes, and knowledge-building programmes in order to build relationship equity (Rust, Zeithaml and Lemon, 2000). This CE driver has been known to be more beneficial for organisations that offer a variety of products and services to the same customers.

This CE model used field research with actual customers to determine the relative importance of the CE drivers, as well as sub-drivers and contrasted this with the performance of the organisations. With this model, guidelines for improving CE are provided for organisations by focusing on the under-performing sub-drivers. The main contribution of this model is understood to be the central focus of customer inputs, while exploring at a deeper level, the underlying CE drivers that organisational management bodies can measure and strengthen. This CE model, however, has a shortcoming: there is no provision for evaluating its marketing programme, and its effectiveness in building CE.

Rust, Lemon and Zeithaml. (2004)

Building on the model developed in the Rust, Lemon and Zeithaml (2000) paper, the updated 2004 model made use of Markov brand-switching matrices to model aspects of CE such as customer retention, defection, and return prospects. Equations were developed by the authors to model the dependent variable, probability of choice, the probability matrices, and CE in the form of customer lifetime value (Rust, Lemon and Zeithaml, 2004). The improved model considered field surveys of consumers which placed an emphasis on the purchase amounts and, frequency, as well as the intent of the purchase divided amongst the different providers.

The purpose of this model is to understand the impact that marketing investment has on specific drivers of CE, and how this influences customer lifetime value. The financial aspects used in this model, such as return on marketing investment that is used to calculate a change in CE, allows for the returns on various marketing programmes to be compared. This allows company management to understand how to use the different marketing programmes to drive shareholder value. A strength of this model is that it uses actual customer inputs, as well as relative sensitivities of these inputs for externally focused CE optimisation. Some of the weaknesses of this model are that it requires customers to have a healthy recall of their historic spend, in reality this is not very accurate. The complexity of the model used may also make it difficult for other organisations to replicate it (Bick, 2009). The model also assumes that there is only one brand or product in the organisation and it does not consider cross-selling between the multiple brands or products that an organisation may have (Rust, Lemon and Zeithaml, 2004).

Gupta and Lehmann (2003)

The Gupta and Lehmann (2003) model was developed to address the difficulties previous researchers had in linking customer lifetime value with firm value. (Gupta and Lehmann, 2003). These difficulties arise partly because of the extensive data and complex modelling required to measure the customer relationship and customer lifetime value in business. Additionally, previous research has not shown a strong link between the customer and company value (Gupta and Lehmann, 2003). The model uses publicly available data with simple formulas to estimate customer lifetime value (Gupta and Lehmann, 2003). A link is then shown between customer value and company value, which then provides a guideline towards strategic decision-making, which is useful in the current context of exploring merger or acquisition opportunities. It is also found to be beneficial in assessing a company's value, when traditional financial metrics fail or don't provide a holistic picture (Gupta and Lehmann, 2003).

A strength of this model is the simple manner in which it calculates customer lifetime value and in essence, CE. The aim of the model is to determine customer value using internal metrics. A weakness of the model is its lack of external focus, as it does not consider the effectiveness of the various marketing programmes as well as customer inputs in terms of CE drivers.

2.2.3 Brand equity

Brands have been used by companies for many years to differentiate their products and services from those of their competitors. While there is a long history of branding and brand management practices, brand equity (BE) as a concept has only gained prominence since the 1980s (Leone, et al., 2006). The mergers and acquisitions boom of the 1980s is what initially spurred much of the interest in brands, where the purchase price paid for many companies was reflective of the brand's value. From this, it can then be seen that brands are one of the most important intangible assets of an organisation (Leone, et al., 2006).

As a result of this realisation, much research has been done and many models have been created in order to understand branding as well as brand equity. These models share a few common basic premises regarding brand equity, one such premise is that, a brand's power exists in consumers' minds and is based on their experiences, as well as what they have learnt and felt about a brand over a certain period of time (Leone, et al, 2006). Additionally, BE can be thought of as a 'supplementary value' endowed to a product in terms of the words, thoughts, and actions of consumers. There are numerous ways in which this added value can be constructed for a brand, as well as varying avenues by which the value of a brand can be demonstrated or utilised towards the benefit of an organisation, i.e., increased revenue or lower costs (Leone, et al., 2006).

A distinction can be made between two different aspects of how a brand is defined. The first being, the brand which is distinctive in terms of the small 'b' and includes tangible elements such as the name, term, signage, as well as other elements which are used to differentiate the brand. The second aspect is of course the Brand in terms of the big 'B', and this includes the less tangible elements such as awareness, reputation, and associations which are created in the marketplace (Keller, 2006 cited in Riley, 2009, p.2). It can then be seen that in addition to having the role of differentiation, brands are also used to build competitive advantage points and financial returns for an organisation. Brand equity is a market-based intangible asset that can be leveraged by companies towards improving the performance of an organisation (Zaichowsky, Parlee and Hill, 2010).

According to Bick (2009) brand equity is comprised of four major asset categories. These include: brand name awareness, brand loyalty, perceived quality and brand associations. Brand awareness is related to the strength of the brand's presence in consumers' minds, which can be measured by recognition and recall, while brand loyalty represents the consumers' willingness to repurchase the same brand. The perceived quality represents the main reason-to-buy for a consumer and is also the reason for which they are prepared to pay a premium price. Lastly, brand associations are attributes which consumers associate with a specific brand. Therefore value provided to the customer through BE by intensifying the consumer's interpretation or processing of information, adding confidence in the purchasing decision and satisfaction in use (Bick, 2009).

Academics have approached the study of BE with three distinct perspectives. The first is a customer-based perspective. This point of view is premised upon the customer's perception of a brand and whether they are attracted or repulsed by the brand, due to some non-objective part of the product offering that would be something other than the product's attributes (Keller and Lehmann, 2006). While it may be true that the product and the brand are directly tied to one another, factors such as advertising, usage experience, and other activities will influence a series of attachments and associations that exist over and above the base product over time (Keller and Lehmann, 2006).

The second perspective is that of a company-based perspective. From a company's point of view, a strong brand serves many purposes which include increased effectiveness of advertising and promotion, securing distribution, protecting a company's product from competition, and allowing growth and expansion into other product categories (Hoeffler and Keller, 2003 cited in Keller and Lehmann, 2006, p.745). As stated by Keller and Lehmann (2006, p.745), "Brand equity from the company perspective is therefore the additional value (i.e. discounted cash flow) that accrues to a firm because of the presence of the brand name that would not accrue to an equivalent unbranded product". Basically, BE is seen as capturing a rate of market inefficiency through the use of a company's brand (Keller and Lehmann, 2006).

Finance-based perspective is the third perspective. From this perspective, a brand is considered to be an asset much like property, plant and equipment. Therefore, the

price of a brand is the price it could realise in the financial market. This price includes expectations about the discounted value of future cash flows (Keller and Lehmann, 2006). In terms of valuation approaches, these can be classified into five categories which include: cost-based approaches, market-based approaches, economic-use or income-based approaches, formulary approaches, and special situation approaches (Abratt and Bick, 2003). Cost-based approaches are related to the costs associated with the creation of a brand, or the replacement cost when launching a new brand. Market-based approaches use a valuation based on the amount a brand can fetch on the open market. This is derived by comparing amounts paid for similar brands or the brand equity apportionment of the market value of a company. The economic-use or income-based approaches considers the future value of net earnings (Abratt and Bick, 2003). Formulary approaches to BE valuation uses methods popularized by companies such as Brand Finance, BrandMetrics, Equitrade, and Interbrand to determine the value of a brand by utilising multiple brands, market and risk criteria. Special situation approaches include strategic purchases done with a premium, liquidation sales including a discount, or for special purposes such as tax (Abratt and Bick, 2003).

Having a strong brand in the market is important to organisations because it provides many benefits such as companies being relatively immune to the to the marketing actions of competitors. It can also provide greater margins, brand extension opportunities, and improved intermediary co-operation and support (Delgado-Ballester and Munuera-Aleman, 2005). Brand equity is a relational market asset because it exists outside an organisation, in the sense of the relationship it has with brand users (Srivastava, Fahey and Christensen, 2001). Additionally, the dominant focus on relationship marketing by both practitioners and theorists would suggest that the main factor underpinning such relationships is trust (Delgado-Balester and Munuera-Aleman, 2005).

Although there are many measures of BE, there are two broad measurement approaches, the first being consumer-based brand equity (CBBE) - what consumers think or feel about a brand. The other, called sales-based brand equity (SBBE), is based on choice or share in the marketplace, (Datta, Ailawadi and van Heerde, 2017). Research into the concept of BE has seen consumer-based brand equity being measured on a large scale and along multiple dimensions. By contrast, sales-based

brand equity is seen to be the marketplace manifestations of these consumer perceptions. Therefore, sales-based brand equity, in addition to its objectively measured attributes and marketing mix, is part of a brand's utility (Datta, Ailawadi and van Heerde, 2017). According to Datta, Ailawadi and van Heerde (2017, p.2), "Despite the importance of brand equity in marketing theory and practice and despite the fact that firms spend considerable sums of money to track CBBE and SBBE, no empirical study to date has systematically investigated the link of CBBE with SBBE or marketing-mix response".

2.2.4 Value equity

Value is at the very centre of everything an organisation does. This is in terms of building and maintaining the customer relationship. The best brand strategy and strongest retention and relationship marketing strategies will be inadequate if an organisation's products and services do not meet customer's expectations (Lemon, Rust and Zeithaml, 2001). According to Lemon, Rust and Zeithaml (2001, p.1), "Value equity is defined as the customer's objective assessment of the utility of a brand, based on perceptions of what is given up for what is received". Additionally, there are three key levers that influence value equity, namely, quality, price, and convenience (Lemon, rust and Zeithaml, 2001). The quality aspect of the product or service is encompassed in the objective physical and non-physical aspects. Price represents aspects of what is traded or given up by the consumer, and that which is influenced by the organisation. The last of the three key levers, convenience, is related to the reduction of time costs, search costs, and the consumer's efforts when doing business with the company (Lemon, Rust and Zeithaml, 2001).

2.2.5 Relationship equity

According to Lemon, Rust and Zeithaml (2001, p.2), "Specifically, relationship equity is defined as the tendency of the customer to stick with the brand, above and beyond the customer's objective and subjective assessments of the brand". This is based on the premise that brand equity and value equity may not be enough to keep the customer captive, especially in light of the shift from goods to services and from transactions to relationships (Lemon, Rust and Zeithaml, 2001). Furthermore, the key levers that organisations can use to influence relationship equity are loyalty programs, special treatment and recognition, affinity programs, community-building programs, and knowledge-building programs. Perhaps the most common of these is loyalty

programs and these programs recognise a consumer's specific behaviour with tangible benefits (Lemon, Rust and Zeithaml, 2001). Special treatment and recognition involves recognising a customer's specific behaviour with intangible benefits (such as a VIP customer service desk at a car rental outlet), while affinity programs attempt to create a strong emotional connection with consumers by linking the relationship the customer has with the firm to some important aspect of the customer's life. An example of special treatment or recognition is the VIP service desk available to certain customers at car rental terminals. A rewards card that allows a customer to accumulate points with every purchase is an example of an affinity program. Community-building programs link the customer to a larger community of similar or identical customers in an attempt to build the customer-company relationship. Knowledge building programs create structural bonds between the company and the customer, which makes the customer more reluctant to re-create those bonds with another provider (Lemon, Rust and Zeithaml, 2001).

2.2.6 Customer relationship management (CRM)

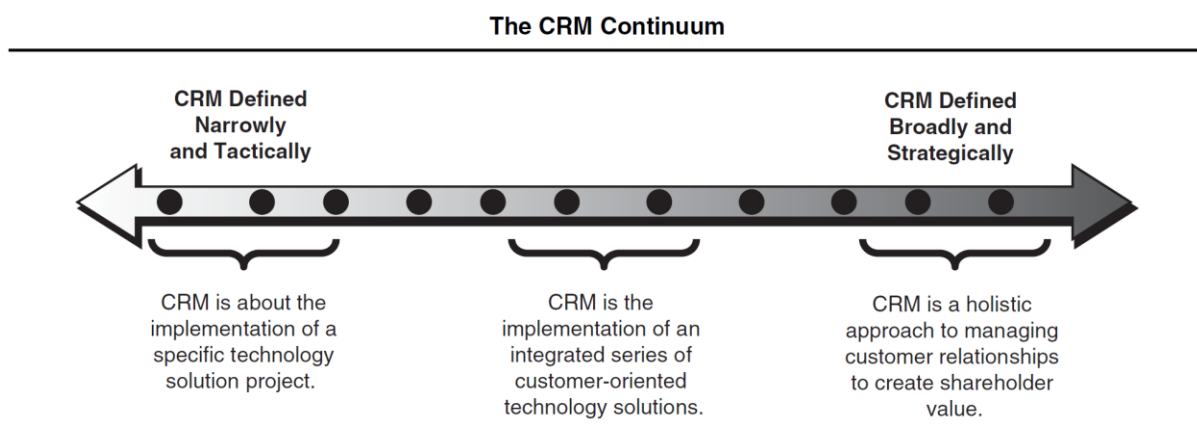
The information technology revolution has allowed companies to build better relationships with customers than what was possible previously. This increased ability to build, nurture and sustain long-term customer relationships is due to the fact that companies can now respond directly to customer requests and provide them with a customised, highly interactive experience (Winer, 2001). Additionally, mass production techniques and mass marketing techniques altered the competitive landscape by changing the way products are made available to consumers. This means that the traditional shopkeeper/customer relationship has fundamentally changed and organisations must now use other means to build relationships with their consumers (Chen and Popovich, 2003). Another area of concern is that in the midst of globalisation, e-commerce and world wide trading is that in some instances, customers have become defined merely by their account numbers and the personal relationship with customers has disappeared to some extent (Chen and Popovich, 2003). This is an area of concern that must be addressed.

According to Payne and Frow (2005, p.167), "The term "customer relationship management" emerged in the in the mid-1990s in the information technology (IT) vendor and practitioner communities. It is often used to describe technology-based customer solutions, such as sales force automation (SFA)". The primary motivation for

a company to implement CRM applications is to track customer behaviour, and to gain insights into evolving customer needs and tastes (Mithas, Krishnan and Fornell, 2005). In addition, customer knowledge is complex and can be derived from multiple sources and this knowledge could also have many contextual meanings. Customer knowledge is also seen to be dynamic and rapidly changing (Mithas, Krishnan and Fornell, 2005). Thus organisations need to be aware of these changes and should keep up with or be ahead of the anticipated change.

Problems in organisations adopting customer relationship management (CRM) stem firstly from an organisations understanding of its components. This can mean a variety of things to different executives. Furthermore, this lack of a universal definition of CRM can lead to CRM projects failing, either because an organisation views it from a limited technology perspective or, decides to undertake it on a fragmented basis (Payne and Frow, 2005). CRM is not to be viewed simply as an IT solution used acquire and grow the customer base from a strategic point of view, according to Payne and Frow (2005, p.168), “it involves a profound synthesis of strategic vision; a corporate understanding of the nature of customer value in a multichannel environment; the utilization of the appropriate information management and CRM applications; and high-quality operations, fulfilment, and service”. With emphasis of technology, CRM can also be defined from a minimum of three perspectives that can be portrayed as a continuum as per Figure 3 below. The first of these being from a narrow point of view or tactically as a singular technology solution, the second perspective being wide-ranging technology, and lastly customer-centric perspective (Payne and Frow, 2005).

Figure 2.3 - The CRM continuum. Payne and Frow (2005, p.168)



There are three reasons that CRM applications are likely to influence customer satisfaction, the first of these is that they allow firms to customise their offerings to individual customers. From the customer's point of view customisation enhances the perceived quality of the products and services offered by a company (Mithas, Krishnan and Fornell, 2005). Because perceived quality and satisfaction are interlinked, CRM applications can be seen to indirectly influence customer satisfaction due to their influence on perceived quality. The second reason is that CRM applications allow improvement in the reliability of consumption experiences in that customer orders and requests are processed in a timely and accurate manner, as well as the ongoing management of customer accounts (Mithas, Krishnan and Fornell, 2005). This, once again, has a positive impact on customer satisfaction. The final reason is that CRM applications assist companies in managing their customer relationships more effectively throughout its various stages, namely initiation, maintenance, and termination (Reinartz, Krafft and Hoyer, 2004).

2.3 Resource-based theory (RBT)

While the literature on competitive strategy emphasizes the strategic positioning of companies in terms of choices between cost and differentiation advantages, and narrow or broad market scopes, the fundamental principle underpinning such decisions is the resource position of the company (Grant, 1991). There is also a key distinction between resources and capabilities; resources can best be described as inputs into the production process and can include capital equipment, skills of individual employees, patents, brand names, and finance. It should also be noted that few resources can be productive on their own, Resources need to be coordinated and requires cooperation from teams. On the other hand, a capability is then the ability to perform tasks or activities using a team of resources. This means that resources are the source of a company's capabilities while capabilities drive competitive advantage (Grant, 1991).

One of the most prominent theories for describing, explaining, and predicting organisational relationships is resource-based theory (RBT) (Barney, Ketchen and Wright, 2011). At the level of business strategy, the resource-based view of the company is seen to be, according to Grant (1991, pp.114-115), "explorations of the relationships between resources, competition, and profitability include the analysis of competitive imitation, the appropriability of returns to innovations, the role of imperfect

information in creating profitability differences between competing firms, and the means by which the process of resource accumulation can sustain competitive advantage". Furthermore, it can be stated that tacit knowledge, that is knowledge which is personally held and knowledge which is difficult to transfer, forms the foundation of the knowledge-based view which is the essence of resource-based theory (Conner and Prahalad, 1996).

