Investigation into the Profitability Strategies of Shared Sheet Metal Spray Centers

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Abstract. With the introduction of regulations such as the "Decision of the Ministry of Transport on Amending the Regulations on the Administration of Motor Vehicle Maintenance" in China, the government's environmental requirements for the traditional automotive repair industry have been continuously increasing. The spray painting and sheet metal repair business, which has a significant environmental impact, has gradually evolved into modern, intensive, and specialized shared sheet metal spray centers. While domestic scholars have paid some attention to the social and environmental benefits of shared sheet metal spray centers, there is a lack of systematic research on their profit models. This paper investigates the current state of shared sheet metal spray centers by analyzing the development of the spray painting and sheet metal repair industry, comparing the profit models of other sharing economy sectors vertically, and integrating the value chain theory to sort out the profit strategies of shared sheet metal spray centers. The aim is to provide theoretical reference for spray and sheet metal repair operators to promote the healthy development of shared sheet metal spray centers.

Keywords: Sheet Metal Spraying, Shared Sheet Metal Spray Centers, Profit Model, Value Chain Theory.

1. Introduction

According to the data from the Ministry of Public Security, as of the end of September 2023, the national motor vehicle ownership reached 430 million units, with 330 million being cars, accounting for 76.7% of the total motor vehicle ownership, and still maintaining a rapidly increasing trend. The automotive repair industry, which was previously an auxiliary industry mainly serving operational vehicles, has developed into an important livelihood service industry characterized by strong professionalism, wide distribution, and high social attention. In 2021, the Ministry of Transport passed the "Decision on Amending the Regulations on the Administration of Motor Vehicle Maintenance" (Document No. 18), encouraging the modernization, intensification, and specialization of automotive repair centers, and promoting the development of environmentally friendly and energy-saving technologies in motor vehicle maintenance. As an essential part of the automotive repair industry, spray painting services are gradually separating from traditional repair shops to form shared sheet metal spray centers, due to the uneven pollution control levels and externalized environmental costs commonly found in traditional repair shops. Unlike traditional repair shops, shared sheet metal spray centers centralize the spray-painting process, which has a significant environmental impact, and adopt more advanced and eco-friendly technologies. They manage hazardous substances such as volatile organic compounds (VOCs) centrally, reducing the harm of spray-painting operations to the external environment, thus responding to the national government's call.

Currently, shared sheet metal spray centers are still in the growth stage, and the related cooperation and operation models have not yet formed mature standards. Scholars and experts have conducted some research around shared sheet metal spray centers. The Xinyingke Auto Repair and Spray Center in Wanjiang, Dongguan, built in March 2019, can reduce VOC emissions by 0.107 tons per year, a reduction of up to 85%, with significant emission reduction effects [1]. Similarly, the Wanjiang Jiesheng Shared Sheet Metal Spray Center, a pilot project in Dongguan City, has shown that high-volume low-pressure (HVLP) spray guns, compared to traditional manual air spraying techniques,

have the advantages of good spraying quality and high transfer efficiency, saving paint and thus reducing VOC emissions during the spraying process [2]. Liang Guohui (2022) [3] indicated that with the improvement of environmental standards, many small and medium-sized automotive repair enterprises lack funds to install environmental protection equipment. The total investment of the Nanhai Sheet Metal Spray Center is about 5 million yuan, with environmental protection investment exceeding 2 million yuan. With the spray center, small and medium-sized repair centers no longer need to set up separate spray-painting rooms, and environmental costs can be reduced.

2. Overview of Relevant Theories

Shared sheet metal spray centers, as an emerging industry trend, operate on the concept of sharing the use rights of spray-painting equipment and skills. By integrating and revitalizing a vast array of dispersed social spray-painting resources, they provide shared services to a broad consumer base [4]. This paper, based on the shared economy attributes of shared sheet metal spray centers and from the perspective of the value chain, analyzes the issues encountered in the operation and development of shared spray centers and proposes corresponding suggestions.

2.1. Shared Economy Theory

In 1978, Marcus Felson and Joe L. Spaeth first introduced the concept of the sharing economy, also known as the sharing or collaborative economy, which primarily emphasizes collaboration, mutual benefit, and equality among individuals. The essence of the sharing economy is a new economic model that leverages modern technology to optimize the allocation of resources based on the idea of sharing usage rights. Compared to traditional service economy forms, the sharing economy effectively breaks through resource constraints from a property rights perspective and innovatively solves spatial and temporal constraints from a technological perspective.

