Role of social media analytics in understanding the impact of institutional pressures on sustainable practices: A case study of Indian automotive industry

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Abstract

The study uses the data from the microblogging site 'Twitter' to understand the impact of institutional pressures on the sustainable practices adopted by companies in Indian automotive industry. A significant change in the environmental policy to upgrade the emission standards of vehicles is analysed to understand how different stakeholders responded to this change. Findings of this study highlighted that most companies adopted the strategy to discount non-compliant vehicles and increased the prices of the compliant ones. The paper argues that the institutional pressures to implement sustainable practices may not always have a positive impact in short-term.

Keywords: Social media analytics, Sustainable practices, Automotive industry.

Introduction

Indian automotive industry has been facing increased pressure in last few years to improve the emission standards of vehicles due to the growing pollution level in the country. On 27th March 2017, the Supreme Court of India made an announcement to ban the sales of all vehicles having BS III emission standards (Bharat Stage 3 emission standards, equivalent to European emission standards Euro III) from 1st April 2017 and implement the BS IV standards (equivalent to Euro IV standards) (Choudhary, 2017). The ban of BSIII standard vehicles created a shock wave in the sector due to the huge inventory of these vehicles. Automobile companies had less than a week to decide what to do with their BS III vehicles. The paper explores the impact of this

change in environmental policy on the automotive sector in India, and studies how different stakeholders responded to this change in order to understand the impact of institutional pressures on their sustainable practices.

Past studies have identified various factors that influence the successful implementation of environmental practices in the automotive industry (Luthra et al. 2015; Gopal and Thakkar 2016; Luthra et al. 2016). Some of the prominent factors are the pressures exerted by the government, consumers, and other stakeholders. In recent years, automobile companies are bombarded with requests and policies to reduce the emissions of the manufactured vehicles and improve their environmental performance. Growing awareness over the environmental concerns has influenced these companies to develop efficient environmental strategies. Some studies (such as, Seuring and Muller 2008) argued that adopting sustainable practices would provide economic, environmental and social benefits, however others found a negative effect on performance. Luthra et al. (2016) found that consumer management factors have a negative relationship with the implementation of sustainable practices in Indian automotive industry. They discussed the consumers' preferences in buying cheaper products and identified lack of awareness over the benefits of buying environmentally friendly products.

In addition, some of the studies examined the effect of institutional pressures on environmental practices in supply chain. For instance, Hoejmose et al. (2014) found that institutional pressures, especially coercive and mimetic, play a significant role in the adoption of cooperative green supply chain management (SCM) practices. They argued that the causal effect is a highly context-dependent variable for across countries and regions as the society and norms differ significantly. Likewise, Zhu et al. (2013) found that the positive influence of coercive pressure for adopting eco-design of products, significantly increases the environmental performance of entire life cycle of the products. Further, normative and mimetic pressures were found to have some effect on the adoption of internal environmental practices. Moreover, Wu et al. (2012) recognised that the regulatory pressure has a positive influence in implementing green SCM practices. Gopal and Thakkar (2016) also revealed that the adoption of sustainable practices in Indian automotive industry has a positive relationship with supply chain performance (SCP). However, a plausible negative effect of a sustainability initiative implemented under pressure needs further research. In this context, the paper aims to understand the impact of external pressures on adopting sustainable practices. The paper explores the social media data to gauge the actions of different companies in response to the introduction of a new environmental regulation and investigates the impact of their responses on the environmental performance.

Research Methodology

Data from the microblogging site "Twitter" are collected to uncover how different companies in the automotive industry responded to the new regulation to ban the sales of low emission standard vehicles and to enforce the sale of vehicles with higher emission standards of BSIV. We extracted data with the help of *Mozdeh",* which uses Twitter's Search API (Ahmed and Bath 2015). Relevant Twitter data were collected between 22th March and 12th April 2017 (before, during, and after the announcement and enforcement of new regulation). Although the new regulation was announced on 27th March and came in effect on 1st April 2017, we decided to collect tweets between 22th March and 12th April to get a broader picture of how the selected keywords for search behaved before, during and after the announcement. The keywords used for the search of relevant tweets were: 'BSIII', 'BS3', 'BSIIIban', 'BS3ban', 'BSban', 'BSIV', 'BS4', 'BSIVban', and 'BS4ban'.

