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Analysis of Facebook Engagement and Financial Outcomes

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Document Version
Accepted author manuscript

Published in:
Big Data – BigData 2018

DOI:
10.1007/978-3-319-94301-5_20

Publication date:
2018

License
Unspecified

Citation for published version (APA):
An, Q., Grimmig Christensen, M., Ramachandran, A., Mukkamala, R. R., & Vatrapu, R. (2018). Volkswagen's Diesel Emission Scandal: Analysis of Facebook Engagement and Financial Outcomes. In F. Y. L. Chin, C. L. P. Chen, L. Khan, K. Lee, & L.-J. Zhang (Eds.), Big Data – BigData 2018: 7th International Congress, Held as Part of the Services Conference Federation, SCF 2018, Seattle, WA, USA, June 25–30, 2018, Proceedings (pp. 260-276). Springer. https://doi.org/10.1007/978-3-319-94301-5_20

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This is a post-peer-review, pre-copyedit version. The final authenticated version is available online at:

DOI: https://doi.org/10.1007/978-3-319-94301-5_20

* This version of the article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the publisher's final version AKA Version of Record.

Uploaded to CBS Research Portal: April 2019

Volkswagen's Diesel Emission Scandal: Analysis of Facebook Engagement and Financial Outcomes

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Abstract.

This paper investigates Volkswagen's diesel scandal with a focus on the relationship between their Facebook engagement and financial performance during the period of 2012-16. We employ the big social data analytics approaches of visual and text analytics on Volkswagen's Facebook data and financial reporting data. We specifically analyze the potential effects on the company in the diesel emission scandal years of 2014-2016. We find that the diesel emission scandal had the most impact in the short-term period immediately after its occurrence resulting in Facebook users reacting negatively against Volkswagen but also some users defending the company. In the long-term, it seems that the scandal has not impacted the company based on the analysis of both their financial data and their social media data.

1 Introduction

Volkswagen (VW) was ranked as the biggest car company measured on cars produced in 2016 and reports from 2017 shows that they will keep this position surpassing competitors such as Toyota and Nissan-Renault [3]. The brand portfolio of the Volkswagen group includes brands such as Audi, Porsche, Seat, Skoda, Bentley, Lamborghini and VW [4]. Volkswagen kept their place as the biggest automaker in the world even though they were subject to a global emissions scandal, which broke out in September 2015. The crisis entailed a total of 11 million diesel cars, as admitted by VW, fitted with a special software that made it possible them to show lower emissions during tests than they would if they where used regularly on the road [5]. The software was detected on multiple of VW Group's car brands this meant that VW, Audi Skoda and Seat had installed the software on their diesel cars. The cars used the same types of motors and motor technology as a way to obtain synergy affects across the multiple car brands[3]. A scandal at this level also affected the stock price, which plummeted in the period after the announcement of the software. It fell from a level of 160 EUR to a level of 110 EUR in November [6]. The fall can be attributed investors concerns of how VW's brand

[3] Volkswagen Is World's Largest Automaker
[4] Volkswagen annual report
[5] Volkswagen: The scandal explained
[6] Timeline of Volkswagen's tanking stock price

impairment will affect future sales, the possible litigation cost, and the cost of the 11 million recalls. VW has prepared to spend up to $25 billion in the US to take care of the emission problem this includes legal fees, buyback of cars, repairs etc. The diesel scandal had broader ramifications than just the negative impact on the stock price. Therefore it becomes relevant to analyze sentiments on social media, revenue, profits and sales in the aftermath of the diesel scandal, in order to measure whether the diesel scandal have had any affect on these metrics. This paper explores whether the emission scandal was just a media news story or whether the scandal affected:

1. The revenue and profits of VW in the period of 2012-2016.
2. The production of cars or delivering of cars from VW in the period 2012-2016
3. The engagement on social media. This consists of sentiment, consumer decision, personality traits and keyword analysis to analyze the development sentiments and sentiments expressed before and after the crisis.

By analyzing the above we aim to obtain a holistic view of how the diesel scandal has impacted the VW Group.

