

Study on the Spare Part Logistics Management Model Facing the Automotive Aftermarket

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Abstract. With the quickening of internationalization process of Chinese automotive industry, the profits from the manufacture and sales of full vehicle are fewer and fewer. Automotive aftermarket industry has gradually become a principal approach of automobile enterprises in China to achieve more profits, and the spare part logistics management is an important part in the automotive aftermarket and a hot research area in this field. Therefore, it is of great significance and practical value for the improvement of spare part logistics efficiency in the automotive aftermarket and the increase of management level and benefits of automobile enterprises to take advantage of modern information technology and logistics technology, to learn the internationally advanced spare part logistics management model and to study and conduct the automotive spare part logistics management combing with the situation of China. The paper analyzes the current situation of modern logistics and related automotive aftermarket spare part logistics management at home and abroad. On this basis, considering the situation of China and the characteristics of automotive aftermarket spare part logistics, the author studies the traditional spare part logistics management model in the automotive aftermarket and its cooperative relationship with relevant subjects.

Introduction

With the continuous development of economic globalization, the domestic automobile enterprises begin to set the spare part sales as a new profit growth point. With the features of diversity, small batch and timeliness of the demands for spare parts, automobile enterprises are required to shorten the time for delivery, improve the quality of products, decrease the cost and perfect the service level, so they need to make quick response to the constantly changing market, satisfy the requirements of customers, and occupy a vantage point for competence with quick and convenient services. The modern logistics plays a decisive role during the process. The logistics operation runs through the whole circulation process of automotive spare part aftermarket and brings great economic benefits for automobile enterprises. Advanced spare part logistics system has become the strategic target that every automobile enterprise strives to create.

Currently, with the increase of car ownership in China, the market share of automotive spare part sales grows rapidly; what's more, most automobile enterprises have built comparatively perfect spare sales and supply network in China. At present, the main work is to realize the information and data sharing among node enterprises by optimizing the spare part logistics management process and taking advantage of the information technology, network technology and modern logistics technology for the purpose that the spare parts can be sent timely to the customers at a lower price to

reduce the risk of spare part operation. Therefore, the main business of most domestic automobile enterprises in the automotive aftermarket is the perfection and optimization of automotive spare parts sales and supply network to achieve large profits from spare part sales.

Nowadays, automobile spare part enterprises in China have a common problem, i.e. they pay more attention to the assembly and make light of the sales, while the full vehicle enterprises attach importance to the automobile manufacturing but neglect the after-sale service and spare part sales. With the deepening of China's marketization, the automotive spare circulation system has turned into diversified development from the single state-owned channel, which leads to the continuous progress of automotive market subjects in China, the unceasing improvement of market levels, the incessant perfection of market structure, uninterrupted renewal of contents and methods of making a profit and the continual improvement of market conditions and environment. Therefore, the study and exploration on the automotive spare part circulation system is required. Under new competitive environment, it is needed to learn about the customers and enlarge new demands, as well as to analyze competitors and increase the market shares. Besides, the development of communication technology and the popularization and application of the international internet give the production and sales new development.

In conclusion, in order to ameliorate the existing unreasonable points in the automotive spare circulation system in China and to meet with the challenges and opportunities in the market, the modern logistics technology, network technology and information technology should be introduced into the automotive spare part management, which is of great significance for improving the spare part logistics management level of automobile enterprises and perfecting the enterprise benefit and has certain reference significance for other spare part logistics management.

Considering the situation of China, the paper analyzes the characteristics of spare part logistics facing the automotive aftermarket. On the research foundation of traditional spare part logistics management model, the paper studies the cooperation relationship of every operation subject in the automotive aftermarket, builds a spare part logistics management model based on the full vehicle enterprise distribution center and comes up with a series of spare part logistics management strategies on the foundation of the model. The author studies the general structure, technology system, operation mode and function model of the logistics management information system that supports the spare part logistics management model and designs the function model of the spare part logistics management system with the IDEF method.

Characteristics of spare part logistics facing the automotive aftermarket

The spare part logistics facing the automotive aftermarket has its specificity compared with the logistics of general goods. The reason is that the logistics activity of automotive spare parts serves for the after-sale service. The purpose of the whole activity is to increase the full vehicle sales, decrease the management cost, improve the service level of after-sale market and gain new profit growth points of the enterprise; on the other hand, spare part logistics has the common points with the logistics of general goods, in that the fundamental logistics operations also mainly include information processing, purchasing management, warehouse management, transportation and distribution management, etc.