The original dataset consisted of 19,532 tweets in English. Procter et al. (2013) argued that when data is retrieved from social media, it should go through a process of filtering for spam, irrelevant and duplicate contents. Therefore, the collected data were 'cleaned' by removing non-related tweets and spam. To avoid the over-representation of particular tweet and to have a more manageable dataset, the researchers opted for filtering out posts with identical text from the same user, including reposts. This action reduced the dataset to 7,284 tweets. Then, the data were further 'cleaned' by removing non-related tweets and spam. For instance, the dataset contained 233 tweets with the keyword 'Bristol' because of some neighbourhoods of the city of Bristol, UK, use the term "BS3" for advertising properties. Finally, after the spam and non-related tweets were filtered out, finally the dataset went down to 6,440 tweets. This final dataset were then subjected to further analysis such as, content analysis, time series analysis and sentiment analysis (Thelwall et al. 2012).

Data analysis and findings

The paper adopts the social media analytics approach to explore the impact of institutional pressures on the implementation of sustainable practices.

Descriptive analysis

The final dataset contained 6,440 tweets from 4,144 different authors; which on average represent less than two tweets per user. It was observed that 74.8% of tweets were original, whereas, rest were in majority retweets and a few replies. The high percentage of original tweets together with the low number of tweets per-capita suggest that the dataset was quite heterogeneous, as no individual user (or group of users) were overrepresented.

Moreover, the frequency of the searched keywords was as follows: 46.6% of tweets were related to the 'BSIII' keyword, followed by 31.1% to 'BS3', 12.4% to 'BSIV', 8.7% to 'BS4', 0.6% to 'BS3ban', 0.5% to 'BSIIIban', and 0.2% to 'BSban'. The keywords 'BSIVban' and 'BS4ban' were not contained in any tweet. As it can be seen, most tweets (78.8%) were related to the BS3 models, while only 21.1% were related to the BS4. This was perhaps because the BS3 ban came as a surprise, whereas introduction of BS4 standards were speculated earlier. Later on, a word frequency analysis was conducted for the overall dataset. This showed that the top-used keywords were related to 'automobile' or 'sales'. The top-five keywords were: vehicle (27.4%), ban (15.6%), discount (14.1%), sale (10.4%), and bike (6.60%). The words within the dataset were grouped together under three key themes: Discounts (e.g. discounts, sales, offers); Automobile brands (e.g. Honda, Hero, Bajaj); and Environmental issues (e.g. emission, pollution, environment).

Content Analysis

The highest percentage of tweets were in the 'discounts' category, accounting for 28.23% of all the dataset. This was followed by the environmental theme, which comprised 7.64% of the tweets. Lastly, 7.27% of the data contained a keyword, hashtag, or Twitter account from an automobile brand. This suggests that most Twitter users were sharing content related to sales and promotions. Top-5 keywords, hashtags, or accounts were further analysed for each of the theme. It was found that the highest relative frequencies were from 'Discounts', which included keywords such as: discount (14.1%), sale (10.4%), rs (6.1%), offer (5.6%), and sold (4.0%). The second top-5 group, composed by keywords, hashtags, and accounts was Automobile brands, where the top terms included were honda (3.5%), followed by hero (2.5%), #honda (2.4%), @honda2wheelerin (1.2%), and #hero (1.1%). Finally, the category with least tweets was 'environment', which included some of the terms like, emission (3.1%), pollution (1.7%), environment (1.0%), #pollution (0.7%), and #emission (0.4%).

Time-series analysis (TSA)

The dataset comprised 22 days of tweets. The time-series graph of the whole dataset (Figure 1) shows an initial peak in the use of the selected keywords on the 27th March, when the measures to ban BS3 vehicles were announced, followed by an even higher peak on 31st, the deadline for the BS3-4 ban to take place. There were almost 1,700 tweets on this topic posted on 31st March. The following day, tweets reduced to half and then these reduced to an average of 197 tweets per day during a week. After this, the activity on the microblogging service reduced even further.