In 2022, China's carbon peak and carbon neutrality "1+N" policy framework mentioned the encouragement of the sharing economy multiple times. For example, the "Implementation Plan for Promoting Green Consumption" by the National Development and Reform Commission and six other departments called for "expanding channels for sharing and reselling idle resources, orderly developing sharing economies in transportation, accommodation, freight, and other fields, and encouraging the sharing and exchange of idle items." In December of the same year, the "Strategic Planning Outline for Expanding Domestic Demand (2022-2035)" and the "14th Five-Year Plan for Expanding Domestic Demand" were successively issued, both specifically mentioning the promotion of the sharing economy.

Compared to the new models of the sharing economy that have sprung up in various fields in recent years, such as ride-hailing, online food delivery, shared accommodations, shared bicycles, and shared power banks, shared sheet metal spray centers represent an emerging form of sharing economy entity. They take the joint business model of enterprises as the starting point and adopt an operating system that shares spray painting, technicians, and workstations. The difference between shared spray centers and traditional auto repair shops is mainly reflected in the service process and profit model.

In terms of the service process, shared spray centers have transformed the past empirical spray-painting methods into more advanced intensive operations, shifting from a result-oriented production approach to an advanced production method that controls input resources and manages processes. Regarding the profit model, shared spray centers have shifted from the previous model where enterprises were self-reliant and responsible for their own profits and losses, to one that involves multiple resources and shares profits according to certain internal regulations.

Therefore, based on the sharing economy theory, shared spray enterprises can achieve an "increase effect" of high efficiency, rapid growth, and large volume through mechanisms such as cost substitution and value co-creation, network effects and two-sided market effects, economies of scale, and scope economies [4], addressing issues such as difficulty in profitability and low profits for shared spray enterprises.

2.2. Value Chain Theory

In 1985, Michael E. Porter first introduced the concept of the value chain, proposing that a company's value chain can illustrate the various economic activities involved in the process of designing, producing, marketing, delivering, and supporting its products. These value-creating activities influence and support each other, collectively providing value and profit to the enterprise. Since then, scholars both domestically and internationally have continuously expanded and refined the study of "value chains," describing and analyzing them from multiple perspectives.

Baner JeeS et al. (2018), after studying Professor Porter's "value chain" theory, emphasized the integration of value with organizational research in terms of value manifestation [5]. Laudon Traver et al. (2013), from a lifecycle perspective, pointed out that the study of "value chains" spans the entire lifecycle of material production, from the production of raw materials to the delivery of products [6]. Some scholars focus on business practice analysis; for example, Qian Min et al. (2017) conducted research on China's physical department store industry. From the value chain perspective, they analyzed the existing problems of its business model in terms of customer value propositions, core resources, related party processes, and profit models, and proposed transformation paths for the business model [7].

The value chain runs through the entire process of enterprise development and is the fundamental basis for operators to achieve profitability. Competition among enterprises has evolved from single competition in products and services to competition in profit models. Whether an enterprise can establish itself and develop in the market depends on its ability to find a suitable profit model. The value chain and profit model complement each other; managers can enhance the profitability of an enterprise by optimizing its value chain system and creating value chain activities that are adapted to the enterprise's profit model, thereby creating additional profits and achieving the goal of maximizing enterprise profits.

Operators in the sheet metal spray industry, by applying the value chain theory, should manage each link of business activities and take appropriate action measures. At the same time, by strengthening their insight and judgment of changes in customer needs, they can demonstrate the competitive potential of the enterprise in the complex market competition and truly achieve the key transition from "factory" to "center."

3. Prominent Issues of Shared Sheet Metal Spray Centers

At present, shared sheet metal spray centers can be generally divided into three types: those self-built by repair enterprises, sheet metal spray industry parks led by the government, and branded sheet metal spray centers built by leading industries or large 4S stores (see Table.1. for details). All three types of shared sheet metal spray centers have not yet formed a clear business model, and there are problems such as unclear dividend models, difficulties in customer attraction, and susceptibility to the impact of malicious competitive means from traditional repair shops like "bad money drives out good," leading to a decline in competitiveness.