1.1 Problem statement

We want to investigate the VW crisis in 3 ways. First, to explain the revenue and profits fluctuations during the diesel scandal. Second, to establish whether the production of cars and cars delivered dropped after the diesel scandal broke out. Third and last, to establish what sentiments and keywords were expressed in social media in the aftermath of the diesel scandal. The overall research question is stated below:

> *What were the primary volumetric and linguistic characteristics of social media reactions towards Volkswagen during the diesel scandal and to what extent, if any, did the diesel scandal in itself and as manifest on Facebook impact VW financially?*

This paper will analyze data from social media and annual reports in order to answer the research question. The analysis will focus on answering the 6 propositions stated below. The 6 propositions will be analyzed with the use of big social data in order to either confirm or reject them. Proposition 1 is about the consumers reaction to the scandal. Proposition 2 is about the effectiveness of the corporate apology to the scandal. Proposition 3 is about consumers' reactions to the scandal solutions. Proposition 4 is about the Volkswagens social media community. Proposition 5 is on the long lasting effect, if any, to consumer purchase decisions.
Proposition 1: We expect that the negative sentiment outweigh positive sentiment after the diesel scandal breaks out on September 18th, 2015.
Proposition 2: The negative brand sentiment outweigh positive brand sentiment after the diesel scandal breaks out on September 18th, 2015.
Proposition 3: The positive sentiment outweigh negative sentiment after Volkswagen apologize for the scandal on September 25th, 2015.
Proposition 4: Consumers' positive sentiment will outweigh the negative after VW announces the recall and Goodwill package, because Volkswagen is actively trying to fix

the problem.
Proposition 5: The product recall would cause an emotional reaction from consumers and therefore we expect that the personality trait of neuroticism is the dominant personality trait.
Proposition 6: The scandal would have negative influence to consumers' purchase behavior.

2 Conceptual Framework and Related Work

This section is divided into four parts. The first part describes the conceptual underpinnings of social media and the second part focus on the current literature on corporate crisis and negative word-of-mouth In the third part we discuss brand equity and product recall and in the last part we provide background of VW Crisis.

2.1 Social Media

Social media can provide individuals with increased power of voice. Instead of vocalizing ones opinion to a few close friends, social media has the possibility for individuals to share their opinions to thousands of even millions of people. 2,46 billion is currently users of social media webpage [7]. Social media can be a place where firms are able to manage their brand equity. Brand equity defined as "Brand equity is the added value endowed on products and services" [1, p. 492]. This company page enables a firm to communicate with followers but does also include posting news about products, posting announcements. Thereby social media can be used as a way to strengthen the brand image of a firm, and manage relationship with stakeholders [2]. Socio-technical interactions take place on social media. This includes that people interact with technologies and individuals. Social-technical interaction leaves a digital trace; this could be liking someone's photo, writing a comment to a profile picture etc. This digital trace can be defined as social data [3]. These unstructured volumes of data can be challenging for many firms as it can be difficult to extract meaning out of these unstructured volumes [4]. This implies that the data cleaning process is important when working with big data as it contributes to make data meaningful. In social-technical interaction there is a distinction between social graph analytics and social text analytics [3]. Social graph is a communication network of people who interact. Social graph includes Actors, actions, activities and artifacts [3, 4] Social text focuses on the content of what is being communicated [4]. Social text includes: topics, keywords, Pronouns, Sentiments. Social text is can therefore be a useful tool when analyzing social media activity as it then becomes possible for this project to analyze the sentiment expressed in the comment post on Facebook.

2.2 Crisis and Word-of-mouth

Crisis management becomes important when enduring a crisis like the diesel scandal. The typical traits of a crisis is as follows: 1) severe consequence(s), 2) threats to the