The TSA for the Discounts theme presents a similar shape than that of the whole dataset. However, 27th and 28th of March have less than 15 tweets, and then there is a significant increase in the following three days. This rise probably indicates that the automotive industry took some time to react and come up with a strategy regarding what to do with their unsold inventories. The graph also presents a smaller peak on 2nd of April, which could probably correspond to the fact that resellers were still selling motorcycles, despite the ban imposed by the government (Guptal 2017). In contrast, the Environment category started increasing from 28th and had a peak on the 31st, but did not go back to its initial level until 8th of April. Finally, when plotting the tweets from that mention the automobile brands, it can be seen that these peaked from the 28th to 31st, but after the 1st of April they almost disappeared.
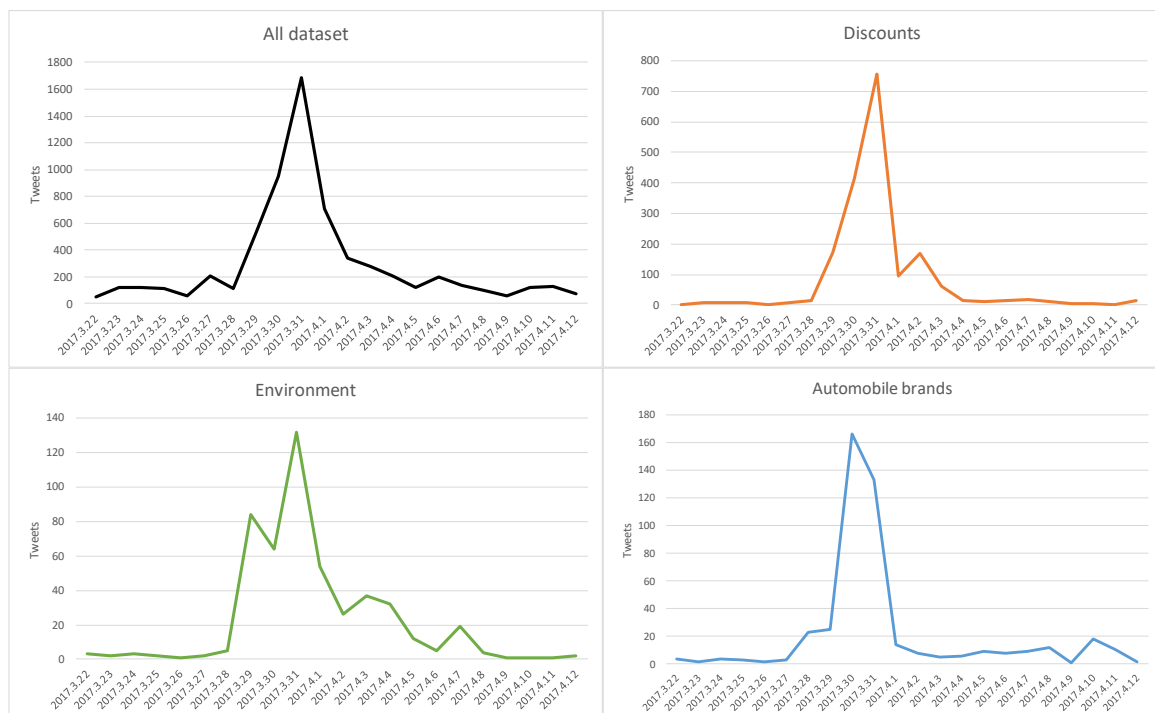

Figure 1 - Time-series of whole dataset and themes

Sentiment analysis (SA)

Both positive and negative sentiments are measured on a scale of one to five for every tweet. Then, the average of each sentiment is plotted for the whole dataset and the three themes identified (Figure 2). Both positive and negative sentiments of the whole datasets are weak -

barely reaching a strength of two. There is a slight increase in the two sentiments when the ban was announced, which might indicate that people showed a mild opinion regarding the topic. Between 27th and 31st March, the sentiment was mostly positive, arguably because the environmentalist groups were happy about the ban and also since very big discounts were announced, making automobiles more affordable. Still, there was a slight increase in negative sentiment between 1st and 2nd April, right after the ban was introduced, followed by a decrease and stabilisation of both sentiments.

