TRENDS OF CAR RECALL: ANALYSIS OF INDIAN MARKET

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Abstract : Since the adoption of voluntary code of recall in July 2012, which was rolled out by SIAM in India; more and more automakers are recalling vehicles to correct the defects in their respective products. Influenced by the sudden surge in recalls after its acceptance and highlighting the importance of recalls, this study attempts a trend analysis for the Indian market that would be first of its kind. Primary and secondary data used in the study is gathered from government websites along with newspapers, media websites etc. The study shows that the recalls have affected almost all the auto OEMs in India. The extent to which the carmakers must face the unwanted recalls can be indicated by recall rates. The recall rates can be a useful tool to assess the process performance in the car design and production chain. Results of automobile recall trends will be beneficial for the carmakers, government agencies, trend analysts, insurance companies and researchers.

Index Terms **– recalls, safety defect, automobiles, reliability, automotive recalls, product recalls, reverse logistics**

I. DEFINITION

Recall – Motor vehicles are required to be designed and manufactured as per applicable standards in such a way as to be sufficiently safe for road use. Sometimes however after release to the market, if in the opinion of the manufacturer some vehicles have issues which pose a 'safety defect 'as defined herein, such vehicles are voluntarily inspected and rectified by the manufacturer/importers(distributors), free of cost. This activity is called Recall.

Safety Defect – Generally, a safety defect is defined as a potential safety issue that may exist in a motor vehicle or an item of motor vehicle equipment that may –

- Have originated at the design, manufacturing or assembly stage, and
- pose a risk to safety of occupants of motor vehicle, pedestrians, other vehicles, occupants of the vehicle on the road and
- pose a risk to motor vehicle safety, and
- exist in a group of vehicles of the same design or manufacturing lot or items of equipment of the same type and manufacture, and
- occur with little or no warning

II. INTRODUCTION

According to a data posted by Society of Indian Automobile Manufacturers (SIAM) website, over 1.12 lakh vehicles have been recalled in the first three months of 2018 -- between January and March. Moreover, the figures have surpassed the number of total vehicles recalled in the entire 2017.

In 2017, almost 12 automakers in India recalled 80,531 units. However, the figures for the first three months of 2018 are still less, compared to the record year 2015, when almost a million of vehicles were recalled.

The prime challenges faced by the automobile industry are of overcapacity and its harmful effects on profitability. In these situations, any measure that can harm the brand value of the firm or increase the costs of the firm is very much undesirable. Recall is one such scenario. Hence, if some safety concerns are identified by the car manufacturers, a decision for recall is opted in which the car manufacturers locate the affected vehicles and also rectify the faults free of cost at the respective dealers. Although safety recalls are initiated to ensure the safety of driver, passengers and also of the public, it can be costly and can also harm the brand value of the organization.

Japanese car maker Honda issued one of its biggest ever recall in India when 2, 23, 578 cars were recalled to replace the airbag inflators in 2015. The models involved were the Honda CR-V, Civic, City and Jazz produced between 2003 and 2012.

In the same year General Motors India called back 1, 01, 597 units of Chevrolet Beat to replace faulty clutch pedal levers.

However, the biggest recall was of Volkswagen India amid its global emissions cheating scandal. 3.23 lakh vehicles were recalled when the models of Volkswagen, Skoda and Audi failed lab tests in India proving that the cars emitted pollutants above the permissible limits. The Automotive Research Association of India (ARAI) found out the cars with E189 series engines were fitted with the 'defeat device' which allowed the vehicles to pass the emission tests in the lab but during normal driving would exceed the emission levels. Volkswagen admitted that the software was installed in around 11 million vehicles having the EA 189 engine series which were supplied globally. The main diesel models affected were Jetta, Golf, Passat and Audi A3.

In 2018, India's largest car maker Maruti-Suzuki had a total recall volume of 61,305 vehicles, while Honda India issued a recall of 30,124 vehicles.

Maruti-Suzuki's list of recalled vehicles includes Baleno, Dzire, Vitara Brezza, S-Cross and Ciaz. The main reasons for recall being critical issues like untimely inflation of air bags, sudden engagement of neutral gear when the vehicle is in motion etc. Mercedes Benz recalled 2673 units of A-class, B-class, C-class, GLA and CLA to repair the issue of unwanted deployment of airbags on driver's side.