[7] Social media - Statistics & Facts

fundamental value of an organization, 3) limitations in response time, and 4) unexpectedness of the event [5, p.372]. Once a company crisis emerges the news of it can spread vastly and quickly through the use of word-of- mouth on social media but also how it affect the brand equity of firms. Social media can provide power to people whenever they express their opinion or thoughts about a given brand or product. The power relies in the fact that people are able to connect and communicate with vast amounts of other users. Corporate firms have only limited possibilities in altering the discourse of the conversation that people are having and thereby negative word-of-mouth has the possibility to spread very quickly. Social media can provide negative branding effect for a firm, if consumers react negatively to a product or service, it is then possible for the users to spread the news quickly among them [2, 6]. Possible reasons why people share their thoughts and opinions and initiate negative word-of-mouth can be to obtain emotional support from other members in a social network another reason could be that that consumers is left with a feeling of firm injustice making business with a firm [6, 7]. Negative word-of-mouth do have consequences for a business as it can hurt the purchase intention and brand image of the company [6]. The further implication of such is volatile stock prices and uncertainty about long-term outcomes [6]. It can be difficult for firms to stop an outburst of negative word-of-mouth once it is initiated through social media. Therefore, it becomes important to respond with a well articulated crisis strategy in order to respond to the attacks from dissatisfied customers. These attacks can be difficult for firms to stop because customers will often listen more to each other in search of advice on products and services than listen to firms [8]. Therefore consumers come to rely on each other when they review products or services. In Pace et. Al. [9] they argue that when a consumers is exposed to a brand crises on social media it causes a more negative reaction towards the brand than if it was through traditional media. Personal experiences with the products of a brand and the experiences of others determinate of what people think of a particular brand [10]. This proves that negative word-of-mouth can change people perceptions of brands. Therefore it becomes important that a firm is able to control the outburst on social media. Especially stakeholders become central in a potential crisis. Some stakeholders can be very engaged in the particular issue and react strongly. Furthermore, they also becomes important for the firms because they can inhibit a position as brand creators [9] and they describes ”Stakeholders can amplify and extend the crisis, providing further meanings and resonance to the critical event” [9, p.136]. Thereby stakeholders can play a critical part in the event of a crisis and it is important to execute a precise communication strategy with these stakeholders. It becomes important to deal with negative word-of-mouth quickly and effectively because by delaying the problem it can become even worse [6]. If the firm as failed to live up to their promise in terms of e.g. product quality, it becomes important that they apologies quickly and acknowledges the problem, and in that way it can soften the potential backlash from the stakeholders [6, 11]. Often a crisis result in a increasing brand awareness and it is important that firms use this heightened attention to invest in communication, which can restore the brand credibility for stakeholders [11].

2.3 Background of VW Crises

It all started in 2006 when VW had a low market share in the US and the cars had difficulty passing the American diesel test. A short time after, VW executives decided in 2006 that illegal software should be installed on cars in order to obtain lower emission level during testing[8]. In 2008 VW pushes out a new marketing campaign for their low emission vehicles. In 2013 a small team from West Viginia University receives a grant and the purpose of the grant was to test whether diesel cars had a higher emission during normal driving than under tests. The test revealed that VW had a far higher emission level than during regular road use than under tests[8]. In 2014, after the publication of the report from the team in Virginia, VW receives a memo, which states that VW cars may be subjected to further investigation due to the report and an inquiry is opened towards VW. VW responds to the regulators by providing with inaccurate data, which they apologize for later on. In early 2015, VW starts recalling diesel cars, VW is postulating that a software update will fix the problem, even after adjusting on the software the problem is not fixed[8]. In the summer of 2015, VW starts destroying documents that could be incriminating to them in a potential legal battle. In the fall of 2015, VW admits that their diesel cars are equipped with illegal software. The 23rd of September, Martin Winterkorn, then CEO resigns. In the summer of 2016, VW settles the lawsuits against them at $14,7 billion. In January 2017, VW pleads guilty and enter a settlement with the US justice department for $4,3 billion. Furthermore makes a $1,3 billion settlement to owners of the 3.0 liters diesel motors that where placed in Audi, Volkswagen and Porsche[8]. VW decided to recall upwards of 8,5 mio of the cars in Europe alone, which were affected by the illegal software[9]. People experienced a loss of power and acceleration as well as worse fuel consumptions after recalls meaning that cars where also affected even after the removal of the software[10]. This has provided further challenges to VW who in the start said that a software update could fix the problem but as it turns out people have experiencing problems with the cars even after the recall.

VW has responded to the crises through social media and they have also opened an Internet site vwdieselinfo.com where the consumers can seek guidance if you are included in the range of cars, which has the illegal software, installed. However VW did experience some problems with their communication. A few instances did occur where they where denying any wrongdoing and fed regulators with wrongful information and then a few weeks later admitted the misdemeanor. Their social media tactics has been orientated towards being reactive rather than proactive. This is evident in the in the time between that the Viginia team publishes the report in May 2014 to the point when VW actually admits wrongdoing in September 2015. They did not admit nor acknowledge the problem right away even after different reports where published which proved that the cars did have lower emission during test than during normal use. Later on the have corrected this behavior. Despite their social media strategy it becomes interesting to analyze what reaction the crisis caused on social media.