Table 1. Comparison of Shared Sheet Metal Spray Center Types

Enterprise Type	Composition Structure	Enterprise Features
Self-built Shared Spray Center	High-quality enterprises in the automotive repair industry with conditions	Resource Complementarity
Spray Painting Industrial Park	Led by the government, all spray painting businesses can enter the park	Resource Integration
Branded Spray Center	Leading enterprises and large 4S stores	Resource Extension

To present a clearer picture of the prominent issues faced by shared sheet metal spray centers, the following analysis is proposed in conjunction with the four key elements of enterprise profit models.

3.1. Diversification of Profit Targets but Lack of a Unified Model

The business models of shared sheet metal spray centers typically exhibit both B2B (Business-to-Business) and B2C (Business-to-Consumer) characteristics, providing centralized services such as painting for vehicles. These centers offer slightly differentiated services based on the type of client they serve, as shown in Table.2. (which is not provided here but is referenced in the question). Here, we list the profit targets and corresponding service content for shared sheet metal spray centers:

Table 2. Shared Sheet Metal Spray Centers' Service Targets

Profit Targets	Service Content
Individual Car Owners, Car Modification Enthusiasts	Vehicle repair, painting, or cosmetic maintenance services for car owners.
Auto Repair Shops and Maintenance Stores	Outsourcing some sheet metal spray painting work, providing a stable flow of orders for the shared spray center.
Used Car Dealers and Dealerships	Sheet metal spray painting restoration for used cars before sale to enhance vehicle appearance and market competitiveness.
Vehicle Insurance Companies	Provide claim services for vehicle accidents after the incident, with shared spray centers obtaining stable business through cooperation with insurance companies.
Commercial Fleets and Logistics Companies	Need to maintain the appearance of fleet vehicles and uphold a uniform and professional brand image for the company.

The customer base of shared sheet metal spray centers is diverse, and a unified industry profit model has not yet been established. It is necessary for shared spray centers to provide professional, high-quality services to meet the needs of different customer groups and to attract consumers in appropriate ways. If enterprises can effectively provide spray services for different customer groups, taking into account both economic and social benefits, and establish a service system and profit model with industry characteristics, it will effectively stimulate the internal motivation for traditional auto repair shops to transform into more environmentally friendly, advanced, and efficient shared spray centers.

3.2. Unclear Profit Points

The core value of enhancing the profitability of shared sheet metal spray centers is concentrated in aspects such as efficiency improvement, sales expansion, competitiveness enhancement, and risk control. Firstly, there is ambiguity in the pricing of labor costs, which are currently mostly determined by the brand of the car. Secondly, it depends on the store's technology, service, professional level, team, and management methods. Due to the different cooperation models of shared spray centers, this leads to unclear internal organizational structures, non-uniform facilities and parts, and significant disparities in technician levels. Lastly, there is work efficiency; the profit of shared spray centers mainly comes from customer traffic. The best way to address the continuous rise in fixed costs is to improve work efficiency. The business process of accident car spray painting and repair is a complex and tedious process, and there is currently a lack of a refined spray-painting business management system to reasonably control costs, enhance work efficiency, operational efficiency, and management quality [8].

3.3. Low Profit Leverage

The profit lever refers to a series of business activities through which an enterprise produces products or services and attracts customers to purchase and use its products or services. The pursuit of seeking excessive profit returns with a small amount of investment has always been the goal of enterprises, and it is also the ideal effect that the profit lever aims to achieve. Shared sheet metal spray centers mainly attract traffic by cooperating with insurance companies, securing a continuous flow of customers. Cost reduction is mostly achieved by reaching agreements with raw material suppliers to lower procurement costs. However, because shared spray centers have adopted more environmentally friendly spray-painting materials, some external costs have been transformed into internal corporate

costs. Enterprises need to increase their investment to leverage profit output, making it more challenging to enhance the profit lever, as detailed in Figure 1.