The paper examines the predominance of recalls, different tendencies of the car makers in response to recalls and also determines the future agenda to tackle the problem on recalls.

II.1 Objectives of the Study

- To study the relationship between the absolute levels of recall and trends over time for Indian automotive market.
- To examine how for the recall rates for different vehicle manufacturers varies.
- To study the relationship between recall volumes with sales and number of models offered by Indian automotive OEMs.

II.2 Research Methodology

Both primary and secondary data are used as a data source for the present study. The researcher
Approached the sales and service managers of Indian automotive OEMs. Questionnaire of 50 questions were filled with them. OEMs contacted are, Maruti Suzuki India Ltd, Hyndai, General Motors, JLR, tata, Skoda, VW and Honda Motors for collection of the necessary data.

III. Previous Studies

This section deals with the research about the recalls that have already been conducted. Most of the existing studies deal with the impacts, attributes & trends of safety recalls and their effects on the automobile market (Hilary Bates, 2004). There have also been studies conducted on the influence of recalls on the corporate performance and customer attitude. The role of media in the communication of recall situation has also been studied.

Studies dealing with the impact of recall conclude that recalling a vehicle is a costly business for the car makers both financially and in terms of reputation damage. But minor well-handled recalls have insignificant or even a positive effect allowing the car makers to promote themselves as safety conscious organization that care about the customers. Brand image is tainted only when recalls relate to numerous injuries or deaths. Age of the model also influences recall as old models can be less associated with brand's current image (NADA Used Car Guide, 2014).

Recall attributes are important indicators of shareholder losses. The results indicate that shareholder losses are sensitive not to the size of the recall, but to the component category being recalled. There were no evidences that government initiated recalls were more damaging for the shareholders than the manufacturer initiated recalls (Rupp, 2003).

Study carried out in U.S. about the occurrence of the Toyota recall concludes that every car maker in U.S. has experienced recalls although only a few car makers have initiated recalls. More recent car year models have less recalls as compared to older models. Complaints made by the customers are also taken as a factor for initiating recalls.

Media coverage indicated that recalls are a routine event in the car industry. Popular car makers have more recalls. Also, traceability of recalled products is an issue in the supply chain. Light has been shed on the fact that proper identification of the faults of recall would help the manufacturers stop the production line of that particular product instead of initiating recalls of the entire batch of the product. Limited research is found about the factors or the causes initiating the recalls. One study indicates that main recall initiators are the manufacturers. Hence, resources and costs associated with product recalls are mostly borne by the manufacturer. Retailers are the second main initiators, and the government conducts the least recalls, as manufacturers are not within the country and retailers take responsibility for the product. A generic recall process is described in Figure 1 (Kamrul Ahsan, 2014).

Recall procedures in India have not been prevalent until 2012. This has addressed the urgent need to incorporate recall policies in the Motor Vehicles Act making it mandatory for the automobile manufacturers to publicly announce recalls. Stringent norms that require automobile manufacturers to take total responsibility for defective vehicles have not yet developed in India (Balasubramaniam, 2013).