Three concepts are listed as central to the resource-based theory, firm resources, competitive advantage, and sustained competitive advantage (Barney, 1991). Firm resources are the assets controlled by an organisation which may be used to establish and implement strategies towards improving its efficiency and effectiveness. These assets may include all assets, capabilities, organisational processes, firm attributes, information, and knowledge (Daft, 1983 cited in Barney, 1991, p.101). It should also be noted, with regard to firm resources, that not all aspects of an organisation's physical and human capital, as well as organisational capital, can be considered as strategically relevant resources, as some may prevent the organisation from establishing and implementing strategies (Barney, 1986; Barney, 1991). Competitive advantage for an organisation is when an organisation implements a value-creating strategy that is not simultaneously implemented by any potential or current competitors. Sustained competitive advantage for an organisation, over and above the aspects of competitive advantage, has the added advantage of competitors not being able to duplicate the benefits of a value-creating strategy. In terms of sustained competitive advantage, the period of time an organisation has an advantage is not considered, rather the nature of the advantage is important, i.e. competitors being unable to replicate the strategy's benefits (Barney, 1991).

The resource-based view makes two assumptions about analysing the sources of competitive advantage, the first of these being that all companies within an industry can be heterogeneous in regard to their control of strategic resources (Barney, 1991). These strategic resources could be seen to have different levels of 'efficiency' with some being superior to others (Peteraf, 1993). Thus, companies that are endowed with such resources have the ability to produce more economically, or are able to better meet the customers' expectations (Peteraf, 1993). The second assumption is that the strategic resources are not always perfectly mobile, and this means that heterogeneity can, in fact, be long-lasting (Barney, 1991). According to Peteraf (1993,

p.180), "Heterogeneity implies that firms of varying capabilities are able to compete in the market-place and, at least, breakeven (sic). Firms with marginal resources can only expect to breakeven (sic). Firms with superior resources will earn rents". "Rents" refer to heterogeneity in an industry which could reflect superior productive factors which have limited supply and cannot be expanded, either rapidly or at all. This means that the company is unable to satisfy the demand for their products or services and this presents an opportunity for inferior resources to enter production as well (Peteraf, 1993).

According to Grant (1991, p.121), "The critical task is to assess capabilities relative to those of competitors". This means, for a firm to execute a successful strategy, they should exploit their relative strengths. Conversely, Grant (1991) says the failure of organisations is largely due to companies extending their activities beyond the scope of their capabilities. Furthermore, Grant (1991, p.122), says "Creating capabilities is not simply a matter of assembling a team of resources: capabilities involve complex patterns of coordination between people and between people and other resources". Organisational routine is a concept that describes the regular and predictable patterns of activity which comprise the sequence of coordinated actions by individuals. In this context a capability can be described as a routine, or a number of interacting routines, with the organisation itself being a large network of routines (Grant, 1991).

Priem and Butler (2001) in their critique of the resource-based view (RBV) conclude that much conceptual work remains before RBV meets the requirements of a theoretical structure. Secondly, RBV contains certain implicit assumptions about product markets which are likened to earlier environmentally-based models and the assumptions they contained about resources (Priem and Butler, 2001). Numerous definitions of resources increase the difficulty in establishing contextual and prescriptive boundaries. Moreover, when static, cross-sectional approaches are made towards RBV development, it could result in casual "hows and whys" remaining in a black box and thus, not being sufficiently understood. Priem and Butler (2001) further contend that RBV has gained prominence mainly due to its wide applicability and intriguing terminology such as tradability, substitutability, and casual ambiguity.

2.4 VRIO framework

The SWOT (strengths, weaknesses, opportunities, and threats) framework, while being an effective tool for rigorous environmental analysis, does not provide the entire story (Barney, 1995). The most extensive analysis of the successful firm's competitive environment is not able to fully explain the factor of their success (Barney, 1995). The most important aspect of success is perhaps the organisation's internal attributes, the strengths and weaknesses, which can be referred to as resources and capabilities (Barney, 1995).

In terms of creating sustained competitive advantage, it should be noted that not all resources hold the potential to create this (Barney, 1991). Furthermore, to build a theoretical model of RBT, the basic assumption that resources should be heterogeneous and immobile should be met. For an organisational resource to possess this, it should have four attributes, namely, (a) it should be valuable, (b) it must be rare, (c) it must be imperfectly imitable, and (d) it must be non-substitutable (VRIN) (Barney, 1991). Valuable means that the resource should be able to exploit opportunities and/or neutralise threats within the organisation's environment, while "rare" means that it should be a resource that is not common amongst the organisation's potential or current competition (Barney, 1991). Imperfectly imitable means that the resource cannot be imitated and non-substitutable is understood to mean a resource that has no strategically equivalent substitutes that are also valuable, rare or imperfectly imitable (Barney, 1991). The original version of the VRIN framework was improved by Barney (1995) and presented as the VRIO framework.

The valuable, rare, imitable, organisation (VRIO) framework states that managers should address the following four questions about their resources and capabilities: (1) the question of value, (2) the question of rareness, (3) the question of imitability, and (4) the question of organisation (Barney, 1995). The most notable change from the initial framework is the last of the four questions, organisation. This term means that even though an organisation's competitive advantage potential may depend on the value, rareness, and imitability of its resources and capabilities, an organisation must also be organised in a manner that they are able to exploit their resources and capabilities (Barney, 1995).

2.5 Theory applicability to the Dieselgate scandal

In the above sections of chapter 2, the theoretical framework of customer equity, customer lifetime value, brand equity, value equity, relationship equity, customer relationship management are cited from current literature. Additionally, resource-based theory and the VRIO framework were outlined as detailed in the literature. Furthermore, four models of customer equity were reviewed and discussed.

In light of this research study's objectives, the concept of customer equity is relevant to the Dieselgate scandal in that CE is something that is built by a company over a period of time using a significant amount of resources that include the drivers of customer equity (value equity, brand equity, and relationship equity). Moreover, the theories of customer lifetime value and customer relationship management are additional components/considerations of the CE of an organisation and these are intricate theories in their own right. Therefore, customer equity is noted to be a multi-faceted model with many inter-connected theories that ultimately demonstrates complexity in its fundamental make-up.

From an organisational standpoint, there are additionally the resource-based theory and the VRIO framework. The resource-based theory outlines the resources in an organisation and how these are used to obtain a competitive advantage. It is glaringly apparent that while resources within an organisation, both tangible and intangible should be used to create a sustainable competitive advantage, this is not always the case with regards to the OEMs involved with Dieselgate. The same is true in relation to the VRIO framework. As the resources were not used to build a sustainable competitive advantage, instead emissions cheaters adopted unfavourable practices to unfairly gain a competitive advantage or market share. This contradicts the principle of using an organisations resources in an ethical manner to create a competitive advantage. This would ultimately impact customer equity for the manufacturers in question.

Based on the above, it can be understood that establishing customer equity is reliant on numerous moving parts. It is then necessary to understand whether a single event (albeit an event that took place over a few years before it became public knowledge) has impacted the customer equity in the South African market. While it is apparent that there was an almost immediate reaction (in terms of a public outcry, regulatory

changes, diesel vehicle sales) to the Dieselgate scandal in other markets, especially Europe, not much is known about the effects of the Dieselgate scandal on the South African market (Amelang and Wehrmann, 2017).

Chapter 3 - Research methodology

3.1 Introduction

This chapter provides an outline of the methodology that was adopted in conducting the research study. The aspects discussed in this chapter are the research paradigm, the research design, the method of analysis (quantitative and descriptive) for the research, the samples used for the research, the data collection, and data analysis are discussed. Finally, the ethical considerations pertinent to the research study are also outlined. The data collection portion will be undertaken using two distinct methods. The first portion was to analyse sales data for passenger vehicle sales in the South African market for equal periods, both before and after Dieselpgate (September 2015). The purpose of this section was to gain an initial impression of potential market fluctuations both before and after the Dieselpgate scandal. The second major portion of the analysis will be conducted with the aid of a customer equity questionnaire as the research instrument. This provided real consumer insights into whether there is any evidence of lost customer equity as a result of the Dieselpgate scandal.

3.2 Research goals and objectives

The study set out to establish whether the Dieselpgate scandal of 2015 had any effect on customer equity for new vehicles in the South African market.

The purpose of the research was to:

1. Assess new vehicle sales in the South African market using three separate *t-tests* for diesel sales, overall sales, and affected manufacturers sales for a defined period both prior to as well as post Dieselpgate using statistical analysis.
2. Make use of descriptive statistics to understand whether manufacturers, Brand A, Brand B, Brand C, and Brand D, were affected by Dieselpgate based on responses to the defined research instrument (customer equity questionnaire) which is further described in section 3.3 below.

By statistically analysing the vehicles sales data captured in this research study, the following hypotheses which were generated for this study were tested:

Hypothesis H1

H₀1: Diesel vehicle sales were not affected by Dieselgate

H_a1: Diesel vehicle sales were affected by Dieselgate

Hypothesis H2

H₀2: Overall vehicle sales were not affected by Dieselgate

H_a2: Overall vehicle sales were affected by Dieselgate

Hypothesis H3

H₀3: Affected manufacturers vehicle sales were not affected by Dieselgate

H_a3: Affected manufacturers vehicle sales were affected by Dieselgate

3.3 Research design

3.3.1 Research paradigm

The paradigm used for this research was positivist (Edirisingha, 2012). The paradigm chosen was relevant for a study of this nature, as participants generally tend to be biased due to their personal and cultural values, world views, their upbringing and this could have an influence on the data that is gathered (Trochim, 2006). This means that no individual can perfectly see the world as it really is (Trochim, 2006). The ontological view adopted for this research was that of a critical realist. According to Archer, et al. (2016), "Critical realism is concerned with the nature of causation, agency, structure, and relations, and the implicit or explicit ontologies we are operating with".

A quantitative, as well as a descriptive approach, was used for this research study which is consistent with the post-positivist paradigm. Data from the first portion (sales data) of the research were analysed using a paired *t-test* to either reject or accept the null hypothesis (Guba and Lincoln, 1994). A paired *t-test* is used for comparison of two population means where there are two samples in which observations in one sample can be paired with observations from the other sample (Shier, 2004). Furthermore, the data gathered for the second portion (customer equity questionnaire) of the research was analysed by means of descriptive statistics. The research design is non-experimental (descriptive) in that existing data was used and no manipulation of variables or control groups took place (de Vos, et al., 2011). The data was gathered through both primary, as well as secondary means, as outlined in the section below.

3.3.2 Data collection method

The data collection methods, as well as research instruments, are outlined in the following sub-sections. This includes the rationale behind using the two data analysis portions outlined below.

3.3.2.1 Vehicle sales data

Secondary source sales data was, one of the sources, used to analyse the effects the Dieselgate scandal has had on the automotive industry in South Africa. Sales data for brands that were also involved in emissions irregularities (Brand A, Brand B, Brand C, and Brand D) are included in the data set amongst all the passenger car brands that are sold in South Africa. The sample data used excludes road freight and commercial vehicles. This is because diesel engines are an inherent part of this industry and including the vehicles from this sector may provide an inaccurate picture of the results. South African vehicle sales data is readily available and was obtained by email request to Lightstone Auto. This data is also the official data that is reported by the South African Department of Trade and Industry (DTI) and The National Association of Automobile Manufacturers of South Africa (NAAMSA). The data was analysed by means of a paired *t-test* to firstly, understand whether diesel vehicle sales in the South African market were impacted, and secondly, to understand whether there was an impact on overall vehicle sales in the South African market. The method of analysis is discussed further in a subsequent sub-section.

Analysing sales promotions run by the various automotive manufactures is beyond the scope of this paper. This is due to the exhaustive nature of such an investigation, which would involve contacting hundreds of individual dealerships. As such, any potential impacts that this could have on the reported sales data would have to be omitted. This potential impact will be somewhat negated by the fact that the sales data is recognized as being a preliminary measure with the questionnaire. This is discussed in sub-section 3.3.2.3 below and is the primary instrument for assessing the impact on CE. This sales analysis portion of the research is thus classified as desk or secondary research in nature (Hague and Wilcock, 2018).

3.3.2.2 Respondents profile

The profile of the respondents to the survey was also analysed briefly. This data was presented with the intention of providing an overview of the participants in the survey.

Based on the data gathered, the respondent's profile outlines the time taken to complete the survey, age group, gender, originating province, purchase intent, brand switching and awareness of the Dieselgate scandal. The awareness of the Dieselgate scandal becomes a critical separator to determine pre- as well as post-groups amongst the respondents.

3.3.2.3 Customer equity questionnaire

The second section of the research involves the use of a questionnaire to determine CE related aspects. The value, brand, and relationship-related drivers were adapted from a marketing paper that focused on customer equity (Rust, Lemon and Zeithaml, 2004). The questionnaire was distributed via an electronic platform and no incentives were used to encourage questionnaire completion. To achieve a wide complement of respondents, the online survey provider, *Pollfish*, was used for the distribution of the questionnaire. As this is a paid platform, the researcher only paid for the number of responses that was specified as being sufficient for the study, in this case this was 200.

3.4 Questionnaire design

The questionnaire was designed using a paper by Rust, Lemon, and Zeithaml (2004) titled 'Return on Marketing: Using customer equity to focus marketing strategy' as a basis. A sample version of the questionnaire has been included in the list of appendices (Appendix I).

Table 3.1 - Customer equity questionnaire design – question/factor relationship

Factors	Related questions
Information/opt in	1
Brand alignment (bias)	2
Simulated pre- and post-Dieselgate	3
Size and frequency of purchase	4
Market share and transition (bias)	5
Value-related drivers	6, 16, 17
Brand-related drivers	7, 8, 9, 10, 11
Relationship-related drivers	12, 13, 14, 15

Questions 2-5 were classified as information, multiple-choice, and dichotomous questions (Sincero, 2019). Question 2 was used to establish whether the respondents have any alignment to any of the brands in terms of employment (dealership, service

centre, marketing agency, or direct employment). Question 3 determined whether respondents had any prior knowledge of the Dieseltgate scandal and this question, as mentioned in section 3.3.2.2, was used to create two distinctive groups, those that were aware of the 2015 Dieseltgate scandal, as well as those that weren't. Question 4 established purchase intent in the foreseeable future (1-2 years) as well as the price bracket in which the respondent was looking to purchase a vehicle. Question 5 was used to establish whether the respondents owned or planned to buy one of the brands affected by the Dieseltgate scandal. The basic format of the above questions can be found in Table 3.2 overleaf.

It should be noted that in order to protect the identity of the organisations, the actual brand names were omitted from the examples overleaf, even though the original brand names were used in the actual customer equity questionnaire.

Table 3.2 - Initial questions for the customer equity questionnaire

<p>Q.1 - The aim of this research is to understand the impacts of Dieselgate on customer equity in the automotive industry. Your identity is not required or known to the researcher. This research is approved by the Research Ethics Committee of Rhodes University. Participation in the survey is voluntary and you are free to withdraw at any time without penalty. Completion time is approximately 15 minutes.</p>
<p>Q.2 - Are you aligned or associated with (manufacturing facility, dealership, service center, or marketing agency) any of the following brands?</p> <ul style="list-style-type: none"> •Brand A •Brand B •Brand C •Brand D •Other •None of the above
<p>Q.3 - Are you aware of the 2015 Dieselgate scandal?</p> <ul style="list-style-type: none"> •Yes •No
<p>Q.4 - In which price bracket would you purchase a new vehicle if you intend on purchasing a vehicle in the foreseeable future (1-2 years)?</p> <ul style="list-style-type: none"> •R200 000 - R299 000 •R300 000 - R399 000 •R400 000 - R499 000 •R500 000 - R599 000 •R600 000 - R700 000 •R700 000 and above •No purchase intent
<p>I currently own & plan to buy the following brands</p> <ul style="list-style-type: none"> •Own Brand A Brand B Brand C Brand D •Plan to buy Brand A Brand B Brand C Brand D

Questions 6-17 were designed to measure customer equity, as well as the drivers of customer equity. An overview of this is provided in Table 3.1. These questions are direct adaptations of the questions posed for the drivers of customer equity (value, brand, relationship) as posited by Rust, Lemon, and Zeithaml (2004, pp.125-126). Tables 3.4 -3.6 outlines the actual value, brand, as well as relationship driver questions from the questionnaire. To prevent exceptionally long tables, only the actual questions are represented in the tables and not the full question which includes the brands and Likert scale in each question. The format of the questions, however, follows in Table

3.3 overleaf, where the question is stated, and the respondent is required to provide a response on a Likert-type scale for each of the individual brands.

Table 3.3 - Sample of the customer equity driver questions full format

I believe this brand meets my mobility needs					
Answers	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Brand A	X				
Brand B		X			
Brand C				X	
Brand D	X				

Table 3.4 - Value driver questions for customer equity questionnaire

Driver	Question
Value	Q.6 - I believe this brand meets my mobility needs
	Q.16 - This brand provides the best overall quality
	Q.17 - I believe this brand meets my pricing needs – question 17

Table 3.5 - Brand driver questions for the customer equity questionnaire

Driver	Question
Brand	Q.7 - The image of this brand fits my personality well
	Q.8 - If this brand sends me information, I take note of it and pay attention to it
	Q.9 - I take note and pay attention to advertising from this brand
	Q.10 - This brand is known as a good corporate citizen
	Q.11 - This brand is known to have a high ethical standard with regards to customers and employees

Table 3.6 - Relationship driver questions for the customer equity questionnaire

Driver	Question
Relationship driver	Q.12 - I have a high level of trust in this brand
	Q.13 - This brand knows a lot of information about me
	Q.14 - This brand recognises me as being special
	Q.15 - I feel a sense of community with other users of this brand

3.5 Data analysis

The below sub-sections outline the methods used for the analysis of both the sales data portion of the research, as well as the customer equity portion. Additionally, the results of the reliability test for the customer equity driver questions of the questionnaire will also be discussed. All data analysis including reliability testing was done using Microsoft Excel.