[8] Engineering a Deception: What Led to Volkswagen's Diesel Scandal
[9] Volkswagen recalls 8.5 million diesel vehicles in Europe
[10] Up in smoke: the VW emissions fix has left our car undriveable

3 Research Methodology

In the methodology section we will be focusing on the data and the analysis techniques we have used. First, we collected four different datasets related to financial measures e.g. stock prices, sale numbers etc. Facebook data was collected using the Social Data Analytics Tool SODATO [12]. The purpose of Facebook data was to measure the social media engagement and the social media conversations about Volkswagen. This data was collected for the years 2015 and 2016 where Volkswagen admitted to placing fraudulent software in 11 million diesel vehicles. The data was further transformed into a file that contains only the posts and comments without any likes, specifically made to process through Text Analysis Tools. We used this file but also split it into two different CSV files which were called: *Before scandal* and *After scandal*. The distinction between these two were made by the dates 17th of September 2015 and 18th of September 2015. Every comment that was posted before the 17th of September where classified as *before the scandal* and every comment from the 18th of September and onwards was classified as *after the scandal*. For the social media data we had to clean for empty text comments and other gibberish comments meaning the data had dirty noise that needed to be removed before we could continue using the data.

3.1 Data transformation

In order to analyse the comments, we have chosen four domain specific models (Information Type, Sentiment, Consumer Decision and Personality Traits) based on their relevance and importance to our dataset and field of inquiry. The description of the models are shown in table. 1. We wanted to identify the comments which are actually about the scandal and therefore we have used supervised machine learning algorithm to build a classifier that can label the comments according to our models. Therefore, we started manually labelling different comments according to the models described in table. 1, to prepare a training-set that can be used to train the classifier. As part of *Information Type* model, carRace was labelled based on the comments that were made specifically for the Red Bull Global Rallycross race that was during the year 2015. Moreover, 'Information' was labelled based on most of the general comments. This included a whole variety of comments which did not have anything to do with the scandal or the Red Bull race. The label 'Scandal' includes all the comments that revolve around the diesel scandal and these comments are highly relevant to our paper since we want to know how much social media attention the scandal received. These comments contained both positive and negative sentiments in which some people react negatively and "attack" Volkswagen and others that decide to defend Volkswagen. This often leads to discussions between the two groups. Being able to analyze how many of the comments that were aimed towards the scandal would be very helpful in understanding if and how much attention the scandal received outside of the news. Lastly, the label 'Irrelevant' entailed the comments where people tag each other, so the comment is only a name. In the end, 1500 comments were labelled to prepare training set for the classifier.

The second classification model *Sentiment* contains the labels positive, neutral and negative for the attitudes expressed in the social media data. The comments that had a positive attitude towards Volkswagen, the scandal or just in general were marked

Label	Definition
Text Classification Model: **Information Type**	
CarRace	Comments talking about Volkswagen car race team.
Information	Comments discussing about cars but not related to diesel scandals, including the functions of their cars and new car models etc.
Scandal	Comments directly talking about diesel scandals, including positive, negative and neutral attitude.
Irrelevant	Comments like names or information can't be classified into any above.
Text Classification Model: **Sentiment**	
Positive	Comments shows supportive, joyful and/or encouraging attitude.
Negative	Comments shows unsupportive, sad and/or bad attitude.
Neutral	Comments shows attitude that is neither positive or negative.
Text Classification Model: **Consumer Decision**	
Awareness	Consumer is aware of the presence of your brand in a particular product segment.
Knowledge	Consumer have certain knowledges about the product and will evaluated product against other brands.
Liking	Consumers like the product and started to consider emotional benefits.
Preference	Consumers maybe convinced to try out the products but may like other brands too.
Conviction	Consumers doubt about buying the product might be converted into action. Consumers at this stage would decide whether stick to the brand.
Purchase	Consumer decided to buy the product.
Text Classification Model: **Personality traits**	
Openness	Describe a general openness to new ideasm, experiences and is related to curiosity, adventure and imagination.
Conscientiousness	Describe an individual who aims for achievements and expresses a propensity to be thoughtful, thorough
Extraversion	Extraversion is often opposed to introversion and the extravert is often the center of attention, out-going, socially comfortable, energetic and likes to talk.
Agreeableness	Describes an individual is focused on establishing consensus to achieve social harmony. Such individuals often conform to social norms and are usually generous, trustworthy, optimistic, caring and emotionally supportive
Neuroticism	This trait is linked to emotional instability, anxiety and depression. Individuals labeled with neuroticism will be vulnerable and emotionally reactive.