Through the practical investigation and in-depth analysis on the automotive spare enterprise, four main characteristics of the spare part logistics are reached, which are the indetermination of demands,

preference for mobility, purpose of ensuring the supply and making a profit and the distributed inventory:

Indetermination of demands. The users of automotive spare parts are in every place all over China and the world. And the spare parts need alteration only when they have loss or have gone through an accident. What's more, there are various automotive spare parts and a car may be made up with more than 20,000 parts that are of different shapes, weights and sizes. For example, the dimensions of exhaust pipe and automotive panel are comparatively large, while those of some common standard parts, such as the bolt and the oil seal, are small. Therefore, the automotive spare parts have such characteristics as indetermination of demands, small batches and short cycles.

Purpose of ensuring the supply and making a profit. The main purpose of automotive spare part logistics is to ensure the timely supply of spare parts with the minimum cost. As a result, the spare part logistics can't adopt the just-in-time supply model of the production logistics. It is generally supplied in multi-variety and small batches. The regional distribution center and point-of-sale terminal always have certain storage. At the same time, as enterprises spread the profits to the automotive aftermarket, spare part sales and circulation will become the new profit growth point of the spare part logistics management besides the main purpose of ensuring the supply.

Characteristic of distributed inventory. Allowing for the characteristics of automobile products, the distribution range pervades the whole China and even the world, which results in the wide sphere of circulation. Therefore, the automobile enterprises should set warehouses and distribution centers of different sizes all over China to satisfy the demands. Generally, the automobile enterprises set the spare distribution centers according to the regions. Under the regional distribution centers, there will be district distribution centers and warehouses.

Analysis on the solutions to spare part logistics management system facing the automotive aftermarket

The technology system of the spare part logistics management system facing the automotive aftermarket is shown in Figure 1, which only covers the related main technologies. The technology system includes mainly the basic support technology and basic application technology.