3.5.1 Data population, sampling, and analysis

Quantitative as well as descriptive data analysis techniques were used for the purposes of this research. The sales data was readily available and made available by Lightstone auto, upon email request. This is the official data that is reported by both the DTI and NAAMSA. The sales data that was provided, included data starting from January 2014 to August 2018. This time period was deemed sufficient to analyse the effects of the Dieselpgate scandal, which became public knowledge during the month of September 2015. The sales data covered diesel, petrol, hybrid diesel, electric vehicles amongst 49 brands, which are distributed by 42 different distributors in South Africa. The sales data was analysed by means of a paired *t-test* which included 21 months before and 21 months after the Dieselpgate scandal (January 2014 – June 2017). The paired *t-test* was conducted on three defined sets of data in the 42-month period, one solely for diesel vehicles, another for overall sales for passenger vehicles, and lastly one for sales for the affected manufacturers. Additionally, the sales data was used to create a trend for diesel vehicles sales, overall vehicle sales, as well as, sales for the affected manufacturers. These trend graphs were created using the same time period (January 2014 – June 2017).

The collection of the primary data for the customer equity questionnaire was done via an online survey provider (“Pollfish”). The basis for the questionnaire is mentioned in section 3.4. The questionnaire was distributed to members of the “Pollfish” database that reside in South Africa. With descriptive statistics being used for the analysis, 200 responses was deemed to be a sufficient target and this was attained. Respondents were also grouped according to whether they were aware of the 2015 Dieselpgate scandal, to establish simulated pre- and post-Dieselpgate scandal data. Actual pre-Dieselpgate customer equity data won’t be available due to this research being conducted after the incident, and this is recognized as a limitation of this study. The

data analysis for the customer equity portion of the research was analysed using descriptive statistics. A comparative analysis was done using the statistical mean values for both pre- as well as post-Dieselgate for each brand (Brand A, Brand B, Brand C, and Brand D) for each of the customer equity drivers (value equity, brand equity, relationship equity).

3.5.2 Reliability testing

Reliability testing was deemed necessary for the customer equity questionnaire, as this test considers whether consistent results would be attained if the same variables were tested in the same test environment (Brink, 1993). This means that the measurement precision of the data collection instrument is being established. Only the customer equity driver questions (questions 6-17) were part of the reliability test, as questions 2-5 were designed to gather information of a more general nature regarding the participants. Question 1 was just a statement of information. Additionally, questions 6-17 used a Likert scale which lends itself to reliability testing. Questions 1-5 were a mixture of information, multiple-choice, and dichotomous questions.

The collected data for the customer equity questionnaire was subjected to a reliability test. The data collected for each of the 200 participants for the value, brand, and relationship equity drivers was considered in the *Cronbach alpha* test. The *Cronbach alpha* score obtained from the 9600 individual data points was:

Cronbach Alpha Coefficient (α): 0.8594

As the *Cronbach alpha* coefficient is above 0.85, it is concluded that the questionnaire has acceptable reliability (Tavakol and Dennick, 2011).

3.6 Ethical considerations

The data for this study was collected by means of a two-pronged approach – the first was vehicle sales data for South Africa, which was supplied by the custodian organisation without charge. Although the actual names were used in the customer equity questionnaire, it was decided that the actual brand names shouldn't be used in the analysis of the results or subsequent discussions.

The second data collection technique was performed by means of an online survey conducted on a paid, third-party platform. All respondents were over the age of 18 as per the third-parties' terms and conditions. Additionally, no personally-identifiable

information was requested. This ensured the anonymity of the participants. The consent of all participants was obtained by means of an opt-in question at the beginning of the survey. Furthermore, the third-party granted consent for the usage of the data procured for the purposes of this study. Ethical clearance (2018/10/88) was also obtained from Rhodes University to conduct the research. A copy is attached to the list of appendices (Appendix II).

3.7 Conclusion

This chapter provided an outline of the framework used for this research study. The research paradigm, as well as ontological view was briefly discussed, as well as the approach used for the data collection. The data population, as well as the statistical analysis techniques used was discussed, with the ethical considerations concluding the methodology section of the chapter.

The technique adopted in this research study is consistent with research literature, as well as similar studies of this nature, as outlined in preceding paragraphs. The interpretation of the collected data is further outlined and unpacked in the subsequent chapter.

Chapter 4 - Results and discussion

4.1 Introduction

This chapter follows on from the methodology presented in the preceding chapter. The results and findings from the study are discussed in this chapter.

As the study was conducted using two data collection instruments, the first part of this chapter discusses the results obtained from analysing the vehicle sales data. The second part focuses on the data obtained from the customer equity questionnaire.

4.2 Vehicle sales data results

New vehicle sales data was obtained with the intention of establishing whether a difference in sales was apparent pre- and post- the Dieselgate scandal. As an initial indication, this portion of the analysis is concerned with establishing whether Dieselgate had any impact on the market in terms of sales volumes. As the Dieselgate scandal became public knowledge in September 2015, data from equal periods pre-, as well as post- the scandal was extracted from the sales data-set. The extracted data was then used to do the initial analysis.

4.2.1 Diesel vehicle sales

The first data-set extracted from the overall new vehicle sales data was that of diesel vehicles sold in the 21 months prior to, as well as 21 months post-Dieselgate. The pre-scandal periods extended from January 2014 to September 2015 (pre-scandal) while the post period extended from October 2015 to June 2017 (post-scandal). The data-set was extracted, but excluded one manufacturer that sold a hybrid diesel model. This data was excluded partly due to the fact that only 4 vehicles were sold over the entire analysis period, and partly because these vehicles would be categorised as 'green' or eco-friendly vehicles (including electric and petrol hybrids) instead of as strictly diesel or combustion vehicles (Braun, 2014).

The extracted data-set was then analysed using a paired *t-test*. The purpose of the analysis was to establish whether diesel vehicle sales in the South African market experienced a difference in the pre- as well as post-Dieselgate diesel vehicle sales results. Therefore, the hypotheses of the paired *t-test* for diesel vehicle sales are as follows:

H₀1: Diesel vehicle sales were not affected by Dieselgate

H_a1: Diesel vehicle sales were affected by Dieselgate

Below are the results of the analysis.

Table 4.1 - Paired *t*-test for diesel vehicle sales pre- and post-Dieselgate

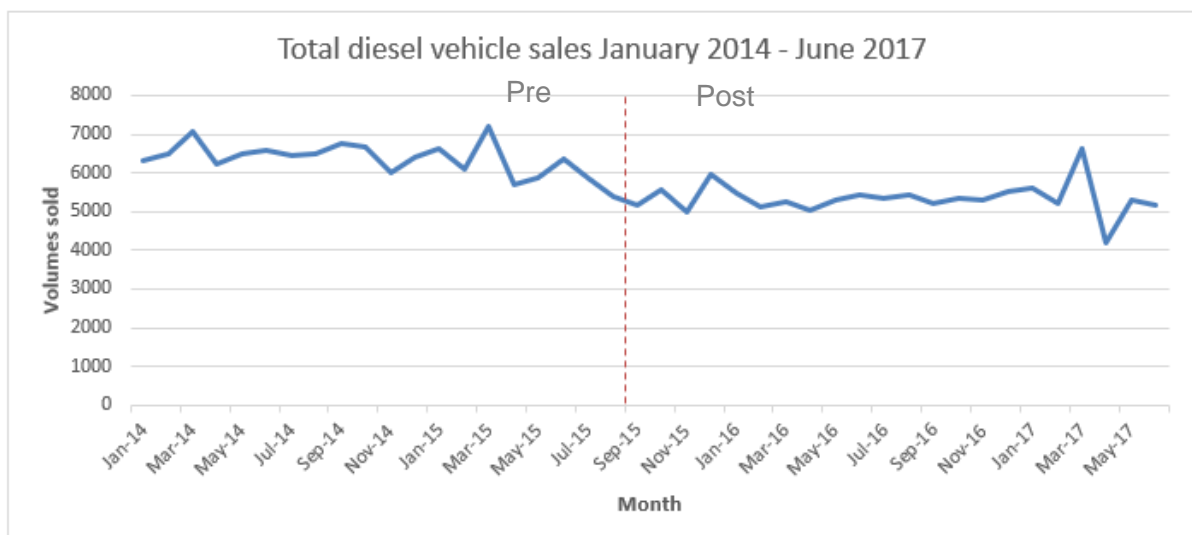
	Results
t Stat	2.627066311
P(T<=t) two-tail	0.012962876

The analysis revealed a two-tailed p-value of 0.013 which is less than the α value of 0.05 which means that H₀1 was rejected.

4.2.1.1 Trend data for diesel vehicle sales

The data relevant to the diesel vehicle sales in the pre-determined period (January 2014 – June 2017) was plotted as a line chart. Figure 4.1 below provides a visualisation of the data to enable a better understanding of the trend in terms of volumes of new diesel vehicles sold in South Africa. Figure 4.1 also supports the results of section 4.2.1 above.

Figure 4.1 -Total diesel vehicle sales trend



The red line shown in Figure 4.1 above notes the separating line for pre, as well as post-Dieselgate. What is apparent from the trend line is that there is a steady decline

in the sales volume over the period. The downward trend appears to start around the middle of 2015 but continues from there with only three periods showing upward spikes in the months following the Dieselgate scandal.

4.2.2 Overall passenger vehicle sales in the South African market

An analysis of the overall market over the same period was necessary to further understand whether the entire market saw any changes or whether this difference was solely seen in diesel vehicle sales. The data set used includes all passenger vehicles sold (petrol, diesel, electric, diesel hybrid, petrol hybrid) during the period January 2014 to September 2015 (pre-scandal) through to October 2015 to June 2017 (post-scandal). The results shown below also utilised a paired *t*-test with the following hypotheses:

H₀2: Overall vehicle sales were not affected by Dieselgate

H_a2: Overall vehicle sales were affected by Dieselgate

Below are the results of the analysis.

Table 4.2 - Paired *t*-test for overall vehicle sales pre- and post-Dieselgate

	Results
t Stat	3.225506176
P(T<=t) two-tail	0.001730476

The analysis revealed a two-tailed p-value of 0.0017 which is significantly less than the α value of 0.05, therefore H₀2 was rejected.

4.2.2.1 Trend data for overall vehicle sales

A line chart for the overall vehicle sales in South Africa for the period of January 2014 through to June 2017 is shown in Figure 4.2 below. The red line separates the pre-Dieselgate from post-Dieselgate data. This trend supports the results seen in section 4.2.2 above.

Figure 4.2 - Overall vehicle sales trend

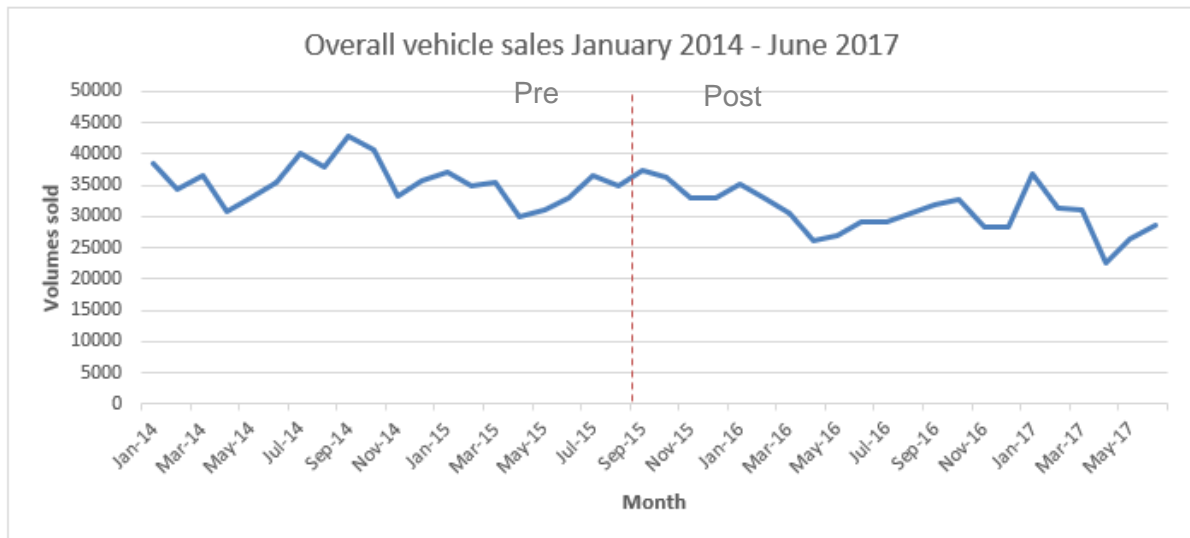


Figure 4.2 shows that overall sales were still high during September 2015, although not as high as it was in the preceding year, in September 2014. There was a decline in overall sales volumes although this only started in January 2016 with a single upward spike in sales seen in January of the following year.

4.2.3 Sales for Brand A, Brand B, Brand C, and Brand D

The data for the manufacturers affected by the Dieselgate scandal was extracted from the vehicle sales data. In addition to the analysis for diesel vehicles and overall sales for the pre-determined period, the sales data for all the manufacturers were subjected to a paired *t-test*. The period for the data-set is from January 2014 to September 2015 (pre-scandal) and October 2015 through to June 2017 (post-scandal). The hypotheses are as indicated below:

H₀: Affected manufacturers vehicle sales were not affected by Dieselgate

H_a: Affected manufacturers vehicle sales were affected by Dieselgate

Below are the results of the analysis.

Table 4.3 - Paired *t*-test of vehicle sales for affected manufacturers pre- and post-Dieselgate

	Results
t Stat	3.014056656
P(T<=t) two-tail	0.014619422

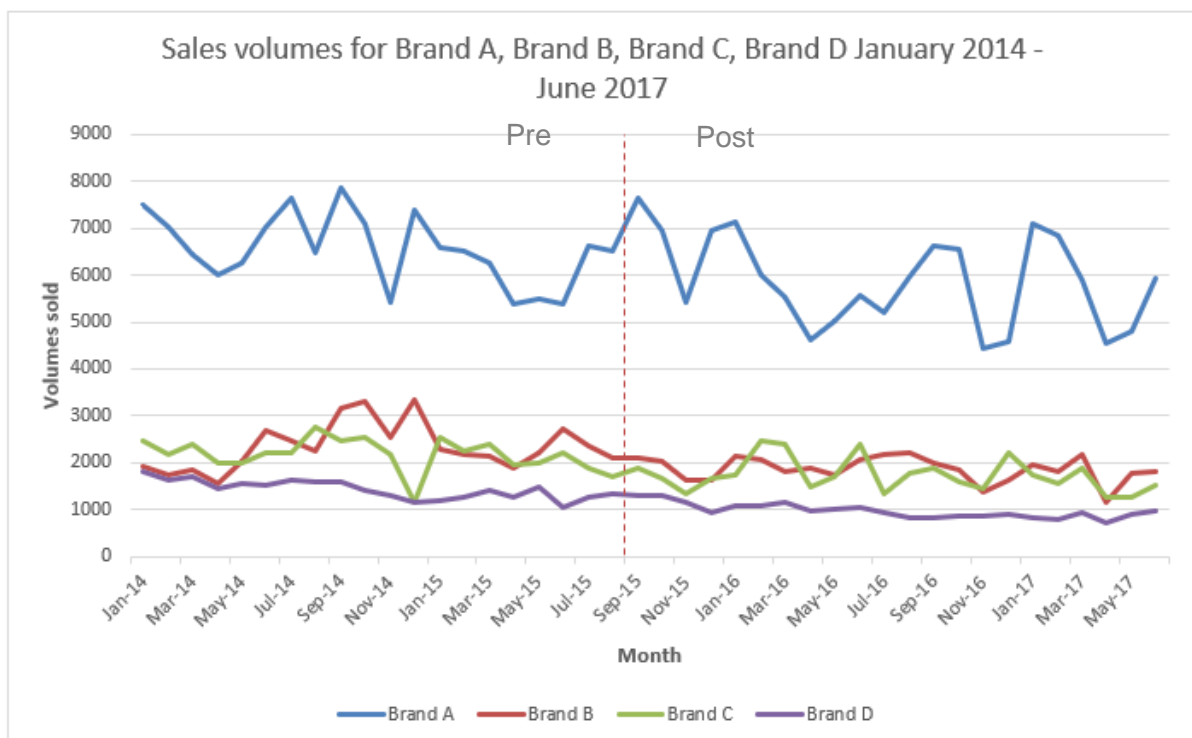
The analysis revealed a two-tailed p-value of 0.0146 which is significantly less than the α value of 0.05 therefore H_0 was rejected.

4.2.3.1 Trend data for affected manufactures vehicle sales

The sales data for the affected manufacturers (Brand A, Brand B, Brand C, and Brand D) are plotted in Figure 4.3 below. The line chart once again allows for a visual representation of the data that supports the analysis conducted in section 4.2.3 above. The red line in Figure 4.3, once again, separates the periods before and after Dieselgate.

