

Research on the Effect of Automobile Recall System on Quality Improvement

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ABSTRACT

Based on the stakeholder theory model of automobile recall system, this paper puts forward the research framework of automobile recall system for quality improvement. 439 valid questionnaires from automobile manufacturers, dealers, parts suppliers and consumers are studied to reveal the role of automobile recall system in quality improvement. The research results show that the automobile recall has improved the level of automobile safety technology, forcing enterprises to improve the quality and safety of automobile products and enhance the consumers' sense in quality and safety.

Keywords: *automobile recall system, quality improvement, effect*

1. INTRODUCTION

According to the Quality Management Systems Fundamentals and Vocabulary (ISO 9000: 2008), quality refers to "a general term of the features and characteristics that reflect the ability of a product or service to meet a defined or implicit need." Quality, an important indicator of social and economic development, reflects the level of product in usability, safety, reliability, economy, etc. through a set of quantitative internal attributes, characteristics, performance and other parameters. The historical experience of the developed countries such as the United States, Germany, and Japan shows that the implementation of the national quality strategy, comprehensive improvement of quality, and improvement of the quality supply level play an important role in improving the economic development efficiency.

The proposal of China's quality improvement actions is closely related to China's reform and opening up and the development level of quality management. China began to implement reform and opening up in 1978, gradually shifting from the planned economy to the socialist market economy. At that time, the competent department of machinery industry took the lead in introducing total quality management[1]. At the 14th National Congress of the Communist Party of China in 1992, China determined that the goal of economic system reform was to establish a socialist market economic system, and gradually began to develop quality planning to promote quality development. The Quality Invigoration Programme (1996-2010), the Quality Development Outline (2011-2020) and the Plan for the Improvement of Consumer Product Standards and Quality (2016-2020) were respectively released in 1996, 2012 and 2016. The Guiding Opinions of the CPC Central Committee and the State Council on Conducting Quality Promotion Actions (the Guiding Opinions) issued in 2017 clearly put forward the national strategy of being a great power of quality. The release of the Guiding Opinions is

not only a strategic plan for China's quality development, but also a guide to the path of quality governance and quality supervision.

In the Guiding Opinions, "(XVI) Strengthening Total Quality Supervision" clearly states that it is necessary to "deepen the reform of the 'decentralization, management and service', strengthen interim and ex post supervision... increase the recall of defective products, expand the scope of recalls, improve an administrative supervision and technical support system for the recall of defective products and establish defective product recall management information sharing and departmental collaboration mechanisms." Existing research and practical experience at home and abroad manifest that as an important measure to strengthen the interim and ex post supervision, the automobile product recall system has an irreplaceable role in eliminating quality and safety risks, protecting consumers' personal and property safety, and promoting product quality improvement. However, how to improve the product quality level by the automobile recall system has always been a "black box", and it is urgent to carry out in-depth research.

2. STAKEHOLDERS OF THE AUTOMOBILE RECALL SYSTEM

In the 1960s, Stakeholder was put forward as a clear theoretical concept, and Stakeholder Theory has evolved since then. The influence of Stakeholder Theory has expanded rapidly since Freeman's introducing stakeholder analysis into management for the first time in Strategic Management A Stakeholder Approach. Most researchers agree that stakeholders are individuals or groups that affect or are affected by the organization's management activities. On one hand, they provide necessary resources for the organization's survival and development, and on the other hand, they rely on the organization to meet their interests and expectations.

With respect to any enterprise, it faces specific stakeholders in the business environment, and the enterprise and these stakeholders define the expected interests they give (and obtain) from each other, through contractual relationships (either written or implicit). It is available to transform the conventional operating environment into specific operating objectives and then to

determine the corresponding strategies in a targeted way, by clarifying who are the important stakeholders and concretizing their expectations for the interests from/to the enterprise.

Figure 1 shows the six types of stakeholders that most enterprises may face, and their demand points for the interests from/to enterprises.