Table 1: Domain Specific Text Classification Models

as positive. Negative attitudes were based on when people were angry or sad about the scandal or against Volkswagen in general. Neutral attitudes happened when the data was just informative, were objective or just asking questions without having a specific attitude towards Volkswagen. The third classification model (table. 1) is based on the Hierarchy of Effects model which contains 6 stages of a consumer's decision making. These stages are: 1. Awareness, 2. Knowledge, 3. Liking, 4. Preference, 5. Conviction, 6. Purchase. The first two steps are also called the cognitive stage which is where the consumer processes as much information as possible about his/her need and the product. The next two steps are also called the affective stage which is where the consumer figures out his/her attitude towards the brand. These steps are can also be more emotional than the cognitive stage where you only look at information. The

affective stage is where you look at how you actually feel about the brand and if you would prefer to buy that brand over another brand. The last stage contains the last two steps in which you combine the first two stages and make your decision based on them. This is called the Conative stage [13].

The fourth model (table. 1) is the five factor model which is based on personality traits, which are Extroversion, Neuroticism, Openness, Agreeableness, and conscientiousness. Extroversion is characterized as being sociable and having interest in others and being confident in new environments. Neuroticism based on stability, anxiety and volatility. The word has a negative connotation to it but can mean both low and high stability, anxiety and volatility. In our paper we will be looking at Neuroticism as a negative trait towards VW. Openness is about how welcoming you are towards new ideas and situations. Agreeableness is how you get along with others. Conscientiousness is based on the high amount of consideration you have towards others before making decisions [14]. Furthermore, Keyword analysis was used on both the before and after scandal comments. With this we were able to see if there were any big differences which words were used after the scandal hit. For the social media data the same techniques were used with more focus on specific time periods regarding different events of the scandal e.g. the news about the scandal, the recalls and goodwill packages etc. the focus was then put on the different sentiment analysis that we had to see how the sentiments changed because of these events.

3.2 Financial and Sales Overview

During the diesel scandal Volkswagen went through a rough media storm and with a decreasing stock price. Overall there has been as slow increase of cars delivered in the period. In the period from 2012-2017 the trend of the revenue has been increasing as shown in fig. 1, which means that there has not been a major setback in revenue during this time period. The profit development as seen in fig. 1 in the same period has been volatile and with a decreasing trend. This can be attributed to the severe litigation cost that VW has been subject to, which lies in the range of $25 billion [11]. The two periods with negative profit where incurred in Q3 (-$1,6 billion) and Q4 (-$1,3 billion) of 2015. Different factors can be attributed to this fact, such as litigation cost, recall, cost of fixing the cars and these provisions caused a deficit. VW Group has not incurred any deficit in 2016 and 2017, meaning that they once again started earning profits. The performance of Volkswagen has been positive during the scandal, both when looking at the revenue as well as the number of delivered cars. The only area where the financial performance of the VW group was compromised was in terms of the profits, which were severely affected by the litigation cost and the Recall cost as shown in fig. 1. Even though the number of delivered cars increased for the sub-brands Audi, Skoda and Seat, the number of delivered cars did decrease for the main brand VW.

4 Results

In this section, we will present results of our data analysis on VW dataset.

[11] Volkswagen falls to biggest annual loss in its history

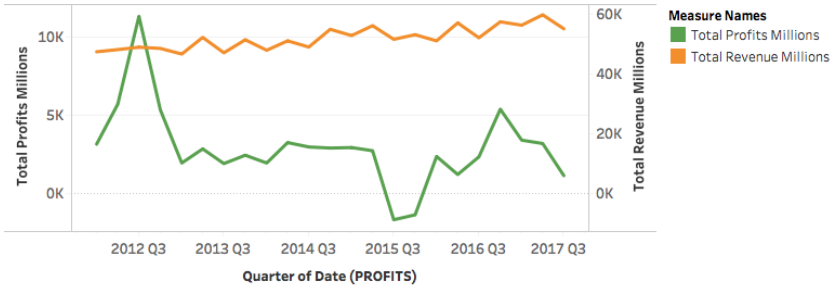


Fig. 1: Distribution of Profits for VW Brand

4.1 Proposition 1

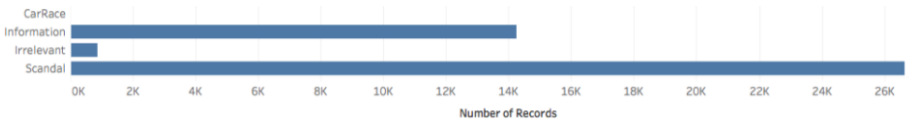


Fig. 2: Distribution of Comments for Information Type

Figure 2 shows the topic distribution of VW after the scandal. As we could see in Figure 8, more than 26,000 comments are specifically talking about the scandal. This is twice as much as the second most frequent topic which is 'information'. 'Irrelevant' and 'CarRace' were not mentioned very frequently.