Unlike Figures 4.1 and 4.2, however, this graph depicts the data individually for each of the affected brands.

Figure 4.3 - Affected manufacturers vehicle sales trend



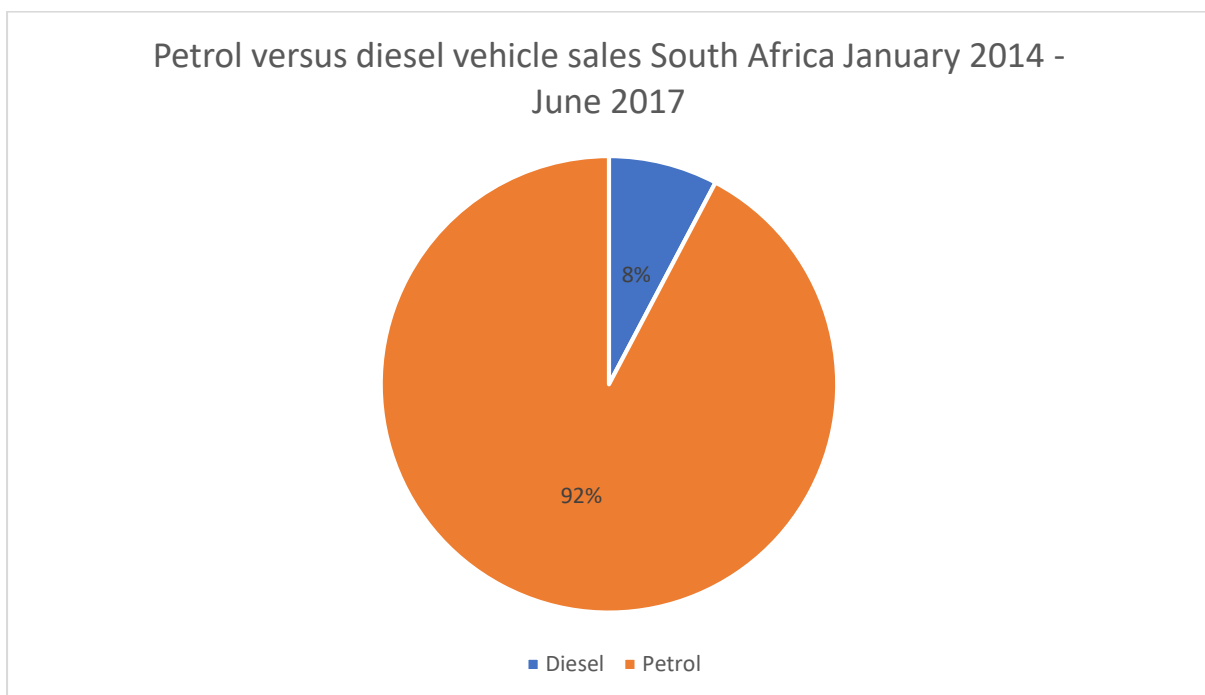
From Figure 4.3 above, it can be seen that Brand A, the brand most commonly associated with the Dieseltgate scandal, showed significant fluctuations in terms of sales. It is interesting to note that sales still showed an upward trend for a short period until the end of September 2015, but starts to go downwards in the following two months. The sales at the end of the period for Brand A was lower than the sales volumes at the beginning of the analysis.

Brands B and C showed a slow decline in sales with nothing significant revealed during the Dieseltgate period. These brands, however, showed a gradual decline in sales from their high at the end of 2014 to the beginning of 2015. Brand C showed lower sales at the end of the analysis, while Brand B sales remained the same at the start, as well as at the end of the analysis period. Finally, brands B and D remained relatively flat throughout the period, with a steady decline in sales ending in lower sales at the end of the period.

4.2.4 Percentage diesel and petrol vehicles sales

Figure 4.4 below depicts the percentage split between diesel vehicles and petrol vehicles sold in South Africa during the period of January 2014 – June 2017.

Figure 4.4 - Petrol versus diesel vehicle sales



From the above, it can be seen that diesel vehicles hold a relatively small share of the overall vehicle sales in South Africa. This data is important in the context of this study,

as it provides insight into how visible the vehicle market reaction is when the Dieselgate scandal is considered.

4.3 Customer equity survey

The second portion of the research makes use of a customer equity (CE) questionnaire, based on a paper by Rust, Lemon, and Zeithaml (2004) titled 'Return on Marketing: Using customer equity to focus marketing strategy'. The questionnaire was structured in a manner that allowed the researcher to understand whether there was any lost CE amongst South African consumers. This may have been as a result of Dieselgate for the affected brands.

A survey service provider distributed the questionnaire, via an online platform, to only their South African respondents. The survey was completed solely via mobile phones and not via a computer web browser. Furthermore, no personally identifiable information was requested or procured through the survey process. Participants had the option of opting-out of the survey. Two hundred respondents participated in the survey, which was 50 responses above the prescribed minimum of 150 responses.

While the preceding sections dealt with the vehicle sales data, the ensuing sections outline the data generated by the questionnaire in more detail. A brief overview of the respondent profile is provided, as well as several representations of the data analysis portions of the survey. The chapter closes with a discussion around the results of the analyses.

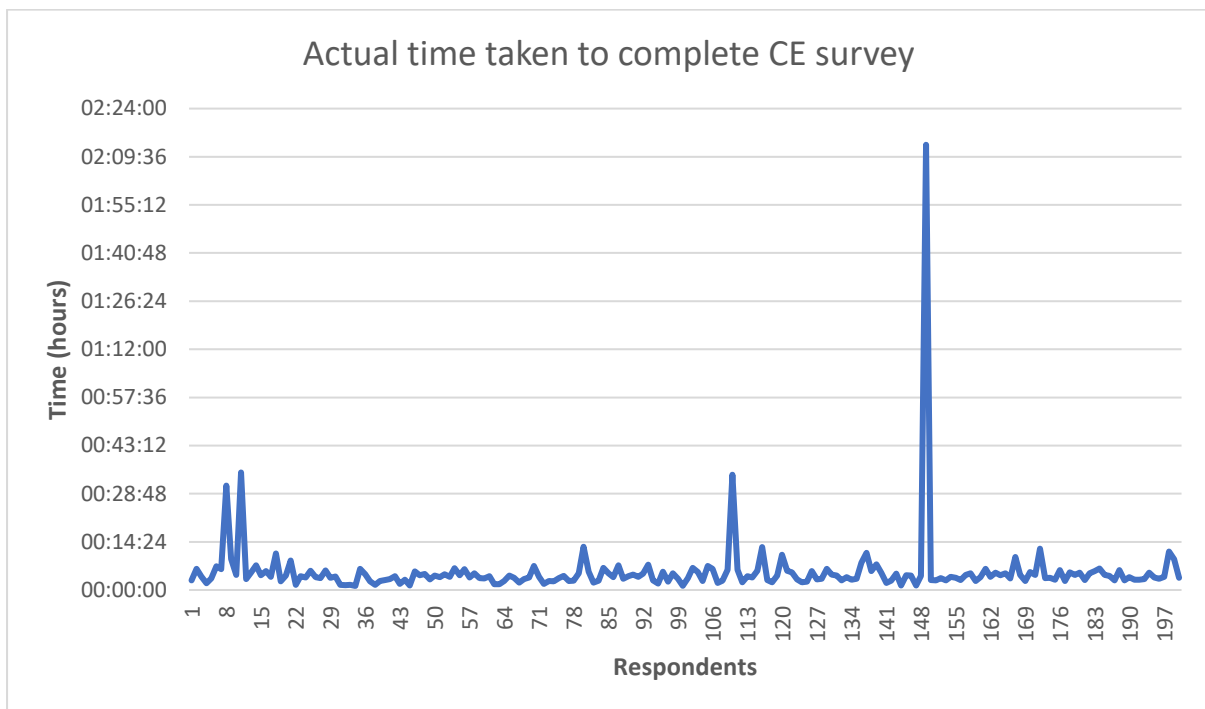
4.3.1 Respondent's profile

This section outlines the profile of the respondents to the CE research instrument. This data is summarised with the intention of providing an overview or generalised description of the participants in the survey. Based on the data gathered by the online service provider, the respondent's profile will outline the time taken to complete the survey, age group, gender, originating province, purchase intent, brand switching, and awareness of the Dieselgate scandal.

4.3.1.1 Time taken to complete the survey

The survey was opened by the survey service provider, on the 19th December 2018. The last response was received on the 20th December 2018. Figure 4.4 illustrates the time taken to complete the survey for the 200 respondents.

Figure 4.5 - Time take to complete CE survey



From the figure above, it can be seen that there are very few outliers (four in total). The longest time taken to complete the survey was 02:13:10, but this is significantly longer than the subsequent highest value of 00:35:11. Based on the entire data set, the average time to complete the survey was calculated as 00:05:29 with the median for the survey completion time being 00:03:57.

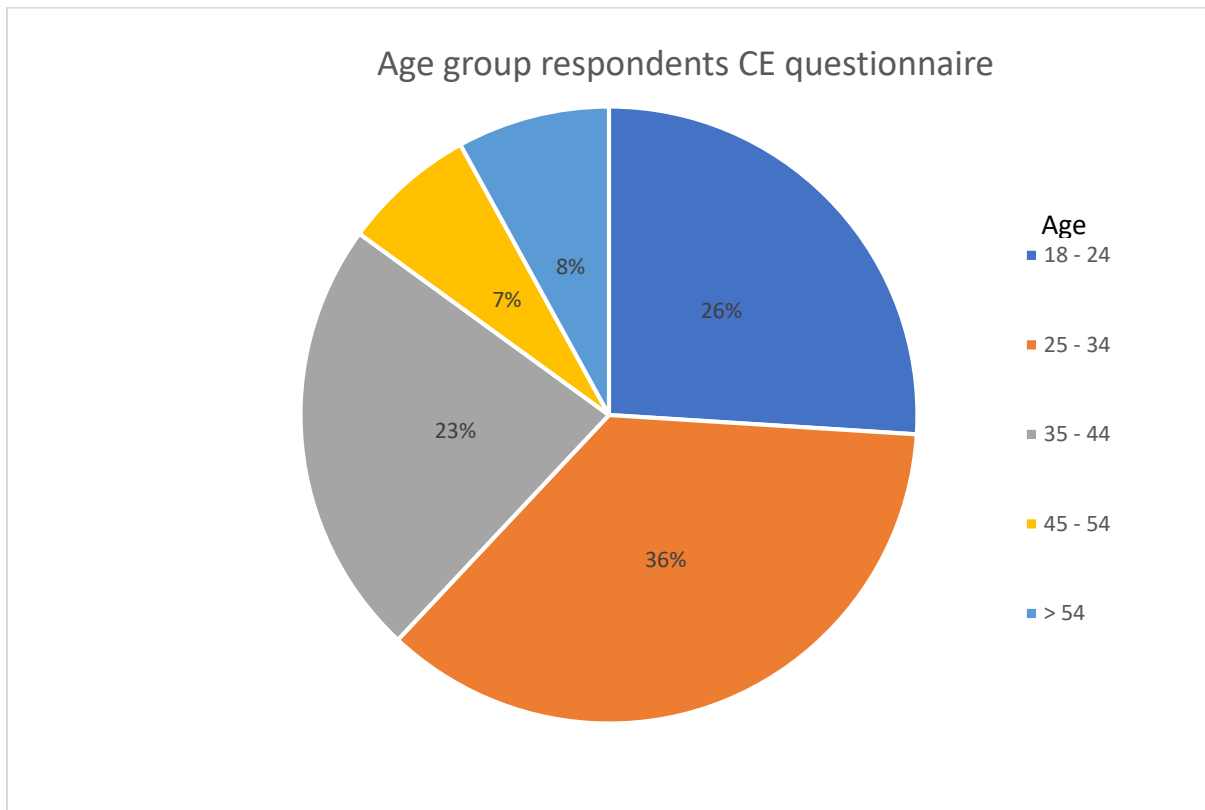
4.3.1.2 Age group

The following age groups were specified by the survey service provider:

- 18 – 24 years of age
- 25 – 34 years of age
- 35 – 44 years of age
- 45 – 54 years of age
- >54 years of age

Based on the supplied data, the below Figure 4.6 depicts the respondents per age group.

Figure 4.6 - Age group profile respondents CE survey



As per Figure 4.6, it can be seen that the majority of respondents were from the age group 25 – 34 while the age group 18 – 24 make up the next major group with 26%. Interestingly, the data seems to point to the younger generations constituting the majority of respondents. Together the two oldest age groups, 45 – 54 and >54 constitute only 15% of the respondents, which is in total less than any of the other individual age groups. The reason for this could be due to the fact that the survey was conducted solely via a mobile browser although this deduction could only be classified as conjecture without further evidence or investigation.

4.3.1.3 Gender

Figure 4.7 below shows the number of responses received per gender. There were no participants who identified as unspecified gender.

Figure 4.7 - Gender split CE survey

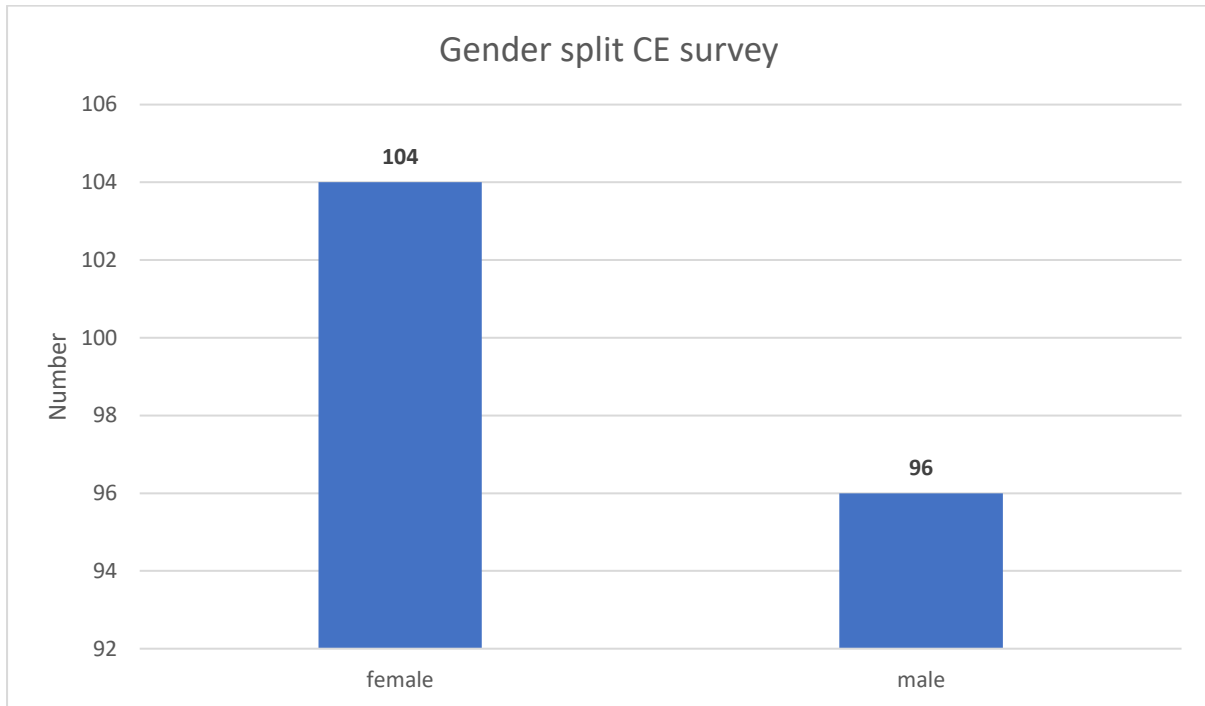
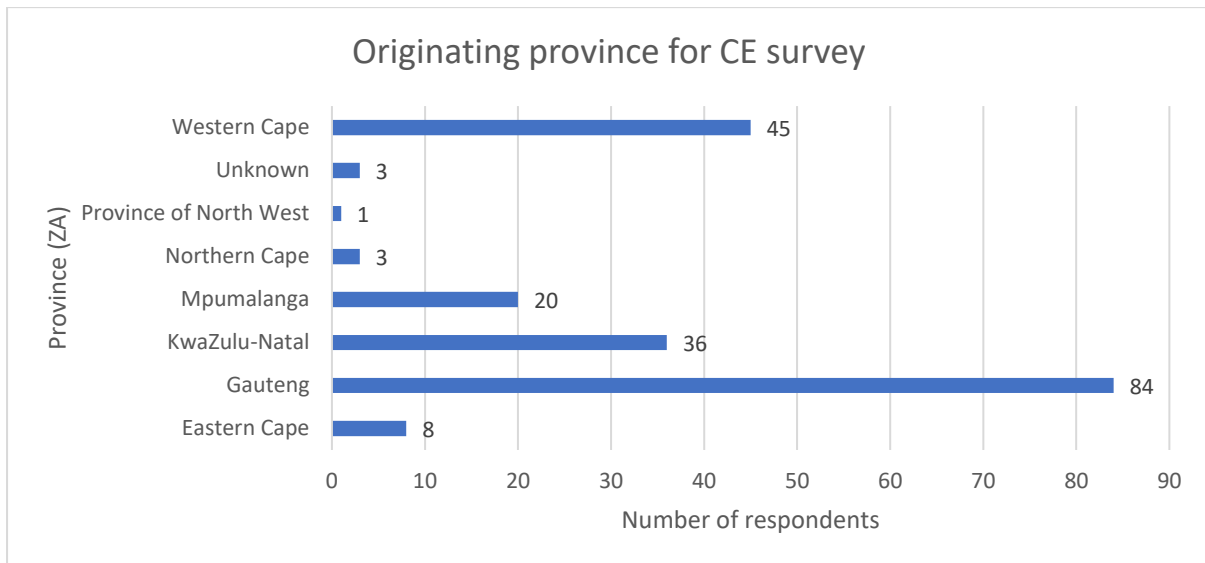


Figure 4.7 shows that 104 responses out of 200 were female while the remaining 96 were male. The percentage of female responses were 52% to 48% male.