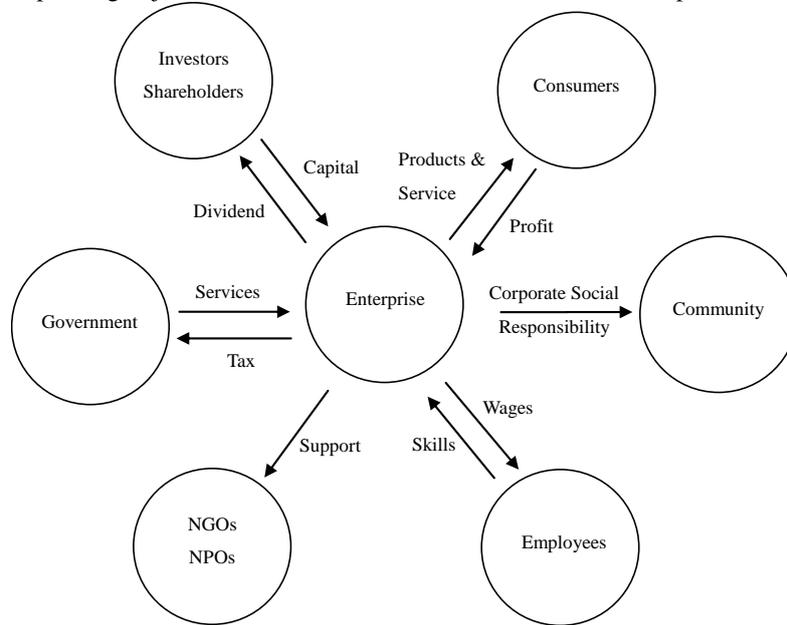


Figure 1 Stakeholders of an enterprise

Stakeholders of an enterprise include not only its shareholders, creditors, employees, consumers and other trading partners, but also such pressure groups as government, local communities, media, non-profit organizations (NPOs), non-governmental organizations (NGOs), and even objects whose natural environment is directly or indirectly affected by the business activities of the enterprise. These stakeholders are closely related to the survival and development of the enterprise, and their interests need to be considered in, or may restrict, the operating decision-making of the enterprise.

The impact of automobile recall system on product quality is influenced by a variety of stakeholders (see Figure1). Under the automobile recall system, the automobile producer is held liable and mainly responsible for information recording and filing, defect investigation and analysis, formulation and reporting of the recall plan, and recalling[2]. Automobile operators, including dealers, leasing companies and maintenance companies, mainly grant cooperation for recalling by the automobile producers. Parts suppliers primarily cooperate with the defect investigation and recalling. The government will be responsible for administrative supervision and management and technical judgment. Regulators will formulate the relevant regulations and policies, and supervise and manage the implementation thereof. Technical supporters shoulder the collection and analysis of defect information, the technical review of defects,

technical supervision of the recall, recall effect evaluation and other technical and auxiliary services. For consumers, that is, buyers and users of automobiles, may report any defects in the automobiles, if any, to the relevant department and cooperate with the recalling.

Recall of defective automobile products is defined as reporting any defective automobile products to authorities in accordance with the laws and rules, notifying consumers in a timely manner, attempting to recall such defective products from the market and consumers, as well as repairing or replacing the same free of charge by any manufacturers, sellers and importers of any defective automobile products, while they become aware of any defects in the automobile products they produce, sell or import, which may cause consumer health and safety problems. Therefore, as an event that may cause widespread concern in the society, during the process of implementing the recall system of automobile products, recall has become a dynamic process in which the manufacturers, consumers, investors, media, government and other enterprise stakeholders may be involved together.

The influence of automobile recall system on product quality is affected by various stakeholders. The present research aims to study and design a specific research & survey framework, on basis of the Stakeholder Theory, in order to explore the impact and function of the recall system on quality improvement more effectively.