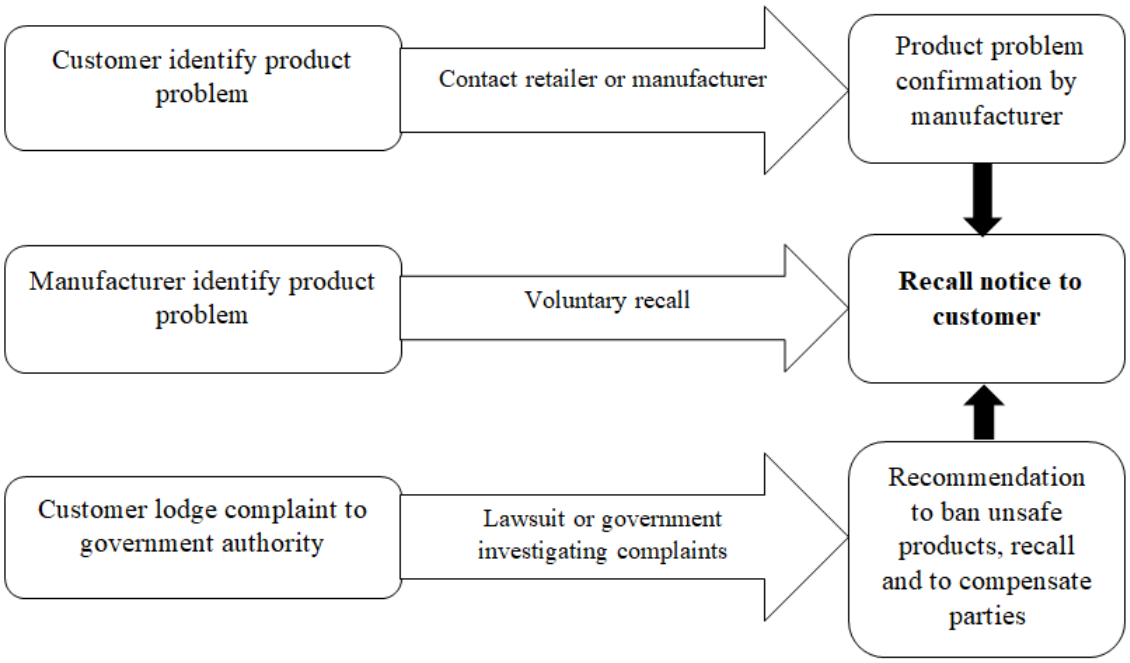

Figure 1: A generic recall process

A study on effects of automobile recall on the stock prices of the manufacturers in Indian market recorded that automobile recalls do not have any damaging effects on the stock prices of the manufacturers. The manufacturers recorded insubstantial and insignificant results for all the observed 13 automobile recall announcements. The study also has important implications for the managers in the Indian automobile field. It states that managers can proactively initiate car recalls as and when required

without worrying too much about reactions on the stock market. However, it should not be taken lightly by the manufacturers and must continue their focus on quality during manufacturing process (Singh, 2017).

A need for improving the quality of parts in the Indian automobile sector is identified however systematic approaches are not yet in place and the efforts for the improvement are not providing satisfactory results. The analysis of response has shown many areas for development to be competitive on the global level. The processes adopted as corrective actions are not effective thus leading to high rejection rates (S.N.Teli, 2014).

A study on the psychological effect of recalls on the minds of customers indicates that voluntary recalls generate positive impact on customer's trust perceptions. Customers having relational situation with the organization perceive voluntary product recall as a form of recovering competence, while customers on a transactional purchase situation do not perceive the impact (Bortoli, 2017). Also, loyalty of the customers is affected by the type of the product. The seriousness of the recall has an impact on various levels on loyalty to strong brands in comparison with weak brands (Mariana Hammel Brandão, 2016).

Role of media in the automotive recall is likely to play a key role in the formation of perceptions in the minds of the consumers. Product liability is of considerable interest because business responses to and consequent economic effects of product liability are of major social concern. Also, it was observed that production of defective cars is not always unprofitable.

The paper therefore sets out to address three main questions.

1. How widespread are recalls, particularly when compared to number of vehicle sold?
2. Is any trend observed over time in the number of vehicles recalled? If yes, then what are the possible reasons for the trend?
3. Are any differences observed in the recall rates of the automobile manufacturer? If yes, then what are the possible reasons?

After finding the results and then determining the pros and limitations of the data, the scope for future research is also identified.

IV. RESEARCH METHODS

The data is used in the paper is sorted in two types .i.e. data on automobile recalls and data on automobile sales. The data for automobile recalls was collected from publicly accessible database of Indian website Society of Indian Automobile Manufacturers (SIAM). In India, recalls of automobiles operate under the code of practice which is agreed between the SIAM and the automobile manufacturer. This includes the manufacturers, car models, production dates of car models, variants of car models and the number of vehicles recalled. The dataset includes automobile recalls carried out by 13 automobile manufacturers from 2013 to 2017. The data for the sales of automobiles was obtained from the websites of car manufacturers as well as websites of various news channels.