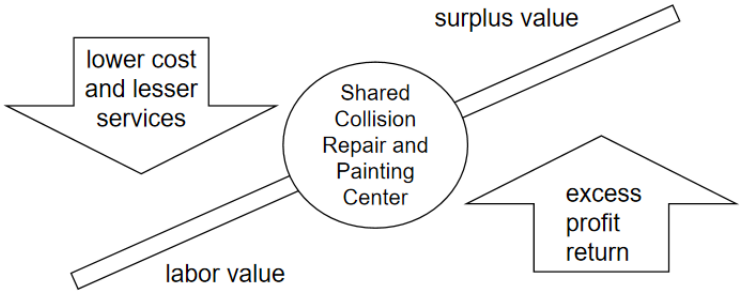


Figure 1. Neural network structure

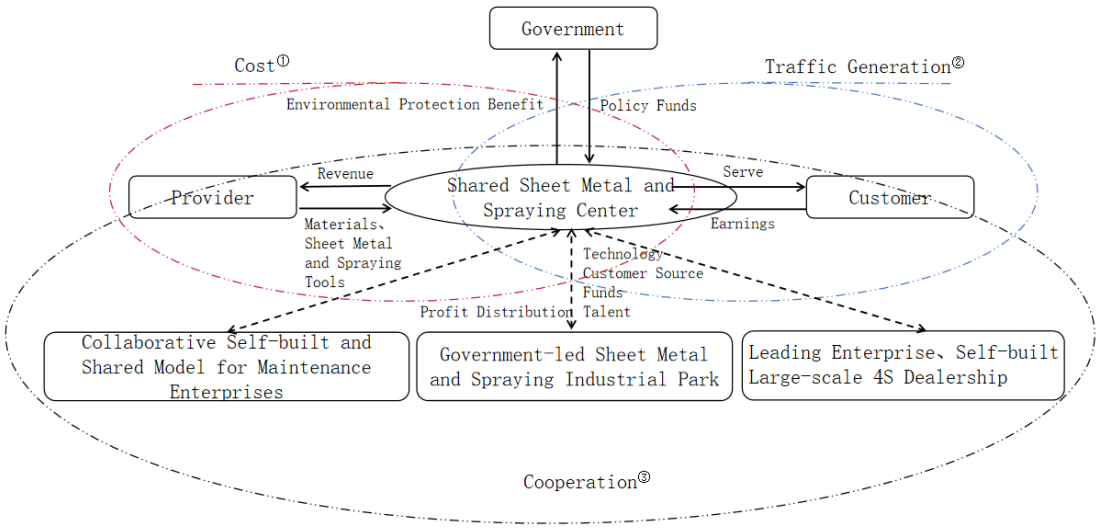
3.4. Weak Profit Barriers

Profit barriers refer to the defensive measures taken by enterprises to prevent competitors from encroaching on their profits, which are essential for maintaining a competitive edge and achieving sustainable profitability. Shared sheet metal spray centers primarily receive support from the national and local governments. Although there is a surge in the construction of shared spray centers, the post-construction operational status is not optimistic. They often face competition and exclusion from traditional auto repair shops and 4S stores. At the current stage, the development of shared spray centers is immature, and there is a lack of unified standards within the industry. The government's absence of regulatory measures for shared spray centers leads to a competitive disadvantage when compared to traditional repair shops and 4S stores.

4. Analysis of Profit Strategies for Shared Sheet Metal Spray Centers in the Sharing Economy

4.1. Economic Growth within the Sharing Concept

The sharing economy emphasizes the reduction of transaction costs and sustainable development, enabling assets to be used to their maximum potential. Shared sheet metal spray centers achieve economic and environmental benefits by collectively utilizing modern and environmentally friendly spray-painting equipment. The economic growth points of shared sheet metal spray centers can be reflected in three aspects: cooperation costs and customer attraction, as shown in Figure 2.



①Cost involves procurement, sheet metal spraying, and human resource aspects.
②Customer acquisition is primarily achieved through collaborations with insurance companies, leveraging the existing customer base of auto repair shops and 4S dealerships, as well as attracting individual customers.
③Collaborations have led to the establishment of three models for shared sheet metal spraying centers.

Figure 2. Economic Growth Points of Shared Sheet Metal Spray Centers

4.2. Development Strategies under the Value Chain Theory

The value chain in the sheet metal spray industry typically refers to the process from "the supply chain end to the shared spray center end and then to the consumer end." As shown in Figure 3, the shared spray center is an activity that involves multiple departments, multiple links, and the entire chain, including basic activities such as inbound logistics, operations management, outbound logistics, marketing, and sales, as well as auxiliary activities. The procurement of raw materials and equipment provides the material foundation for spray services, the quality and efficiency of which directly affect the effectiveness of marketing and customer relationship management. Meanwhile, the level of internal operations management significantly impacts the efficiency and cost of the entire value chain.