The 'Discounts' category shows stronger positive and negative sentiments. Between 28th and 31st March, the positive sentiments are significantly greater than the negative ones. Afterwards they are both equal for a day, and on the 2nd and 3rd of April the negative sentiment is greater. As it will later be explained, this happened because some Twitter users complained about the discounts bringing more pollution. Likewise, those tweets comprised in the Environment theme presented a higher positive sentiment from the moment the measure was announced, and until 31st of March. However, the positivity went down, at times even below the negative levels. The collected tweets show that when the environmental measure was announced most users were happy about the decision taken by the Supreme Court. Though, due to the massive discounts being offered by automotive industry, by the time the ban was imposed people felt that the measure even brought more pollution in the short and medium-term. Finally, tweets referring to specific brands had weaker sentiments, and both positive and negative sentiments increased in strength when the ban was announced. Overall for this theme, positive strength had a higher average than negative sentiment.
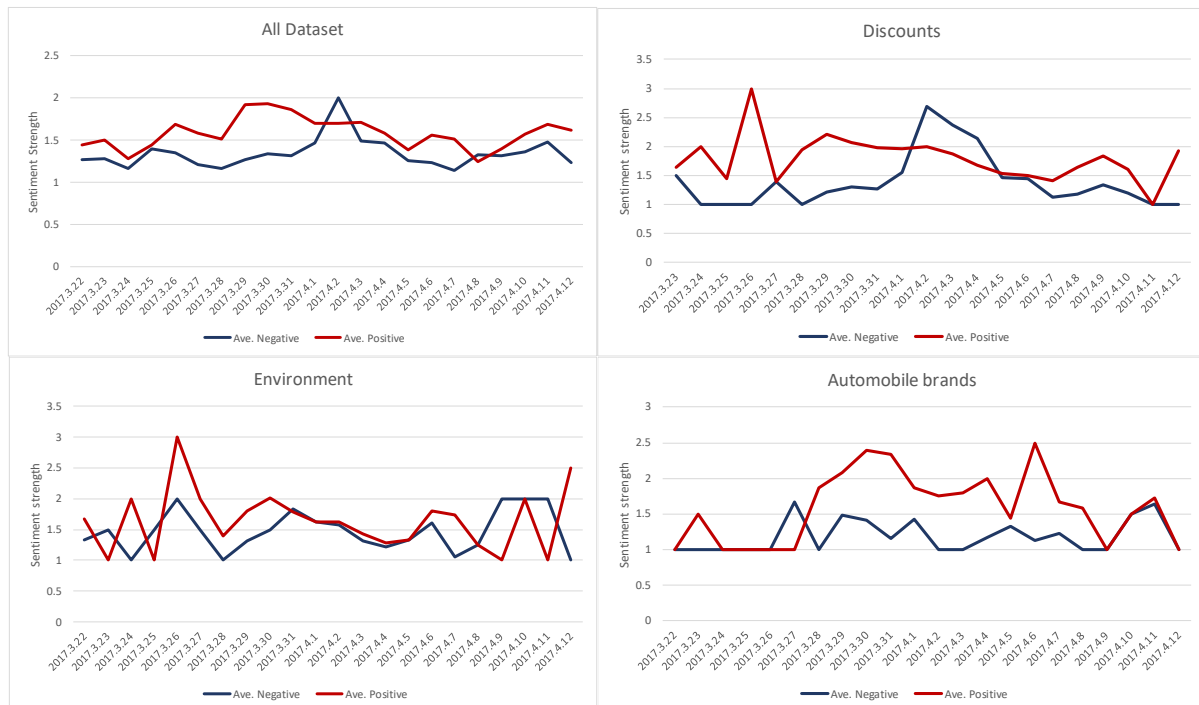

Figure 2 - Sentiment strength of whole dataset and themes

An interesting finding is that positive sentiment strength within automobile brands was related to 'discounts', whereas negative sentiment was linked to the 'environmental issues'. Some consumers tagged specific companies in their tweets and condemned the harm they were

making to the environment by trying to sell the inventory of the banned models. However, there was one company (Bharat-Benz) that seemed to have attracted different perception by consumers. We found tweets from the public, local news agencies, employees, and by the company itself, where it was being promoted that they were more concerned about the environment unlike their competitors, and therefore they have not discounted the low emission standard vehicles. In all of these cases, the tweets were accompanied by a news article or a picture shown in the media, presumably to highlight that the information was true.

Discussion

Findings of this study highlighted that most companies adopted the strategy to discount non-compliant vehicles while increased the prices of the compliant ones. In contrast, there was only one company that targeted pro-environmental consumers and promoted itself as a 'green-brand' and made no changes in the prices for their BS IV compliant-vehicles. The findings of this study further reflect that, on average, customers valued "discounts" on vehicles greater than their environmental performance, and therefore the sales of non-compliant vehicles significantly increased between 27th March to 1st April 2017. Of course, this could not be considered good for the environment. Based on the findings, we argue that the institutional pressure on environmental regulations may not always have a positive effect in short term, as in this case the announcement of the ban of vehicles with poor emission standards, ironically increased the sales of these vehicles due to the additional discounts offered by automotive companies before the ban came into effect.