The above mentioned data sources reveal that 1, 35, 84, 664 vehicles were sold in India between 2013 and 2017. The sales data identifies 132 models sold in India during this period. The figure of around 13 million vehicles indicates the number of vehicle units which were sold between 2013 and 2017. This figure does not indicate the volume of vehicles. The study includes 13 vehicle manufacturers and also different models which amount for 97% of the Indian market from 2013 to 2017. Many small scale manufacturers were not included in the study due to the inconsistencies of data observed for these firms. The exclusions include electric variants from manufacturers etc. since these accounted for discrepancies in the two sets of data. Some methodological issues are also observed for aligning the vehicle recall and sales data since they belong to two different datasets. Vehicles recalled are also spread over build periods that are stretched over several years.

Also, there is a substantial time lag in the incidents of vehicle recalls. Vehicle recalls can happen in the build year of the vehicle as well as some years after the vehicle has been sold. Figure 1 shows the delay in reporting of vehicle recalls with respect to the build period of the vehicle, in other words, after how many years since the production of the vehicle, the fault was reported. In some cases, build dates or year were not provided while in some cases, different models produced by the same vehicle manufacturer were recalled under a same notice. This made it difficult to determine the exact number of recalled vehicles of each model produced by the manufacturer. A substantial time lag in the recall incidents has also been noticed.

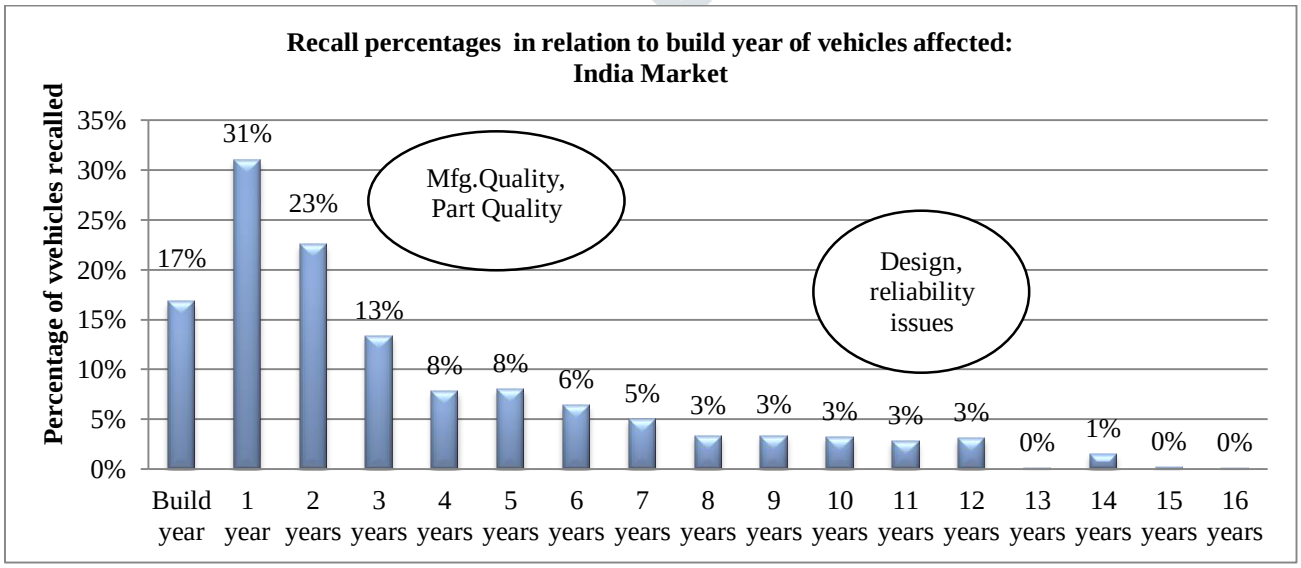

Figure 2: Recall reports in relation to build years in relation to Indian market

It can be seen from fig. 2 that around 48% of safety recalls are initiated after a year or more when the vehicle is built, although 71% of recalls occur within three years of the build date. The amount of vehicles recalled are usually related to the year in which the vehicle is manufactured. Hence, a distortion is present in the database since the vehicle production of the calendar year is not sold during the same period. It is observed that within the first three years, reasons for recalls are attributed to manufacturing and part defects while recalls taking place beyond 5 years are attributed to design and reliability issues.

