

Organization of Supply of Auto Service Enterprises with Spare Parts

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Abstract: The efficient organization of spare parts supply is a critical factor in the operational success of auto service enterprises. This article examines the key components involved in the supply chain, including inventory management, supplier selection, procurement strategies, logistics, and digital integration. It explores current challenges such as part diversity, counterfeit products, and global disruptions, and presents best practices such as demand forecasting, digital platforms, and strategic supplier collaboration. The article also includes a case study of Toyota's spare parts distribution system to illustrate effective supply management. Ultimately, a well-structured spare parts supply system enhances service quality, reduces downtime, and improves customer satisfaction.

Keywords: Auto service enterprises, spare parts supply, inventory management, procurement, logistics, supplier relationship, digital integration.

Introduction:

In the modern automotive industry, the efficiency and reliability of auto service enterprises depend not only on the availability of qualified personnel and modern equipment but also on the effective organization of the supply of spare parts. Timely and accurate delivery of spare parts is essential to ensure minimal downtime of vehicles, high customer satisfaction, and overall operational efficiency. Moreover, the increasing complexity of automobile technologies and the wide variety of vehicle models necessitate a highly structured and responsive supply chain. This article aims to provide a comprehensive analysis of the organization of spare parts supply in auto service enterprises, highlighting methods, challenges, and successful practices.

To begin with, spare parts supply plays a crucial role in maintaining continuity in service operations. Auto service centers rely heavily on the prompt availability of parts such as filters, brake pads, sensors, belts, and electronic components. Without a reliable spare parts supply chain, services are delayed, causing customer dissatisfaction and financial losses. For instance, a study conducted by Frost & Sullivan (2023) found that over 45% of delays in vehicle repairs in independent auto service centers in Europe were due to the

unavailability or late delivery of spare parts. Furthermore, the report emphasized that supply-related delays could lead to an average revenue loss of up to \$15,000 per month for medium-sized garages. Therefore, supply organization directly influences both productivity and profitability.

In organizing the supply of spare parts, several components must be considered, including inventory management, supplier selection, procurement strategy, logistics, and information systems. Let us explore each of these in more detail. First and foremost, effective inventory management is essential. This involves determining which parts to stock, in what quantity, and at which location. Methods such as ABC analysis, just-in-time (JIT), and economic order quantity (EOQ) are widely used. For example, JIT inventory helps in reducing storage costs but requires a reliable supplier network. Additionally, computerized maintenance management systems (CMMS) or enterprise resource planning (ERP) software can be used to track usage rates and predict future demands. As an example, Bosch Car Service uses SAP ERP to automate parts ordering and minimize overstocking [1, 31-50].

Equally important is selecting reliable and responsive

suppliers. Criteria for supplier selection include delivery lead time, cost, quality assurance, and technical support. Long-term partnerships and contracts with OEMs (Original Equipment Manufacturers) or authorized distributors can enhance stability in the supply chain. Moreover, maintaining a good relationship with suppliers facilitates better credit terms, faster response in emergencies, and collaboration in demand forecasting. For instance, AutoZone, a major US-based aftermarket parts provider, partners with both local and international suppliers to ensure timely delivery of over 750,000 parts across its service network.

Procurement strategies must align with the enterprise's size and service volume. While large chains may adopt centralized procurement for cost efficiency, small workshops often rely on local wholesalers or retail stores. Some businesses use hybrid models where high-frequency items are sourced locally and specialized items are ordered from central warehouses. Furthermore, adopting e-procurement platforms can enhance transparency and speed in purchasing. For example, many service centers use online portals such as PartsTech or Nexpart to compare availability and prices from multiple suppliers in real time.

Another essential aspect is logistics – the movement of spare parts from suppliers to service centers. Efficient logistics ensure that the right part is delivered to the right place at the right time. Distribution centers, delivery schedules, courier partnerships, and warehouse locations all influence logistics efficiency. In metropolitan areas, many service providers opt for daily or even same-day delivery, especially for fast-moving parts. Conversely, in rural areas, batch delivery systems are more common due to transportation costs. The use of regional distribution centers (RDCs) is also expanding. Companies like NAPA and O'Reilly Auto Parts operate multiple RDCs to optimize delivery routes and times. Moreover, the implementation of fleet tracking technologies, such as GPS and RFID, contributes to real-time monitoring and helps minimize errors and losses during transportation [4, 694-704].

Despite technological advancements, several challenges still hinder the smooth supply of spare parts in auto service enterprises. Modern vehicles are equipped with advanced electronics and unique design features, making it difficult for service centers to predict and stock all necessary parts. Even two vehicles of the same brand may require different components depending on the model year or region of manufacture. Another significant problem is the

circulation of counterfeit spare parts. According to the World Economic Forum, the global trade in counterfeit automotive parts is estimated to be worth over \$40 billion annually. These parts not only damage customer trust but also pose serious safety risks. In addition, global events such as pandemics, geopolitical tensions, and raw material shortages can disrupt the supply chain. The COVID-19 pandemic, for example, led to severe delays in parts shipping and increased costs due to container shortages and factory shutdowns. In light of these challenges, adopting best practices can significantly improve the reliability and efficiency of supply operations. Using historical service data and predictive analytics tools allows auto service enterprises to forecast part requirements more accurately. Seasonal trends, vehicle aging, and market dynamics should all be considered. Furthermore, integrating digital platforms for inventory management, procurement, and customer communication helps streamline the entire process. Cloud-based systems ensure real-time data sharing between branches and suppliers. Establishing strategic partnerships with suppliers for demand sharing, joint planning, and consignment stock agreements leads to mutual benefits. Some large networks even have supplier-managed inventories (SMIs), where suppliers restock based on real-time consumption data. Finally, investing in the training of personnel involved in supply chain management is vital. Knowledge of logistics software, negotiation skills, and an understanding of auto parts categories can greatly enhance supply efficiency. To illustrate best practices, let us consider Toyota's spare parts logistics system. Toyota uses a multi-echelon distribution network with national, regional, and local distribution centers. With more than 1,500 service points globally, Toyota uses advanced forecasting algorithms and barcode tracking to ensure over 95% of parts are available within 24 hours. This system is considered a benchmark in the automotive industry for supply efficiency and customer satisfaction.

CONCLUSION

In conclusion, the organization of spare parts supply in auto service enterprises is a complex but critical function that directly affects service quality, operational costs, and customer satisfaction. By adopting structured inventory management, reliable procurement processes, advanced logistics, and digital integration, enterprises can enhance their spare parts supply chain significantly. While challenges such as part diversity, counterfeit products, and global disruptions persist, strategic planning and technological adoption offer effective solutions. Thus, a well-organized supply system not

only supports the smooth functioning of auto service businesses but also provides them with a competitive edge in the rapidly evolving automotive market.

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