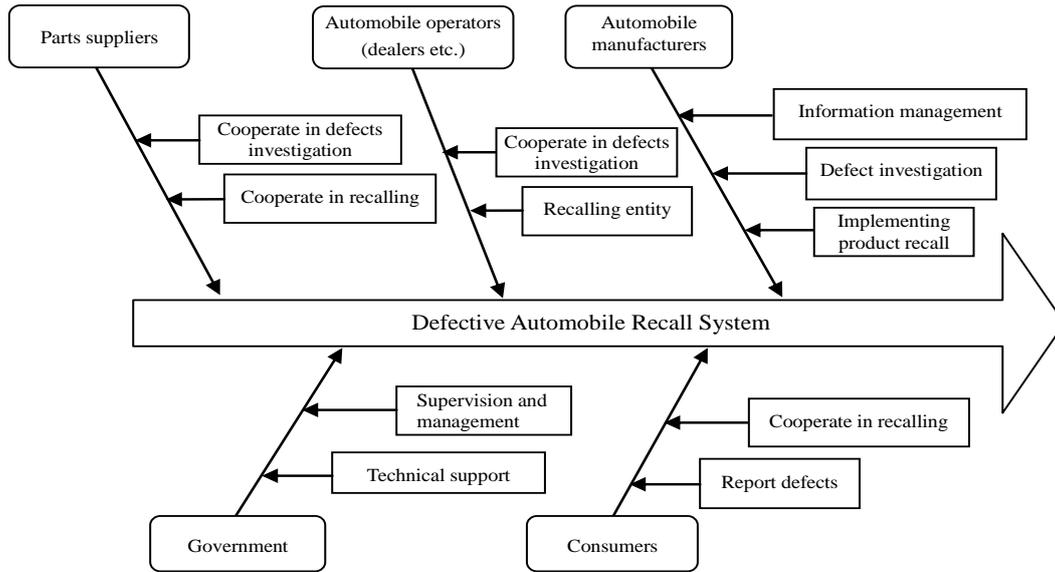


Figure 2 Stakeholder theory model of the automobile recall system

3. RESEARCH DESIGN

3.1. Research Framework

According to the stakeholder theoretical model of the automobile recall system, the interests of automobile manufacturers, automobile operators (dealers, etc.), part suppliers, and consumers are directly affected by recall during the implementation of the automobile recall system. For example, among others, defects are likely to cause harm to consumers; automobile manufacturers have to develop measures to eliminate defects. Automobile operators (dealers, etc.) have to recall cars as required by automobile manufacturers and auto parts suppliers, provide parts for replacement. These activities have a profound impact on the quality of automotive products and services. To sum up, this paper introduces a research framework on the effect of automobile recall system on quality improvement, and reveals the role of the said system on quality improvement based on study targeted automobile producers, dealers, parts suppliers and consumers.

3.2. Questionnaire Design

Questionnaires for manufacturers, consumers, dealers, and part suppliers have been designed according to the research objectives and research framework. Among them, the Questionnaire on Automobile Recall System Implementation (for Manufacturers) is mainly intended to investigate the implementation of the automobile recall system by manufacturers and the impact thereof on their quality improvement; the Questionnaire on Automobile Recall System Implementation (for Consumers) mainly

investigates the consumer’s understanding of the automobile recall system, and the impact of the said system on the quality of automotive products; the Questionnaire on Automobile Recall System Implementation (for dealers) and the Questionnaire on Automobile Recall System Implementation (for Part Suppliers) mainly study the implementation of the automobile recall system by dealers and part suppliers, as well as the impact on their product quality and quality management.

3.3. Study Samples

From August 2018 to January 2019, the project team obtained 439 valid questionnaires from four surveys on automobile manufacturers, consumers, dealers and part suppliers. Statistical analysis shows that the survey objects are widely distributed and have a typical representativeness.

