Analysis on the Trends and Characteristics of Automobile Recalls in China

Yongqin Feng1,a*, Wenzhao Li1,b, Xiaorui Zhang1,c, Le Liu1,d
1Product Safety Research Institute China National Institute of Standardization Beijing, China

a*Corresponding author: fengyq@dpac.org.cn, bliwzh@dpac.gov.cn, czhangxr@dpac.gov.cn, dliule@dpac.gov.cn

Abstract—Based on the statistical data provided by the State Administration for Market Regulation, China Automobile Industry Association and China Consumers’ Association, this study analyzes the trends and characteristics of automobile recalls in China from 2008 to 2017. Studies have shown that automobile recalls in China have become a normal trend, there is a recall almost every two days and most recalls are initiated by a few automobile manufacturers. The recall of auto brands such as Volkswagen and Honda usually occur in the first 5 years of the model year. This shows that consumers should pay more attention to the after-sales and maintenance services in this period when buying a car.

1. INTRODUCTION

As an internationally accepted product safety supervision method, the automobile recall system originated in the United States and was subsequently promoted and established in the United Kingdom, Canada, Australia, Japan, South Korea and other countries. In 2004, China issued the Defective Automobile Products Recall Provisions, which marked the establishment of China’s automobile recall supervisory system. In 2012, the Defective Automobile Products Recall Regulations was issued, which upgrades the defective automobile products recall system to administrative regulations from departmental regulations. In 2015, the Implementation Measures for Defective Automobile Products Recall Management Regulations was issued, which further improves the operability of China’s automobile recall. So far, China has formed a relatively complete automobile recall system. Judging from the practice of automobile recalls, as of the end of 2017, China had accumulatively recalled 56.736 million cars.

With the development of the automobile recall system, the studies on the recall system have gradually received extensive attention. Bates et al. pointed out that the recall rate of automobiles is increasing. There is a huge difference in the recall rate between different automobile manufacturers. The recall rate of European and American manufacturers is almost three times higher than that of their counterparts in East Asia [1]. Han and Chen pointed out that from 2004 to 2010, the number of automobile recalls in China has increased rapidly year by year, but automobile recalls mainly include the recall of imported vehicles, non-independent brand vehicles and European and Japanese vehicles [2]. Sriram and Sinha pointed out that the learning effect of enterprises in the recall will increase with the accumulation of recall experience, thereby reducing the possibility of defects and promoting the improvement of product quality [3]. Feng et al. pointed out that the design and implementation of China’s automobile recall system plays an important role in the product innovation of automobile
enterprises. Product innovation under the automobile recall system is more oriented to product safety [4]. Shi et al. pointed out that the number of single-batch recalls of automobile manufacturers in China is not much different from that of the United States, but the number of recalls is seriously insufficient. The recall enthusiasm of independent brands is far less than that of joint venture automobile manufacturers [5]. In summary, the trends and characteristics of automobile recalls have become an important content in the field of recall study, but there is no special study on the trends and characteristics of automobile recalls in China in recent years.

The structure of this paper is as follows. In the second part, the study methods and data sources of this paper are described. In the third part, China’s automobile safety situation is studied from the aspects of automobile production and sales, consumer complaints and defect reports as well as recall statistics. In the fourth part, the characteristics of automobile recalls in China are discussed mainly from the perspective of recall rate and recall frequency. Finally, the main study conclusions of this paper are summarized and future study directions are proposed.

2. STUDY SAMPLES AND DATA
This study takes the practice of China’s automobile recalls from 2008 to 2017 as the study object and uses the statistical data released by the State Administration for Market Regulation and China Automobile Industry Association as the data source. Especially, automobile production and sales data comes from the China Automobile Industry Association. The sales data of auto brands such as Volkswagen and Honda comes from Sohu Auto. The data of automobile complaints comes from the Analysis on Complaints Accepted by the China Consumers’ Association issued by the China Consumers’ Association. The data of automobile defect information report comes from the National Defect Information Collection Platform. The automobile recall data comes from the automobile recall database of the Defective Product Administrative Center of the State Administration for Market Regulation.

3. ANALYSIS ON TRENDS OF AUTOMOBILE SAFETY

3.1. Analysis on automobile sales trend
In 2008, Asia began to surpass Europe and America to become the world’s largest automobile market. Since 2009, China’s automobile production and sales have been ranked first in the world. From 2008 to 2017, the average compound annual growth rate of China’s automobile production and sales was 13%. In 2017, China’s total automobile production and sales were 29.014 million and 28.889 million respectively. As of the end of 2017, the car ownership in China reached 217 million cars. Statistics on automobile sales of various brands from 2008 to 2017 show that during the 10 years, there were 7 auto brands whose sales were all in the Top-20, they were Volkswagen, Honda, Buick, Toyota, Nissan, Hyundai and Chery. Their market shares are as shown in Figure 1.

Figure 1. Market shares of best-selling auto brands in China in 2008-2017.
3.2. Analysis on automobile complaint trend
As shown in Figure 2, from 2008 to 2017, the number of consumer automobile complaints (including parts and components) accepted by the China Consumers’ Association and the annual automobile defect information collected by the National Defect Information Collection Platform showed an overall upward trend. Especially, the number of consumer automobile complaints (including parts and components) accepted by the China Consumers’ Association exceeded 20,000 for the first time in 2013 and the number of annual automobile defect information collected by the National Defect Information Collection Platform exceeded 10,000 since 2013. In 2017, the China Consumers’ Association accepted 20,474 consumer automobile complaints (including parts and components) and the National Defect Information Collection Platform collected 17,020 valid automobile product defect reports.

Figure 2. Number of automobile product defect information reports and complaints in 2008-2017.