4.3.1.4 Originating province

Figure 4.8 overleaf depicts the originating province for the 200 respondents to the survey. Only three respondents failed to indicate their originating province, but the remaining 197 respondents all specified their provinces.

Figure 4.8 - Originating province of respondents from CE survey



Based on Figure 4.8, it can be seen that 84/200 (42%) responses came from Gauteng with the second highest response rate coming from the Western Cape with 45/200 (22,5%). KwaZulu-Natal had 36/200 (18%) while Mpumalanga had 20/200 (10%) with the remaining provinces showing lower response rates. Interestingly, the two provinces with the highest participation rates are also the most well-off or richest provinces in South Africa (in terms of GDP per capita). (Sen Nag, 2018).

4.3.1.5 Purchase intent

The purchase intent question of the survey was designed to establish whether the respondents had any intentions of purchasing a new vehicle in the foreseeable future (i.e. 1-2 years) as well as what vehicle price bracket they intended purchasing a vehicle in. The following price brackets were given:

- R200 000 - R299 000
- R300 000 - R399 000
- R400 000 - R499 000
- R500 000 - R599 000
- R600 000 - R700 000
- R700 000 and above
- No purchase intent

The reasoning behind including the price brackets is that typically the premium brands involved with diesel vehicle emissions cheating would not be found as new vehicle

purchases in the lower price brackets, with the exception of Brand A. This provided the researcher with a bit of insight into which segment of the market the respondents were intending to purchase from. Figure 4.8 below depicts the findings on purchase intent.

Figure 4.9 - Purchase intent CE survey

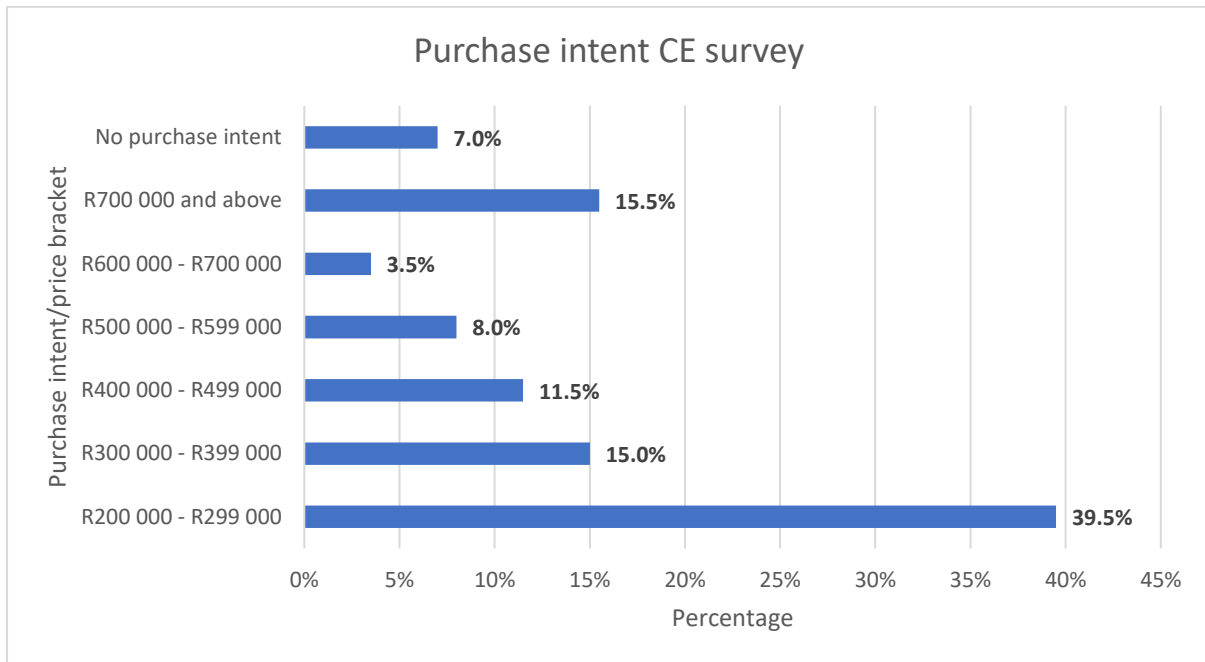
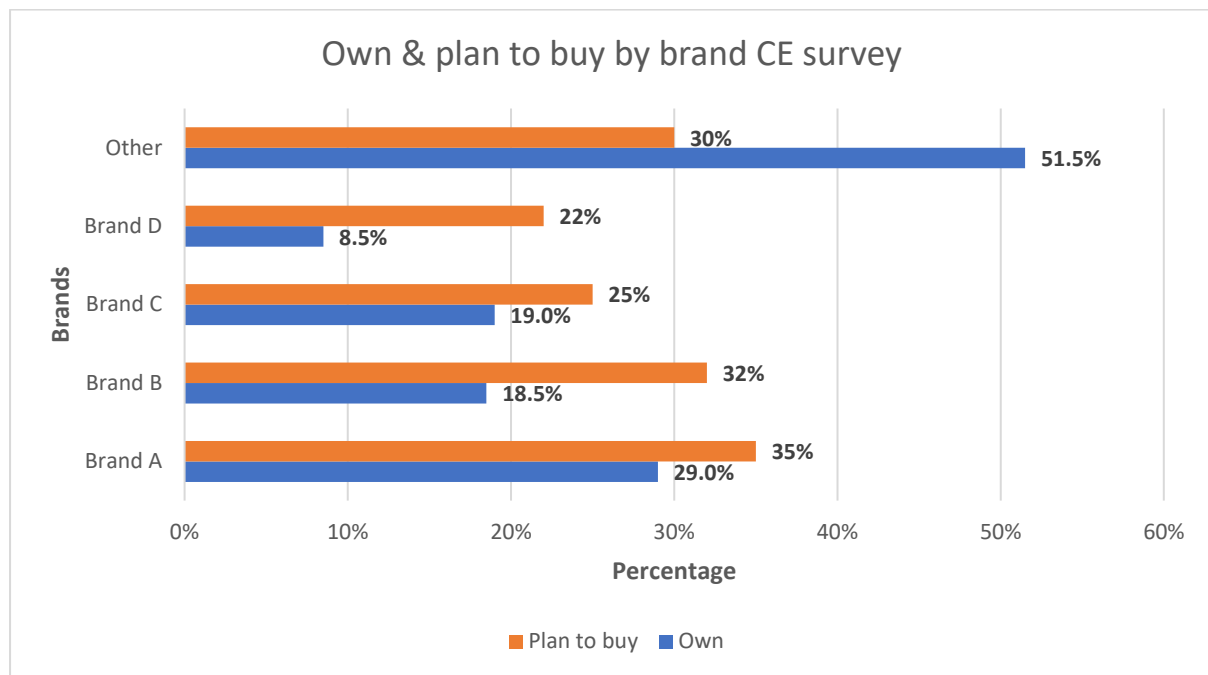


Figure 4.9 reveals that the majority of responses (39.5%) had purchase intent for the lowest price bracket, a market in which Brand A has its lower-cost offerings. The premium new vehicle segment represented in the R700 000 and above bracket shows the second largest number of respondents with 15.5% with the R300 000 – R399 000 bracket marginally trailing with 15%. The lowest responses correspond with the R600 000 – R700 000 bracket while only 7% of respondents had no purchase intent.

4.3.1.6 Ownership and intention to purchase (brands)

The CE survey made provision for respondents to state the number of brands they own, as well as which brands they planned to purchase. The brands listed were the brands affected by the Dieselpgate scandal (Brand A, Brand B, Brand C, and Brand D) as well as a category for ‘other’. It is important to note that for this question, the number of responses can exceed 200 as some respondents own multiple brands while planning to buy more than one brand as well. Figure 4.10 below represents the breakdown of responses for each brand.

Figure 4.10 - Own and plan to buy CE survey



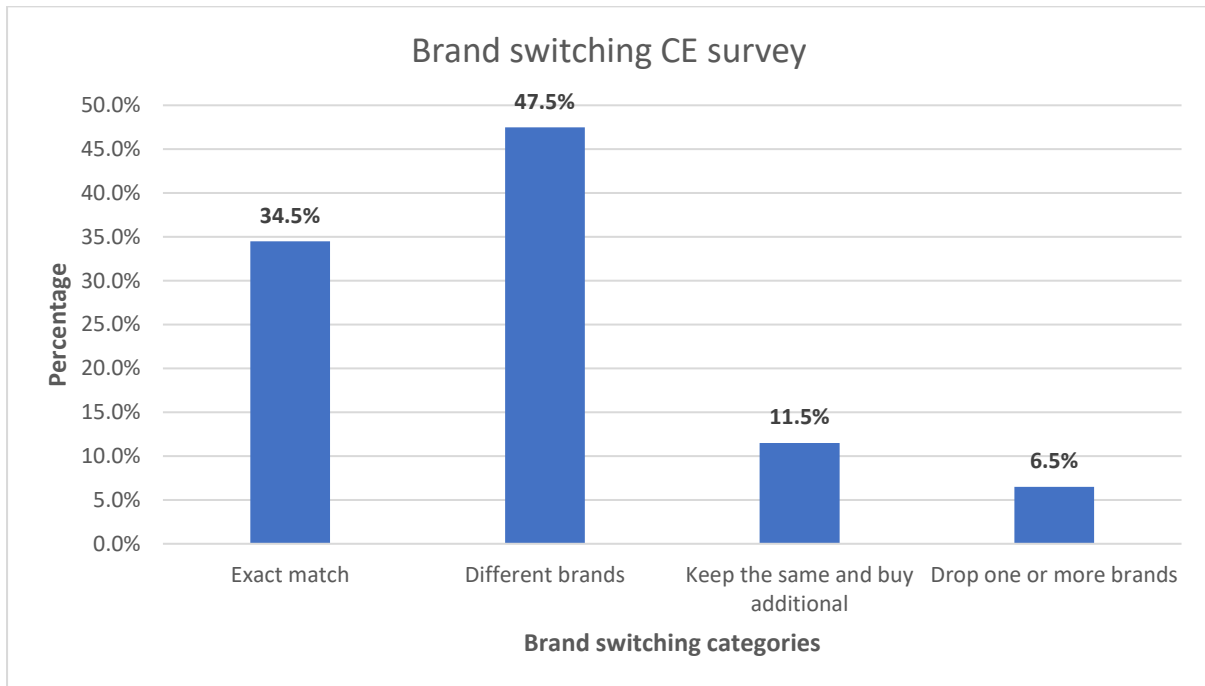
The analysis reveals that the majority of the respondents (51,50%) own brands other than those specified. Perhaps unsurprisingly, Brand A was the first of the brands with 29% of respondents indicating that they currently own one of these vehicles. This is due to the fact that this brand offers models in lower segments of the market. This is quite possibly related to the number of respondents with purchase intent in the lowest category of Figure 4.9 (Purchase intent). In terms of 'plan to buy', Brand A has the highest percentage of respondents, with 35%, while Brand B shows a "plan to buy" figure of 32%. A point to note is that all the manufacturers showed significant increases in the 'plan to buy' which indicates that respondents have increasing interest in the brand highlighted in the survey. The next section provide a brief analysis of what these actual figures look like.

4.3.1.7 Brand switching

The brand switching data depicted in Figure 4.11 overleaf, shows various categories of what is owned in terms of brands and what is preferred for future new vehicle purchase purposes. This data was extracted from the 'intention to purchase' data, and provides an overview of whether respondents planned on remaining with their current brands or planned to switch as an indication of whether they were content with their current brand or not. The data was split into 4 categories for this representation, and

no values fell outside of these 4 categories. This means that Figure 4.11 is representative of all 200 responses obtained from the survey.

Figure 4.11 - Brand switching for the CE survey



The above analysis reveals that the respondents (47.5%) were planning on switching to alternative brands in the near future while 34.5% were planning on staying with the same brands for future purposes. The lower percentages are reflected in respondents who chose to keep the same brands for future purposes, while also purchasing additional brands (11.5%). Lower percentages are also reflected in keeping the same brands while dropping one or more of their current brands for future purchase purposes (6.5%).

4.3.1.8 Brand switching for respondents based on Dieselgate awareness

Figures 4.12 and 4.13 below depict brand switching for the respondents who were aware of the Dieselgate scandal, as well as those that were not. These figures are presented with the intention of understanding the percentage of respondents who had intentions to switch brands based on awareness of the Dieselgate scandal.

Figure 4.12 - Brand switching for respondents who were aware of Dieselgate

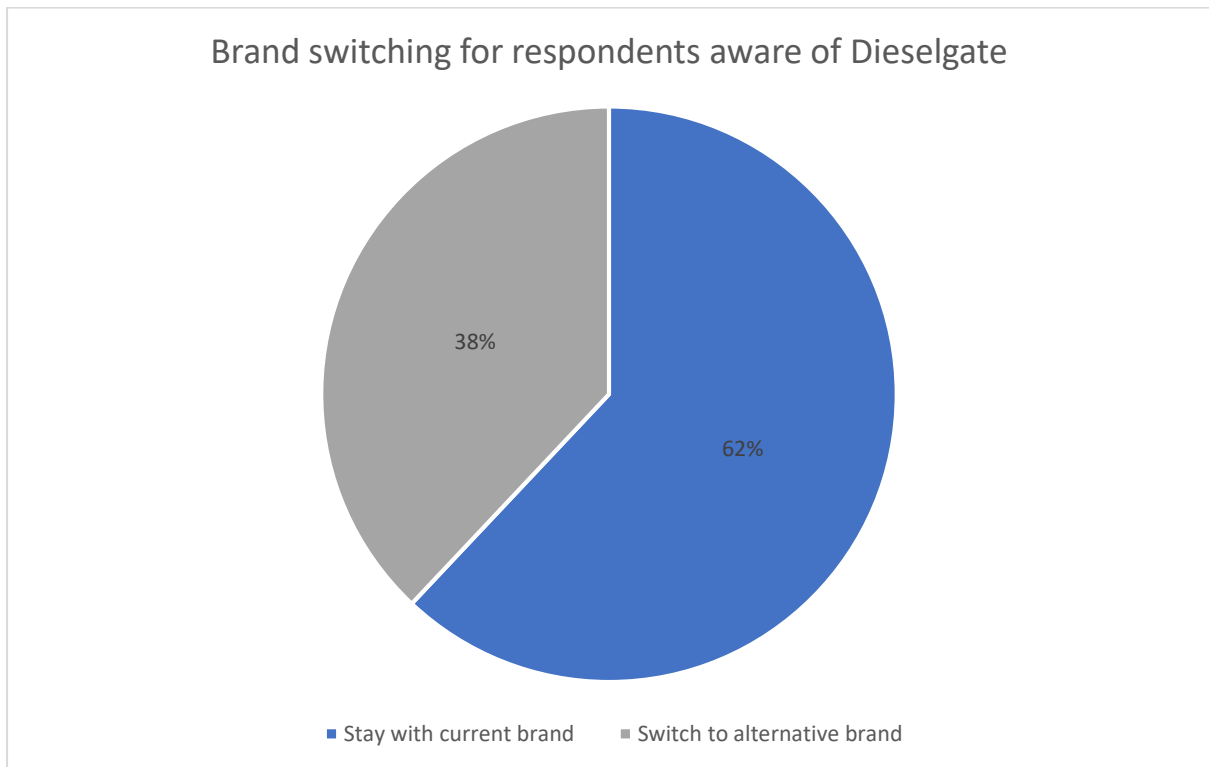
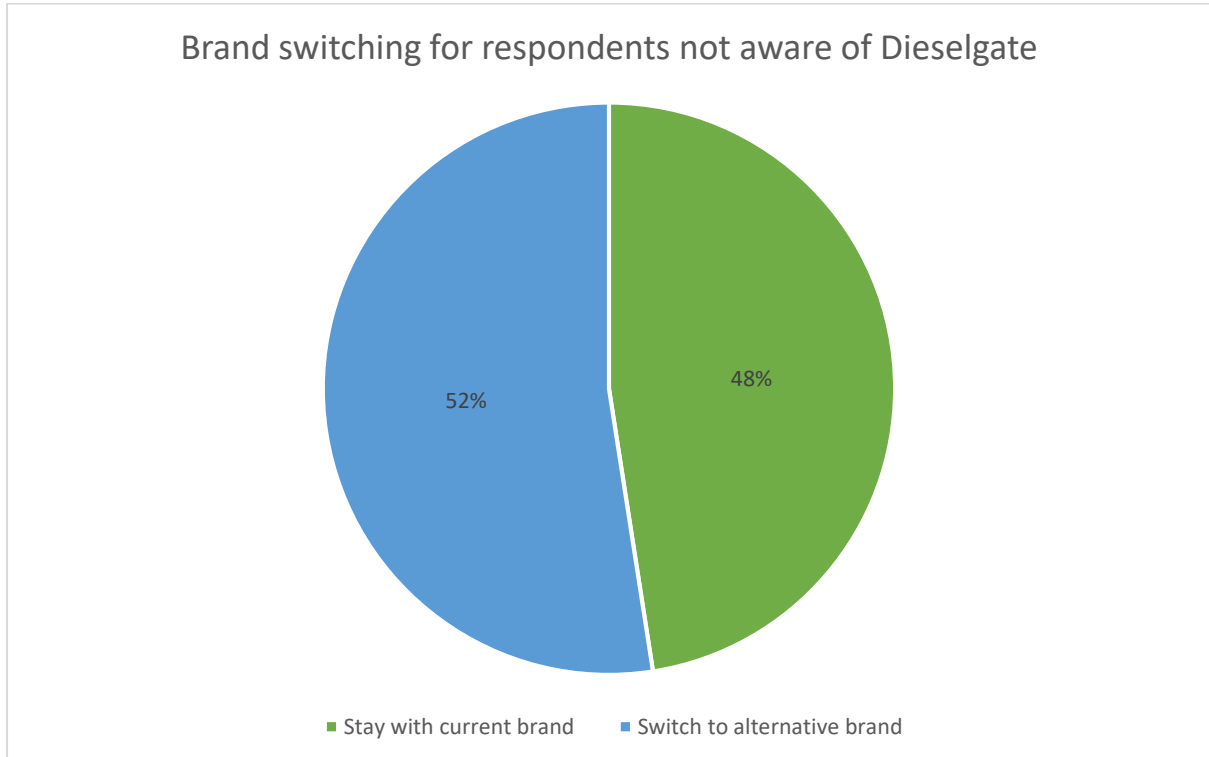