In August 2018, e-mails were sent to 257 passenger vehicle manufacturers to invite them to answer questionnaires online. 101 manufacturers completed the questionnaire, accounting for 39.30%. A total of 30 private enterprises, 29 state-owned enterprises, 26 joint ventures, 12 foreign-funded enterprises and 4 ones of other types participated in the survey. We sent SMS messages to invite 5,000 car owners randomly selected from the defect complaint database to answer the questionnaire online and finally 80 of 341 owners who entered the questionnaire completed the questionnaire, or 23.46%. Among them, 77.5% (62) owners have education background of undergraduate/college and above, and 71.25% (57) owners are 30-50 years old.

In September 2018, we invited via WeChat enterprises to answer questionnaires online, and randomly selected 1,000 dealers that can be issued with research questionnaires.

Finally, 415 dealers entered the questionnaire, and 178 dealers completed the questionnaires, with a completion rate of 42.89%. The questionnaire involved 41 brands of dealers, covering 18 provinces and cities.

From December 2018 to January 2019, questionnaires were sent to 102 part suppliers through email. After eliminating the invalid questionnaires, 80 valid questionnaires were finally obtained, with the effective rate being 78.43%. The questionnaire mainly covers parts such as engines, airbags, seat belts, steering wheels, tires, automatic transmissions, etc., involving part suppliers of various OEMs such as Guangqi Honda, FAW Volkswagen, and Chang'an Ford.

4. ANALYSIS ON THE ROLE OF AUTOMOBILE RECALL SYSTEM ON QUALITY IMPROVEMENT

4.1. Effect of Automobile Recall on Manufacturers

Firstly, recalls offer an opportunity for automobile manufacturers to improve product safety. From the corrective measures taken by automobile manufacturers, those with respect to design defects mainly include measures concerning design and materials, accounting for 77.23% and 51.49% respectively; those with respect to manufacturing defects mainly include measures concerning work flow and production monitoring, both accounting for 62.38% and those with respect to logo defects mainly include measures regarding instructions and packaging, accounting for 41.58% and 15.84% respectively. This suggests that the recall opens a window of opportunity for automobile manufacturers to improve product safety by developing new technical specifications or changing existing specifications.

Secondly, recalls compel enterprises to establish defect prevention mechanisms, so as to promote automobile safety. 80.20% of the manufacturers covered have been equipped with defective prevention mechanisms to advise on product quality improvement. In order to prevent defects, 81.19% of the manufacturers covered indicated that they would conduct an in-depth analysis of the root cause of the recall and take corrective actions for the same or similar products; 78.22% expressed their willingness to share defects information with the part suppliers to avoid the same defects in other models; 76.24% said they would record defects and strengthen quality control during the manufacturing and 70.30% made up their minds to intensify inspections during the product design phase.

Thirdly, recalls are conducive to improving the quality management. Manufacturers under coverage generally believe that the implementation of the recall system has a greater impact on R&D and design, manufacturing, quality management, and after-sales services departments. Among them, the most considers that the R&D and design department will be subject to larger impact. At the same

time, 78.22% would incorporate the recall management system into their quality assurance system. 96.04% answered that they have established a traceability information management system for automotive products and 93.07% would conduct quality control on part suppliers. This shows that the automobile recall system functions to improve the quality of products throughout the life cycle of automotive products. The survey also found that the quality improvement of automobile products caused by automobile recalls was mainly completed by PDCA cycle and 8D analysis.

4.2. Effect of Automobile Recall on Consumers

Firstly, recalling has enhanced consumers' sense of quality and safety. 99.44% of the dealers covered said that the recall has ensured the safety of consumers by eliminating safety hazards; 69.10% believed that recalls would improve customer satisfaction. Consumers' perception of automobile brands is not only limited to the tangible products such as production quality, industrial design and processing technology of automobiles, but also after-sales services such as maintenance and parts supply. Recall measures will help strengthen consumers' perception of services regarding automotive products and enhance consumers' sense of quality and safety.