3.3. Analysis on automobile recall trend
Since the establishment of China’s defective automobile recall system, significant progress has been made in automobile recalls. As shown in Figure 3, from 2008 to 2017, the times and quantity of China’s automobile recalls showed an overall increasing trend. After the promulgation and implementation of the Defective Automobile Products Recall Regulations in 2013, the number of annual recalls exceeded 5 million for consecutive three years; after the promulgation and implementation of the Implementation Measures for Defective Automobile Products Recall Management Regulations in 2016, the number of annual recalls exceeded 10 million for the first time; In 2017, affected by the problem of Takata airbags, the number of recalls exceeded 20 million, reaching 2.048 million. The average annual number of recalls is 144 in these 10 years and there is a recall almost every two days. Automobile recalls have become a normal trend.
Defective automobile recalls are divided into active recall and passive recall. Active recall means that the enterprise implements the recall through independent investigation and analysis, and the competent government department does not intervene in any work before the recall. Passive recalls include those affected by investigations by government regulatory authorities and those ordered by government regulatory authorities. Recall affected by investigations means that the competent government department analyzes the defect information, finds that there is a defect after investigation and evaluation, and notifies the manufacturer to implement the recall. According to statistics, from 2008 to 2017, the number of times and quantity of recalls affected by investigations in China have been increasing year by year. Especially, the quantity of recalls affected by investigations exceeded 60% in 2014, 64% in 2015 and 75% in 2017. In these 10 years, there were 296 recalls affected by investigations, involving 32.67 million defective automobiles, accounting for about 59% of the total recalls.

4. ANALYSIS ON CHARACTERISTICS OF AUTOMOBILE RECALLS

Statistics on the data of automobile recalls show that the recalls of 7 auto brands such as Volkswagen, Honda and Buick accounted for 52.82% of the total recalls in these 10 years. This means that most recalls are initiated by a few automobile manufacturers. This study will use the 7 brands as examples to analyze the characteristics of automobile recalls.

In order to study the characteristics of automobile recalls, this study firstly introduced the concept of “recall rate”. Recall rate = number of automobiles recalled / number of automobiles sold. Considering that a recall may involve the cars of multiple model years and an automobile may undergo multiple recalls due to multiple defects, this study conducted a conversion statistics of the recalls of these 7 auto brands in these 10 years by the model year. As shown in Figure 4, the recall rate of the 7 auto brands has dropped significantly after 2013, which is closely related to the promulgation and implementation of the Defective Automobile Products Recall Management Regulations in 2013 to strengthen the safety supervision of manufacturers. At the same time, it also reflects that with the continuous progress of technology, the recall rates are decreasing, and the level of vehicle safety has been improved. In addition, although Volkswagen has the largest market share in China, its recall rate is very low, which shows that automobile recalls are not necessarily proportional to automobile sales.
Figure 4. Recall rates of the 7 auto brands in 2008-2017.

In order to investigate the characteristics of automobile recall frequency, this study conducted a statistical analysis of the average annual number of recalls of the 7 auto brands over the 10 years. As shown in Figure 5, Volkswagen, as the best-selling auto brand in China, has the most average annual recalls except 2017. The average annual number of recalls of the other 6 auto brands fluctuated during the 10 years, without obvious characteristics.

Figure 5. Average annual number of recalls of the 7 auto brands in 2008-2017

In order to better investigate the recall of automobiles during their lifetime, this study counted the number of recalls of the 7 auto brands according to the model year. As shown in Figure 6, the recall of the 7 auto brands such as Volkswagen and Honda usually occurs in the first 5 years of the model year and the number of recalls after 5 years has decreased significantly. This shows that consumers should pay more attention to the after-sales and maintenance services in this period when buying a car.
5. CONCLUSIONS
By investigating the trends and characteristics of automobile recalls in China from 2008 to 2017, this study found that automobile recalls in China have become a normal trend and there is a recall almost every two days. From the perspective of the main body of recalls, most of the automobile recalls are initiated by a few automobile manufacturers and the recalls of auto brands such as Volkswagen and Honda account for half of the total recalls. An analysis on the recall characteristics of the 7 auto brands such as Volkswagen and Honda shows that the recall rate has dropped significantly after 2013 and the recall usually occurs in the first 5 years of the model year. As the best-selling auto brand in China, Volkswagen has the most average annual recalls except 2017. In this study, the descriptive statistics of automobile recalls are mainly used. In future studies, we can further verify the impact of automobile recalls on automobile sales by establishing empirical models of automobile recalls and automobile sales, so as to deeply explore the essential characteristics of automobile recalls in China.

ACKNOWLEDGMENT
This work was financially supported by the Fundamental Research Funds of China National Institute of Standardization Project (No. 282019Y-6696).

REFERENCES
[1] H. Bates, M. Holweg, M. Lewis and N. Oliver, “Motor vehicle recalls: Trends, patterns and emerging issues,” Omega, 2007, vol.35, pp.202-210.
[2] W. B. Han and J. Y. Chen, “The analysis of auto recall in China,” Journal of Jiamusi University (Natural Science Edition), 2012, vol.30(1), pp:77-78.
[3] Y.Q. Feng, Y. Yin, X. R. Zhang, and L. Y. Zeng, “The action mechanism of automobile recall system on technological innovation of enterprise in China,” Science Technology and Industry, 2016, vol.16(12), pp:123-128.
[4] T. Sriram, K. K. Sinha, “Product recalls in the medical device industry: an empirical exploration of the sources and financial consequences,” Manage. Sci., 2011, vol.57(2), pp: 376-92.
[5] W. Shi, K.J. Leng, I.V. Nieuwenhuysen, Y.C. Liu, X.H. Chen, “Vehicle recalls performance in an emerging market: evidence from the comparison between China and U.S.,” Transport. Res. A, 2020, Vol.132, pp:290-307.