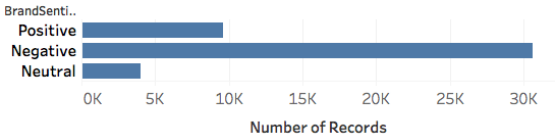


Fig. 3: Distribution of Comments for Sentiment

We have classified the dataset according to text classification model *Sentiment* to analyze people's attitude toward the scandal. As we could see in Figure 3, comments that show positive sentiments and negative sentiments generally have the same frequency, which is different from what we expected. When we look into the details of different sentiments, the main points varied differently. The data was manually examined in order to clarify what topics were dominant in the positive, negative, and neutral.

For the positive attitudes, people were defending Volkswagen from different angles. Many of the defenders are diesel car owners or loyal customers. They defend Volkswagen because of the high-quality cars and also the accumulated brand reputation of

Volkswagen. However, among the main points in the scandal discussion, what surprised the most is that many diesel car owners did not seem to care about the emission. These owners showed intense dislike to environmental friendly cars like Prius. Furthermore, some people compared VW to other car manufacturers who had recalled cars due to safety issues in 2015, many Volkswagen owners expressed that these safety issues were worse than that of VW because this was not a safety issue but emissions issue. Their point was that increased emission does not risk your life when driving but safety issues do. People with negative attitudes were generally people concerned about the environment and many of them were also loyal Volkswagen customers who felt that the company had cheated them. Neutral opinions tend to be more rational and concerned more about side effects by the scandal. These comments were concerned more about how Volkswagen would fix the problem and why it happened in such a high reputation company. If Volkswagen were doing this, then there might be more car manufacturers doing the exact same thing, tricking people into believing that they were buying low-emission vehicles.

4.2 Proposition 2

The negative brand sentiment outweigh positive brand sentiment after the diesel scandal breaks out on Sep 18th, 2015. Figure 4 shows the brand sentiments for 2015 and

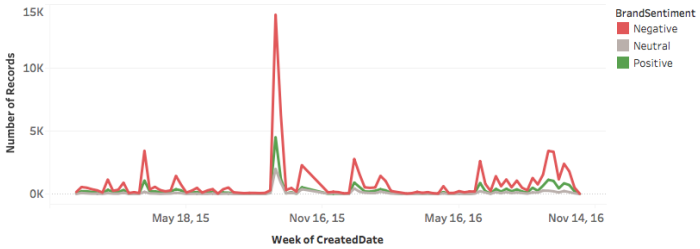


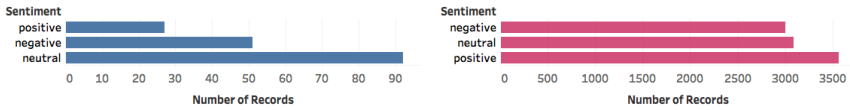
Fig. 4: Distribution of Sentiment after the Scandal

2016. The overall tendency is that the negative brand sentiments outweighs the positive ones. However, during the outbreak of the diesel scandal in September 2015 there were far more negative brand sentiments than before and after. After the scandal the negative brand sentiments dropped. In the period after the diesel scandal the negative brand sentiments still outweighed the positive. This is perhaps due to the fact that people were not reacting to the news about the goodwill package positively it could also be that people did not react to the news of the recalls positively.

4.3 Proposition 3

The positive sentiment outweighs negative sentiment after Volkswagen apologize for the scandal on Sep 25th, 2015 Figure 5a shows the reaction from the 18th when the news came out and to the 24th, which was the day before the apology. The figure shows that

Facebook users are generally reacting negatively to the news about the illegal software, in the time before VW apologizes. There are almost twice as many negative sentiments as positive.