Figure 4.13 - Brand switching for respondents who were not aware of Dieselgate



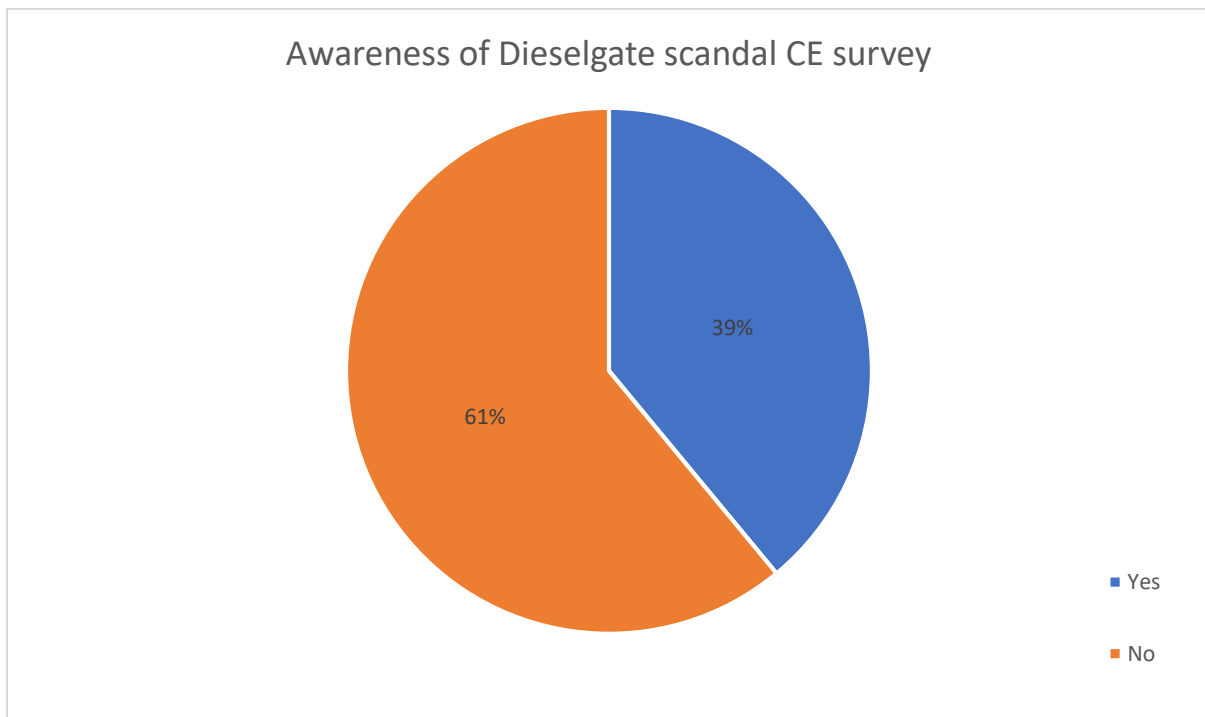
It is noted that while only 38% of the respondents who were aware of Dieselgate when undertaking the questionnaire had intentions of switching brands, the percentage of

respondents with no awareness of Dieselpgate when completing the questionnaire was actually much higher at 48%. This is interesting due to the fact Figure 4.12 (Brand switching for respondents aware if Dieselpgate) should show a higher change to alternative due to awareness of the Dieselpgate scandal as well as the brands affected.

4.3.1.9 Awareness of the Dieselpgate scandal

The final of the sub-sections dealing with the respondent's profile considers whether the respondents had any prior knowledge of the Dieselpgate scandal before undertaking the CE survey. This information is vital in the research, as it will reveal whether respondents answered questions with the scandal in mind or not. Figure 4.14 below shows the response rates.

Figure 4.14 - Awareness of the Dieselpgate scandal



As per Figure 4.14, it can be seen the 61% of the respondents had no prior knowledge of the Dieselpgate scandal, while 39% do have knowledge about it. This split will be addressed further in the following sections where the actual responses to the customer equity drivers (brand, value, and relationship related drivers) are analysed.

4.4 Customer equity questionnaire - analysis of responses

This section will outline the responses received for the customer equity questionnaire. It is this portion of the analysis that is likely to provide the most insight about whether the Dieselgate scandal has had any effect on the brands implicated in the emissions scandal. The first sub-section outlines the design used for the customer equity questionnaire with the relevant factors related to the various questions depicted in tabular form. The remaining sub-sections will outline the analysis for the value, brand, and relationship drivers for the various brands.

4.4.1 Questionnaire design

Table 4.4 below provides an outline of the questions and their relationship to various factors chosen for the analysis. This table is presented from chapter 3 for ease of reference.

Table 4.4 - Customer equity questionnaire design – question/factor relationship

Factors	Related questions
Information/opt in	1
Brand alignment (bias)	2
Simulated pre- and post-Dieselgate	3
Size and frequency of purchase	4
Market share and transition (bias)	5
Value-related drivers	6, 16, 17
Brand-related drivers	7, 8, 9, 10, 11
Relationship-related drivers	12, 13, 14, 15

The most important factors related to the analysis can be found in the last three rows of Table 4.4, these are the value, brand, as well as relationship-related drivers of customer equity. All the questions related to these drivers used a 5-point Likert scale with the possible responses being; 1: Strongly agree, 2: Agree, 3: Neutral, 4: Disagree, 5: Strongly disagree (Bhat, 2018). The numbers noted for each answer also provided the actual rating for the answer. This means that it is convenient to analyse the data using a descriptive statistical approach.

Additionally, the defining question related to awareness of the Dieselgate scandal is found in question 3. This will be used to differentiate between the driver's pre- as well as post-Dieselgate. A sample of the questionnaire can be found in the list of appendices (Appendix I - Customer equity questionnaire).

4.4.2 Value driver for the individual brands

The analysis below uses descriptive statistics to analyse the responses generated by the customer equity questionnaire in relation to the value driver questions. The tables provided will outline the results for each brand for both pre- as well as post-Dieselgate.

4.4.2.1 Brand A value driver analysis

Table 4.5 below shows the analysis of the responses for the value related questions pre-Dieselgate (for respondents who were aware of Dieselgate) for Brand A, while Table 4.6 shows the analysis post-Dieselgate (for respondents not aware of Dieselgate) for Brand A.

Table 4.5 - Value driver analysis pre-Dieselgate Brand A (not aware of Dieselgate)

Value DR questions	(Q) 6.1	(Q) 16.1	(Q) 17.1
Mean (average)	1.90	1.98	1.79
SD (standard deviation)	0.98	0.91	0.90
N (sample size)	122	122	122

Table 4.6 - Value driver analysis post-Dieselgate Brand A (aware of Dieselgate)

Value DR questions	(Q) 6.1	(Q) 16.1	(Q) 17.1
Mean (average)	1.90	2.09	1.83
SD (standard deviation)	1.04	1.27	1.04
N (sample size)	78	78	78

The tables above reveal that the mean for the value related questions are in the same range with the largest difference of means being between pre-and post-Dieselgate for question 16.1 (“This brand provides the best overall quality”), this difference is 0.11. This difference in means shows although question 16.1 has the largest difference in terms of the average value, they still concur with the Likert scale value of “agree”. The standard deviations are also close to 1, with the pre-Dieselgate values all being less

than 1 while the largest difference of standard deviation is again on question 16.1, showing a 0.36 difference. This means that in terms of data dispersion, question 16.1 shows a wider variety of responses for those respondents who were aware of Dieselgate although this is not greatly different. These data sets reveal no significant difference pre- and post-Dieselgate for Brand A.

4.4.2.2 Brand B value driver analysis

Tables 4.7 and 4.8 below show the responses for the pre- as well as post-Dieselgate data for the value related driver for Brand B.

Table 4.7 - Value driver analysis pre-Dieselgate Brand B (not aware of Dieselgate)

Value DR questions	(Q) 6.2	(Q) 16.2	(Q) 17.2
Mean (average)	2.10	1.80	3.03
SD (standard deviation)	0.99	0.88	1.09
N (sample size)	122	122	122

Table 4.8 - Value driver analysis post-Dieselgate Brand B (aware of Dieselgate)

Value DR questions	(Q) 6.2	(Q) 16.2	(Q) 17.2
Mean (average)	1.82	1.63	2.44
SD (standard deviation)	0.98	0.93	1.21
N (sample size)	78	78	78

Tables 4.7 and 4.8 reveal differences pre- as well as post-Dieselgate in terms of the mean, particularly for question 17.2 (“I believe this brand meets my pricing needs”) where pre-Dieselgate shows a mean that is firmly in line with “neutral” on the Likert scale. This means that people are closer to “agree” when aware of the Dieselgate scandal. The mean value for question 17.2 for Table 4.8 is in between “agree” and “neutral”. This means that although there are difference for the means of certain questions, there are no significant differences in terms respondents either agreeing or

disagreeing with any statement presented to them. In terms of standard deviation, there are no significant differences between Tables 4.7 and 4.8, with the largest difference in standard deviation being for question 17.2.

4.4.2.3 Brand C value driver analysis

Tables 4.9 and 4.10 show the responses for the value related drivers for Brand C both pre- as well as post-Dieselgate.

Table 4.9 - Value driver analysis pre-Dieselgate Brand C (not aware of Dieselgate)

Value DR questions	(Q) 6.3	(Q) 16.3	(Q) 17.3
Mean (average)	2.13	1.88	2.96
SD (standard deviation)	1.01	0.87	1.07
N (sample size)	122	122	122

Table 4.10 - Value driver analysis post-Dieselgate Brand C (aware of Dieselgate)

Value DR questions	(Q) 6.3	(Q) 16.3	(Q) 17.3
Mean (average)	1.97	1.90	2.44
SD (standard deviation)	1.07	1.05	1.21
N (sample size)	78	78	78

When analysing the mean values presented in Tables 4.9 and 4.10, there are differences in question 6.3 (“I believe this brand meets my mobility needs”) as well as question 17.3 (“I believe this brand meets my pricing needs”). Although question 6.3 (for both Tables 4.9 and 4.10) is still around the mean of 2 (“agree”), question 17.3 is closer to “neutral” (meaning indifferent) in the pre-Dieselgate table. Post-Dieselgate for question 17.3 is also approaching the middle between “agree” and “neutral” although it is marginally closer to the side of “agree”.

With regards to the standard deviation, the most variability of data is seen with question 16.3 (“This brand provides the best overall quality”) and also with question

17.3. This would indicate that there is higher variability in the answers that deviate from the mean. This is even though there is only a 0.02 difference between the mean of question 16.3 between Table 4.9 and 4.10 (Hargrave, 2019).

4.4.2.4 Brand D value driver analysis

Although Brand D is owned by Brand A, Brand D operates in the premium luxury segment which directly competes with Brand B and Brand C. This brand is additionally a mark on its own and this distinctly separates it from Brand A (Bhasin, 2018). Below are Tables 4.11 and 4.12 that depict the pre- as well as post-Dieselgate data from the customer equity questionnaire related to Brand D for the value related drivers of customer equity.

Table 4.11 - Value driver analysis pre-Dieselgate Brand D (not aware of Dieselgate)

Value DR questions	(Q) 6.4	(Q) 16.4	(Q) 17.4
Mean (average)	1.98	1.94	2.66
SD (standard deviation)	0.96	0.89	1.10
N (sample size)	122	122	122

Table 4.12 - Value driver analysis post-Dieselgate Brand D (aware of Dieselgate)

Value DR questions	(Q) 6.4	(Q) 16.4	(Q) 17.4
Mean (average)	2.04	1.90	2.33
SD (standard deviation)	1.09	1.06	1.11
N (sample size)	78	78	78

The mean values for both Table 4.11, as well as 4.12, show no stark differences for any of the questions, in fact, the results are quite close to one another. Question 17.4 (“I believe this brand meets my pricing needs”) of Table 4.11 show a mean closer to 3, which is “neutral”, but this value is not significantly different to question 17.4 of Table 4.12. This means that there are no significant differences between the two tables in

that, whether respondents were aware of the Dieselgate scandal or not, their responses are still within the same range. Questions 6.4 and 16.4 are close to an average of 2 which correlates with “agree”. With regards to the standard deviation, once again the values show low dispersion around the mean with question 16.4 showing the greatest variability. With this, it can be concluded that there is no significant difference between the two tables which means that respondents were not influenced in their responses based on whether they were aware of Dieselgate or not.

4.4.3 Brand driver for the individual brands

The below results will outline the brand driver questions of the customer equity questionnaire for Brand A, Brand B, Brand C, and Brand D. The analysis will include both pre- as well as post-Dieselgate and is based on the respondent’s answers to question 3 (“Are you aware of the 2015 Dieselgate scandal?”) of the questionnaire.

4.3.3.1 Brand A brand driver analysis

Tables 4.13 and 4.14 below show the mean as well as the standard deviation of the responses to the customer equity questionnaire for the brand driver questions for Brand A. In total, there are five questions related to the brand driver.

Table 4.13 - Brand driver analysis pre-Dieselgate Brand A (not aware of Dieselgate)

Brand DR questions	(Q) 7.1	(Q) 8.1	(Q) 9.1	(Q) 10.1	(Q) 11.1
Mean (average)	2.09	2.15	2.09	1.90	1.93
SD (standard deviation)	1.06	1.10	1.10	0.83	0.88
N (sample size)	122	122	122	122	122

Table 4.14 - Brand driver analysis post-Dieselgate Brand A (aware of Dieselgate)

Brand DR questions	(Q) 7.1	(Q) 8.1	(Q) 9.1	(Q) 10.1	(Q) 11.1
Mean (average)	2.08	2.05	1.92	2.05	2.05
SD (standard deviation)	1.20	1.18	1.19	1.14	1.15
N (sample size)	78	78	78	78	78

The analysis of the mean values for the brand driver questions for Brand A reveals that all values in both Table 4.13 and Table 4.14 are around the value of 2 which correlates with the response of “agree” on the Likert scale. The differences between the means in the two tables are seen in questions 9.1 (“I take note and pay attention to advertising from this brand”), 10.1 (“This brand is known as a good corporate citizen”), and 11.1 (“This brand is known to have a high ethical standard with regards to customers and employees”). There is a difference of more than 0.10 between pre- and post-data. The standard deviation shows the most notable dispersion from the mean for questions 10.1 and 11.1 although the standard deviation values are still relatively low for all the questions. For both the mean as well as the standard deviation of both tables, the values do not vary greatly and thus, respondents answered in a similar way whether they were aware of the Dieselgate scandal or not.

4.4.3.2 Brand B brand driver analysis

The data analysis the brand driver questions of the customer equity questionnaire is presented below in Tables 4.15 and 4.16 for Brand B. Table 4.15 represents the pre-Dieselgate data while Table 4.16 represents the post-Dieselgate scandal data.

Table 4.15 - Brand driver analysis pre-Dieselgate Brand B (not aware of Dieselgate)

Brand DR questions	(Q) 7.2	(Q) 8.2	(Q) 9.2	(Q) 10.2	(Q) 11.2
Mean (average)	2.23	2.32	2.20	1.92	1.75
SD (standard deviation)	1.10	1.09	1.05	0.88	0.77
N (sample size)	122	122	122	122	122

Table 4.16 - Brand driver analysis post-Dieselgate Brand B (aware of Dieselgate)

Brand DR questions	(Q) 7.2	(Q) 8.2	(Q) 9.2	(Q) 10.2	(Q) 11.2
Mean (average)	1.97	1.76	1.73	1.77	1.68
SD (standard deviation)	1.04	0.96	0.91	0.82	0.86
N (sample size)	78	78	78	78	78

The data analysis for the means shown in Tables 4.15 and 4.16 reveal that there are larger differences for questions 7.2 (“The image of this brand fits my personality well”), 8.2 (“If this brand sends me information, I take note of it and pay attention to it”), and 9.2 (“I take note and pay attention to advertising from this brand”). The differences in the means show values moving closer to “neutral” for Table 4.15 while the post-values in Table 4.16 are all below 2. This is of some interest as the pre-Dieselgate values are higher which indicates that consumers are less interested in the brand and its information post-Dieselgate. It is only questions 10.2 (“This brand is known as a good corporate citizen”) and 11.2 (“This brand is known to have a high ethical standard with regards to customers and employees”) that show little change, although question 10.2 shows a decrease of 0.15 in the post-scenario. The standard deviations in both tables reveal low values (around 1), which is consistent with values clustered around the mean.