The longer the period covered more likely is the recall seen. The cause might relate to the reliability on the part of the components of the vehicles which deteriorate and lead to recall situations. This error is crucial considering the average lifecycle of the vehicles in India.

V. RESEARCH FINDINGS

Three variables are created from the data collected. These are mentioned as follows:

1. *Volume of automobile recalls per manufacturer per year:* It refers to the total for all vehicles for the automobile manufacturer for each year. If same vehicle is recalled many times throughout the year, then the volume is counted in each of these as separate recalls. Hence, 'vehicle recalls' should not be understood as 'amount of vehicles recalled'.
2. *Number of automobile recall incidents per manufacturer per year:* It is the number of distinct recall incidents occurring per year, irrespective of the number of models affected by each incident. This states that a single recall incident having a common problem which affects three different models would be counted as one incident only.
3. *Number of car models provided by each automobile manufacturer:* It is overall number of models offered by the manufacturer over the 9 year period. This can be useful to determine the relation between vehicle recall and variety in the car models.

Cumulative Levels of Recalls and Trends over Time

There were 102 incidents of safety recall reported between 2008 and 2017 in India. A cumulative total of 25, 51, 422 vehicles were recalled, an average of 2, 55, 142 vehicles per year. The amount of vehicle recalls represents 20 % of the vehicles sold during that period. It can be possible to conclude that the average probability of vehicle recall can be taken as 20%. But this cannot be totally correct since a substantial amount of vehicles were recalled more than once hence the possibility of an individual vehicle to be recalled is lower.

Figure 3 relates the number of vehicle recall incidents happening per year between 2008 to 2017 and the total number of vehicle recalled each year. A sharp increase in the number of vehicles recalled between 2013 and 2015 is observed but it declines after 2015. Since the formation of SIAM in the year 2012, focus on customer safety was increased while also voluntary recall guidelines were issued. Earlier Indian automobile manufacturers used to shy away from admitting to a recall scenario. SIAM has been serving as a platform for the automobile manufacturers to make announcements about the defective components. Hence, recall volumes show a sudden rise after the year 2012.