(a) Sentiment Before Apology (b) Sentiment After Apology

Fig. 5: Sentiment Before and After Apology

In the time after the scandal the discourse in the comments of VW turned to focus on the scandal. Therefore, it becomes relevant to analyze the timeline from the 25/09/2015 to 01/10/2015 this entails the first week after VW apologized. The data from the Facebook sentiments in the week after VW apologized is depicted in figure 5b.

The stock price adjusted itself after the news where the lowest stock price was reached 28th of September just around the time where VW apologizes. This is accordance to the theory of Chen et. Al. (2009) that when uncertainty and the issue of a product recall arises, evidence show that the general impact is a decreasing of stock price. A further reason which could explain that the stock price stopped decreasing shortly after the news broke, can be attributed to the fact that stakeholder was informed of the crisis and was provided with an apology. This is in accordance to the theory of Balaji et. Al (2016) & Dawar (1998) that it is important for a firm to quickly acknowledge and admit to problems when things go wrong.

4.4 Proposition 4

Consumers' positive sentiment will outweigh the negative after VW announces the recall and goodwill package, because Volkswagen is actively trying to fix the problem. During the process of fixing the problem, Volkswagen provided a goodwill package, which was a $500 prepaid visa card, to all diesel car owners (motortrend, 2017). It aimed to compensate for the inconvenience of the diesel problem for the VW customers. The people generally did not respond well to the goodwill package. The negative sentiments far exceeded both the positive and the neutral sentiments. Some of the worries that users expressed were related to the resale value of their cars.

The next area to investigate is how people reacted to the recall of cars. Figure 6 shows that a lot of negative sentiments were expressed after recall. This indicates that the reactions to the recall confirms what the theory assumes in the sense that people in general show a negative attitude towards recalls.

4.5 Proposition 5

Product recall would cause an emotional reaction from consumers and therefore we expect that the personality trait of neuroticism is the most dominant personality trait.

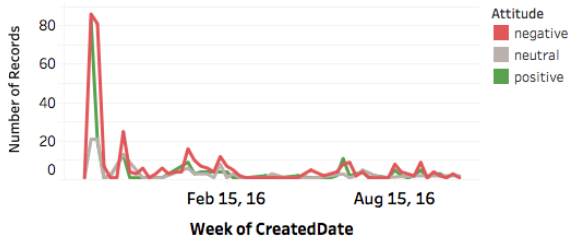


Fig. 6: Sentiment After Recall

The distribution of personality trait model shown in figure 7, most people show sign of neuroticism and extraversion, which indicate that they might be 'vulnerable' and 'emotionally reactive', or 'out-going' and 'like to talk'. This can explain why people are commenting frequently when the news broke about the diesel scandal and again when VW apologized.

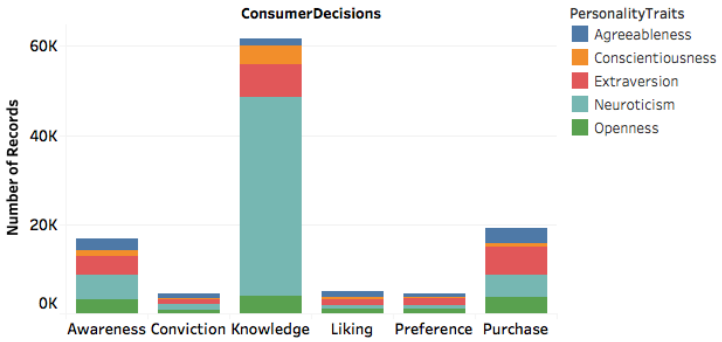


Fig. 7: Consumer Decision verses Personality Traits

4.6 Proposition 6

The scandal would have negative influence to consumers' purchase behavior. The figure 8 shows that there are more 'conviction' than there is regarding 'liking' and 'preference'. The 'purchase' data also increased during the scandal. It might be caused by the Volkswagen owners who defended the company. However, just like the scandal related comments and brand sentiment, it soon returned to the normal level which indicate that the scandal did not have long lasting influence to consumer purchase behaviors. Furthermore, when looking at the Sales Overview, it is noticed that the sub-brands of Audi, SEAT and Skoda were all increasing the number of cars which they delivered and VW was the only brand that experienced a decreasing number of cars delivered. This could indicate that the consumer purchasing behavior did not change the sales much in the af-

termath of the scandal. Therefore the data does not show that the scandal had negative influence on the people purchasing behavior.