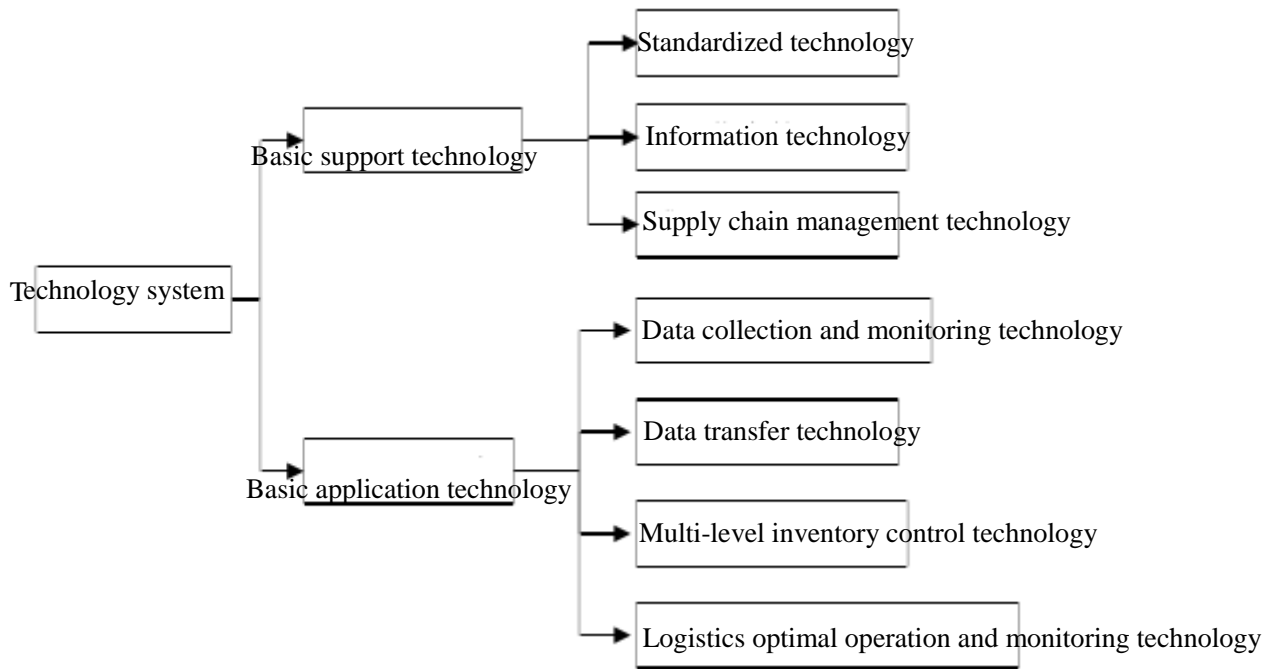


Fig. 1 Technology System of the Spare Part Logistics Management System Facing the Automotive Aftermarket

The spare part logistics management system is to improve the logistics management level and perfect the logistics efficiency with information technology and it must be appropriate for the automotive aftermarket logistics application model. The solution is to design the function model centering on the aforesaid spare part logistics management model and strategies. There are many methods for system design and the currently common method is the model construction method recommended by the CIMS experts of the National 863 Plan—IDEF method, which was initially built in the ICAM Project of the United States Air Force. According to the application, IDEF method is divided into two categories:

First, the function of IDEF method is to improve the information communication between the staff of system integration, mainly including IDEF0, IDEF1, IDEF3 and IDEF5. IDEF0 describes the system function by analyzing the function and classifying the relationship between the functions (such as classification according to the inputting, outputting, controlling and mechanism). IDEF1 shows the important information during the enterprise operation. IDEF3 supports the structural description of view of the system users. IDEF5 is to collect the cases and gain knowledge.

Second, the importance of IDEF method is the design part during the system development. Currently, there are two methods of IDEF design: IDEF1X and IDEF4. IDEF1X assists the design of semantic data model. IDEF4 can produce the high-quality design products required in the object-oriented realization method.

Functional structure of the spare part logistics management information system facing the automotive aftermarket

After analysis of the solutions to the automotive aftermarket spare part logistics management system, the paper designs the spare part logistics management information system facing the automotive aftermarket, mainly including the system management, inventory management, purchasing management, distribution management, recycling management, IC Card management, sales management and terminal management, etc.

① System management: including the user management and basic information management. The user management handles the user information management, authorization role management and the increase and decrease management of maintenance stations, etc.; the basic information management consists of the recording and maintenance of the basic information of spare parts, that of inventory and that of distribution. It also shows the relevant automotive spare information.

② Purchasing management: from the angle of supply and sales of automotive spare parts, comprehensively considering the inventory condition of the warehouses of different levels, the efficient control and tracking on the purchasing process are carried out in the round. The spare branches formulate the monthly purchase plan according to the actual demands of maintenance stations. The customer service company summarizes the purchase plans of the spare branches and gives out purchase orders to the suppliers after inquiring the inventory; there are monthly purchase order and urgent purchase order, mainly including purchase order management, collecting and return management, purchase settlement and inspection management, etc.

③ Sales management: mainly includes the sales order management, sales analysis and sales settlement, etc. The automotive spare part sales, spare part sales information tracking and information feedback, etc. are mainly involved. Making a difference between sales and allocation can supply appropriate sales data for the financial management. Under the conditions of inventory shortage of distribution center of the company, the scheduling request should be sent to the application servers. Through connecting to the servers of other spare branches by VPN and checking out the inventory information, the spare will be allotted by proximity at the fast speed.

④ Inventory management: includes the daily out-put and in-put of warehouse operation, inventory warning line setting, allocation management, making an inventory of goods in the warehouse, adjusting entries, inventory statistics and query parsing, etc. The spare part out-put and in-put of warehouse and daily warehouse business, such as making an inventory, inventory information analysis and so on are involved.

⑤ Distribution management: includes distribution business management and outsourcing management, etc. The unified distribution plan will be worked out by the customer service company according to the purchase plans of every spare branch. By making full use of the current inventory and transportation resources, the distribution cost optimization should be achieved on the condition of timely supply. The distribution business management refers to the administration of the whole process from spare part business acceptance to the accomplishment of delivering goods, including business acceptance, stowage plan, vehicle scheduling, completion of stowage, acceptance of consignment order management, receipt management and accident management, etc.; the outsourcing management mainly supplies the interconnection management with the logistics company because that the spare part transportation from the customer service company to the branches is outsourced to the third logistics company.