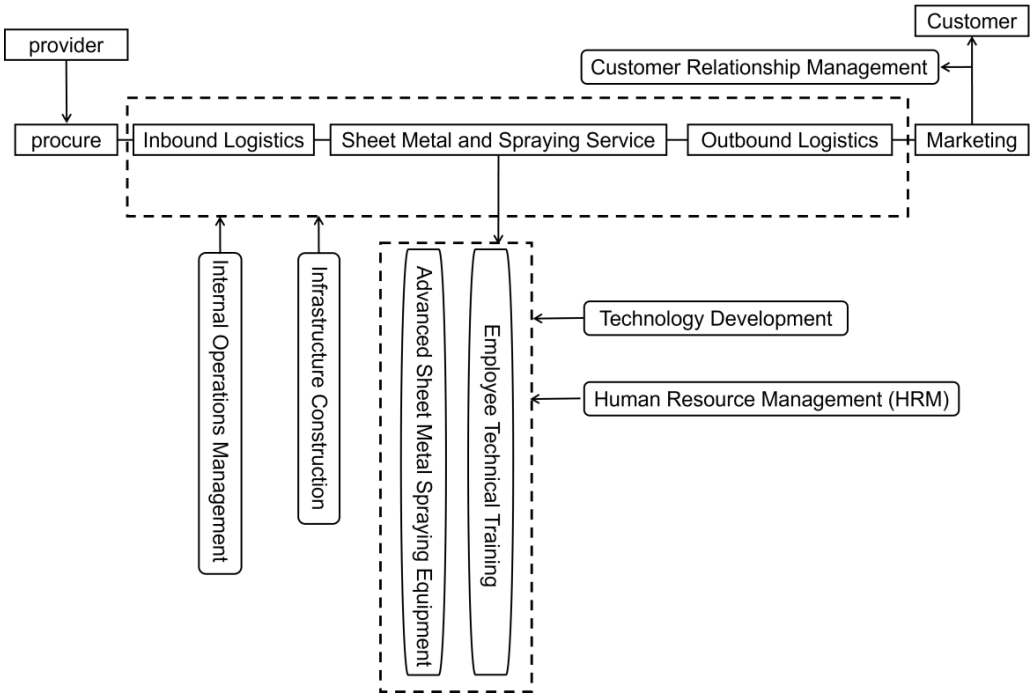


Figure 3. Value Chain Process Diagram of Shared Sheet Metal Spray Centers

4.2.1. Core Value Chain Strategy

Operations management is the core of the shared sheet metal spray center's value chain, playing a pivotal role in the enterprise's procurement, storage, sales, and other activities, and is also the activity where the shared spray center achieves the highest profit. The sheet metal spray process includes activities such as sheet metal repair, painting, and assembly. Since sheet metal repair and painting are inherently high-end technical tasks, customers often consider technical capabilities and service quality when choosing a shared spray center. Therefore, the spray center needs to continuously train and improve its employees' technical and service skills. It also needs to introduce advanced sheet metal spray equipment and engage in business expansion and diversified operations to meet market demands.

4.2.2. Building a Shared Sheet Metal Spray Center Value Chain Alliance

In the supply chain management of shared sheet metal spray centers, rapid changes and uncertainties in market demand are the norm. In the field of supply chain, the value chain theory provides important guidance for the construction of agile supply chains. The foundation of constructing an agile supply chain is the establishment of strategic alliance relationships between enterprises at various stages of the supply chain, thereby enhancing the value of the entire supply chain through resource and information sharing, and rapid response [9]. Compared to the original concept of integrated supply chains, it places more emphasis on the speed objectives of the supply chain in responding to diverse customer needs, as well as keen insight and rapid response to market

changes and customer demands. This paper applies the idea of value addition in the supply chain to optimize the supply chain management of shared sheet metal spray centers.

Originating from the triple needs of efficiency improvement, cost optimization, and environmental benefits in the automotive aftermarket services, shared sheet metal spray centers have emerged. Currently, there are mainly three cooperation models for shared spray centers: joint self-construction by small and medium-sized auto repair shops, spray painting industrial parks planned and constructed under government leadership, and spray centers built by leading enterprises and large 4S stores under government promotion. This cooperation model aligns with the broad concept of corporate strategic alliances, and for cooperative enterprises, establishing a fair and effective profit distribution mechanism is a prerequisite for coordinating conflicts of interest among stakeholders, protecting shareholder rights, and ensuring stable operations.