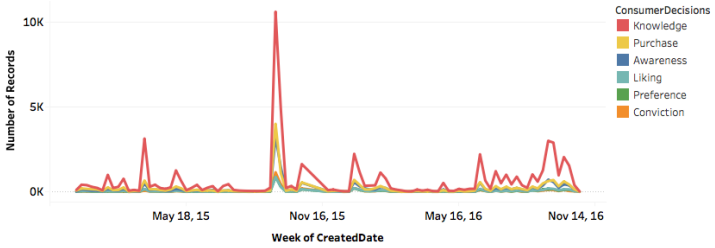


Fig. 8: Distribution of Consumer Decision Process Labels

5 Discussion and Conclusion

Facebook users expressed mainly negative brand sentiment during and after the crisis and they did also express negative sentiments toward the recall and goodwill package. Furthermore the research also proved that scandal was the dominant topic. Therefore at lot of negative sentiments was expressed regarding sentiment, recall and goodwill package but during the last 2 quarters of 2015 the negative sentiments decreased severely again, and the brand sentiments reached approximately the same levels as before the crisis. People also were positive towards the apology of VW. This all points in the direction of why the VW revenue was not affected much by the scandal as it showed an increasing trend from 2012-2016. The number of delivered cars by the VW Group decreased in the third and fourth quarter of 2015 when comparing to the same numbers from 2014. In the same period negative brand sentiments increases greatly during the scandal and decreased to normal level suggesting that VW recovered relatively quickly from the scandal. The profit was however affected greatly by the scandal due to litigation cost and the recall cost.

Proposition	P1	P2	P3	P4	P5	P6
Empirical Findings	Not Supported	Supported	Supported	Not Supported	Supported	Not Supported

Table 2: Propositions Overview

Proposition 1 was not supported because the findings did not suggest that the negative sentiment outweighed the positive sentiment after the crisis broke out as shown in figure 3, where both positive and negative sentiment was almost equal. Evidence suggests that proposition 2 is supported because the negative brand sentiment outweighs the number of positive brand sentiment in period after the news of the diesel scandal breaks out. It can be a sign of high brand equity that the negative outburst decreases so

quickly after crisis. This could indicate that VW has a very strong brand equity as sales fairly stable throughout the diesel scandal, where the total number of cars for the VW Group experienced a small decrease in 2014 compared to 2015 but recovered quickly in 2016 with sales numbers which were even higher than in 2014. This is evidence of strong brand equity that VW were able to recover those sales numbers so quickly after the diesel scandal. This was proven by Hsu & Lawrence [11, 15] that high brand equity firms were able to withstand negative word-of-mouth better than low equity firms, where firms can use the high equity as a buffer in relation to crisis. Proposition 3 is supported because the positive sentiments outweighs the negative sentiments after VW apologizes. This could indicate that VW managed to minimize the information asymmetry between VW and their stakeholder, by providing are clear statement where they acknowledges the that the installed the illegal software and in the same time apologized for their actions. The shareholders did also seem to receive the news well as the stock price reached its lowest level on 28th of December before stabilizing and going upwards. This is also in accordance to theory which predicts when a firm acknowledges a problem the potential backlash from stakeholders can be decreased [11].

The negative brand sentiments, which were observed in relation to the recalls, is also in accordance with what the theory predicts. This is evident that when a product recall is materialized the financial cost increases, the uncertainty increases and the stock price decreased as consequence, this was also evident in the VW case [16]. The findings from this paper suggest that the fourth proposition is not supported because the positive sentiments did not outweigh the negative sentiments after VW announces the recall and goodwill package. The findings show that the as the neuroticism is the dominant personality trait and therefore the fifth proposition is supported. The findings also show that proposition 6 is not supported because the scandal did not have a continually negative influence on consumers' purchasing behavior. This is also evident according to two different metrics, the revenue and the number of cars delivered. Both these metrics a higher in 2016 than in 2015.

5.1 Implications for Research and Practice

Our findings are in line with the extant literature on big social data analytics of corporate crisis [17–19] which show an volumetric increases in engagement during the crisis with a proportionate increase in negative or positive sentiments depending on the crisis type and a regression to the mean user engagement. For researchers, this empirically demonstrated lack of persistent negative social media engagement, implies that slacktivisim needs to accounted for in the analysis of big social data for corporate crisis and other social movements. For companies, this implies that reputational risks from corporate crises due to social media crises can be managed with a suitable crisis communication and management strategy and in the final analysis might not be a determining factor. Further research is needed to further understand and better estimate these effects.

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