As the ban of BS-III vehicles came into effect on 1 April 2017, the automobile industry had no choice but to adopt the BS-IV norms. In this context, it can be argued that the government exerted coercive pressure on the automakers in India to produce low emission vehicles. A number of studies such as Zhu et al. (2005) and Wu et al. (2012) found that institutional pressure, especially the regulatory one, has a positive impact on the implementation of environmental practices and performance. It can be argued that coercive pressure can positively influence organisations to implement environmental practices and manufacture vehicles in compliance with BS-IV norms. However, the strategy adopted by organisations to liquidate BS-III vehicles via promotions have eventually increased environmental pollution in short-term, if not in the long-term. Almost all companies offered discounts on BS-III vehicles to liquidate their stock before the ban became effective.

Moreover, the influence of pressure from consumers on the organisations seemed weak. Initially, when the ban was announced, consumers appreciated the move and expressed positive sentiment, which increased the pressure on the companies to implement environmental practices. But, immediately after sales discount was announced, the number of tweets related to environmental concerns went down. Further findings from the sentiment and word-frequency analyses indicate that consumers seem more interested in discounts rather than in environmental issues. This would indicate a lack of environmental concern, and may indicate that the pressure from consumers were not significant in this case to encourage companies to implement environmental friendly practices.

Normative pressure is considered as a significant factor for adopting environmental practices in environmentally mature sectors (Seles et al. 2016). Key stakeholders and employees of the automotive industries are members of professional networks such as the Society of Indian Automobile Manufacturers (SIAM), which disseminate information about anticipated environmental regulations. Acceptance of new environmental regulations by professional bodies such as SIAM acknowledges the implementation of BS-IV models as a standard practice in the industry and creates normative pressure on automobile makers.

Moreover, in the automotive mission plan of the Indian government, the automobile companies, industry associations, and stakeholders were informed of the government's plan to introduce BS-IV norms. However, despite the normative pressure, organisations were reluctant to completely stop the production of BS-III models until the regulatory body imposed the ban. This shows that compared to coercive pressure, the normative one had less influence on the implementation of environmental practices. Perhaps, as the literature suggests (Seles et al. 2016), normative pressure is more significant in mature sectors, suggesting that the Indian automotive industry is not environmentally mature compared to their European counterparts.

Furthermore, organisations under uncertainty tend to imitate practices of its successful competitors. In this research, the ban of BS-III vehicles caused uncertainty and businesses were unclear about the prospects of a huge volume of BS-III vehicles in stock. Literature suggests that mimetic pressure is significant for adoption of environmental practices (Sancha et al. 2015). Businesses tend to imitate the practices of other firms under pressure. As discussed earlier, sudden ban by the regulatory body induced coercive pressure, and organisations started adopting sales promotion strategy to liquidate the stock instead of recouping and retrofitting the vehicles. Not giving importance to the environment, all automobile makers started imitating each other and offered promotions on BS-III vehicles, purely influenced by mimetic pressure. It was observed that automakers advertised their BS-III vehicles sales through Twitter and other social media platforms, but some customers criticised this unethical behaviour of major automotive brands. The consequences of mimetic pressures may have benefited the automobile makers in improving sales and financial performance, but it has not improved their environmental performance in this case. Some literature (such as Green and Peloza 2011) argued that companies should focus on their social responsibilities to develop a competitive advantage. However, in the current example, it seemed that sales and discounts influenced the customers' buying behaviour to a greater extent.

Conclusion and future research

The study contributes in understanding the impact of institutional pressure on adopting sustainable practices. The use of social media analytics has highlighted the advantage of a novel approach to making use of social media data to understand different management theories and principles (Glover et al. 2014). Companies can make use of social media analytics to have a deep understanding of different external factors influencing the market dynamics. For instance, they can understand what their customers value, how their competitors are responding to changing regulations and consumers' expectations, and accordingly they can better prepare to deal with these unexpected challenges. Further, the study also highlighted that introducing a new environmental regulation without proper consultation with the key stakeholders may not be always beneficial to improve the environmental performance in short term. The case example presented in this study showed that the coercive environmental pressure made automobile companies to discount non-compliant vehicles while increasing the price of the compliant one. These discounts seemed to be gladly received by the consumers, and therefore sales of the vehicles with lower emission standards increased sharply. As a result, more vehicles with lower emission standards will be on the road for next few years, which will further degrade the environment. This outcome is counter-productive to the objectives of the new environmental regulations.

As this study is based on one particular case example specific to only one country i.e. India, it would be challenging to generalise the findings of this study. In future, multiple cases from other industries and countries should be investigated to verify whether the findings of this study could hold in multiple context. It would be also interesting to explore what factors influence customers purchasing behaviour towards environmental friendly products, and

whether there is any long-term negative impact on organisations who preferred to give discounts on high-emission vehicles rather than promoting the upgraded vehicles.

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