(1) Joint self-construction of shared spray centers by repair enterprises - Resource Complementarity

Shared spray centers can adopt a shareholding system, established by high-quality enterprises in the automotive repair industry with conditions, implementing an investment and profit-sharing model. This can include methods such as capital investment, fixed asset investment, customer source investment, and technology investment (generally, the proportion of technology investment reference does not exceed 30%). At the end of the period, each auto repair shop can distribute the net profits of the shared spray center according to certain standards and principles. The returns and risks of the investing entities are positively correlated. Generally, the principles of profit distribution include: distribution based on the proportion of capital contribution, priority distribution based on technology, and distribution based on contribution value. When distributing profits, shared spray centers should not only consider the proportion of capital contribution but also the size of the contribution. Specifically, according to the net profits of the shared spray center after making up for losses from previous years and extracting surplus public funds as stipulated in the merger agreement, profits are distributed to shareholders according to the agreed proportion. To ensure the rights of each shareholder to distribute profits as much as possible, shared spray centers should improve their governance structure and establish effective management, decision-making, and supervision mechanisms.

(2) Government-led spray-painting industrial parks - Resource Integration

Existing auto repair shops inevitably experience pain from equipment upgrades, service structure reorganization, personnel transfers, etc., which directly hinders the enthusiasm for cooperation in moving out of the city and into the park. In addition to policy guidance, the government's financial investment in spray painting industrial parks mainly adopts a one-time limited compensation method, while appropriately reducing the initial costs of entering the industrial park, thus achieving a mutually compatible system. Compared with the uncertain risk investment in the post-event environmental governance process, encouraging spray painting enterprises to operate intensively and handle pollutants centrally in advance can indirectly reduce environmental protection costs and promote the continuous and positive transformation and upgrading of the spray-painting industry, forming a high-position operation state. In the short term, limited compensation cannot fully compensate for the negative impact on profits brought about by transformation and upgrading to auto repair shop operators, but in combination with long-term and short-term views, the internal economic benefits and external social benefits brought by intensive operation can to some extent mobilize the initiative of operators, which is the key significance of government compensation.

In addition to the government's one-time limited compensation, Wang Huanhuan pointed out that in the development of emerging industrial clusters, the government should actively encourage the development of a complete upstream and downstream supply chain between large and small enterprises within the cluster and provide specialized supporting services. Strategic emerging industrial clusters achieve a linkage effect on strategic emerging industries and a driving effect on other industries through radiation effects [10]. Attracting multiple industries upstream and downstream has two advantages for the development of spray painting industrial parks: first,

considering the strong dependence of the spray painting industry on raw material supply, the cooperative value chain with the industrial park can provide continuous and stable downstream demand for upstream enterprises, including brand paint merchants, thereby consolidating and developing the spray painting industrial park; second, it can improve the visibility and influence of the spray painting park, enhance the competitiveness against the same industry, especially traditional auto repair shops, and form a regional industrial cluster with strong influence, expanding the high-quality development space of the spray painting industry.

(3) Self-construction of spray centers by leading enterprises and large 4S stores - Resource Extension

Leading enterprises and large 4S stores can use capital ties and market operation methods to integrate the best resources in the region through reorganization, mergers and acquisitions, expansion, and other models to build their own spray centers. Self-built spray centers have distinct branding features; as subsidiary projects derived from the parent group, the service content is often an extension of the parent group's services and is closely related to the business conducted by the parent group. As a form of after-sales resource integration, self-built spray centers can cooperate with other forms of customer sources such as vehicle beauty chains and surrounding auto business circles to expand the service group and form a clear franchise development of "N+ Spray Center."

4.2.3. Optimization of Shared Sheet Metal Spray Center Marketing Strategies from a Value Co-creation Perspective

Under the impact of the internet economy, the global economic landscape has undergone significant changes, with the marketing system shifting from a product-centered approach to a customer-centered one. User perception and experience are becoming the new core competencies. This paper argues that to truly optimize their marketing strategies, shared spray centers should explore the balance between service value propositions and customer needs, and adjust their marketing strategies in a timely manner to ensure a win-win outcome in the process of value co-creation with customers.

Shared spray centers need to conduct in-depth market research and data analysis to accurately grasp customer repair needs and expectations. They should also encourage customer participation in the service process by offering customized sheet metal repair solutions, giving customers more choice and decision-making power during the repair process. Additionally, shared spray centers should establish multi-channel customer interaction platforms, such as online communities and forums, to encourage customers to share their experiences and suggestions for improvement. The centers can also regularly organize offline events, such as customer meetings and technical exchanges, to enhance face-to-face communication with customers. Through these interactive collaborations, the centers can continuously gather customer feedback to optimize service processes and improve service quality, achieving value co-creation with customers. Furthermore, shared spray centers can establish close partnerships with car 4S stores, auto insurance companies, and car clubs to jointly provide one-stop car repair services. By sharing resources and complementing each other's strengths, not only can operational costs be reduced, but service efficiency and quality can also be improved, thereby attracting more customers.