4.4.3.3 Brand C brand driver analysis

Tables 4.17 and 4.18 below list the brand driver question analysis for pre- as well as post-Dieselgate for Brand C.

Table 4.17 - Brand driver analysis pre-Dieselgate Brand C (not aware of Dieselgate)

Brand DR questions	(Q) 7.3	(Q) 8.3	(Q) 9.3	(Q) 10.3	(Q) 11.3
Mean (average)	2.28	2.36	2.22	1.95	1.86
SD (standard deviation)	1.07	1.11	1.02	0.85	0.77
N (sample size)	122	122	122	122	122

Table 4.18 - Brand driver analysis post-Dieselgate Brand C (aware of Dieselgate)

Brand DR questions	(Q) 7.3	(Q) 8.3	(Q) 9.3	(Q) 10.3	(Q) 11.3
Mean (average)	1.91	1.79	1.82	1.95	1.65
SD (standard deviation)	1.13	1.06	1.02	0.91	0.75
N (sample size)	78	78	78	78	78

The means presented in Tables 4.17 and 4.18 show some notable differences for questions 7.3 (“The image of this brand fits my personality well”), 8.3 (“If this brand sends me information, I take note of it and pay attention to it”), and 9.3 (“I take note and pay attention to advertising from this brand”) between pre- as well as post-Dieselgate. Pre-Dieselgate values for these questions are around 2.3, while post-Dieselgate shows values below 2. The difference in means is not dissimilar to the values seen for Brand B in Tables 4.15 and 4.16. As mentioned above, it is interesting that there seems to be less interest in terms of the three of the brand driver questions between pre- and post-scandal. Standard deviations in both Table 4.17 and Table 4.18 show values close to 1, which indicates values clustered around the mean.

4.4.3.4 Brand D brand driver analysis

The Tables 4.19 and 4.20 below show the data analysis for Brand D with regards to the brand driver related questions for the customer equity questionnaire.

Table 4.19 - Brand driver analysis pre-Dieselgate Brand D (not aware of Dieselgate)

Brand DR questions	(Q) 7.4	(Q) 8.4	(Q) 9.4	(Q) 10.4	(Q) 11.4
Mean (average)	2.07	2.17	2.11	1.94	1.86
SD (standard deviation)	0.94	1.03	1.02	0.89	0.76
N (sample size)	122	122	122	122	122

Table 4.20 - Brand driver analysis post-Dieselgate Brand D (aware of Dieselgate)

Brand DR questions	(Q) 7.4	(Q) 8.4	(Q) 9.4	(Q) 10.4	(Q) 11.4
Mean (average)	2.05	1.95	1.94	1.99	1.82
SD (standard deviation)	1.09	1.13	1.06	0.93	0.89
N (sample size)	78	78	78	78	78

The analysis of means for both Tables 4.19 and 4.20 depict values that are not significantly different from one another for all questions. For each question, the values both pre, as well as post, are quite close to 2, with perhaps question 8.4 (“If this brand sends me information, I take note of it and pay attention to it”) and 9.4 (“I take note and pay attention to advertising from this brand”) showing the largest differences, but the difference is no more than 0.22. These questions are again related to the advertising and information from the brand, so it is notable that the post-Dieselgate values are lower as seen with Brand B and Brand C. The standard deviation for all questions in both tables is also relatively close to 1 which indicates a low dispersion of values from the mean. The standard deviation for question 11.4 (“This brand is known to have a high ethical standard with regards to customers and employees”) is the lowest for Table 4.19, which is 0.76.

4.4.4 Relationship driver for the individual brands

This sub-section will cover the responses to the customer equity questionnaire related to the relationship driver questions for Brand A, Brand B, Brand C, and Brand D. As per Table 4.4, there are four questions related to relationship equity. These are also split according to question 3 (“Are you aware of the 2015 Dieselgate scandal?”) to create the pre- as well as post-Dieselgate tables.

4.4.4.1 Brand A relationship driver analysis

Tables 4.21 and 4.22 below show the relationship driver information in terms of responses to the customer equity questionnaire for Brand A. The pre-Dieselgate data is in Table 4.21 while the post-Dieselgate data is in Table 4.22.

Table 4.21 - Relationship driver analysis pre-Dieselgate Brand A (not aware of Dieselgate)

Rel. DR questions	(Q) 12.1	(Q) 13.1	(Q) 14.1	(Q) 15.1
Mean (average)	1.93	3.07	2.85	2.19
SD (standard deviation)	1.00	1.26	1.21	1.04
N (sample size)	122	122	122	122

Table 4.22 - Relationship driver analysis post-Dieselgate Brand A (aware of Dieselgate)

Rel. DR questions	(Q) 12.1	(Q) 13.1	(Q) 14.1	(Q) 15.1
Mean (average)	2.05	2.55	2.46	2.13
SD (standard deviation)	1.20	1.45	1.28	1.26
N (sample size)	78	78	78	78

According to Tables 4.21 and 4.22 above, questions 13.1 (“This brand knows a lot of information about me”) and 14.1 (“This brand recognises me as being special”) show the highest mean values in terms of responses, with the pre-Dieselgate table showing

higher values than that of the post-Dieselgate. These values are close to 3 which correlates with the “neutral” response. Interestingly, the responses are more favourable post-Dieselgate, which would indicate that for Brand A, respondents tended to agree with the statements post-Dieselgate and this is contrary to lost customer equity. In fact, had there been effects of lost CE due to Dieselgate, the pre-Dieselgate responses should be more inline with “agree” while the post-Dieselgate values should be more negative, i.e. “neutral” or indifferent. The results, however, still do not show any significant differences in terms of agreeing versus disagreeing. In terms of standard deviation, the values experience a higher deviation from the mean for post-Dieselgate when compared to the values pre-Dieselgate and this would indicate that there are more varied responses to the relationship driver questions.

4.4.4.2 Brand B relationship driver analysis

Tables 4.23 and 4.24 below contain the data for the responses to the customer equity questionnaire for Brand B. Table 4.23 contains the analysis of the responses pre-Dieselgate while Table 4.24 contains the analysis of responses post-Dieselgate.

Table 4.23 - Relationship driver analysis pre-Dieselgate Brand B (not aware of Dieselgate)

Rel. DR questions	(Q) 12.2	(Q) 13.2	(Q) 14.2	(Q) 15.2
Mean (average)	1.77	3.25	2.99	2.62
SD (standard deviation)	0.86	1.12	1.22	1.08
N (sample size)	122	122	122	122

Table 4.24 - Relationship driver analysis post-Dieselgate Brand B (aware of Dieselgate)

Rel. DR	(Q) 12.2	(Q) 13.2	(Q) 14.2	(Q) 15.2
Mean (average)	1.56	2.51	2.27	2.03
SD (standard deviation)	0.69	1.30	1.16	1.02
N (sample size)	78	78	78	78

The analysis of means shows that for questions 13.2 (“This brand knows a lot of information about me”), 14.2 (“This brand recognises me as being special”), and 15.2 (“I feel a sense of community with other users of this brand”) shows pre-Dieselgate values closer to 3 which relates to the answer “neutral” on the Likert scale. The post-Dieselgate values are closer to 2, which relates to the answer “agree” - apart from question 13.2 which is 2.51. As with the Brand A analysis, questions 13.2 and 14.2 show the highest values while the pre-Dieselgate values are higher than those post-Dieselgate and again this points to more statements that agree with the question statements post-Dieselgate. This again points to the opposite results of what should be seen should the Dieselgate scandal have been a factor in the respondents view of their relationship with the brand. These results are also not significant enough to show any strong changes in the respondent’s view. In terms of standard deviation, the values are quite close to 1 with the exception of question 12.2 (“I have a high level of trust in this brand”) where the values in both tables are below 1.

4.4.4.3 Brand C relationship driver analysis

Tables 4.25 and 4.26 below contain the data of the analysis of the responses to the customer equity questionnaire for Brand C. Table 4.25 contains the pre-Dieselgate data while Table 4.26 contains the post-Dieselgate data.

Table 4.25 - Relationship driver analysis pre-Dieselgate Brand C (not aware of Dieselgate)

Rel. DR questions	(Q) 12.3	(Q) 13.3	(Q) 14.3	(Q) 15.3
Mean (average)	1.84	3.22	2.89	2.50
SD (standard deviation)	0.93	1.16	1.20	1.10
N (sample size)	122	122	122	122

Table 4.26 - Relationship driver analysis post-Dieselgate Brand C (aware of Dieselgate)

Rel. DR questions	(Q) 12.3	(Q) 13.3	(Q) 14.3	(Q) 15.3
Mean (average)	1.74	2.45	2.28	2.04
SD (standard deviation)	0.81	1.36	1.14	1.00
N (sample size)	78	78	78	78

The analysis of the data in Table 4.25 shows that questions 13.3 (“This brand knows a lot of information about me”), 14.3 (“This brand recognises me as being special”), and 15.3 (“I feel a sense of community with other users of this brand”) show high values that are closer to 3 “neutral”. These values are significantly higher than the corresponding values in Table 4.26, except for question 15.3 (although this question still a 0.46 difference). This means that three of the four relationship driver questions are closer to “agree” post-Dieselgate as opposed to “neutral” pre-Dieselgate. With regards to the standard deviation, the values are once again close to 1, apart from post-Dieselgate in question 13.3, this value is 1.36 but is also closer to 1. This value just indicates a more varying spread of the data.

4.4.4.4 Brand D relationship driver analysis

The analysis of the relationship driver questions, four in total, are shown in Tables 4.27 and 4.28 below for the Brand D. Table 4.27 shows the pre-Dieselgate data for the customer equity questionnaire while Table 4.28 shows the data post-Dieselgate.

Table 4.27 - Relationship driver analysis pre-Dieselgate Brand D (not aware of Dieselgate)

Rel. DR questions	(Q) 12.4	(Q) 13.4	(Q) 14.4	(Q) 15.4
Mean (average)	1.83	3.25	2.83	2.50
SD (standard deviation)	0.87	1.16	1.16	1.08
N (sample size)	122	122	122	122

Table 4.28 - Relationship driver analysis post-Dieselgate Brand D (aware of Dieselgate)

Rel. DR questions	(Q) 12.4	(Q) 13.4	(Q) 14.4	(Q) 15.4
Mean (average)	1.74	2.58	2.37	2.08
SD (standard deviation)	0.86	1.33	1.25	1.03
N (sample size)	78	78	78	78

Table 4.28 shows that, as with Brands A, B, C, Brand D shows mean values closer to 3 or above 3 for questions 13.4 (“This brand knows a lot of information about me”), 14.4 (“This brand recognises me as being special”), and 15.4 (“I feel a sense of community with other users of this brand”). The pre-Deiselgate values shown in Table 4.27 are higher than the corresponding values for the post-Dieselgate data shown in Table 4.28. Question 12.4 (“I have a high level of trust in this brand”) is consistently low, both in the pre- as well as post-Dieselgate data. This is true for all the brands analysed in this sub-section. This indicates that the level of trust hasn’t changed that much for the brands put forward to respondents. With regard to standard deviations, the values also remain consistently low, with the highest value being 1.33 for question 13.4 of the post-Dieselgate analysis although this still indicates data that is close to the mean.

4.5 Discussion

The discussion below outlines the results of the analyses done in sections 4.2 and 4.3. The vehicle sales data analysis that was statistically run by methods of a paired *t-test* will be discussed in the context of what this means in terms of the 2015 Dieselgate scandal. Additionally, the trend analysis is discussed in terms of what the sales figures for diesel vehicles, overall sales volumes, and sales volumes for the Brand A, Brand B, Brand C, and Brand D are discussed in terms of what was discovered for the period prior to, as well as post-Dieselgate.

The final discussion of this section outlines the results of the customer equity questionnaire in terms of the analysis conducted, by means of descriptive statistics,

on the customer equity drivers (value, brand, relationship) for Brand A, Brand B, Brand C, and Brand D.

4.5.1 Vehicle sales data

The initial indicator of vehicle sales data for this study reveals that there is a difference in sales data for diesel vehicles between the pre-scandal and post-scandal. The same is true for overall vehicle sales, as well as sales for Brand A, Brand B, Brand C, and Brand D. Additionally, the paired *t-test* used for the analysis of both the diesel vehicles as well as overall new vehicle sales data, establishes whether there is a significant difference from zero between the two variables used in each of the tests. (Yeager, 2019). The same is true for sales of the affected manufacturers for both pre- as well as post-Dieseltgate. What is established from the analysis done on the overall vehicle sales is that there is a more significant difference between the pre- and post-scandal periods for overall vehicle sales than what is seen for diesel vehicle sales over the same period. This possibly indicates that there are other factors that have an influence on vehicle sales, although the Dieseltgate scandal is a factor that would influence customers perceptions of the brands currently in the South African market. These factors include a weaker currency which will not only affect new vehicle prices, but will also affect the prices of all imported goods, some of which are used as inputs (raw materials, components, equipment) into local manufacturing, thus driving the prices of even local goods up (Amiti, Itskhoki and Konings, 2016). Furthermore, weakness in currency discourages consumerism, productivity, and investments, while increasing the cost of living (Amadeo, 2019). There is also the influence of vehicle pricing when combined with market factors. A cheaper vehicle may still do well in terms of sales even though the brand may have questionable ethical practices. The influence of the Dieseltgate scandal however, holds weight when it is considered that Brand A is one of the most prominent automotive brands (Bekker, 2019). A major scandal involving such a prominent manufacturer could immediately shock the market, whereas a less prominent manufacturer would have a notably lesser market effect.

A full market analysis would be required to understand whether sales volumes in the South African market were directly affected as a result of the Dieseltgate scandal in the period selected, but this is exhaustive and beyond the scope of this paper. It is for this reason that this portion of the analysis is only used as an initial indicator of whether the new vehicle sales market has experienced any notable changes.

4.5.1.1 Vehicle sales data trends

In addition to the statistical analysis conducted in section 4.5.1 above, the actual sales volumes for the period January 2014 – June 2017 were plotted for diesel vehicle sales, overall sales, as well as sales volumes for the affected manufacturers (Brand A, Brand B, Brand C, and Brand D). For diesel vehicle sales, the volume decline is seen from as early as June 2015, and this trend continues throughout until the end of the analysis period with minor upward spikes in some months.

With regards to the trend for overall vehicle sales in the South African market as seen in Figure 4.2, the decline seen only begins four months after the Dieselgate scandal became public knowledge. When the percentage sales of diesel vehicles in South Africa is considered, as per Figure 4.4 above, it can be understood that in terms of overall vehicle sales, the effects of Dieselgate are not as easy to determine. Considering this, Figure 4.3 provides useful insight into the sales volumes of the affected manufacturers, Brand A, Brand B, Brand C, and Brand D, during the analysis period. While Brands B-D seems to already be in a steady decline, starting approximately three months before the Dieselgate scandal became public knowledge, Brand A, the most prominent brand associated with Dieselgate, still shows sales growth until October 2015, where a sharp decline in sales can be seen. There seems to be major fluctuations in sales after this point, more notably so that the pre-Dieselgate period although this period also shows some fluctuation. What can be said for sales in terms of Brand A is that, the Dieselgate scandal effects are apparent in terms of vehicle sales, however this is not the only factor at play. As such, a deeper investigation, that combines a number of factors, would be required to understand the sales fluctuations of Brand A.

Based on the trend lines plotted in Figures 4.1 and 4.3, the influence of the Dieselgate scandals can be seen although, once again, there is a multitude of factors at play with regards to market forces. One such force in South Africa is currency volatility and this weakness of the local currency will affect markets in general, especially those which import a large number of products such as the automotive sector (International Trade Administration, 2019). As mentioned in section 4.5.1, it would, understandably, be challenging to attribute the changes in sales as seen in both the paired *t-test* results as well as the trend analysis for sales solely on the Dieselgate scandal, as there a multitude of factors that could influence sales. Once again, it is for this reason that

sales data was used as only an initial indicator for loss of confidence from South African consumers in the brands guilty of emissions cheating. The following section discusses the results of the customer equity questionnaire, the research instrument that enabled the researcher to gain actual insights into consumers in the South African market.

4.5.2 Customer equity questionnaire discussion

The results in terms of the analyses of the responses to the customer equity questionnaire, are discussed for the individual drivers below. The first of these results is for the value driver of customer equity.

4.5.2.1 Value driver analysis discussion

In terms of the value driver for Brand B and Brand C, it is noted that for Tables 4.7 - 4.10, the difference is based on pricing pre- as well as post-Dieselgate. While this difference is not significant (it moves from “neutral” to between “agree” and “neutral”), this factor, while related to the customer equity model, is not directly influenced by the Dieselgate scandal. In addition to this, the largest grouping of respondents in terms of purchase intent (39.5%) revealed purchase intent for the R200 000 – R299 000 category, a category in which the majority of Brand B and C’s vehicles do not feature (Carmag, 2019). It is also stated that pricing and customer satisfaction are interlinked (Herrmann, et al., 2007). This then further supports the statement that although there is a shift from “neutral” to between “neutral” and “agree”, that this is related to perceived price fairness, as well as customer satisfaction, rather than to the Dieselgate scandal.