⑥ Terminal management of automotive repair shop: conducting real-time tracking management of all the 4s/3s shops and authorized service shops of the company to get an overall understanding of

the inventory information, including order management, taking delivery management, inventory management and billing management, etc.

⑦ Recycling management: mainly handles with the recycling of waste spares, including recycling recording, archiving recycling inquiry and recycling summarizing, etc.

⑧ IC Card management: mainly takes responsibility for the IC Cards sent with the cars during the full vehicle sales, including the owner information, car information and maintenance information, etc.

The application of IC Card in the automotive spare part logistics management information system

IC Card is sent to the users with the car while he/she buys the full vehicle. On the one hand, it is used as the privilege evidence in the after-sale service of the owners. On the other hand, it is also used by the automotive full vehicle enterprises to collect the vehicle operation information, spare purchasing information and vehicle maintenance information, etc.

In the automotive aftermarket, the main problems in spare part logistics management are how to improve the timeliness of spare part logistics, enlarge the spare manufacturer control inside and outside the supporting system, enhance the control force of sales terminal and make efficient analysis on the spare part logistics to reduce the logistics total cost and improve the service quality.

It is proved by the experience at home and abroad that the combination of IC Card with the spare part logistics management information system can effectively solve the above problems existing in the spare part logistics. The IC Card has the following functions:

First, it can manage the upgrading information of all spare parts during the vehicle operation and come up with the management strategies. For example, once the maintenance cost of the normal supporting factory spare reaches a certain limit, the user can enjoy the discount privilege in all the businesses in the after-service market. The user can check directly the spare updating information of his/her car with IC Card in the automotive aftermarket service network of the full vehicle enterprises, which attracts users by avoiding the losses of the users caused by the lack of automobile knowledge. What's more, the users beyond the three guarantees period can continue to use the IC Card and enjoy the follow-up service of the full vehicle enterprises.

Besides, the use of IC Card resource can improve the management of the full vehicle enterprises on the retailers and maintaining dealers. By the use information of IC Card, the full vehicle enterprises can efficiently administrate the spare part use information of the retailers and maintaining dealers.

As a result, taking full advantage of the IC Card resource and building full vehicle IC Card management system can enhance the supervision on the retailers and maintaining dealers by making the utmost of users. The direct benefits of customers and the construction of the full vehicle brand can be achieved at the same time.

Conclusions

The effective management on the automotive spare part logistics of the automotive aftermarket is the powerful method for automobile enterprises to gain rich profits of aftermarket. The logistics management is difficult as the automotive spare part logistics process is complicated and the warehouses of the regional distribution centers (authorized service shop and 4s/3s shops, etc.) and

sales terminals are distributed and multi-level. Focusing on the difficulties in the spare part logistics management of automotive aftermarket, based on the information technology, network technology and logistics technology, the paper studies the spare part logistics management model of automotive aftermarket and draws the following conclusions:

(1) Based on the research of the characteristics of spare part logistics of automotive aftermarket and the traditional automotive spare part logistics management model, the author studies the cooperation relationship of every spare operation subject in the automotive aftermarket and comes up with a spare part logistics management model based on the distribution centers of the full vehicle enterprises, which extrudes the organization and coordination and the integrated planning capability of the distribution centers of the full vehicle enterprises and takes into consideration the inventory of suppliers, the regional distribution centers and sales terminals. Based on the above management model, the papers gives the management strategies related to the suppliers and the sales terminals.

(2) The paper brings forward a solution of the logistics management system supporting the above logistics management model and strategies. The solution includes four aspects of the general structure, technology system, operation mode and function model. The four-tier general structure is mentioned referring spare suppliers, the automotive full vehicle enterprises, sales terminals and the user; the relative technology about the spare part logistics management system is studied, including the basic supporting technology and the basic implementation technology; the design of the purchasing management, inventory management, distribution management and sales terminals management of the logistics management system is conducted with IDEF method to guide the development and application of the system.

(3) Based on the above theories and solution, the paper designs the spare part logistics management information system of the automotive aftermarket and discusses the functional structure and referred techniques.

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