5. Conclusion and Recommendations

Shared sheet metal spray centers, as a new business model in the automotive repair industry, do not inherently belong to the sharing economy, but their operational methods align with the commercial logic of the sharing economy. By integrating dispersed spray-painting businesses in society, these centers have successfully undergone industrial upgrading, conducting spray painting operations in a more standardized, intensive, and environmentally friendly manner. Through market testing and development, shared spray centers have formed a profit model that integrates societal demand and production capacity, enhancing the efficiency of spray-painting services while providing high-quality services to both B2B and B2C segments. Under this model, operators may encounter difficulties in

cooperation and management, but shared spray centers have become a trend in industry development. To ensure the healthy and sustainable development of shared spray centers, this paper proposes the following recommendations:

(1) The government needs to strengthen guidance and policy support

The government should implement mandatory measures to shut down small and weak auto repair shops that do not meet environmental protection requirements, and if necessary, impose environmental fees on auto repair businesses that still retain spray painting operations but do not meet standards. The government must effectively promote the implementation of environmental policies and increase scrutiny over market entities. Regulatory authorities should urge enterprises to promptly rectify issues found during inspections and handle environmental violations promptly, creating a fair market competition environment. To address the issue that existing regulations may not cover sharing economy enterprises, the government should leverage the role of industry associations, social organizations, and experts to first issue industry initiatives or rules, and then gradually improve laws and regulations to enhance the timeliness and precision of regulation. Additionally, the government should increase subsidies, offer tax incentives, or include spray center projects in the scope of environmental protection funding at various levels to boost enterprise enthusiasm, reduce economic costs, alleviate corporate concerns, and reduce the occurrence of cutthroat competition, thereby promoting the centralized, economical, and environmentally friendly development of the industry's painting operations.

As China's aging population continues to increase, the traditional labor cost advantage will continue to weaken. The new model of shared spray centers should not rely on the input of cheap labor but should rely on a higher level of skilled technician teams to achieve "high competitiveness." The government should value vocational education and strengthen the integration and training of related technical practices. By solidifying the talent supply foundation for shared spray centers and enhancing the adaptability of new labor forces to new technological revolutions and industrial changes, the level of existing human capital can be continuously improved. The government can also guide shared spray centers to upgrade their industries by introducing advanced technologies and equipment, promoting the industry's development towards digitalization and intelligence. With government guidance as a support point, multi-field leverage can be used to drive industry development and seek more profit possibilities for shared spray centers.

(2) Enterprises need to maintain a competitive advantage in the market

As business operators, it is important to grasp the direction of development, reach cooperation consensus as soon as possible, and achieve breakthroughs in corporate profits through various paths. The existing policies are gradually promoting the transformation and upgrading of the spray-painting industry. Business operators should take this opportunity to focus on their self-sustaining capabilities, improve their scaled operation capabilities while the industry is undergoing transformation and upgrading, specifically by enhancing technical levels, quality awareness, and talent quality. At the same time, enterprises should actively share environmental costs, contribute to social benefits, maintain a competitive advantage in the market, and thus remain invincible in fierce market competition.

(3) Citizens need to raise environmental awareness and green consumption concepts

Citizens should practice their obligations and responsibilities for ecological and environmental protection, becoming active disseminators and exemplary practitioners of ecological civilization concepts. To ensure the healthy and sustainable development of shared spray centers, the public should raise environmental awareness, choose shared spray centers with less negative environmental impact, and consciously resist low-cost, environmentally harmful traditional spray-painting methods. Citizens should also clarify their needs and expectations, supervise the service quality of spray centers, provide feedback on problems and opinions in a timely manner, promote the improvement of service quality, and thereby obtain a better service experience.

This paper analyzes the current development of the spray-painting industry, compares the profit models of other sharing economy industries, and examines each link of the shared spray-painting

industry based on the value chain theory, ultimately defining the profit model for shared spray centers. However, this study has certain limitations, as it only proposes the conceptual understanding of the profit model for shared spray centers from a theoretical perspective. In specific operational processes, many difficulties may still be encountered, and future research will require more industry experience and business cases for validation.

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