This is the only difference that can be found with regards to the value driver related questions, the value driver results for Brand A and Brand D reveal no significant differences between the pre- and well as post-Dieselgate analysis. This is interesting to note as Brand A was the most prominent brand associated with the Dieselgate scandal while Brand D is owned by Brand A and this means that Brand D was also immediately associated with Dieselgate. In terms of literature, value is considered to be central to all that an organisation does in terms of the customer relationship. Additionally, value is based on three key levers, quality, price, and convenience and the best brand strategies and relationship marketing will be insufficient should the organisation not meet customer expectation in terms of value (Lemon, Rust and

Zeithaml, 2001). Based on this fact, these brands, if any, should show differences with regards to the value driver between the pre- and post-Dieselgate analysis which is not the case.

4.5.2.2 Brand driver analysis discussion

The brand driver questions for Brand A reveal that there are differences between the pre- and post-Dieselgate tables (4.13 and 4.14) for the questions related to brand awareness, the brand being a good corporate citizen, and the brand maintaining a high ethical standard with regards to its customer and employees. The questions related to ethics and corporate citizenship are actually higher for the respondents who were aware of the Dieselgate scandal. Brand awareness has dropped although, throughout both tables, any differences seen are not significant. This means that the responses are still located within the “agree” to “neutral” category and not from “agree” to “disagree” for instance. This is once again an interesting observation in that Brand A is the brand most associated with Dieselgate. Similarly, the results for Brand B do not show much deviation between Tables 4.15 and 4.16, although there are differences in terms of brand association, brand information, and brand advertising. Interesting to note is that the respondents show less interest in this brand post-Dieselgate. Again, as with Brand A, the differences seen is not significant enough to establish that the respondents have lost favour with the brand due to the fact that responses are once again in the “neutral” to “agree” range. Similarly, Brand C shows the same range of responses as Brand B which points to less interest in the brand although there are no definitive statements to indicate strong agreement or disagreement. Brand D additionally shows values similar to Brand A which would indicate there are no significant differences, or losses to the brand equity driver of customer equity for any of the brands.

It should also be noted that consumers brand tastes or preferences for different products differ. This means that the way that consumers develop tastes for different brands depends wholly on the type of product (Alreck and Settle, 1999). This means that the factors for a consumer’s preference for a soft drink brand will be different when compared to the factors that that same consumer would use to develop a preference for a certain automotive brand. In light of this statement and the results obtained for the brand driver of customer equity, it can be said that in terms of the Dieselgate scandal, consumer brand preferences are complex and that it would take more than

one aspect of what defines a brand in a consumer's mind to sway that consumer's preference for the brand. Furthermore, when it considered, as per Figure 4.14 that only 39% of respondents were aware of the Dieselgate scandal. The knowledge or extent of the scandal in the public mind is less prominent here in South Africa than it is in Europe as can be seen from the significant drop in diesel vehicle sales, as well as regulatory changes in Europe as opposed to South Africa (Hooftman, et al., 2018).

4.5.2.3 Relationship driver analysis discussion

The final customer equity driver of the analysis was that of relationship equity. The analysis for Brand A (as per Tables 4.21 and 4.22) reveals that two relationship factors (brand knowledge and brand recognition of the individual) improved post-Dieselgate which, as mentioned in section 4.4.4.1, is contrary to a sign of lost customer equity as a result of Dieselgate. Additionally, the standard deviation for the responses indicated a higher variability of responses although there is still no clear distinction in responses to state that respondents disagreed with any of the questions. With regard to Brand B, the responses tended to point to a more positive view of the brand post-Dieselgate although, once again, the statement is centred around "neutral" and "agree". Similarly, with Brand C and Brand D although the gap between "agree" and "neutral" is larger. Respondents moved to a more agreeable view of the brands post-Dieselgate.

The results of the analysis for the relationship driver are contrary to what might have been expected if the Dieselgate scandal had been a factor in respondents' perception of the brands. This scenario points to a situation that, in terms of relationship equity and customer relationship management, the effort on the part of the brands has negated the effects the Dieselgate scandal would have had. In support of these findings, the literature reviewed revealed that relationship equity is the tendency of customers to remain with a brand despite their objective and subjective assessment of the brand (Lemon, Rust, and Zeithaml, 2001). Additionally, the key levers that organisations can influence and that can influence relationship equity are loyalty programs, special treatment and recognition, affinity programs, community-building programs, and knowledge-building programs. Perhaps the most common of these is loyalty programs and these programs recognise a consumer's specific behaviour with tangible benefits (Lemon, Rust and Zeithaml, 2001). This is in further substantiation of the findings, although these programmes were not evaluated in the study, they may have further contributed to the results seen for the relationship equity driver. Finally,

as per section 4.5.2.2 above, the prominence of Dieselgate in the minds of South African consumers and the real effects are notably less than those experienced in other countries, particularly Europe (Hooftman, et al., 2018).

4.5.2.4 Customer equity discussion

Based on the above discussions, it is necessary to view the results obtained for the individual drivers considering the over-arching theme of customer equity.

Customer equity is defined as the acquisition and retention of customers. This includes the approach, on the part of organisations, to the management of customer value over the lifetime of the customer's relationship with the organisation (Blattberg and Deighton, 1996). Furthermore, the management of customer equity leads to competitive advantage gains by an organisation and thus, they are able to expand their marketplace presence as well as enhance their marketplace value. When the results from the sections above are considered, it could be said that there were undetermined factors that influenced the way respondents perceived brands. A major scandal such as Dieselgate should immediately raise 'red flags' in the eyes of the consumer. This is not only because these companies behaved unethically, but also due to the risk factor to human health resulting from diesel vehicle emissions. Economic factors in a country may influence the way consumers perceive brands. An example of this would be price – if a vehicle is offered cheaply in a developing country (companies can offer their vehicles more cheaply in developing countries because of less-stringent regulations), a person may choose or prefer the brand due to the pricing coupled with their individual financial circumstances. Their financial circumstances are ultimately also due to the economic factors in their country. The person from the example would also then place less priority on human health. Price is also, in fact, one of the three key levers of value equity (Lemon, Rust and Zeithaml, 2001). This may mean that a higher price is placed on price depending on the country in which it is being evaluated.

Customer lifetime value (CLV) was an aspect customer equity that was included in the literature review. In terms of CLV, the longer an organisation maintains a relationship with a customer, the more profitable the consumer is (Reinartz and Kumar, 2000). Considering this, the results present a picture of the relationship between the offending organisations and their customers being resilient enough to withstand a scandal of this

nature. This once again points to a different dynamic being present in South Africa. This dynamic, and the extent of which, would require more extensive research to uncover. This dynamic would involve the economic circumstances in the country, coupled with the motivations of the consumers in the region such as: price, level of environmental concern and awareness, quality requirements, lifetime requirements of the product. It is understood that this multitude of forces would influence customer equity in different countries in varying ways and South Africa may not be alone

4.6 Conclusion

The above sections of chapter 4 presented the results of the analysis of the vehicle sales data, as well as the sales trends for diesel vehicle sales, overall vehicles sales, as well as sales volumes for the affected brands. This data was presented for the period of analysis (January 2014 – June 2017). Furthermore, the results of the vehicle sales data analysis revealed a sales decline that was apparent as well as the support of the hypotheses Ha1, Ha2, and Ha3.

The analysis of the results of the customer equity questionnaire was also presented including a profile of the respondents compiled from the data supplied by the survey service provider. These results, including the results of the vehicle sales data, are discussed in the final section. The conclusion for the customer equity survey is that there are no significant effects that can be seen as a result of the Dieselgate scandal based on the pre-Dieselgate, as well as post-Dieselgate responses received.

The following chapter will present the final conclusion of the research including limitations of the research, recommendations, implications, ethical considerations, as well as a general discussion.

Chapter 5 - Limitations, implications, recommendations for future research, summary and conclusion

5.1 Introduction

This research was undertaken with the objective of identifying if the Dieselgate incident had any effect on customer equity (CE) in the South African market for the vehicle manufacturers involved with emissions irregularities, the most notable of these being Brand A. The pertinent theories related to customer equity, were evaluated to gain insight into the potential effects the Dieselgate scandal could have on the affected brands. From the aforementioned theories and models contained within, the customer equity questionnaire was used as the research instrument to gain insights from consumers in the South African market. The subsequent sections will discuss the results obtained, as well provide the limitations of the study, recommendations and future research, and the summary and conclusion.

5.2 Limitations of the study

The study, with regards to the sales data and customer equity, did not account for sales promotions or sales and marketing initiatives (such as loyalty programmes, special treatment and recognition, affinity programmes, and community building programmes) undertaken by any of the manufacturers during the period of analysis. This data was omitted because of, firstly, the availability and accuracy of such information and secondly, the exhaustive nature of such a data collection process. Availability of such data and the subsequent analysis could allow for a better understanding of the sales and customer equity data, especially in terms of the fluctuations seen in sales for the various Dieselgate affected manufacturers.

Furthermore, previous brand alignment was not accounted for in the study. Although the questionnaire did address this question, it was found to be not specific enough to add to the results in any meaningful way. This is because the data did not distinguish between ownership of the various brands or whether a respondent was employed or affiliated with any of the brands.

A further limitation of the study is, in light of the data collection process occurring post-Dieselgate, that pre-Dieselgate customer insight data was lacking. To accommodate this, a question in the research instrument was used to separate the questionnaire

respondents into two categories (those aware of Dieselgate, and those who were not aware).

Lastly, the sales data analysis lacked insight into the market conditions and the state of the economy in South Africa during the study. The multitude of economic factors such as political stability, the global economy, and gross domestic product (Hancock, 2019). This information is useful, as market factors have a more direct and noticeable impact on vehicle sales and this would have aided the analysis in terms of understanding the impacts of the Dieselgate scandal.

5.3 Implications of the study

Based on the results, and the lack of a full market analysis, the implications of the study are that organisations are able to achieve a greater latitude with consumers based on the markets in which they operate. Europe has seen a more severe reaction from both Government, in terms of regulatory changes, as well as consumers in terms of favourability for diesel vehicles (Hooftman, et al., 2018). A different scenario is evident for South Africa and Africa in general. All vehicles, including old vehicles, that do not meet emissions regulations in industrialised countries are exported into Africa (Welle and Mbuguah, 2018). This is further substantiated by Holmes (2016, pg.1), “But in South Africa, Brand A’s performance has continued as if the raging scandal never existed. It looks forward to its sixth year of dominance in the passenger car market and increased its market share in the first six months of this year”. Moreover, Brand A’s owners are seemingly unperturbed and unaffected, as certain models of Brand A’s cars were the best-selling vehicles in South Africa in certain months after Dieselgate (Holmes, 2016). In light of the above, it can be understood that consumers perceptions of brands will differ based on their circumstances and needs at any given point in time, depending on the market in which they exist. These consumer perceptions and circumstances will also differ based on the products they have access to, as is the case in South Africa, due to regulatory influence.

5.4 Recommendations

Based on the results of the research, the findings show no significant impact on South African consumers in terms of lost customer equity. Based on the literature, when the streams of service quality, direct marketing and relationship marketing are integrated, the concept of customer equity highlights the aspects of assessing the relationships

with customers, defining strategies for long-term customer relationships, maximising the value of customer cash flow, and increasing the market value of the company (Hogan, Lemon and Rust, 2002; Gupta, Lehmann and Stuart, 2004). In light of the literature and the findings, it can be said that the type of market in which an organisation operates affects the way consumers behave, and this additionally, has an impact on customer equity modelling, as complex and multi-faceted as it is.

The theory of the CE approach regarding marketing management is grounded in a number of converging research streams, including service quality, direct marketing, brand equity, and relationship marketing (Hogan, Lemon and Rust, 2002). The models reviewed (Blattberg and Deighton – 1996, Rust, Zeithaml and Lemon – 2000, Rust, Lemon and Zeithaml. 2004, Gupta and Lehmann - 2003) all focussed on varying aspects of customer equity although these models do not include an all-inclusive approach. This research paper is based on the customer equity model developed by Rust, et al., 2004.

5.5 Future research

Future research should follow an integrated approach when assessing CE in terms of developing a model that fully integrates these individual research streams. This would include integrating customer relationship management (CRM) and customer lifetime value (CLV), which are research streams in their own right. An all-encompassing model, although difficult to develop considering the number of divergent research streams, would allow researchers to gain more in-depth insight into the concept of customer equity. This would further allow organisations to effectively measure customer equity as well as understand losses in customer equity when ‘problems’ such as the Dieselgate scandal arise.

5.6 Summary and conclusion

The following hypotheses were formulated based on the sales data:

Hypothesis H1

H₀1: Diesel vehicle sales were not affected by Dieselgate

H_a1: Diesel vehicle sales were affected by Dieselgate

Hypothesis H2

H₀2: Overall vehicle sales were not affected by Dieselgate

H_a2: Overall vehicle sales were affected by Dieselgate

Hypothesis H3

H₀3: Affected manufacturers vehicle sales were not affected by Dieselgate

H_a3: Affected manufacturers vehicle sales were affected by Dieselgate

For the above, all null hypothesis were rejected. When interpreted, the sales data revealed that there were differences in sales for the pre- as well as post-Dieselgate period. Although it can be said that the Dieselgate scandal was a factor, other factors that could impact sales were not investigated or ruled out definitively. This was recognised as a limitation of the study and for this reason, this portion was only used as an initial indicator in support of the data obtained by means of the customer equity questionnaire research instrument.

The data from the customer equity questionnaire, in terms of the drivers of CE, value, brand, and relationship equity, showed no significant differences between the respondents that were classified as either aware of Dieselgate or not aware of Dieselgate. For the relationship driver questions, in particular, the post-Dieselgate responses were more on the favourable side than those of the pre-Dieselgate responses. However, the responses were not significantly different. This means, that there are no significant impacts to the CE of the affected brands in South Africa based on the research.

In light of the above, it is imperative that when undertaking a study of this nature, that external factors such as market factors (exchange rate, GDP, and political climate) are considered in terms of their degree of influence on the results. Furthermore, a more comprehensive and all-inclusive (based on the multiple converging research mentioned in section 5.4 above) model for CE should be established in order to review customer equity in any market, this would include the persuasions or motivations of the consumers in any market, as these will vary vastly. Lastly, the regulatory conditions in any specific market contribute to what vehicle manufacturers can and cannot do in that specific market. This, once again, impacts the conditions for operating, as well as the products that consumers have access to in those markets.

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Appendix

Appendix I – Customer equity questionnaire

*Please note that the below outlines the questions as they were presented in the questionnaire, although on a Google forms template. The actual survey was conducted on an online platform, the format of which is not downloadable.

Customer equity Questionnaire

*Required

1. The aim of this research is to understand the impacts of Dieselgate on customer equity in the automotive industry. Your identity is not required or known to the researcher. This research is approved by the Research Ethics Committee of Rhodes University. Participation in the survey is voluntary and you are free to withdraw at any time without penalty. Completion time is approximately 15 minutes.

2. Are you aligned with (dealership, service center, or marketing agency) or work for any of the following brands? *

Tick all that apply.

- Volkswagen
- Mercedes-Benz
- BMW
- Audi
- Other
- None of the above

3. Are you aware of the 2015 Dieselgate scandal? *

Mark only one oval.

- Yes
- No

4. In which price bracket would you purchase a new vehicle if you intend on purchasing a vehicle in the foreseeable future (1-2 years)? *

Tick all that apply.

- 200 000 - 299 000
- 300 000 - 399 000
- 400 000 - 499 000
- 500 000 - 599 000
- 600 000 - 699 000
- 700 000 and above
- No purchase intent

5. I currently own & plan to buy the following brands *

Mark only one oval per row.

	Volkswagen	Mercedes-Benz	BMW	Audi	Other
Own	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plan to buy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. I believe this brand meets my mobility needs *

Mark only one oval per row.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. The image of this brand fits my personality well *

Mark only one oval per row.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. If this brand sends me information, I take note of it and pay attention to it *

Mark only one oval per row.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. I take note and pay attention to advertising from this brand *

Mark only one oval per row.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. This brand is known as a good corporate citizen *

Mark only one oval per row.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. This brand is known to have a high ethical standard with regards to customers and employees *

Mark only one oval per row.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. I have a high level of trust in this brand *

Mark only one oval per row.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. This brand knows a lot of information about me *

Mark only one oval per row.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. This brand recognises me as being special *

Mark only one oval per row.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. I feel a sense of community with other users of this brand *

Mark only one oval per row.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. This brand provides the best overall quality *

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. I believe this brand meets my pricing needs *

Mark only one oval per row.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Volkswagen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mercedes-Benz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BMW	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of survey

Appendix II – Ethical clearance



Rhodes Business School
Leadership for Sustainability

Rhodes Business School
PO Box 94
Grahamstown
6140

23rd November 2018

Dear Prof Nel and Mr Pillay

Research Ethics Application: Reference: 2018/10/88

This serves to confirm that on **22nd November 2018**, ethical clearance was granted by the RUESC HE Committee for the research project with the following provisional title: **The impact of the Dieselgate Scandal on the customer equity in the automotive industry**

The application was approved, noting that gatekeeper permission had already been obtained.

Please ensure that the Rhodes Business School Ethics sub-committee is notified of any substantive changes that are made, for whatever reason, during the research process.

Please note that this application expires on 31 December 2018. A progress report is required in order to renew the approval for the following year.

Yours faithfully,

Prof Noel Pearse
Chair: Rhodes Business School Ethics sub-committee