Secondly, recalling is a way to raise consumers' awareness of manufacturers' brand image. Questionnaire survey shows that 59.49% of the consumers covered said that recalling has a positive impact on the corporate brand image; 66.85% of the dealers and 42.00% of the manufacturers covered believed that recalls would enhance brand image. When evaluating a company's brand, it usually considers two dimensions of corporate competence and social responsibility[3]. Automobile recalls, especially the voluntary recalls, reflect the integrity and responsibility of a company, embody its credibility and strength and enhance its brand image from the perspective of social responsibility.

4.3. Effect of Automobile Recall on Consumers

Firstly, recalls promote automobile safety by eliminating defects and promoting standards improvement. 99.44% of the dealers covered said that the recall has ensured the safety of consumers by eliminating safety hazards; 92.13% of the dealers indicated that the recall enabled the company to improve the safety performance of the automobile products by effectively eliminating design and manufacturing defects; 40.51% of the surveyed consumers said that the defects have been eliminated, and similar accidents have not occurred again. In addition, there is an inextricable link between defective automobile recalls and product safety standards. Questionnaire survey uncovers that 48.51% of the surveyed manufacturers expressed that they have taken product safety corrective measures in terms of product safety standards. Defective automobile

recalls require manufacturers to take measures to remediate products with potential safety hazards. In addition, when defects involve general product problems in the industry, it will avoid more damages and recall events by amending the State's mandatory product safety standards and therefore improve product quality and safety levels, such as proposing changes to GB 11567.2-2001 Car and Trailer Rear Lower Protection Requirements.

Secondly, the automobile recall system, as a post market supervision measure, forces enterprises to improve the quality of automobiles. 59.49% of the surveyed consumers held that the government has fully played its role of a supervisor and administrator in the recalling; 84.83% of the surveyed dealers indicated that the recall system has supervised the quality of automobiles, and force enterprises to improve the quality of automobile products. Different from market access methods such as product safety standards and certification approval, the automobile recall system forces enterprises to improve the quality of automobiles through post-market supervision. The recall system, as the "Sword of Damocles" hanging above the manufacturers of automobile products, requires them to eliminate defects in the original design and manufacturing process; otherwise they will bear legal responsibility, which will inevitably promote manufacturers to increase safety technology R&D investment to promote the improvement of vehicle safety.

Thirdly, recall is conducive to promoting the overall quality improvement of the automotive industry supply chain. Gibson pointed out that recalls impact the entire supply chain of the automotive industry since they are related to multiple entities such as producers, manufacturers, governments, etc.[4]. Zhu suggest that both suppliers and manufacturers have the power to improve quality because of the quality-related costs such as future market loss costs and customer satisfaction costs[5]. For example, to avoid defects, 85.00% part suppliers covered expressed their willingness to share defects information with the part suppliers to avoid the same defects in other models and record defects and conduct inspections during the product design phase. Kisiel put forward that manufacturers are more willing to participate in the product development process in the automotive industry to ensure early detection and elimination of quality issues[6]. It can be seen that the recall is conducive to promoting the overall quality improvement of the automotive industry supply chain.

5. CONCLUSIONS

This paper discusses the role of automobile recall system in quality improvement based on questionnaires from automobile manufacturers, dealers, parts suppliers and consumers. Studies have shown that recalls offer an opportunity for automobile manufacturers to improve product safety and compel them to establish defect prevention mechanisms, so as to improve product quality management and promote automobile safety. The automobile recall system, as a post market supervision

measure, forces enterprises to improve the quality of automobiles and enhance the consumers' sense in brands and their sense of quality security. However, there are still some limitations in this study. The development of this research framework is an exploration of the automobile recall system and quality improvement. The research framework can be further improved through theoretical research and empirical test. In addition, this study mainly finds out the effect of automobile recall on quality improvement through investigation. In the future, case study can be considered to deeply explore the specific role of automobile recall system on the enterprise level.

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