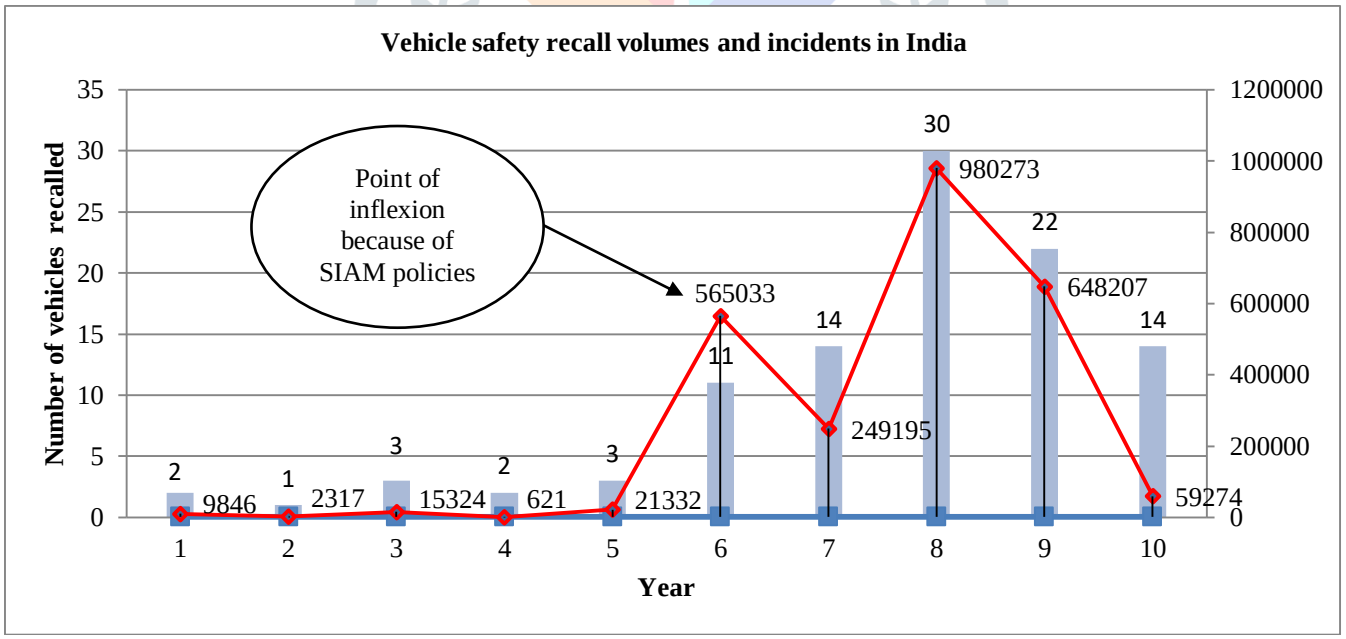

Figure 3: Vehicle safety recall volumes and incidents in India between 2008 and 2017

A significant variation is observed in the amount of vehicles recalled year to year. Some cases depict many recall incidences affecting small number of vehicles.

Although no trend is observed in recall volumes, the number of vehicle recall incidents shows a rise from 2013 to 2015 after which a dip in recall incidences is observed. High volume recalls were witnessed in 2015 partly because of the global recall exercise undertaken by Takata, a Tokyo based air bag manufacturing company. Also, Volkswagen India vehicles too were involved in the global 'emission gate' scandal of Volkswagen leading to high volume recalls in India. The decrease seen from 2015 to 2017 is can be due to car manufacturers tightening the belts at quality fronts, both in-house manufacturing and incoming quality (less to not sufficient data to explore this hypothesis).

Recall rates of different vehicle manufacturers

The volume of vehicles produced and the variety of models produced by the manufacturer vary hugely. For example, average sales of Jaguar Land Rover over a 5 year period are 3158 while that of Maruti Suzuki is 13, 50, 770 with an average of 27, 13,

937 sales per year for all vehicle manufacturers. Table 1 shows the vehicle manufacturers according to number of vehicle recalls as a percentage of number of vehicles sold.

Table 1: Ranking of Manufacturers: India Recall Volumes as Percentage of total vehicle sales (2013-2017)

Ranking	Manufacturer	Recall volumes as % of total vehicle sales
1	Volkswagen	143.85%
2	General Motors	134.89%
3	Honda	88.51%
4	Audi	33.20%
5	Nissan	17.51%
6	Mahindra	8.34%
7	Maruti Suzuki	4.45%
8	Jaguar Land Rover	3.27%
9	Mercedes	2.03%
10	Skoda	1.46%
11	Hyundai	0.58%
12	BMW	0.00%
13	Tata	0.00%

The companies with highest recall rates .i.e. General Motors and Volkswagen are not high volume manufacturers, which depict a link between the manufacturing skills, standardization of production process and the tendency for recall. However, high volume manufacturers like Maruti-Suzuki, Hyundai and Tata Motors are observed to have lowest recall rates.

Considering a relation between the volume of vehicles recalled and the number of recall incidences, the relationship between 'recall volumes as a percentage of sales and number of models offered is examined. This is shown in the scatter plot in fig. 4.

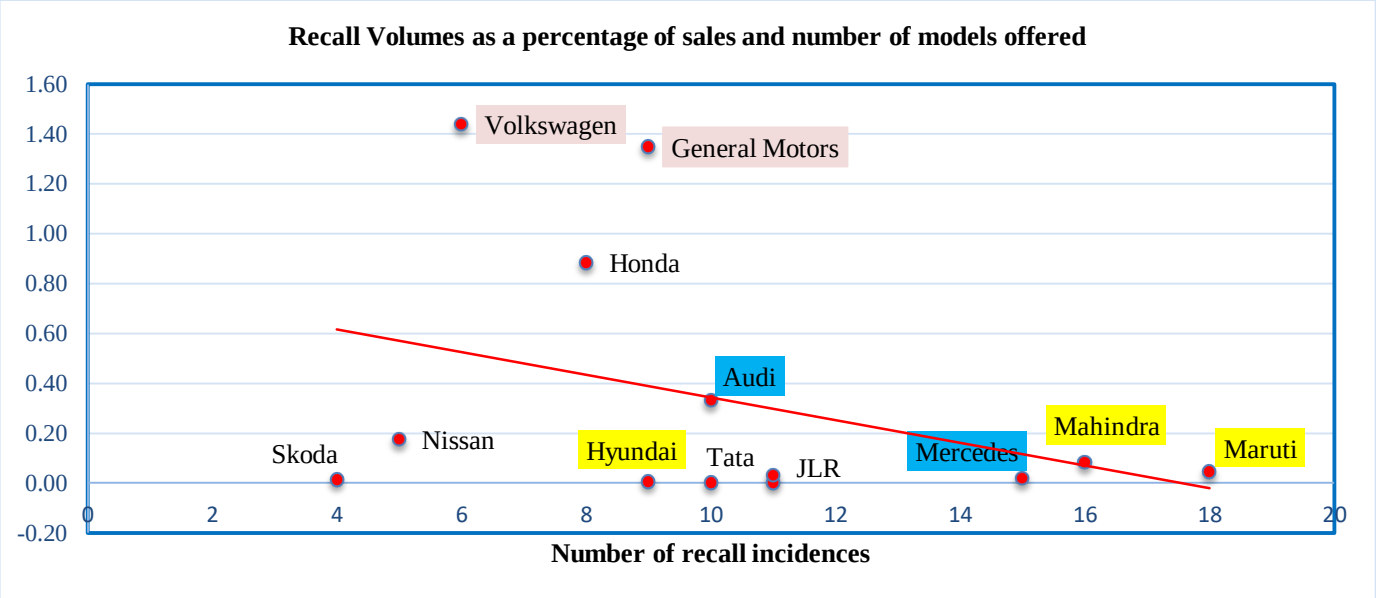

Figure 4: Recall Volumes per sales by Number of Models Offered

Vehicle manufacturers below the line show few incidents of recall with respect to the number of models produced than the vehicle manufacturers above the line. More product variety is to be handled further to the right. Manufacturer like Maruti-Suzuki have the highest product variety .i.e. 18 but also have the least volume of recalled vehicles as a percentage of registrations. This indicates the ability of Maruti Suzuki to simultaneously offer relatively high variety whilst retaining tight control of product development and manufacturing processes. In the mid region of the graph are General Motors, Volkswagen and Honda who in spite of having lower model variety still have high numbers of vehicle recalls.

IV. DISCUSSION AND CONCLUSIONS

More than 0.5 million vehicles have been recalled each year of the past five years in India. It is surprising that very scarce actions have been taken to tackle the causes of recalls. Researches about the impacts of recall are available but very little is known about the causes that lead to initiation of recalls in India.

The following points for future study are proposed in this area:

1. How are recall-rates related to product development and lead time?

Do companies that have less product development times have high recall rates? Are recalls due to shortened problem solving time during the product design phase? If so, then how can manufacturers like Maruti-Suzuki, are able to have low recall rates along with high variation in products and lesser lead times for development while other manufacturers cannot?

2. Are recall rates related to other improvements in the automotive industry?

In order to reduce the costs, automobile manufacturers try to get more out from limited number of resources. This increases the complexity of the teams who work on different models of the car. It also means that a given platform needs to contain more number of model configurations. Is this the reason for increased number of recalls?

3. Are recall rates related to product quality?

In this study, it is assumed that recall rates define a meaningful measure organizational performance. But it is still to be investigated that how recall rates be relate as a measure of quality and efficiency.

A further research is needed into automobile recalls in India. Increase in the number of recall incidents poses a risk to public and vehicle safety. The disparities between automobile manufacturers of India and their needs need to be further studied, considering the differences in the age of models, volumes of production and the manufacturing methods in order to find the root cause of the recall trend.

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